14TH CONFERENCE OF THE EUROPEAN SOCIETY FOR ECOLOGICAL ECONOMICS

Will Achilles catch up with the Tortoise?

It's high time for transformative action on sustainability

14-17 June 2022, Pisa, Italy

Leonardo IRTA

UNIVERSITÀ DI PISA
Dipartimento di Economia e Management

Will Achilles catch up with the tortoise? It's high time for transformative action on sustainability

Welcome to the XIV ESEE PISA, 14-17 June 2022

A warm welcome to the XIV International Conference of the European Society for Ecological Economics (ESEE 2022), and welcome to Pisa. This year is a special one: exactly 50 years ago the environmental crisis was internationally acknowledged during the first UN conference on the Human Environment held in Stockholm. In those fruitful times, Georgescu-Roegen gave us early warnings that technology alone cannot provide us the fix; rather, we need to curb the huge waste of energy and matter that does not add to our well-being. After fifty years we know he was right, but we remain hesitant. While some progress has been achieved, overall environmental degradation has become increasingly alarming.

The UN's Brundtland report identified two key concepts for defining sustainability, acknowledgment of limitation and satisfaction of needs, regardless of their temporal dimension (http://www.un-documents.net/ocf-02.htm). Unfortunately, a distorted interpretation has become mainstream, namely that sustainability is a mere concern for the future. Perhaps this is the reason for the delays in political action and for the growth-mania, the illusion that economic growth will solve our problems, despite the increasing amount of scientific evidence of biophysical limits and the claims for more justice advocated by social movements. Regrettably, it seems that every year the distance between what should be done and what we do remains the same: the system seems locked into unsustainable trajectories and policies have not been capable of freeing us from them. This situation recalls to our mind the famous story of Achilles and the tortoise. The Zeno's paradox entails that movement, and hence change, is not seen as possible. The paradox has been solved by a paradigmatic shift. Similarly, attaining sustainability requires a change in the vision of politicians and the collective imagination. The conference intends to provide a forum for scientific debate and discussion on theoretical and practical issues to answer the following questions: Will politicians catch up with science and engaged civil society? What are the transformative actions to escape from the current unsustainable paths?

Around 450 papers (out of 620 submissions) will be presented in about 50 sessions during the conference. The sessions are organized around the following broad themes:

- Transformations
- Theory and new ideas
- Teaching and communication
- Resources
- Policies
- Institutions and power
- Business and transition
- Behaviours and social change
- Alternative economies

As Ecological Economists, we are aware of the limits that constrain our actions. The conference received many submissions, but the available time does not exceed three days and a half. Additionally, we face space limits, namely the number and the size of rooms available for the conference. For example, the large Congress Hall next to the Department of Economics and Management was available when Pisa's LOC applied to organize the conference but unfortunately, it is not anymore. Hence, we will have to move to the Stazione Leopolda for the lunch (10-minute walk) and behind Polo Piagge for the coffee breaks. Furthermore, plenaries must be held in two remotely connected rooms.

The time and space limits we face make it impossible to conceive our conference as a place where we can present and discuss in-depth our works, as in seminars. Rather our conference is a place for meeting in-person to become aware and get updated about the work in progress in our community. A compromise solution for having many participants in a limited environment is to have short presentations. This would allow avoiding the frustrating experience of a very high number of parallel sessions. For this reason, the 2022 Pisa conference offers participants the opportunity to give 5-minute lightning talks ("elevator pitches") in only 4 or 5 parallel sessions, hence to a large audience.

To encourage the acceptance of this novelty we also offered the possibility to participate in a lot for presenting for 15 minutes to the same large audience. This opportunity is also be given to six students selected among those who applied to the student best papers competition. We hope that experiencing the new presentation formats will show that shortness can contribute to the enjoyment of the ESEE conferences.

Finally, we reaffirm that it is highly worth meeting each other, despite our concern for carbon emissions (and flights). For this reason, we offered fee reductions for using less unsustainable travel modes to get to Pisa. Of course, in exceptional cases, we allow remote presentation, while plenaries and special events will be broadcasted on YouTube. An online conference archive will be maintained to make abstracts/conference presentations/full papers available after the conference.

The opening lecture will be held by Samuel Bowles, while the closing one by Joan Martínez Alier. We organised a "Question time!" involving politicians and engaged civil society, plenaries on "The future of Energy", "The art of communication" and "Sustainable finance". The final round table on "50 years after ..." and the final ceremony will not be

THE END ...

You'll have some more; we will cross the bridge and go back to Stazione Leopolda to play the "Games for Sustainability". The day after, a bunch of survivors will move to the Apuan Alps for four-days hiking and discussions. At home, you will feel nostalgia for ecological economics ... no worries, surf our webpage and listen to the podcast of the XIV ESEE conference "Back to the future: talks on Ecological Economics", realized in collaboration with Il Bo Live (University of Padua).

In exceptional cases, we allow remote presentation, while plenaries and special events will be broadcasted on YouTube. An online conference archive will be maintained to make abstracts/conference presentations/full papers available after the conference.

We would like to take this opportunity to thank all contributors, reviewers, the scientific committee, and organizers of the special tracks. Guest speakers of the conference and the teachers at the summer school not only did not ask for a honorarium, but even financially contributed to the conference with their own funds! This helped us both facing the uncertainty due to the COVID and offering very accessible conference fees to young researchers.

This conference was organized by Istituto di Ricerca sul Territorio e l'Ambiente (IRTA) with the help and support from the Dipartimento di Economia e Management, Università di Pisa, Comune di Pisa, Pacini Editore, Banca Etica, REMARC, and received a generous contribution by Bank of Italy. The staff of our Department, University (in particular CIDIC, SID, and prof. P. Ferragina), and the staff of the other organizations, including la Casa della Città Leopolda, provided an essential contribution. Many trainees and volunteers supported us significantly and we hope they also have learned from this experience. We are grateful to Rosaria Falco who helped us with the graphics and Lorenza Luzzati who enriched the podcasts with brilliant cartoons. Finally, a special mention is due to the staff of ARACONGRESSI for their effort, professionality and patience in assisting us in this terribly challenging experience.

Please visit our website https://esee2022pisa.ec.unipi.it/ for any further details.

We wish you all an inspiring and pleasant conference. Hope you will enjoy your stay and the city of Pisa!

Tommaso Luzzati and Tiziano Distefano

with Claudia Riani, Janne Mercedes Prinsen, and the L.O.C.

PRESENTATION RULES

Q without A

In this conference priority will be given to collecting questions.

Speakers will answer only to short clarification questions. This is imposed by both time and cognitive limits. As suggested several years ago by Silvio Funtowicz when he was chairing a session, presenters usually need time for giving fully appropriate answers to brilliant questions. Hence, we believe that it is better to collect all the questions and suggestions rather than giving time to presenters for clutching at straws.

LIGHTNING TALKS AND LOTTERY (TO LARGE AUDIENCE)

Lightning talks will be presented in 300 seconds, lottery talks in 12 minutes.

A two-minute silent pause between presentations will be used by us for arranging for the next presenter, and by the floor to reflect and to write their questions/suggestions online or on cards that each participant will find in the conference bag. Collected questions/suggestions will be given to the presenters, either directly or with the help of our volunteers. An area in the lunch hall will be reserved to the session presenters to meet persons wishing to discuss the work s/he shortly presented.

TRADITIONAL TALKS

The "traditional" format is available as a 12-minute presentation + 3 minutes of questions in parallel sessions. Authors and chairs will agree whether using this time for questions after each presentation or at the end of the session.

Practical information

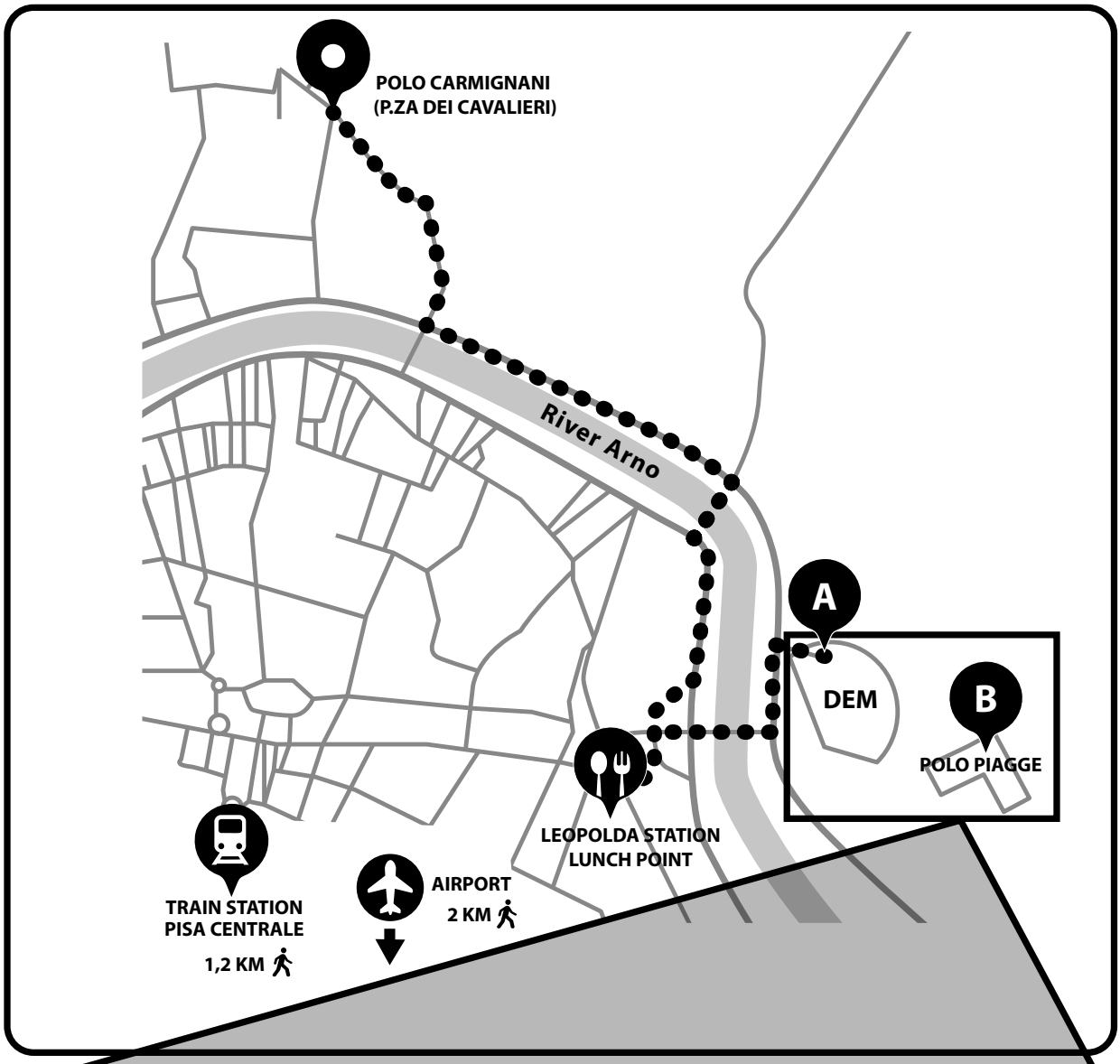
On Tuesday 14th the conference will take place in Polo Carmignani. In Piazza de' Cavalieri look at the Scuola Normale Superiore; on its left, there is a large gate that will bring you to the conference venue.

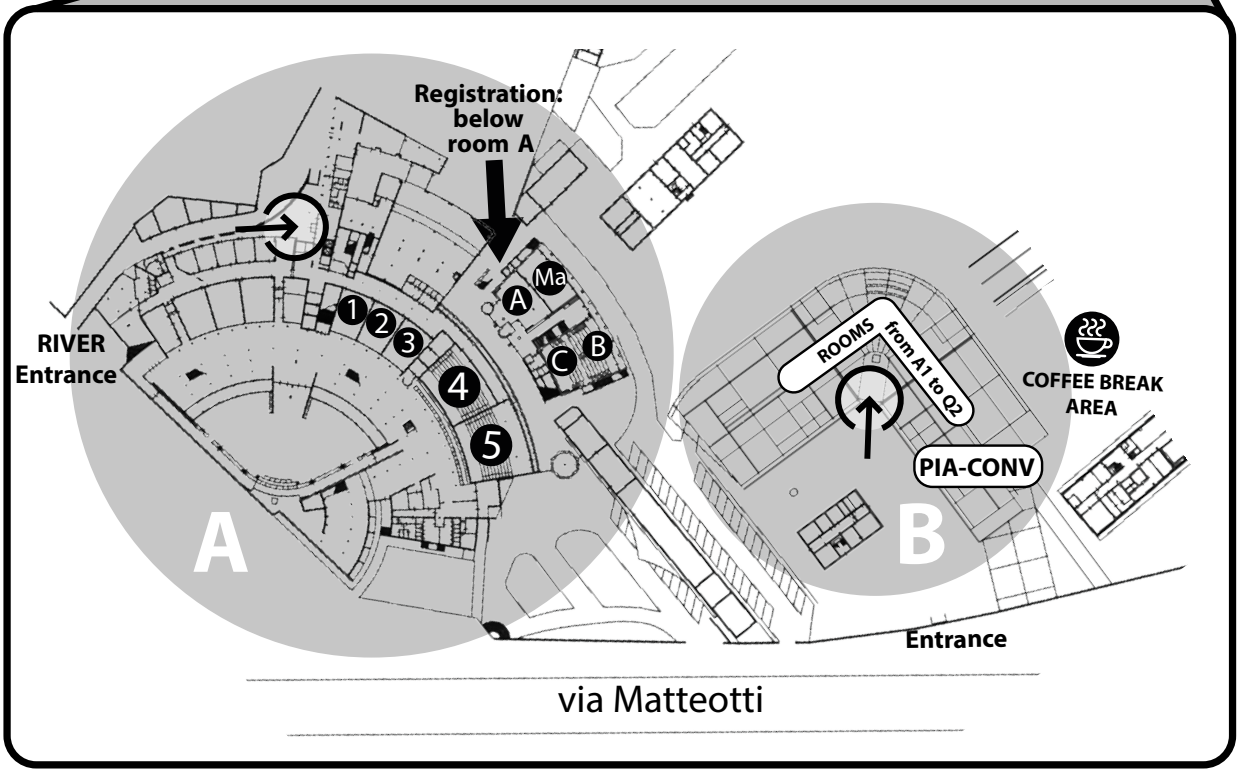
We'll then move to Stazione Leopolda for the Welcome Cocktail (20 minutes' walk). After walking along the ancient Borgo Stretto, Piazza Garibaldi, and Lungarno Mediceo, we'll cross the Fortezza Bridge and arrive at the old Stazione Leopolda for a welcome cocktail and for a classical music concert comparing Vivaldi and Piazzolla.

Furthermore, at Stazione Leopolda, we'll also have our lunches during the conference and play "Games for sustainability" after the closing ceremony.

On Wednesday and Thursday morning the conference will take place in the Department of Economics and Management (DEM, letter A in the map), while in the afternoons in Polo Piagge (letter B on the map). On Friday it will be held in the Department of Economics.

The social dinner of the Conference will take place at the Big Fish Restaurant in Marina di Pisa, a few km away from the town centre, on Wednesday, June 15. The Big Fish is a popular beach resort and restaurant run by L'Alba, a no-profit organisation that, since 2000, deals with the psycho-social integration of people who suffer or have suffered from psychic or psychological distress.


POLO CARMIGNANI
(P.ZA DEI CAVALIERI)
River Arno
A
DEM
B
POLO PIAGGE
LEOPOLDA STATION
LUNCH POINT
TRAIN STATION
PISA CENTRALE
1,2 KM
AIRPORT
2 KM


Registration:
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room A
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1
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A
ROOMS from A1 to Q2
PIA-CONV
B
COFFEE BREAK
AREA
Entrance
via Matteotti

Programme overview

	Day 1 **Tue, 14 June**	Day 2 **Wed, 15 June**	Day 3 **Thu, 16 June**	Day 4 **Fri, 17 June**	
08:45-09:45		Lightning and Lottery Talks: "Wed1-" "Wed2-" *@DEM*	Plenary 2 **The Future of Energy** *a. Nuclear Fusion:* N. Lopes Cardozo *b. Implications for Life-support Systems* M. Giampietro, E. Padoa c. Energy Sufficiency: Y. Sahed *@DEM*	Plenary 4 **The Art of Communication** G. Pellegrini, E. Pezzulli, F. Suman, S. Belardinelli, M. Tuninetti, L. Muñoz Sueiro @DEM	**08:45-09:45**
10:00-10:45	**Post-growth Economic Network (PEN) meeting** *@Le Benedettine*			Plenary 5: **Sustainable Finance** A. Fasano, A. Kocornik-Mina *@DEM*	**10:00-10:45**
10:45-11:15		**Coffee break** *@Polo Piagge* (walk ~ 5min)	**Coffee break** *@Polo Piagge* (walk ~ 5min)	**Coffee break** *@Polo Piagge* (walk ~ 5min)	**10:45-11:15**
11:15-11:45		Lightning and Lottery Talks: "Wed3-" "Wed4-" *@DEM*	**ESEE General Meeting** *@DEM*	Lottery Talks: "Fri1-" & Roundtables: 1. The Art of Communication 2. Sustainable Finance *@DEM*	**11:15-11:45**
11:45-12:15					**11:45-12:15**
12:15-12:45					**12:15-12:45**
12:45-14:15	Registration starts **at 14:00** *@Polo Carmignani*	**Lunch** *@Leopolda station* (walk ~ 10min)	**Lunch** *@Leopolda station* (walk ~ 10min)	**Lunch** *@Leopolda station* (walk ~ 10min)	**12:45-14:15**
14:15-15:00	**ESEE Country Contact Netwok** (starts at 14:00) *@Polo Carmignani*	Traditional Parallel Presentations: "Wed5-" *@Polo Piagge*	Traditional Parallel Presentations: "Thu-" *@Polo Piagge*	Lottery Talks: "Fri2-" *@DEM*	**14:15-15:00**
15:15-16:00				Plenary 6 **Closing Lecture** Joan Martínez Alier **Roundtable:** **"50 Years after..."** N. Ashford, G. Biagioli, K. Mayumi, D. O'Neill *@DEM*	**15:15-16:00**
16:00-16:30	**Opening Ceremony** (starts at 16:15 sharp) *@Polo Carmignani*	**Coffee break** *@Polo Piagge*			**16:00-16:30**
16:30-16:45		Traditional Parallel Presentations: "Wed6-" *@Polo Piagge*	**Coffee break** (ends at 17:00) *@Polo Piagge*		**16:30-16:45**
16:45-17:15	Plenary 1 **Opening Lecture** Samuel Bowles *@Polo Carmignani*				**16:45-17:15**
17:15-17:45			Plenary 3 Politics, Science, and Civil Society: "QUESTION TIME!" (17:00 - 19:00) *@Polo Piagge*	**Student Prizes & Closing Ceremony** *@DEM*	**17:15-17:45**
17:45-18:00				walk to Leopolda station ~ 10min	**17:45-18:00**
18:00-...	**Welcome from the LOC** **Welcome Cocktail** *@Leopolda Station* (walk ~ 20min) **Concert** *@Leopolda Station*	Bus to Marina di Pisa & chilling out on the beach **Social Dinner** *@Marina di Pisa*	**Luminara**	**Games for Sustainability** *@Leopolda Station*	**18:00-...**

Mornings

	Day 1 **Tue, 14 June**	Day 2 **Wed, 15 June**	Day 3 **Thu, 16 June**	Day 4 **Fri, 17 June**	
08:45-09:45		Lightning and Lottery Talks: "Wed1-" "Wed2-" *@DEM*	Plenary 2 **The Future of Energy** *a. Nuclear Fusion:* N. Lopes Cardozo *b. Implications for Life-support Systems* M. Giampietro, E. Padoa c. Energy Sufficiency: Y. Sahed *@DEM*	Plenary 4 **The Art of Communication** G. Pellegrini, E. Pezzulli, F. Suman, S. Belardinelli, M. Tuninetti, L. Muñoz Sueiro @DEM	**08:45-09:45**
10:00-10:45	**Post-growth Economic Network (PEN) meeting** *@Le Benedettine*			Plenary 5: **Sustainable Finance** A. Fasano, A. Kocornik-Mina *@DEM*	**10:00-10:45**
10:45-11:15		**Coffee break** *@Polo Piagge* (walk ~ 5min)	**Coffee break** *@Polo Piagge* (walk ~ 5min)	**Coffee break** *@Polo Piagge* (walk ~ 5min)	**10:45-11:15**
11:15-11:45		Lightning and Lottery Talks: "Wed3-" "Wed4-" *@DEM*	**ESEE General Meeting** *@DEM*	Lottery Talks: "Fri1-" & Roundtables: 1. The Art of Communication 2. Sustainable Finance *@DEM*	**11:15-11:45**
11:45-12:15					**11:45-12:15**
12:15-12:45					**12:15-12:45**
12:45-14:15	Registration starts **at 14:00** *@Polo Carmignani*	**Lunch** *@Leopolda station* (walk ~ 10min)	**Lunch** *@Leopolda station* (walk ~ 10min)	**Lunch** *@Leopolda station* (walk ~ 10min)	**12:45-14:15**

Afternoons

	Day 1 **Tue, 14 June**	Day 2 **Wed, 15 June**	Day 3 **Thu, 16 June**	Day 4 **Fri, 17 June**	
14:15-15:00	**ESEE** **Country Contact Netwok** (starts at 14:00) *@Polo Carmignani*	Traditional Parallel Presentations: "Wed5-" *@Polo Piagge*	Traditional Parallel Presentations: "Thu-" *@Polo Piagge*	Lottery Talks: "Fri2-" *@DEM*	**14:15-15:00**
15:15-16:00				Plenary 6 **Closing Lecture** Joan Martínez Alier **Roundtable:** **"50 Years after..."** N. Ashford, G. Biagioli, K. Mayumi, D. O'Neill *@DEM*	**15:15-16:00**
16:00-16:30	**Opening Ceremony** (starts at 16:15 sharp) *@Polo Carmignani*	**Coffee break** *@Polo Piagge*			**16:00-16:30**
16:30-16:45		Traditional Parallel Presentations: "Wed6-" *@Polo Piagge*	**Coffee break** (ends at 17:00) *@Polo Piagge*		**16:30-16:45**
16:45-17:15	Plenary 1 **Opening Lecture** Samuel Bowles *@Polo Carmignani*				**16:45-17:15**
17:15-17:45			Plenary 3 Politics, Science, and Civil Society: "QUESTION TIME!" (17:00 - 19:00) *@Polo Piagge*	**Student Prizes** **&** **Closing Ceremony** *@DEM*	**17:15-17:45**
17:45-18:00				walk to Leopolda station ~ 10min	**17:45-18:00**
18:00-...	**Welcome from the LOC** **Welcome Cocktail** *@Leopolda Station* (walk ~ 20min) **Concert** *@Leopolda Station*	Bus to Marina di Pisa & chilling out on the beach **Social Dinner** *@Marina di Pisa*	**Luminara**	**Games for Sustainability** *@Leopolda Station*	**18:00-...**

Programme

Tuesday, 14th June 2022

@POLO CARMIGNANI PIAZZA DEI CAVALIERI - AULA MAGNA, AULA 3/4

16:15 - 16:45 Welcome

Chair: Giuliana Biagioli (President of IRTA-Leonardo)

Michele Conti - Mayor of Pisa

Paolo Mancarella - Rector of the Università di Pisa

Luca Spataro - Direttore del Dipartimento di Economia e Management

16:45 - 18:00 Plenary 1: Opening lectures

Chair: Dan O'Neill (President of the European Society for Ecological Economics)

Prologue: Zeno's paradox for Dummies

Enrico Moriconi (Università di Pisa)

Keynote lecture: Natura facit saltum: Is society ready to take a leap too? Is economics?

Samuel Bowles (Santa Fe Institute, University of Massachusetts Amherst, and University of Siena)

18:00 – 18:15 Welcome from the L.O.C.

18:15 – 19:00 Walk to Stazione Leopolda

19:00 - 20:30 Cocktail (@Stazione Leopolda)

20:30 Concert - Bei Legami Ensemble: "Vivaldi vs Piazzolla" (@Stazione Leopolda)

Wednesday, 15th June 2022

08:45 – 13:00 Lightning talks, "Lottery" and Student Prize presentations (5 parallel sessions @DEM)

14:15 – 18:00 Traditional presentations (@Polo Piagge)

18:00 – 23:00 Bus to Marina di Pisa and Social Dinner at "The Big Fish"

Thursday, 16th June 2022

08:45 - 10:45 Plenary 2: The future of energy (@DEM – Eco A and 5)

Chair: Janne Mercedes Prinsen (NMBU)

Nuclear Fusion

Niek Lopes Cardozo (Eindhoven University of Technology)

Abundant (and possibly cheap) energy. Would it be 'good news'?

Mario Giampietro (Universitat Autonoma Barcelona)
Emilio Padoa Schioppa (Università di Milano – Bicocca)

Energy sufficiency

Yamina Sahed (Université Paul Sabatier Toulouse III)

11:15 - 12:45 ESEE general meeting (@DEM - ECO 5)

14:15 – 17:00 Traditional presentations (@Polo Piagge)

17:00 – 19:00 Plenary 3: Politics, science and civil society: Question time!

(@POLO PIAGGE - AULA CONV, AULA B2 AND AULA M2)

Chair: Silvia Camisasca
Scientific background: Aldo Femia. **Politicians:** Giuseppe Conte*, Phillippe Lamberts*, Enrico Letta*, Patty L'Abbate, Marie-Antoinette Maupertuis, Marie Toussaint – **Civil society:** Jasmine Cristallo, Giorgio De Girolamo, Ruth Dinslage, Maddalena Lamura, Giovanni Moro, Claudia Mazzanti and some of her pupils, Giovanni Mori, Patrizia Alma Pacini, Ferdinando Pezzopane
* Remote participation.

Friday, 17th June 2022

@DEM - ECO A AND ECO 5

08:45 - 09:45 Plenary 4: The art of communication

Chair: Tiziano Distefano

Giuseppe Pellegrini (Observa Science Society)

Edwige Pezzulli (RAI)

Francesco Suman (Il BO Live – Università di Padova)

Sofia Belardinelli (Il BO Live – Università di Padova)

Marta Tuninetti (Politecnico di Torino – DIATI)

Lucia Muñoz Sueiro (ICTA)

10:00 - 10:45 Plenary 5: Sustainable banking for ecological transition: lessons and experience from pioneers

Chair: Leonardo Becchetti (Università di Roma Tor Vergata)

Anna Fasano (Banca Etica – remote speech)

Adriana Kocornik-Mina (Global Alliance for Banking on Values)

11:15 – 12:45 Lottery parallels and the following Roundtables

The art of communication (@DEM - Eco 5)

Sustainable Finance: Key challenges for ecological transition (@DEM - Eco A)

Laura Berry (Shareholders for Change)

Francesco Bicciato (Secretary General of ITASIF)

Nick Robins (London School of Economics)

Victor van Hoorn (former Executive Director of Eurosif)

14:15 - 15:00 Lottery parallels

15:15 - 16:00 Plenary 6: closing keynote lecture

Land, water, air and freedom: world movements for environmental justice

Chair: Clive Spash (WU Vienna University of Economics and Business)

Joan Martínez Alier (Universitat Autonoma Barcelona)

16:00 - 17:15 Final roundtable

50 years after "Limits to growth", the UN Stockholm conference, Georgescu, ...

Chair: Roldan Muradian

Nicholas Ashford (MIT)

Giuliana Biagioli (Leonardo-IRTA)

Kozo Mayumi (KCGI)

Dan O'Neill (University of Leeds)

17:30 - 17:45 Closing ceremony and best student prize

Marco Raugi (Unipi delegate to sustainability)

Alessandra Nardini (Regione Toscana Councillor)

18:00 - 20:30 Games for sustainability (@Stazione Leopolda)

Ref. Ares(2022)3458350 - 05/05/2022

EUROPEAN COMMISSION
Office of the President Ms Ursula von der Leyen

Member of Cabinet

Brussels, 05 May 2022
Ares (2022) 2620581

Dear Professor Luzzati,

President von der Leyen has asked me to thank you for your letter on behalf of the organising committee of the 14th International Conference of the European Society for Ecological Economics (ESEE) kindly inviting her to deliver a speech on a date to be convened, in person in Pisa or remotely, to the Conference that will take place from 14 to 17 June 2022.

Regretfully, despite her appreciation for your invitation and the importance that she attaches to the ecological transition, significant constraints resulting from the President's exceptionally busy schedule during the current period and engagements in her diary on the days in question do not allow her to give a positive reply to your invitation.

We thank you in advance for your considerate understanding.

The President has asked me to pass on her best wishes to you for a successful conference.

Yours sincerely,

[*e-signed*]
Florentine Hopmeier

Professor Tommaso Luzzati
Chair of the 14th biennial conference of the ESEE
Prof. ass. in Economia Politica – Università di Pisa

E-mail: tommaso.luzzati@unipi.it
tiziano.distefano@unipi.it

Electronically signed on 05/05/2022 10:03 (UTC+02) in accordance with Article 11 of Commission Decision (EU) 2021/2121

14TH CONFERENCE OF THE EUROPEAN SOCIETY FOR ECOLOGICAL ECONOMICS

14-17 June, 2022, Pisa, Italy

Will Achilles catch up with the Tortoise?

and

I Bei Legami Ensemble

present

The music of the Seasons: Vivaldi vis-à-vis Piazzolla

ANTONIO VIVALDI (1678-1741)

Autunno Rv 293

ASTOR PIAZZOLLA (1921-1992)

Invierno Porteño

Soloist: Alessio Mannelli

Estate Rv 315

Primavera Porteña

Soloist: Emanuele Luzzati

ASTOR PIAZZOLLA

Fuga y misterio, per orchestra d'archi

Conductor

PIETRO CONSOLONI

First Violins
Emanuele Luzzati*
Alessio Mannelli*
Michela Puca
Lidia Parra

Viole
Debora Caretto*
Matteo Tripodi

Continuo
Tommaso Nicoli

Second Violins
Arianna Giannecchini*
Nancy Parra
Camilla Calini

Cellos
Alessandro Maccione*
Giulia Casini

Double Basses
Chiara Riccetti

* Principals

Pisa, 14th June, 2022 – Stazione Leopolda – 20:30

In this program, the chamber ensemble “I Bei Legami” pulls together the music of two very popular composers, Antonio Vivaldi and Astor Piazzolla. The music being performed is testimony to how the Italian Baroque, which saw in Vivaldi its greatest interpreter, has never ceased to inspire genres and generations of composers over the centuries. The evocative style, the polyphonic virtuosity, and the advanced potential of the violin opened the field for Vivaldi to seal, in his "Seasons", the perfect combination of Music and Nature. Probably these naturalistic and ornithological references have found flourishing inspiration in the onomatopoeia of tango, a dance in which the sensuality of the movements embroiders a properly baroque warp.

Inspired by this dance, Astor Piazzolla, of whom the current year marks the 30th anniversary of his death, wrote his: "Las Cuatro Estaciones Porteñas". A wise collection and refined writing give life to an Argentine pastiche in which Vivaldi's quotes alternate with contaminations from the European musical world: the theme of madness, passacaglia, and even the canon of Johann Pachelbel. Mid-seasons, and their intemperance, partly baroque and partly porteñas, will show themselves to the listener in all their relevance.

The name “I Bei Legami” refers to the first number of the collection "Scherzi Musicali" by the famous composer Claudio Monteverdi, published in Venice in 1607. The chamber ensemble was born in Pisa in 2014 with the intent to create a vocal group performing the sacred and profane European repertoire of the sixteenth and seventeenth centuries. An instrumental core has then been established, allowing the ensemble to broaden its musical perspectives up to the Baroque and Classical periods. The several concerts that have been performed got an appreciation for the punctuality of interpretation and the brilliance of the execution. The ensemble is regularly invited to various festivals, for instance, the “Sound of stones” organized by Auser Musici; in 2019 it inaugurated the Lucca International Festival “Sagra Musicale” at the Teatro dei Rassicurati in Montecarlo di Lucca. In October 2021, for the celebration of the 30th anniversary of the Association of Friends of Pisan Museums and Monuments, the “I Bei Legami” started a project to rediscover and execute nineteenth-century Pisan authors.

Pietro Consoloni, born in Pisa, graduated in Composition, Organ and Organ Composition, and Choir Direction with full marks and academic honors. He is completing his two-year specialization course in Orchestral Conducting at the G. Rossini Conservatory in Pesaro. He's been the co-founder and permanent director of the chamber group I Bei Legami since 2014. In 2021, with the Resonare vocal ensemble from Rome, he was awarded 3rd prize at the National Competition of the City of Fermo. He holds the position of Organist at the Primaziale Cathedral of Pisa. He is currently a Ph.D. student in Musicology at the Pontifical Institute of Sacred Music in Rome.

Plenaries

Tuesday 14 June, 11:15 – 18:15, @Polo Carmignani: Aula Magna

Plenary session 1 - Opening lectures

Prologue: Zeno's paradox for dummies

Enrico Moriconi

Born in Rome in 1950, Enrico Moriconi studied in the Scuola Normale Superiore of Pisa, and he graduated from the University of Pisa in 1973. He has been Full Professor of Logic in the Department of Civilizations and Forms of Knowledge at the University of Pisa, and his main topics of interest have been Logic and Philosophy of Mathematics.

Keynote lecture: Natura facit saltum: Is society ready to take a leap too? Is economics?

Samuel Bowles

Samuel Bowles is a professor of Economics at the University of Siena, Italy and the Arthur Spiegel Research Professor and Director of the Behavioral Sciences Program at the Santa Fe Institute in Santa Fe, New Mexico.

Thursday 16 June, 8:45 – 10:45 @DEM: Eco A and Eco 5

Plenary session 2 - The future of energy

In the preface of the proceedings of a workshop organized 12 years ago we read "let's assume for a moment that the miraculous discovery of a "silver bullet" capable of producing an unlimited supply of energy at very low cost will make it possible to run the economy without any significant downsizing. Still, a business-as-usual economy capable of pursuing the goal of perpetual growth will keep increasing the number of cars, the amount of land covered by roads and parking lots, the extraction of minerals for industrial activities, the number of sediments moved to the oceans by agricultural production […]".

https://www.researchgate.net/publication/283504897_Can_we_break_the_addiction_to_fossil_energy_Proceedings_of_the_7th_Biennial_International_Workshop_Advances_in_Energy_Studies

Nuclear energy from fusion is attracting large and increasing amounts of investments, also from the private sector. Is fusion such a "silver bullet"? Is Georgecu Roegen's Prometheus III coming closer? Niek Lopez Cardozo will provide his answer to this question by illustrating the advancement in fusion research and development, while Emilio Padoa-Schioppa and Mario Giampietro (who was among the organizers of the abovementioned workshop), will try to envision life and society in a Promethean III era. Would abundant and cheap energy be good news? Finally, Saheb will bring us to earth, focusing on a paradigm shift towards energy sufficiency.

Niek Lopez Cardoso (Eindhoven University of Technology)

Niek Lopes Cardozo is professor of Science and Technology of Nuclear Fusion at Eindhoven's University of Technology, the Netherlands, where he initiated the dedicated, interdisciplinary MSc programme on nuclear fusion. Before focusing on the education and training of the 'ITER generation', he directed the Dutch fusion research programme and served on many European scientific and managerial fusion committees. He received the Royal Shell prize for sustainable development and energy for his scientific work in nuclear fusion as well as his efforts in outreach. In parallel to his work as a researcher and educator he has been active in science policy. From 2017 to 2020 he was member of the Executive Board of NWO, the Dutch National Research Council, chairing the Science Domain. In the preceding 7 years he chaired the Dutch Organisation for Fundamental Research on Matter (FOM). Climate change and the energy transition have been long time interests (and concerns). In recent years his research has focused on the socio- and techno-economics of the energy transition, and the potential role of fusion energy therein.

Yamina Saheb (Université Paul Sabatier Toulouse III)

Dr. Yamina Saheb is a Senior Energy Policy Analyst at OpenExp, a lead author of the IPCC WGIII 6th assessment report on climate mitigation, and a lecturer at Sciences Po (Paris) on climate risks. Before this position, Yamina was the Head of the Energy Efficiency Unit at the International Energy Charter. She also worked as a Policy and Scientific Officer at the Renewables and Energy Efficiency Unit at the Institute of Energy and Transport of the Joint Research Centre (JRC) of the European Commission (EC). Before joining the JRC, Yamina worked as a Senior Energy Policy Analyst at the International Energy Agency (IEA). Yamina holds a Ph.D. in Energy Engineering, a master's degree in Landscape Architecture and Development Economics, and an Engineering degree in Building technologies.

Mario Giampietro (Universitat Autonoma Barcelona)

Mario Giampietro is ICREA Research Professor at the Institute of Environmental Science and Technology of the Universitat Autònoma de Barcelona, Spain. He works on integrated assessment of sustainability issues using new concepts developed in complex systems theory. He has developed a novel scientific approach, Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism (MuSIASEM), integrating biophysical and socioeconomic variables across multiple scales, thus establishing a link between the metabolism of socio-economic systems and the potential constraints of the natural environment. Recent research focuses on the nexus between land use, food, energy, and water concerning sustainable development goals. He has (co)authored over one hundred fifty publications, including six books, on research themes such as multi-criteria analysis of sustainability; multi-scale integrated assessment of scenarios and technological changes; alternative energy sources; bio-complexity; science for governance. He coordinated the EU-funded project 'Moving towards Adaptive Governance in Complexity: Informing NexusSecurity' (MAGIC – https://magic-nexus.eu/) (2016-2020).

Emilio Padoa-Schioppa (University of Milano-Bicocca)

Emilio Padoa-Schioppa is associate professor of ecology at University of Milano-Bicocca. His main research interests are linked to landscape ecology (assessment and evaluation of ecosystem services, habitat mapping, ecological network planning) and conservation biology (distribution and conservation of herpetofauna), and he teaches "Landscape ecology" (Environmental Sciences, University of Milano-Bicocca), Biology and Didactic of Biology (Science of Primary Formation, University of Milano-Bicocca), Introduction to Sustainability, Ecosystem Services and Advanced Human ecology (Doctoral School of University of Milano-Bicocca). He's president of the Italian Society of Landscape Ecology. He is the author of several scientific papers, technical reports, and chapters of books. In 2014 wrote a textbook on didactic Biology and in 2021 a divulgation book on the Anthropocene (The Anthropocene a new epoch for the Earth, a new challenge for humanity, Il Mulino, in Italian).

Thursday 16 June, 17:00 – 19:00 @PIA: CONV, PIA B2, PIA M2

Plenary session 3 - Politics, science and civil society: Question time!

The roundtable will be focused on the core theme of the conference, namely the gap between politics and what science and civil engaged society have been suggesting for decades for effectively promoting sustainability. Leading Italian and European politicians will participate in a dialogue with representatives of NGO, movements, young students and other citizens.

Silvia Camisasca is a physicist and journalist. She holds a master's degree in Archaeometry from the Louvre Museum in Paris, where she worked on physical conservation and restoration techniques applied to cultural and environmental heritage. She edited the Environmental Yearbook of the Ministry of the Environment and Territory, reporting on the remediation needs of some sites (including Taranto, Crotone and Porto Marghera), especially in relation to the impact on the health of the population. In 2010 he received an award from the President of the Republic for a collection of science stories for children, "The Planet Periodic Table". In May 2021, the European Commission honored her for her journalistic efforts in the Environment, Sustainability, Human Rights section. She teaches Italian to unaccompanied migrant children.

Aldo Femia, Ph.D. in Political Economy and a 25-years-long experience of economy-environment relationships (especially physical flows) and their quantification in satellite accounts, following the System of Environmental-Economic Accounting (EEA). Contributed to several developments of EEA, through participation in international TFs and WGs, including the UN Committee of EEA Experts). Now he is engaged in Ecosystem Accounting and in the revision of the SNA (environmental accounting issues and valuation task team).

Giuseppe Conte, born 8 August 1964 is an Italian jurist, academic and politician who served as Prime Minister of Italy from June 2018 to February 2021. He has been the president of the Five Star Movement since August 2021. Conte spent the greater part of his career as a law professor and was also a member of the Italian Bureau of Administrative Justice from 2013 to 2018.

Patty L'Abbate, Senator of the Republic (18th legislature), group leader M5S of the environment committee in the senate and member of the ecological transition committee. Professor in ecological economics and management at LUM University. Author of "A new ecological economy beyond covid-19 and climate change", Edizione Ambiente 2020."

Philippe Lamberts, born in 1963 in Brussels (Belgium). He graduated as an engineer in applied mathematics from the Catholic University of Louvain. From 1987 to 2009, he held various commercial and managerial positions at IBM. In June 2009, he was elected to the European Parliament for a first term, during which he mainly dealt with banking and financial regulations. On 25 May 2014, he was re-elected as MEP, and one month later became Co-President of the Greens/EFA Group following an internal election process. After five years dedicated to strengthening the position of environmentalists within and outside the European institutions, Philippe was re-elected in 2019 for a third and last term to the European Parliament and re-elected as co-president of the Greens/EFA Group. For his final term as MEP, Philippe aims to keep climate emergency at the top of the European agenda and will continue the fight for social, economic and environmental justice.

Enrico Letta, born in 1966, he is the Secretary of the Italian Democratic Party. Former Dean of the School of International Affairs at Sciences Po Paris (PSIA) and former Italian Prime Minister. Enrico Letta has also been a Member of the Chamber of Deputies between 2006 and 2015. Letta was Minister of European Affairs from 1998 to 1999 and Minister of Industry from 1999 to 2001, and served as Secretary to the Council of Ministers from 2006 to 2008.

Marie-Antoinette Maupertuis, born on April 10, 1967 in Bastia. Professor of Economics, she directed the UMR LISA laboratory until 2020. President of the Assembly of Corsica since June 2021 within the group Fà Populu Inseme, she represents the Collectivity and the Assembly of Corsica in all public events. She also chairs the Assemblea di a Giuventù. Previously, she was Executive Councillor in charge of European and International Affairs, Public Policy of Innovation and Specialisation Strategy as well as President of the Corsican Tourism Agency. Member of the Committee of the Regions, she is vice-president of the COTER and rapporteur of an opinion on Article 174 of the Treaty on the Functioning of the European Union.

Marie Toussaint is a French jurist and environmental activist elected as a Member of the European Parliament in 2019. She is the co-founder of the association "Notre Affaire à tous" and is the initiator and one of the architects of the climate justice campaign "L'Affaire du siècle". In May 2019, she was elected to European Parliament election, as a representative of Europe Ecologie les Verts. Vice-President of the Greens/EFA group, she works in the environment, industry&energy, and legal affairs committees to ensure that EU law(s) protect the planet and guarantee social justice. She is the co-author of *Ensemble, demandons justice: Pour en finir avec les violences environnementales*, published in 2020 with Priscillia Ludosky, initiator of the yellow vest movement.

The political activist **Jasmine Cristallo** led the protest against Salvini - when the member of the Italian party Lega Nord was minister of the Interior in the first Conte government - beginning what is known as 'rivolta dei balconi'. In November 2019, during the campaign for the regional elections in Emilia-Romagna and Calabria, she joined the '6000sardine movement', born in those days in opposition to populism and sovereignism; becoming its national spokesperson. She has worked for years on the migrants' subject matter. She was particularly active in Riace where, after the judicial events that involved Mimmo Lucano, she was among the promoters and active members of the "Fondazione è Stato il Vento", established with the aim of restarting reception and integration projects. She is a volunteer at Recosol (Rete delle Comunità Solidali), a Network of Solidarity Communities. She collaborates with Rinascimento Green, a very young organization working to promote a Green Deal in Italy from below. She is involved in the network of NOAD, Committees for the Withdrawal of any Differentiated Autonomy, for The Unity Of The Republic and The Equality of Rights. She has dealt with mental distress and social marginalization for years and served as a volunteer in the SPDC ward (Psychiatric Diagnosis and Treatment Service) of the Pugliese-Ciaccio Hospital in Catanzaro.

Giorgio De Girolamo is a student in Law at the University of Pisa, he is activist of Fridays For Future Italia. He is interested in and has written about the environment, climate and historical and legal analysis in various national newspapers.

Ruth Dinslage, member of the board 24marzo Onlus, an Italian NGO working in the defence of human rights in cooperation with South American civil society organisations, since 2019 activist in the Parents For Future movement, degree in educational sciences, work in artistic handicrafts.

Maddalena Lamura is research assistant of the Health Economics and Policy Group, at the Vienna University of Economics and Business (WU). There she received a MSc "Socio-ecological economics and policy". She participated as activist in Students for Future@WU and in the organization of the Climate Camp Vienna 2019.

Claudia Maria Mazzanti, a teacher of Mathematics and Science at the First Grade Secondary School for over 20 years, currently works at the Francesco Bartolo di Buti School in Pisa. Specialized in clinical pedagogy, she has designed innovative educational paths for the teaching of Sciences, recognized at European level. and implemented education courses for active citizenship, with particular reference to the Agenda 2030.

Giovanni Mori – Save the Planet. He is an Energy and environmental engineer. He started Fridays for Future Brescia and he has been spokesperson for FFF Italia. Environmental consultant for companies, collaborates with Save the Planet ONLUS and with Lombardini22 architecture studio. Since 2019, he hosted Emergenza Climattina, invited to a TEDx. He wrote on newspaper Domani following Cop26. He is the host of News from Planet Earth, LifeGate's daily podcast.

Patrizia Alma Pacini graduated with full marks in Law from the University of Pisa. She has been President of the Pisan Industrial Union since 2016 and, among other appointments, she is President of the Confindustria Toscana Publishing Commission and a member of the Confindustria Culture Commission. Its active commitment for more than 20 years in the Confindustrial world allows it to have a broad knowledge of the needs and requirements of the company, both locally and nationally. She is a member of the board of directors of Pacini Editore SPA, with several responsibilities including the certification of the quality system. Pacini Editore SPA has been operating in Pisa since 1872, and is specialized in the dissemination of volumes of university history and essays, medicine, art, architecture, landscape, territory and environment.

Ferdinando Pezzopane is a student of International Sciences, development and cooperation at the University of Turin and the School of Higher Studies of Turin, he is an activist of Fridays For Future Italy. He is interested in international relations, the environment, ecology and their conflictual relationship with the capitalist system.

Friday 17 June, 8:45 – 9:45 @DEM: Eco A and Eco 5

Plenary session 4 - The art of communication

The Art of Communication: when Knowledge is not enough

The challenges imposed by climate change and increasing inequality, call for dramatic structural shifts in our economies and drastic behavioural changes toward sustainable lifestyles. How do we effectively conceive these messages to common people? How to make the audience capable of distinguishing between "fake news" and reliable information? The last 2021 Nobel peace prize, assigned to the two campaigning journalists Ressa and Muratov, highlights the vital importance of an independent media to democracy because "Free, independent and fact-based journalism serves to protect against abuse of power, lies and war propaganda" (as declared by the Norwegian committee). The same considerations also hold when media and journalists face and communicate issues related to environmental and social injustice.

Rising movements that overlook the importance of preserving ecological systems (e.g., "Trumpism"), and even the existence of the current pandemic, show that false information could easily spread although not based on scientific evidence. On the other hand, the attempts by scientists to communicate their knowledge through an "objective" perspective, based on data and statistics, have proved to have little influence. Rather, a mass of people was gathered to strike against the political fallacy of tackling climate change by 16-year-old Greta who reported the science, coming from the IPCC, but more attractively. In general, the leader is not the one who has the most knowledge, but the one who can speak in a way capable of touching and shaping emotions: "there are no facts, only interpretations". Here is where art and communication overlap and where we need to understand how to communicate scientific knowledge and increase people's engagement to boost the rapid changes needed.

The guest speakers will offer both theoretical explanations and practical examples of how science could be built and divulgated to increase public engagement and public communication and to fill the gap between science, society, and politics.

Giuseppe Pellegrini (Observa Science in Society, Italy)

Giuseppe Pellegrini is a sociologist. He teaches Innovation, Technology, and Society at the University of Trento. His main research

interests are related to the study of science, technology, and social issues. In this area of investigation, he devoted specific attention to public engagement and public communication. He leads the Italian research team of the European project TRESCA studying the public perception of science and technology. He is the president of Observa Science in Society and a member of the Public Communication on Science and Technology network.

Edwige Pezzulli (RAI, Italy)

Astrophysicist and science communicator. Edwige organizes educational laboratories, and workshops and collaborates with Mondadori Educational. She is an author for Superquark+ and RAI Cultura and has been awarded the national prize for young researchers GiovedìScienza 2019. Together with other 5 astrophysicists, she wrote a book for kids "Apri gli occhi al cielo" (Mondadori 2019).

Francesco Suman (Il BO Live – University of Padua, Italy)

Francesco Suman is a freelance science journalist, collaborating with a series of magazines, journals, and newspapers, such as Il Bo Live, Nature Italy, MicroMega, Il Tascabile, and Valigia Blu. He has a Ph.D. in philosophy of biology earned at the Department of Biology of the University of Padua in 2017. His training in philosophy of science brings him to explore the relationships between science and society, covering topics like climate change, energy transition, Covid-19 pandemics, biology and evolution, physics, technological innovation, research policy, fake news, and misinformation.

Sofia Belardinelli (Il BO Live – University of Padua, Italy)

Sofia Belardinelli is a Ph.D. student in Environmental Ethics at the University of Naples 'Federico II'. Her lines of research concern the philosophy of biology, environmental ethics, and studies on bio-cultural diversity. During her Ph.D., she is focusing on investigating the relationship between humans and non-human nature, exploring from the perspective of evolutionary biology and environmental ethics. She believes in the high social relevance of science dissemination. She writes for 'Il BoLive', the web magazine of the University of Padova, covering environmental and social issues and science news, and for the Italian cultural magazine 'Micromega'. Sofia is passionate about literature and music; she enjoys the beauty of nature and loves photographing it.

Marta Tuninetti (Politecnico di Torino – DIATI, Italy)

Marta Tuninetti is an Assistant Professor at Politecnico di Torino, where she obtained her Ph.D. in Environmental Engineering (2018). As a Research Scholar, she visited Princeton University (present) and the University College London (2017). She was a visiting Master student at the University of Virginia (2013). Her current research focuses on the Water-Food-Energy nexus through global and high-resolution modeling approaches. She convenes scientific panels at international conferences, and she is Associate Editor of the Journal of Hydrology. She is a Science Communicator, one of the creators of Water To Food (a scientific dissemination project), and the co-founder of WeSTEAM (an association for gender-based scientific dissemination).

Lucia Muñoz Sueiro (Institute of Environmental Science and Technology (ICTA-UAB), Barcelona, Spain)

Lucía Muñoz Sueiro is a Ph.D. candidate with an FPU contract at the Institute of Environmental Science and Technology at the Autonomous University of Barcelona (ICTA-UAB). Her research is on traditional local knowledge aligned with degrowth, with an ethnographic approach in the Iberian Peninsula.

Friday 17 June, 10:00 – 10:45 @DEM: Eco A and Eco 5

Plenary session 5 - Sustainable banking for ecological transition: lessons and experience from pioneers

Responsible banking concerns extending lending opportunities to uncollateralized borrowers thereby addressing the main constraints (access to education and external finance) to equal opportunities and the possibility that future achievement does not depend on initial conditions. In addition to it, responsible banks have learned to vote with their loan portfolios by aiming at the social and environmental impact of financed loans. What are their challenges in the next future in an extremely competitive and concentrated industry with tiny profit margins and high economies of scale?

Adriana Kocornik-Mina (Global Alliance for Banking on Values)

In the role of Metrics and Research Senior Manager at the Global Alliance for Banking (GABV) on Values, dr. Adriana Kocornik-Mina contributes to strengthening the capabilities of front runner values-based banks to enable transformative social and environmen-

tal impact. She is an expert in various global and regional initiatives in sustainable finance, including the World Benchmarking Alliance, ISO Technical Committee on Sustainable Finance, and the European Economic and Social Committee (Group III). Before this, Adriana worked at Wageningen University and the London School of Economics on adaptation to climate change-related challenges.

Anna Fasano (Banca Etica)

Economist, passionate about Ethical Finance, Social Economy, and Third Sector organisations, she is the director of the NGO Vicini di Casa and an expert in social housing. Within the Banca Etica Group, she has expertise in governance models, control systems, and human resource management. She has been a member of the Board of Directors of Banca Etica since 2010, and since 2016 holds the role of Vice President.

Friday 17 June, 11:10 – 12:45 @DEM: Eco 5

Roundtable: The art of communication

Friday 17 June, 11:10 – 12:45 @DEM: Eco A

Roundtable: Sustainable finance, key challenges for ecological transition

In the last years, we assisted in the rapid growth of environmentally friendly financial instruments. In addition to it, the vote with the wallet of investment funds for ecological transition has rapidly become mainstream as far as investment funds have progressively discovered ESG risk and the global warming challenge has become more dramatic. EU regulation has intervened in the process trying to avoid washing and asking financial actors to provide statistical evidence for their environmental engagement. How will the process work in the future also in the light of the new challenges posed by the shock of the war in Europe?

Laura Berry (Shareholders for Change)

She currently serves as a member of the Board of Directors and Audit Committee Chair for the Praxis Mutual Funds, a Trustee and Investment Committee Chair for a Connecticut-based family foundation, the William Caspar Graustein Memorial Fund, and is Vice President of the Comitato Etico di Etica, Sgr, an asset management company in Milan, Italy. She is also a founding board member for Washington, DC-based Majority Action (originally 50/50 Climate), Berlin-based Shareholders for Change and the Church Center for Peace and Justice, in New York City. Her institutional roles included nearly a decade of service as Executive Director of the Interfaith Center on Corporate Responsibility (ICCR), a New York-based coalition of faith-based institutional investors; The Community Foundation for Greater New Haven and a 17-year career as a Large Cap Value Portfolio Manager with analytical responsibility covering the Pharmaceutical industry. She began her career in the specialty chemical industry as a Chemical Engineer. Laura received her Certified Financial Planner designation from Quinnipiac University, holds an M.S. from the University of Michigan, and a B.S. from Michigan Technology University. She lives with her husband in New Haven, CT.

Francesco Bicciato (Executive Director of ITASIF)

Member of the Eurosif board. He has worked as programme manager for the United Nations and other public and private international organisations. Since the 1990s, he has been a promoter of the ethical finance movement and has led microcredit and social and environmental finance organisations. He has been Vice President of FEBEA (Fédération Européenne des banques Ethiques et Alternatives). Furthermore, he is the author of several publications on sustainable finance and international cooperation.

Nick Robins (London School of Economics)

Nick Robins is a Professor in Practice for Sustainable Finance at the London School of Economics. Nick has over 20 years' experience in sustainable finance. He currently focuses on mobilizing finance for a just transition to net-zero and the role of central banks in greening the financial system.

Victor van Hoorn (former Executive Director of Eurosif)

Victor Van Hoorn was Executive Director of Eurosif, the leading European association for the promotion and advancement of sustainable and responsible investment. Specialised in EU public affairs, financial regulation and capital markets, Victor's expertise lies in macro-economic policy and its relations with EU politics. He is an ardent support of the EU and believes that finance can be a force for good, provided it is harnessed with the right policy frameworks and incentives. Prior to Eurosif, Victor was Head of Financial Services at Hume Brophy, an EU public affairs consultancy, advising asset managers and asset owners on their engagement with EU policymakers. He also a graduate of Maastricht and Georgetown Universities, and Sciences Po in Paris.

Friday 17 June, 15:15 – 16:00 @DEM: Eco A and Eco 5

Plenary session 6 - Closing lecture

Land, water, air and freedom: world movements for environmental justice

Joan Martínez Alier

Joan Martínez Alier is a Catalan economist. His interests are agrarian studies, ecological economics and political ecology. He is a founding member and a former president of the International Society for Ecological Economics.

Friday 17 June, 16:00 – 17:15 @DEM, Eco A and Eco 5

50 years after "Limits to growth", the UN Stockholm conference, Georgescu, ...

On the 16th of June 1972 the first UN Stockholm conference on the Human Environment ended. It was the first time that the environmental crisis was acknowledged at the international level. In the same year, the Club of Rome published the 'Limits to Growth' report, which provided a scenario analysis showing that exponential material growth cannot continue forever on a finite planet. A few years later the ecological economist H. Daly pointed out, that after some level of income, growth in the economic output becomes undesirable because of many negative side effects, namely, we will have "uneconomic" growth. The publication of the report, because of his criticism of the growth paradigm, triggered an earthquake in policy and academia. It was harshly criticized by many, particularly economists, also because the results were misinterpreted as predictions rather than scenarios. Many are still fascinated by the myth of exponential growth of the GDP and remain unable to see the other side of the coin, namely the harmful effects that render growth uneconomic.

The thesis of limits, however, has resurged with strength over recent years around notions of planetary boundaries and gained traction as international science-policy bodies such as the United Nations climate and biodiversity panels call for transformative changes in economic and financial systems.

It was not just the Stockholm UN conference that took place at the beginning of the 1970s. In that period, we also had seminal academic contributions, including "Limits to Growth" and major works by N. Georgescu-Roegen who gave us an early warning that technology alone cannot solve the situation; rather, we need to curb the huge waste of energy and matter that does not add to our well-being. After fifty years we know he was right, but we remain hesitant.

The last event of the conference will revolve around the atmosphere prevailing in those years, but also on the achievements and failures towards sustainability and transformative actions for the future. The event will start with a Lectio Magistralis by Prof. Joan Martínez Alier, one of the founders and later President of the International Society for Ecological Economics (ESEE). A roundtable of eminent scholars will follow with interventions by prof. N. Ashford and prof. K. Mayumi, prof. G. Biagioli and prof. D. O'Neill. Alessandra Nardini, a Tuscany counsellor in education, research, employment, and gender balance, will conclude the closing ceremony.

Nicholas Ashford (MIT)

Nicholas A. Ashford is Professor of Technology & Policy and Director of the Technology & Law Program at the Massachusetts Institute of Technology, where he teaches courses in Environmental Law, Policy, and Economics; Law, Technology, and Public Policy; and Technology, Globalisation, and Sustainable Development. He holds both a Ph.D. in Chemistry and a Law Degree from the University of Chicago, where he also received graduate education in Economics. Dr. Ashford is a visiting scientist at the Harvard School of Public Health and has taught intensive courses in Sustainable Development, and European & International Environmental Law at Cambridge University, UK, and at the Cyprus University of Technology. Dr. Ashford is a Fellow of the American Association for the Advancement of Science and served as an advisor to the United Nations Environment Programme. He has also served as co-chair of the US-Greece Council for the Initiative on Technology Cooperation with the Balkans. Dr. Ashford's research interests include sustainability, trade and environment; regulatory law and economics; the design of government policies for encouraging both technological innovation, and improvements in health, safety, and environmental quality; pollution prevention and cleaner/inherently safer production; public participation in contaminated communities; labour's participation in technological change; environmental justice; distracted driving; and reigning in fake news. He has published 10 books and hundreds of peer-reviewed articles in science, technology, economics, and law.

Giuliana Biagioli (Leonardo-IRTA)

Full Professor of Economic History at the University of Pisa since 2001, she has been director of the Department of Modern and Contemporary History. In that Department, she covered the courses Economic History and the History of the Environment and the Territory. She has directed numerous national and local research groups. She was a member of the Board of Professors of the Doctorate in Modern and Contemporary History and the Board of Guarantors of the Degree in History and the Specialist Degree in Library and Archival Studies at the Faculty of Literature and Philosophy of the University of Pisa. She was the Italian director of research entitled "World Heritage Site and Local Development", funded under the Galileo cooperation program between Italy and France. In the following years she was responsible for three European projects: VITOUR Interreg IIIC project; Program for the Study of European Rural Societies (PROGRESSOR); Paysage d'Exception. Since October 2002 she is the president of Leonardo-IRTA (Institute for Research on the Territory and the Environment). In 2021, she has been appointed Ambassador for the European Climate Pact.

Kozo Mayumi (The Kyoto College of Graduate Studies for Informatics, Management Information Science)

Kozo Mayumi graduated from the Graduate School of Engineering at the Department of Applied Mathematics and Physics of Kyoto University. Between 1984 and 1988 he studied bio-economics at the Department of Economics of Vanderbilt University under Prof. Nicholas Georgescu-Roegen's supervision. Since then, Mayumi has been working in the field of energy analysis, ecological economics, and complex hierarchy theory. After retirement from Tokushima University, he works at the Kyoto College of Graduate Studies for Informatics. Mayumi is currently an editorial board member of journals, such as Ecological Economics and Ecosystem Services. His works include the following books: (1) The Origins of Ecological Economics; (2) The Jevons Paradox and the Myth of Resource Efficiency Improvements; (3) The Biofuel Delusion: The Fallacy of Large Scale Agro-Biofuel Production; (4) The Metabolic Pattern of Societies; (5) Energy Analysis for a Sustainable Future; and (6) Sustainable Energy and Economics in an Aging Population. Mayumi is the first recipient of the Georgescu-Roegen Awards (Unconventional Thinking Category) at the 13th Delhi Sustainable Development Summit in 2013. Currently, Mayumi is writing two books, one on the money with Dr. Ansel Renner, and the other on hydrogen energy with Dr. Mark Glucina.

Dan O'Neill (University of Leeds)

Dan O'Neill is an Associate Professor in Ecological Economics at the University of Leeds and the President of the European Society for Ecological Economics. His research focuses on the relationships between resource use and human well-being, and the policy changes that would be needed to achieve a steady-state economy. He is co-author (with Rob Dietz) of the book Enough Is Enough: Building a Sustainable Economy in a World of Finite Resources, which has also been made into a short film. Dan has been an invited speaker at numerous institutions, including the European Central Bank, the French National Assembly, and the University of California at Berkeley. His recent work, published in Nature Sustainability, explores how to achieve a good life for all people within planetary boundaries.

Friday 17 June, 17:15 – 17:45 @DEM, Eco5

Closing ceremony

Including Best student prizes award

Alessandra Nardini (Regione Toscana Councilor)

Responsible for education, vocational training, university and research, employment, international relations and gender policy.

Post-conference EVENT
Friday 17 June, 18:00 – 20:30 @Stazione Leopolda

Games for sustainability

Games are gaining momentum as an effective way to foster learning activities and to facilitate behavioral change towards sustainable practices. For this reason, immediately after the closing ceremony, citizens, local administrators, and conference participants, including some of the invited speakers, will participate in an open event where they will interact by playing sustainability games revolving around the main themes of the conference.

We plan to create different spaces targeted for several groups of people (kids, young, adults) with tables dedicated to specific issues where experts will intervene and debate with the participants. The event is organised in collaboration with the Game Science Research Center and Lucca Crea. We expect the inclusion of local and national partners and Italian research teams, from other universities, that will present their own games elaborated to boost behavioural changes.

PODCAST SERIES

Back to the future: talks on Ecological Economics

Il Bo Live and the University of Pisa present a new podcast series to guide the audience through the history of Ecological Economics thanks to the voices of outstanding scholars who contributed to the origin and development of this Vision.

The series will explore the epistemological foundations and some of the main concepts as well as some modern applications to face the social and ecological challenges of our century.

In collaboration with the comic artist Lorenza Luzzati, this project explores new forms of communication through different media to reach wider audiences by connecting science and art. In short, we will go back to the past to have a better look at the future.

Enjoy the podcast here: https://ilbolive.unipd.it/it/news/back-future-georgescuroegen-and-origins-ecological

15th June

Wednesday
08:45 - 09:00

RESOURCES: INDUSTRIAL ECOLOGY AND MATERIAL FLOWS ANALYSIS

Chair: Daniel O'Neill

306 Recessions and the Environment

Daniel O'Neill[1], Giorgos Kallis[2], Luis Díaz-Serrano[3], Qinglong Shao[4]

[1]University of Leeds, United Kingdom. [2]Universitat Autonoma de Barcelona, Spain. [3]Universitat Rovira i Virgili, Barcelona, Spain. [4]Freie Universität Berlin, Germany

Debates on the environmental impact of recessions tend to focus on short-term effects, neglecting long-term impacts. We calculate for the first time the cumulative effect of recessions on CO_2 emissions and material extraction. We consider 1655 recession years across 155 countries, from 1950 to 2021 (including projections for the coronavirus crisis). We determine that recessions, on average, lead to a permanent reduction in environmental impacts. We estimate that if individual country recessions had not occurred, cumulative global CO_2 emissions would be 232–321 Gt (or 16–22%) higher, while cumulative material extraction would be 417–510 Gt (or 15–18%) higher. The CO_2 emissions saved by recessions are substantial — over 30% larger than the total emissions avoided by the deployment of all modern renewables plus nuclear energy. Over 40% of avoided emissions are due to recessions in just three countries (the US, Russia, and China). We find no evidence that recessions have harmed the development of environmental technologies, contrary to claims made in the literature.

398 Modelling dynamic material stocks and flows for Spain with the MODESLOW Integrated Assessment Model

Rosa Lago[1], Emmanuel Aramendia[2], Jaime Nieto[3], Oscar Carpintero[3], Iñigo Capellán-Pérez[3], Luis Fernando Lobejón[3], Carlos de Castro[3]

[1]Universidad del País Vasco, Bilbao, Spain. [2]University of Leeds, United Kingdom. [3]University of Valladolid, Spain

The energy transition is likely to significantly increase the mineral requirements of our economies as renewable energy systems are considerably more material intensive than fossil fuel energy systems. Hence, it is crucial to consistently model material stocks and flows, so that the raw material requirements as well as the recycling potential can be understood in-depth. Here, we present the features of the materials module of the MODESLOW Integrated Assessment Model for Spain, based on the integration of system dynamics and input output. We account both for material consumption for the energy transition and for the rest of the economy, discuss important modelling principles when dealing with material stocks and flows, and present preliminary results from the model. Results suggest that strong measures need to be implemented if the Spanish raw mineral footprint is to stay within its fair share of global mineral resources.

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RESOURCES: FOOD SYSTEMS
Chair: Daniel O'Neill

462 Impacts of climate change on Europe's agri-food supply chains

Martin Bruckner, Patricia Urban, Victor Maus
Vienna University of Economics and Business, Austria

Trade with agricultural commodities has increased 8-fold over the past 60 years. Today, food and feed industries in Europe, but also the textiles, fuel, or chemical industry rely heavily on imports of agricultural commodities. Complex global supply chains are highly vulnerable to climate hazards such as temperature extremes, droughts or floods. A climate-induced supply shock at one place in this global network may propagate through the system, cause spillover effects, and disrupt supply chains and entire industries. By combining a global physical MRIO model of agriculture and food products with crop yield projections under different climate scenarios, we investigate the impacts of climate change-induced production shortages of four major crops (maize, rice, wheat, soybeans) on European supply chains. We identify potential risks and vulnerabilities, and assess the limitations of the used methods, models and data and identify further development options.

554 A research paradigm for assessing food system sustainability at multiple scales

Michael Curran
Research Institute of Organic Agriculture FiBL, Frick, Switzerland

There is little consensus on what counts as "sustainability assessment" (SA). Ambiguities have led to widespread, spurious sustainability claims in the agri-food sector. Bringing more clarity is a pressing task, given the urgency of achieving transformational change in modern food system. This paper aims to develop a new research paradigm for conducting SA, which brings together elements of ontology (beliefs about environmental and social reality), epistemology (the nature of knowledge), methodology (approaches to construct knowledge) and axiology (how values influence knowledge mobilization). First, I review key literature pertaining to food system SA in relation to these elements and then draw on key paradigm positions in Ecological Economics, namely Post-Normal Science and Critical Realism, to develop a coherent position that is suited to the inherently transdisciplinary nature of SA. The paradigm is illustrated through an appraisal of corporate SA initiatives in cacao supply chains delivering raw material to Swiss chocolate industry.

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SPECIAL TRACK: A 'BUSINESS ECOLOGICAL ECONOMICS' PERSPECTIVE ON CORPORATE SOCIAL IRRESPONSIBILITY

Chair: Daniel O'Neill

77 Unsustainability + Irresponsibility = Extinction. Can it be avoided?

Bobby Banerjee

Bayes Business School, City University of London, United Kingdom

The planet is facing a global climate emergency and unless drastic action is taken immediately, we are facing mass extinction. As of date the signs are not encouraging global greenhouse gas emissions continued their steady and unabated climb to a record high of 410.49 ppm in 2019. Climate change is also climate injustice: the world's most vulnerable people that have contributed least to the problem will suffer the most from the devastating impacts of climate change. Corporate irresponsibility and unsustainable business practices are largely responsible for the current crisis. We propose a new research agenda that transforms our paradigmatic orientation: (1) altering our epistemological lenses from managerial to critical perspectives, (2) altering our ontological lenses from realist to process view, 93) changing the way we design and conduct research from discipline-focused to interdisciplinary knowledge, and (4) transforming our scholarly stance from "value-neutral" to academic activism.

431 Corporate social irresponsibilities in COVID-19 pandemic responses in coal mining regions in Canada and Colombia

Gabriel Weber[1], Ignazio Cabras[2], Ana Maria Peredo[3], Paola Yanguas-Parra[4]

[1]ESSCA, Bordeaux, France. [2]Northumbria University, Newcastle, United Kingdom. [3]University of Victoria, Canada. [4]Technische Universität Berlin, Germany

Ecological Economics emphasises the preservation of natural capital, and thereby contradicts the concept of Corporate Social Responsibility (CSR), which draws on the notion of the triple bottom line. The latter considers man-made capital and natural capital exchangeable to achieve sustainability. CSR provides relatively few monitoring tools for the operations of 'irresponsible' businesses, whereby stricter regulation, sanctions, boycotts often work as drivers for change. Similar to CSR and as a critique of it, 'Corporate Social Irresponsibility' (CSIR) has been intermittently discussed for 50 years. Building on the concept of CSIR we conducted a comparative case-study analysis to test the proposition that national and subnational COVID-19 responses in mining areas, indicate a relaxing of environmental, water, and mining regulations as a reaction to increased pressure of multinational firms. We find that the pandemic has served often as an excuse for CSIR such as violations of human and territorial rights of local communities.

498 The political ecology of TotalEnergies: a colonial legacy of socio-environmental exploitation to fuel the industrial economy

Marcel Llavero-Pasquina

ICTA, Autonomous University of Barcelona, Spain

Industrial economies require a steady supply of cheap energy to reproduce and grow. Oil companies fulfil the socio-economic function to extract, transport and concentrate cheap energy, thus facilitating accumulation of wealth and power in industrial societies. But the steady production of cheap fossil fuel resources requires the constant expansion of extraction frontiers and the exploitation of the environment and local communities. This leads to conflicts where local environmental justice organisations fight for their life and companies defend their profits. Big Oil companies thus become the vector of oppression that bridges the societies enjoying the benefits of cheap energy, and those that suffer the impacts. Here we systematically analyse the environmental conflicts related to the oil major TotalEnergies and compare the organisational behaviour at the extraction sites with its rhetoric in the energy-consuming societies to unmask the true social and environmental cost of the energy resources that power industrial economies.

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INSTITUTIONS AND POWER

Chair: Natalia Novakova

494 Creating knowledge commons through public participation in cities - a literature review

Natalia Novakova[1,2], *Tatiana Kluvankova*[1]

[1]SlovakGlobe, Bratislava, Slovakia. [2]Slovak University of Technology, Bratislava, Slovakia

A synthesised overview of latest literature on knowledge commons is presented, with focus on public participation as a method of their creation and maintenance, as well as on a city context of commons. Alongside creating a synthetical analysis of relevant resources on knowledge commons, an objective of this review is to determine what role public participation plays in the process of creation and management of knowledge commons, particularly in an urban context. Due to the interdisciplinary nature of the issues and literature analysed, this review connects multiple topics into one comprehensive base for future research. This is achieved by analysing current and relevant trends, and useful methods that are used to create and manage knowledge commons in cities, while involving public actors in the process. The paper thus provides an overview of relevant research on the topic, which gives a strong base for further findings, whether theoretical or empirical.

496 The European Hydrogen Strategy: The discurse and metabolic power of the incumbents

Mario Diaz Muñoz

Degrowth and Environmental Justice Modul, University, Vienna, Austria

Hydrogen is going through a period of exceptional momentum. The European Hydrogen Strategy poses hydrogen as the technological centre piece for decarbonization while promoting economic growth. Despite all the uncertainty around Hydrogen, the incumbents are instrumentalizing their power - understood as discursive, policy-making influence and metabolic - to advance their demands and role in the Hydrogen strategy. The revival of CSS technologies, the EU taxonomy and the proliferation of export-oriented renewable energy mega-projects for hydrogen production abroad – triggering neo-colonial dynamics - are current terrains in dispute. Following a relational power approach and social network analysis, this research uses Discourse Network Analysis to evaluate how the incumbents use their power to influence and shape the European Hydrogen Strategy. Specifically, I focus on the evolution of Hydrogen narratives and how incumbents instrumentalize uncertainty and metabolic power to advance their demands in the fluid terrain shaped by geopolitics, Covid-19 crisis and economic recovery.

221 Resistance to sustainability transformation: Thinking about the challenge with Finland and Cyprus

Ourania Papasozomenou[1], *Juha Hiedanpää*[2]

[1]Arden University, Berlin, Germany. [2]Natural Resource Institute Finland (LUKE), Turku, Finland

We are interested in two EU member states ranking at diametrically opposite ends of almost all sustainable welfare indicators: Finland and Cyprus. Focusing on biodiversity, we look at a) how recent environmental legislative processes are received by societal, interest-laden forces in both countries and b) what alternative strategies societal critics offer to meet climate and biodiversity targets configured by global expert communities (IPCC;IPBES and the EU). These spaces of contestation reveal the features of institutional obduracy, the potential for renewal and ultimately the potential for sustainable transformation. We explore the significance of different capabilities in resistance-to-change and innovation-by-disturbance and how these capabilities both feed into innovativeness in renewal potential and the conservation of already established problematic practices. By using the logic of abduction, we form a set of hypotheses about where to look to understand the reasons for institutional inertia and for the possibilities of designing rectifying governance means.

278 How many shades of green? Exploring the objectives and scope of foreign aid to the environment

Zdeněk Opršal

Palacký University, Olomouc, Czech Republic

The paper is based on an innovative taxonomy of environmental aid that allows for a more comprehensive analysis of foreign aid to the environment. The taxonomy of environmentally related aid transfers is derived from the combination of the two basic features of the transfers—their objective (local or global) and scope (environment or economic development). The resulting matrix defines four basic categories of environmentally related transfers. This taxonomy has implications for the roles conducted by donors in environmental aid transfers. In theory, the benefits of supporting global environmental goods cannot be easily captured by donors and the costs (e.g. opportunity costs) may be borne by the beneficiaries. On the other hand, local environmental aid tends to produce outcomes directly felt by the recipients and enables donors to pursue their own economic and political interests. This creates incentives that put global environmental aid at a disadvantage to local aid for [...]

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INSTITUTIONS AND POWER

Chair: Natalia Novakova

511 Ecological economics in higher education

Janne Mercedes Prinsen, Erik Gómez-Baggethun

Norwegian University of Life Sciences (NMBU), Ås, Norway

There is a call for a change in how economics is theorized, practiced, and taught, in order to ensure social and environmental sustainability under the threat of climate and environmental change. Neoclassical economics, the current dominant paradigm within economics, has been criticized for contributing to and causing ongoing environmental problems, and for a failure to address these issues. A major opportunity for transforming economics lies within education, and there has been a cry for alternative ideas in economic research and teaching. With a focus on sustainability, ecological economics proposes alternatives to the neoclassical economic theory that heavily dominates the discipline, including in education. This study adopts the perspective of ecological economics and sheds light on the current state of the field, and the potential for its development, in higher education. The importance of reforming economics education towards the ideals of ecological economics is [...]

529 Modern Pedagogies for Modern Problems - a reflection on student-centred learning approaches in Ecological Economics

Corinne Baulcomb[1], Paula Novo[2]

[1]Scotland's Rural College, Edinburgh, United Kingdom. [2]University of Leeds, United Kingdom

Ecological Economics is a problem-focused discipline that emphasizes the integration of different forms of knowledge to address societal challenges. These features of the field suggest an important pedagogical question: How canaes train students in the kinds of complex, transdisciplinary, and uncertain contexts relevant to Ecological Economics? These features of the field contrast directly with traditional 'teacher-focused' pedagogies. Alternative approaches can be found amongst the pedagogies that emphasize 'student-centred learning'. One such pedagogy is problem-based learning (PBL). Another such pedagogy is team-based learning (TBL). In this talk we will present the experience of delivering a postgraduate course in Ecological Economics (at Scotland's Rural College and the University of Edinburgh) using elements of PBL and TBL together. This talk will explain and reflect on how the course has supported student learning, and share suggestions for others who may wish to consider incorporating similar elements in their own Ecological Economics teaching.

251 Sustainability assessment of macroeconomic models

Wiep Wissema

Wageningen University, Netherlands

From critical literature about economic model assumptions this paper derives a list of 'sustainability features' that macroeconomic policy models would ideally incorporate or reflect. Because besides working towards specific policy goals, policy makers are also required to contribute to the overall transition to economic, social and ecological sustainability. The 'sustainability features' are based on academic criticism on model assumptions reflecting boundaries of economic analysis, underlying micro-economic theory, views about economic growth, substitutability of production factors and economic relevance of the laws of thermodynamics. This paper briefly introduces a few heterodox models, such as the thermo-economic flow-fund model and models based on evolutionary and complexity theory. It then makes the first effort to evaluate to what extent the sustainability features are incorporated or reflected in these models, draws conclusions and makes recommendations. It aims to facilitate constructive deliberation about sustainability features as a tool to assess macroeconomic policy models.

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THEORY AND NEW IDEAS

Chair: Victoria Hasenkamp

432 Degrowth and law – systematic literature review

Andrzej Strzałkowski

Polish Academy of Sciences, Institute of Philosophy and Sociology, Warsaw, Poland

The importance of law for the implementation of Ecological Economics is discussed in the literature. However, in terms of the relation between degrowth and law, there is still a lack of systematic review. To fill this gap, I conduct a systematic review on Scopus database. After screening the list of found papers for their relevance to the review, the subject papers are qualitatively analysed and coded using the QualCoder software. Of the 84 found papers, 53 were excluded. What is interesting, 8 of 27 items, included in my review on degrowth and law, were not be found using the keyword "Ecological economics". This might suggest that the concept of degrowth is studied independently from the field. I will present methods, findings, gaps, and promising research directions. The review might support further development of this research field which is very significant for the facilitating of the sustainable degrowth policy's implementation.

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BEHAVIORS AND SOCIAL CHANGE

Chair: Victoria Hasenkamp

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127 Citizens shaping the bioeconomy?

Victoria Hasenkamp, Doris Fuchs

Center for Interdisciplinary Sustainability Research, University of Muenster, Germany

The transition to a bioeconomy is frequently considered a crucial step towards sustainability, but bioeconomic processes are sustainable only under certain conditions. Moreover, civil society is insufficiently involved in selecting and shaping specific bioeconomic strategies today, while other actors have a disproportionately strong say. Thus, we ask: which kind of participatory processes can ensure the sustainability benefits of the bio-economy and strengthen democratic participation simultaneously? To answer this question, we conducted deliberative processes. with citizens and stakeholders and analyzed the resulting data with respect to (1.) the fulfillment of criteria of democratic participation (including questions of recruitment) and (2.) the assessment of the sustainability benefits of the bioeconomy by citizens. Based on our findings, we develop recommendations regarding the design of participation processes in general, and in the context of the bioeconomy, in particular.

217 Climate concern and policy acceptance before and after COVID-19

Stefan Drews, Ivan Savin, Jeroen van den Bergh, Sergio Villamayor-Tomás

UAB, BCN, Spain

The COVID-19 pandemic has disrupted people's lives and dominates their attention. It is still unclear how exactly it has affected public engagement with the climate crisis. According to the finite-pool-of-worry hypothesis, concern about climate change should have decreased after the pandemic, in turn reducing acceptance of climate policy. Here we test these ideas by using survey data from 1172 participants who responded before and after the first wave of COVID-19 in Spain, allowing for both aggregate and within-person analyses. We link changes in climate concern and policy acceptance to individual health and economic experiences as well as perceptions related to COVID-19. We find that on average climate concern has decreased, while for most climate policies acceptance has increased. At the individual-level, adverse health experiences due to COVID-19 have no relation to these changes. The same holds for negative economic experiences, with the exception that unemployment is associated with reduced acceptance of [...].

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521 The public acceptability of carbon taxes: an intertemporal perspective

Mariateresa Silvi[1], Emilio Padilla Rosa[2]

[1]Ghent University, Ghent, Belgium. [2]Universitat de Barcelona, Spain

In a choice experiment on a nationally representative sample of 1,000 United States adults, we presented individuals with alternative carbon tax formulations with varying start dates, temporal horizons of carbon abatement objectives and revenue uses. We find that public support is highest for carbon tax designs that start a few years into the future, that redistribute revenues to citizens and that express their environmental objectives in more long-term and ambitious (2050) goals. This is in contrast with policy efficiency, as the most efficient policy is the one that starts immediately. Individuals are not willingly to postpone the tax indefinitely though, possibly owing to the fact that the price of a carbon tax is adjusted upward to compensate for the delay in its introduction. Redistributing revenues to citizens and disclosing the opportunity costs of delaying the tax (in terms of higher future mitigation costs) realigns preferences with the most efficient policy.

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SPECIAL TRACK: BEYOND GDP: SUSTAINABLE DEVELOPMENT METRICS AND THEIR INSTITUTIONALIZATION

Chair: Miroslav Syrovátka

506 What can one number say about sustainable development? Insights from composite indicators

Miroslav Syrovátka

Palacký University Olomouc, Czech Republic

Composite indicators are often used for the measurement of complex phenomena. It has been argued that they should not be used for measuring sustainable development by linear aggregation of components of development with components of sustainability. Metrics that have been developed recently often approach the integration of development and sustainability differently than the critics envisaged. Their usefulness, consistency, and potential complementarity have not been studied. The study will classify these indicators, assess their value, and bring insights into how components of sustainability and development can be consistently and usefully integrated within one metric.

613 From creative accounting to culturally regressive perception of nature

Aldo Femia[1], Capriolo Alessio[2]

[1]Istat, Rome, Italy. [2]ISPRA, Rome, Italy

The attribution of exchange values to entities that are excluded, by their very nature or societal choice, from the realm of economic transactions, may have counter-productive effects in terms of communication and perception. This is the case of nature and its values. Declarations of good intentions, accompanying monetary valuation exercises, are not sufficient to avoid misuse of monetary values. Even the SEEA EA - whose lack of consistency with basic SNA (and logical) principles cannot be justified even in a satellite accounting perspective - overstretches the meaning of exchange values of economic entities (activities, goods, services and assets), dependent from ecosystem services, transforming them arbitrarily into exchange values of ecosystem services themselves. We pledge for correct interpretation, naming, and displaying of evidence about monetary values depending on ecosystem services. This entails recognizing the fundamental role of institutional arrangements concerning property of ecosystems and appropriation of their services in determining exchange values.

595 Measuring China and USA performances towards the 2030 Agenda

Mario Biggeri[1], Luca Bortolotti[2], Donatella Saccone[3], Mattia Tassinari[4]

[1]Department of Economics and Management, Firenze, Italy. [2]Department of Economics and Statistics, Turin, Italy. [3]Canter Global Studies University of Turins, Italy. [4]University of Macerata, Italy

The Agenda 2030 poses critical elements regarding the transition towards a more sustainable development. Two countries are central in this transition USA and China. This paper aims to capture the dynamics within these two countries analyzing at subnational level by introducing a comparable composite indicator of Integrated Sustainable Development (ISD) Index at USA State level and China's provincial level. The aggregated index embraces the integrated nature of the 17 Sustainable Development Goals (SDGs). We have grouped these variables from official statistics according to the UN's SDGs' domains. These are rescaled and transformed to be comparable. The ISD is calculated at State (for USA) and at provincial level (for China) for two years 2016 and 2019. The empirical results capture the dynamics of sustainable development of USA States and China's provinces and provide a clearer understanding of how policies may influence different SDGs' achievements in the two countries.

596 The Gender Justice Security and Health Index: measuring intersectionally just and sustainable progress

Mazeda Hossain[1], Giulia Ferrari[1], Eva Klaus[1], Leah Kenny[2], Loraine Bacchus[3], Ligia Kiss[4]

[1]London School of Economics, United Kingdom. [2]Medecins Sans Frontieres, London, United Kingdom. [3]London School of Hygiene and Tropical Medicine, United Kingdom. [4]University College London, United Kingdom

GDP is insufficient to measure progress. The vast literature on alternative indices would benefit from including the perspectives of women and vulnerable groups. The Gender Justice Security and Health Index (GJSHI) adopts a feminist approach to include these oft neglected perspectives and uses them to build a measure of sustainable peace that accounts for the diversity of societies. It is an adaptable measure that monitors intersectional progress in a variety of settings.

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SCIENCE-POLICY-SOCIETY INTERFACES FOR RESILIENT AND SUSTAINABLE RURAL DEVELOPMENT

Chair: Sabrina Arcuri

497 Aligning strategies for tackling climate change challenges in rural areas through local Multi Actor Platforms

Sandra Karner, David Steinwender

IFZ, Graz, Austria

Our contribution refers to a currently ongoing EC funded project (MOVING), where we facilitate the constitution of a so called 'Multi Actor Platform' (MAP) in the greater region of Weiz, Austria. We thereby aim at an intervention, which puts a stronger focus on linking and integrating perspectives and interests of already existing climate change related activities in the region. The aim is to jointly elaborate on more integrated strategies to tackle climate change challenges, which better align climate change related initiatives with regional development, and the sheep farming sector. The paper will reflect on the process of setting up the MAP in the region of Weiz, and the implementation of co-creative activities. Based on our experiences with this and other multi-actor activities implemented in previous projects, we will draw on learnings regarding some key challenges, which turn out to be crucial for the successful realisation of such a platform.

405 Understanding transformational changes in agri-food systems and rural areas: insights from three Multi-actor Platforms

Emilia Pellegrini[1], Pedro Santos[2], Gerald Schwarz[3], Marta Mendes[2], Pompeu Pais Dias[2], Meri Raggi[1], Stefano Targetti[1], Davide Viaggi[1]

[1]University of Bologna, Italy. [2]CONSULAI, Lisbon, Portugal. [3]Thünen-Institute of Farm Economics, Braunschweig, Germany

What types of transformational changes are appropriate and feasible to achieve carbon neutrality and better environmental sustainability in the agri-food systems and rural areas of Europe? Three Multi-actor Platforms (MAPs) discussed this topic – i.e., Emilia-Romagna MAP (Italy), Schleswig-Holstein MAP (Germany), Alqueva MAP (Portugal) – emphasizing different priorities. The Emilia-Romagna MAP highlighted the need for a gradual transition based on a territorial approach and a greater uptake of innovative policy instruments. The Schleswig-Holstein MAP stressed sustainable land use systems and regional value chains as key elements, supported by policy approaches fostering the human capital of rural communities. The Alqueva MAP discussed the main research priorities to enhance mitigation and adaptation in a region vulnerable to climate change. The experiences of the engagement in the MAPs provide a positive basis for further development of these platforms to co-construct a common understanding of priorities for the transition process in rural areas.

296 Participatory initiatives for the sustainable development of Italian mountains - a path for the localization of the Agenda 2030

Veronica Polin[1], Laura Cavalli[2]

[1]University of Verona, Italy. [2]FEEM, Milano, Italy

This study provides the first comprehensive overview of local participatory initiatives of Italian mountains engaging local stakeholders from municipalities, businesses, the third sector, and academia, while mapping their contribution to the SDGs. Aim of the study is allowing a dialogue between different forms of knowledge, stressing the importance of maintaining an equilibrium between these different spheres to manage the economic transformation and to localize SDGs. To collect quantitative and qualitative data on local initiatives of "good" economics and "good" local public policies, a mixed method approach with multiple tools is employed. Empirical results suggest a strong need of rethinking such local areas, highlighting the limits of the business as usual such as the traditional definition of economic development. Moreover, the local policy maker is called upon to play a coordinating and networking role between the various active innovative initiatives and committed to concretely promoting a sustainable transformation of their territory.

576 City science and urban climate action: filling the science-policy gap at the local level? The case of the City Science Office of Reggio Emilia (Emilia Romagna, Italy)

Elena De Nictolis[1], Luna Kappler[2], Manfredi Valeriani[2]

[1]Georgetown University, Environmental Justice program, Washington, DC, USA. [2]Luiss University, Rome, Italy

The climate crisis expose the vulnerabilities of city governance and urban law while also reinforcing its relevance. Vulnerable inhabitants in complex neighbourhoods (from an infrastructural, social, economic standpoints) are disproportionately affected by the health and socio-economic implications of climate change. The EU has recently launched the Climate Neutral and Smart Cities by 2030 Mission, which calls on cities to counteract climate change adopting a people-centered approach. Achieving this goal require cities to craft experimental, multi-actor policies, necessarily with the support of scientists and experts which are often involved temporarily and randomly. This paper will analyze the science - urban policy experimentalism connection and more specifically the emerging phenomena of innovations (namely City Science Offices) implemented by cities to include researchers and support the public administration from the inside in promoting science/based policy making on climate change.

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SCIENCE-POLICY-SOCIETY INTERFACES FOR RESILIENT AND SUSTAINABLE RURAL DEVELOPMENT

Chair: Sabrina Arcuri

584 A Living Lab perspective of participatory practices: Exploring Digital transition and resilience aspects in rural communities

Phoebe Koundouri[1,2,3,4], Eleni Toli[2], Ebun Akinsete[2], Christos Marinos-Kouris[2], Panagiota Koltsida[2]

[1]Athens University of Economics and Business, Greece. [2]ATHENA RC, Athens, Greece. [3]SDSN Europe, Paris, France. [4]European Association of Environmental and Resource Economists, Venice, Italy

The successful response to the increased resilience and climate adaptation concerns, with an outlook perspective, suggests an emerging need for effective ways of community engagement and mobilization, to enhance community roles and identify adaptation needs in a system-wide level. Encouraging the inclusion of local stakeholders and community members creates a shared vision, imperative to alleviate efficiently the local vulnerabilities and minimize future risks of technology deployment. This paper presents a small-scale implementation of the above, in the frame of two Living Labs located in Greece and operated by Athena RC inside the scope of H2020 DESIRA project. It illustrates the codevelopment and co-creation methodology adopted by both LLs. Though different in scope, both Living Labs, aim to explore existing gaps and assess the usefulness of digital interventions, tailored in their respective needs, under a common Living Lab methodological approach that fosters multi-stakeholder participation in real life settings.

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POLICIES: BIODIVERSITY AND ECOSYSTEM SERVICES: VALUATION AND POLICIES
Chair: Claudia Sattler

106 Using deliberative valuation to reveal individuals' preferences for ecological and landscape integration of transport infrastructure: empirical evidence from a French case study

Coralie Calvet[1,2,3], Anne-Charlotte Vaissiere[1]

[1]Université Paris-Saclay, CNRS, Laboratoire ESE, France. [2]Centre d'Economie de l'Environnement, Montpellier, France. [3]UMR TETIS, Montpellier, France

There is a growing public expectation that environmental issues should be taken into account in land-use planning, particularly with regard to the development of linear transport infrastructures (LTIs) because of its large spatial footprint and major environmental impacts. Faced with the societal challenges posed by global change, it is more necessary than ever to assess the social demand for a change in modes of mobility. In view of the recent literature, it seems particularly relevant to assess collective preferences in terms of ecological and landscape integration of LTIs, which is the focus of our research. We propose to assess citizens' preferences using an original method that combines the discrete choice experiment and deliberative approaches based on quantitative and qualitative surveys conducted on a national scale. We will test the contributions of such a methodology to better understand social demand in the face of expected ecological transformations of societies.

615 Efficiency and sustainability of fishery resource management policies: is it an economic or a biological matter? The case study of the fishery of small pelagics in the Strait of Sicily

Marco Torri[1], Carmelo Bennici[1], Angela Cuttitta[1], Marilena Di Natale[1], Tiziana Masullo[1], Marianna Musco[1], Bernardo Patti[2], Ignazio Piazza[3], Vito Pipitone[1], Stefania Russo[1]

[1]CNR-ISMed, Palermo, Italy. [2]CNR-IAS, Palermo, Italy. [3]CSR Pesca, Trapani, Italy

The economic relationships involved into the small pelagic fishing sector has been analysed to propose management measures that consider both ecological dynamics and the market orbiting around fishery resources. For this purpose, we considered the small pelagic fish Engraulis encrasicolus and Sardina pilchardus caught in Sciacca (Sicily, Italy). Qualitative mathematical modelling has been implemented as a mean to understand and predict the dynamics of complex biological and socio-economic systems. A sensitivity analysis on the model implemented has been carried out to identify appropriate management policies. Our results highlighted a monopsony structure of the market. Models allowed to take into account biological, economic and social variables in order to evaluate the role played by the stakeholders and define management policies that intervene not only on the control of sampling activities but also on the structure of the market itself, with important repercussions on the economy of the fishing sector.

616 Ecology and economics, a multidisciplinary approach applied to the protection and sustainable exploitation of marine biodiversity: Eco2 for the marine environment

Angela Cuttitta[1], Carmelo Bennici[1], Stefania Bertolazzi[2], Marilena Di Natale[1], Tiziana Masullo[1], Marianna Musco[1], Vito Pipitone[1], Stefania Russo[1], Marco Torri[1]

[1]CNR-ISMed, Palermo, Italy. [2]LUMSA University, Palermo, Italy

This contribution summarizes the main research activities carried out by the ISMed CNR research group of Palermo on the Mediterranean Sea. This young group is made up of researchers and technicians with expertise in economics, biology, natural sciences and is strongly motivated by the love for the sea and biodiversity and the desire to protect it. The research activity is aimed at studying the sea and biodiversity as a resource, with a view to regenerating coastal marine ecosystems and their sustainable use. In this paper, we would like to present a case study of our activities, represented by research on microplastics in the sea. Plastic pollution is one of the major environmental challenges generated by the unsustainable use and disposal of plastics by human societies.

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POLICIES: BIODIVERSITY AND ECOSYSTEM SERVICES: VALUATION AND POLICIES
Chair: Claudia Sattler

243 The marine litter challenge in the Ocean´s Decade

Carmen Morales-Caselles, Cózar Andrés
University of Cadiz, Spain

Nowadays, we live in what is called the "Plastic Age" with more than 8 million tons of plastic that end up in the ocean every year. While an onrush of initiatives to combat marine litter spreads around the world, the necessary information to guide these actions remains limited. This study creates a ranking of the top items littering the ocean in order to contribute to the worldwide debate on waste prevention policies. To do it develops an in-depth harmonization process to connect and compare 36 databases that collectively held more than 12 million observations of litter in aquatic ecosystems. The findings showed that plastics derived from land-based consumption are by far the most frequent items in marine litter on a global scale. Bags, bottles, food containers and cutlery together with wrappers account for almost half of the human-made objects found in the global ocean. The proportion of litter related to sea-based activities increases in sparsely inhabited areas, becoming the predominant litter-type in open ocean waters as well as at high latitudes. Shores emerge as key areas to intercept litter before it becomes microplastic and spreads out of control across the global ocean. These results point to the roadmap to combat marine litter in the Ocean´s Decade. Next steps should enhance the comparability of global litter databases and to mobilize the power of citizen science in order to support marine litter research and decision-making. Despite new polices targeting certain items, management actions should prioritize these top litter items to prevent further impacts in aquatic ecosystems.

280 Institutional analysis of innovative contracts to incentivize farmers to provide environmental public goods: who are the involved actors and what are their roles?

Claudia Sattler
Leibniz-Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany

In this study, we investigate the institutional design of innovative contracts for agri-environmental and climate schemes to better incentivize farmers for the provision of environmental public goods. Four contract types are differentiated: result-based, collective, tenure-based, and value-chain contracts. Institutional analysis is used to explore similarities and differences within and between the different types. Overall 16 case examples from four European countries were included into the sample, identified through a method mix combining literature review, web search, and expert consultation. For a structured data collection Elinor Ostrom's Institutional Analysis and Development (IAD) framework was used. For data analysis, the focus was then on the involved actors and their roles in contract governance. Results highlight on the diversity of roles assumed by different public, private, and civil actors involved from the local, regional, or (inter-)national governance level.

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BEHAVIORS AND SOCIAL CHANGE: EXPERIMENTAL/BEHAVIOURAL ECOLOGICAL ECONOMICS

Chair: Alexandra Koves

20 Bridging political polarisation: Unconscious perceptions about carbon taxes are less divisive than deliberate responses

Aitor Marcos, Jose Maria Barrutia, Patrick Hartmann

University of the Basque Country UPV/EHU, Bilbao, Spain

Political polarisation in the US hinders bipartisan agreements on carbon taxes. Given that perceived fairness is an antecedent of policy acceptability, identifying the source of fairness perceptions is helpful to understand how irreconcilable democrats' and republicans' views on carbon taxes are: Homogeneous implicit perceptions on carbon tax fairness would mean that disagreements are not deeply rooted nor automatic but rather are a result of conscious motivated reasoning. To test this, we recruited 405 US participants who previously reported their political affiliation. We conducted an Implicit Association Test (IAT) to construct a measure of implicit fairness perception, which was then compared with participants' self-reported (explicit) fairness perceptions about carbon taxes. We showed that involuntary fairness perceptions about carbon taxes already divided democrats and republicans at implicit level. This partisan gap widened when fairness was asked explicitly, confirming that deliberated politically motivated reasoning further increased polarisation.

119 A torn generation: Dichotomies and dissonances on sustainability

Alexandra Köves, Lilla Vicsek, Tamás Tóth

Corvinus University of Budapest, Hungary

In research on the expectations of the future regarding technological change, artificial intelligence, equality and sustainability, in-depth interviews were conducted with 33 university students in Hungary. The results show that the interviewees truly struggle to decide whether the world really is on fire regarding environmental change; whether technology is capable of solving the situation; whether inequality really is a problem and how them as individuals can relate to all these problems. The uncovered dichotomies suggest that they neither find comfort in the dominant techno-optimistic, eco-modernisation narratives nor are they aware of any alternatives. The results underline the need in ecological economics to turn towards understanding phenomena long discussed in behavioural sciences such as spatial discounting, lack of perceived behavioural control, techno-salvation, system justification, optimism bias. We also suggest that ecological economics ought to focus on behavioural economics tools to influence the much-needed behavioural change.

237 Understand the origin of the intention to buy certified chocolate in Cameroon through the theory of planned behavior and the theory of self-determination

Bienvenue Belinga[1], Colas Chervier[2], Guillaume Lescuyer[3], Jean Hugues Nlom Pr[4]

[1]Université de Douala, Yaoundé, Cameroon. [2]Cirad, Montpellier, France. [3]Cirad, Cifor, Montpellier, France. [4]Université de Douala, Cameroon

The consumption of certified foods has been the subject of numerous studies in Western countries and more recently in emerging economies. Sub-Saharan Africa is still little influenced by this phenomenon, but it should increase in the medium term. In order to accompany this change, it is crucial to understand the origin of the motivations that can lead African consumers to acquire certified foods on national markets. We used a new approach combining the three precursors of the theory of planned behavior and external regulation to explore the socio-psychological origin of the demand for certified chocolate in Cameroon. The analysis of 118 respondents with structural equation modeling shows that external regulation influences purchase intention through attitude. This study provides a first estimate of the origin of sustainable food purchase motivations and facilitates the development of social nudges capable of promoting this consumption in the Congo Basin countries.

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BEHAVIORS AND SOCIAL CHANGE: EXPERIMENTAL/BEHAVIOURAL ECOLOGICAL ECONOMICS

Chair: Alexandra Koves

535 How do monetary incentives affect intrinsic motivations for nature conservation? Taking stock of the empirical research

Julian Rode[1], Juan Felipe Ortiz-Riomalo[2], Torsten Krause[3], Erik Gomez-Baggethun[4], Alma Scholz[1], Fabian Thomas[2], Stefanie Engel[2]

[1]Helmholtz-Centre for Environmental Research (UFZ), Leipzig, Germany. [2]University of Osnabrueck, Germany. [3]Lund University, Sweden. [4]Norwegian University of Life Sciences, Oslo, Norway

While economic incentives for biodiversity conservation are compelling policy tools to instigate pro-environmental behaviours, there are persistent concerns that they may undermine non-economic motivation for conservation ('crowding out'). Motivation crowding-out can be particularly consequential for conservation outcomes if the non-economic motivation remains eroded after incentive schemes terminate. Empirical studies have confirmed crowding-out effects, but also provide evidence for the opposite, where incentive-based policies strengthen ("crowd-in") intrinsic motivations. We review 65 empirical studies and find that the overall evidence on motivation crowding remains mixed. Comparability between studies is complicated by the variety of methodological approaches that measure behaviour, motivation, or moderating constructs. Our analysis shows how the influence of certain policy design specifics (e.g. incentive level, degree of participation, framing, complementary interventions) in combination with socio-cultural characteristics (e.g. social norms, community cohesion, nature connectedness) can favour the occurrence of motivation crowding-in or crowding-out. We formulate lessons for research and policy design.

607 The acceptability of exosomatic energy limits: an immersive virtual reality experiment

Stefano Baraldi[1], Sara Ermini[1], Claudia Faita[2], Pietro Guarnieri[2], Valeria Faralla[1], Alessandro Innocenti[1], Luca Lusuardi[1], Tommaso Luzzati[2], Marco Raugi[2], Vincenzo Santalucia[1]

[1]Laboratorio di Economia Sperimentale (LabSi) -Università di Siena, Italy. [2]Università di Pisa, Italy

This paper reports on an experiment in Immersive Virtual Reality (IVR) to evaluate the acceptability of exosomatic energy limits. Several papers show that IVR represents a valid tool to study and/or learn pro-environmental behaviours. In particular, IVR offers the advantage to create vivid information by showing consequences of action in a controlled and replicable environment. The feedback given in this experiment to subjects is temporally exaggerated (TEF), that is, medium term consequences are given immediately. Participants first perform a task twice by using two tools requiring two different combinations of personal effort and exosomatic energy consumption (low-high vs high-low). Afterwards, they are asked to choose the preferred tool to perform the task again. Our experiment tests whether exposing the subjects to TEF immediately after using the high energy consumption tool affects the subsequent choice of the tool. We also study the willingness to refrain from using it.

557 Curbing energy consumption through voluntary quotas: Insights from an online experiment

Nicola Campigotto[1], Marco Catola[2], Pietro Guarnieri[1], Lorenzo Spadoni[3]

[1]University of Pisa, Italy. [2]Maastricht University, Netherlands. [3]LUISS Guido Carli, Rome, Italy

This study uses an online experiment to investigate the effects of voluntary quota schemes aimed at reducing energy consumption. Each participant chooses how much energy to consume, with higher energy consumption levels resulting in a higher payoff. Energy is provided by a generator, the capacity of which is mutual knowledge. If the overall energy used by participants exceeds the generator's capacity, then each participant suffers a power outage and consumes no energy. Our design includes three treatments, each featuring a different voluntary quota scheme that trades off potential gains for energy security. Participants who accept a quota must reduce their energy consumption, which however becomes guaranteed regardless of others' decisions. We show that voluntary quota schemes help to prevent outages in the event of energy shortages, and we compare quotas with one another based on their ability to curb aggregate energy consumption and their impact on inequality in energy use.

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TRANSFORMATIONS: ACTIONS FOR SOCIAL CHANGE
Chair: Simona Getova

430 From Early Warning to Early Action: A complex adaptive system approach to explaining the translation of early warnings into early action in the lead time of flood events

Jonathan Ulrich[1], *Finn Laurien*[2], *Reinhard Mechler*[2]

[1]Vienna University of Economics and Business, Austria. [2]International Institute for Applied Systems Analysis, Vienna, Austria

Early warning systems (EWS) are recognised as key elements of effective DRR and community resilience building strategies. While significant progress has been made regarding the understanding and detection of hazards, early warnings still often fail to translate into early actions that save lives and livelihoods. This failure has been attributed to failed warning dissemination and communication as well as low disaster preparedness and capacities for early action. It has been argued that regarding EWS as a 'social process' rather than a separate technological system can help to uncover and address the root causes of EWS failures. Yet, to date there have been only few attempts to conceptualize EWS as 'social processes' that are embedded in and interact with other social-ecological systems at different spatial, temporal, and organisational scales. Based on expert consultations and a systematized search and critical review of the existing literature on EWS, this paper proposes a conceptual framework of EWS as complex adaptive systems [...]

469 The Contribution of Intersectional Praxis in Advancing Just and Care-full Socio-Ecological Transformations for Feminist and Degrowth-oriented Green New Deals

Simona Getova

Universitat Pompeu Fabra, Barcelona, Spain

Intersectionality ia a multifaceted field of inquiry stemming from Black feminist thought that calls out power structures and dynamics from which the interlinked crises stem. I argue that intersectionality can inspire and strengthen the literature on socio-ecological transformations (SETs) towards just, decolonial, and post-growth futures. I explore elements from both scholarships (SETs and intersectionality) that reinforce justice and care in the transformational quest for fair, equitable and sustainable futures - deliberate SETs (Shah et al., 2018). I investigate this cross-fertilization by performing a critical review of the literature on the interface of deliberate SET endeavours and intersectional praxis (Dellheim & Wolf, 2017; Collins, 2019) in relation to feminist and degrowth-oriented Green New Deals (GNDs). The benefits of this interface present how intersectionality captures the plurality in praxis and visions toward transformation, embraces complexity in understanding differentiated impacts and in building desired futures, and studies the experiences of transformations of diverse groups.

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TRANSFORMATIONS: LABOUR AND JUST TRANSITIONS
Chair: Simona Getova

346 Green investments and occupational mobility: a multilayer network analysis of the green transition

Joris Bücker[1,2], Anton Pichler[3], R. Maria Del Rio-Chanona[3], J. Doyne Farme[r1,4,5], Matthew C. Ives[2]

[1]Institute for New Economic Thinking at the Oxford Martin School, University of Oxford, United Kingdom. [2]Smith School of Enterprise and the Environment, University of Oxford, United Kingdom. [3]Complexity Science Hub, Vienna, Austria. [4]Mathematical Institute, University of Oxford, United Kingdom. [5]Santa Fe Institute, USA

In a world that is moving to net-zero greenhouse gas emissions, employment will shift from fossil fuel to renewable energy supply chains. Some workers may have to change jobs. It is important to understand the occupational mobility options in the labor market, as a displaced fossil fuel worker might not easily find work as a wind turbine technician. In this paper we use U.S. data to build a multilayer network of industries and occupations. We aim to find viable occupational mobility pathways from fossil fuels to various renewables to help displaced workers find new jobs. Vice versa we investigate who might supply the new labor necessary for the energy transition to succeed. We find that job opportunities in the renewable energy supply chain are relatively accessible for displaced occupations, but individual workers might still struggle. Vice versa, manufacturing industries might have a hard time finding enough qualified workers.

560 Labour market conditions and health of workers doing platform-mediated online work. A mixed methods analysis

Maddalena Josefin Lamura, Barbara Haas, Marcel Bilger, Dominik Klaus

Vienna University of Economics and Business (WU), Austria

Since digital forms of work are on the rise, it is relevant to understand the challenges digitalisation poses for workers.
We present the first results of a mixed-methods project on platform-mediated online work, i.e. crowd-work, from the perspective of German-speaking workers. The main question is: What is the impact of crowd-work on health and well-being? We examine precarious working conditions, complementing traditional aspects (e.g. working hours, pay, contracts, autonomy) with the role of platform management (e.g. control and transparency of communication). The whole spectrum of online jobs is considered: from highly skilled, demanding (macro) tasks to repetitive, monotonous click work (micro). Qualitative research allows us to conceptualise the heterogeneity of tasks and precarious conditions, to deepen our understanding of the workers' perspective and gain a better understanding of what the impacts are on their (mental) health. The quantitative online survey is followed by final interviews to deepen still open questions.

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SPECIAL TRACK: TRANSFORMATIONS
Chair: Elena Claire Ricci

622 A case and orientations for systemic transformations

Pratik Patil

International Institute for Applied Systems Analysis, Laxenburg, Austria

This presentation contains a synthesis of the big picture: dominant societal dynamic toward collapse (characterised by reductionist idealism) vs emergent transformations towards sustainability (characterised by complex realism). This overview encapsulated in the Figure Collapse vs Transformation gives a necessary contextualisation for further research and a realistic impetus to all actors for catalysing deep transformations.

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SPECIAL TRACK: SUSTAINABLE PATHWAYS FOR THE FOOD SYSTEM: A CITIZEN-CONSUMER PERSPECTIVE

Chair: Elena Claire Ricci

51 Impacts and potential effects of participatory guarantee systems inclusion in the european organic regulation

Giovanna Sacchi[1], Christian Fischer[1], Maurizio Canavari[2]

[1]Free University of Bozen-Bolzano, Italy. [2]University of Bologna Alma Mater Studiorum, Italy

Internal Control Systems (ICS) and Participatory Guarantee Systems (PGS) are alternative quality assurance systems for organic productions implemented by smallholders because they result more accessible and less costly than third-party certification (TPC). Regulation (EU) 2018/848 on organic production recognises ICS for small farmers. Whereas PGS are not included, despite being promoted by the IFOAM and officially recognised by several worldwide countries. This study aims to evaluate the possible future inclusion of PGS at the European level. Thirty experts participated in a Delphi exercise, and both optimistic and pessimistic views were agreed upon among them. Possible bureaucratic excess and standardization requirements needed in the process of PGS institutionalisation could emerge resulting in even more rigid practices compared to the "conventional" ones. While the recognition of PGS could broaden the inclusion of smallholders lowering certification costs, increasing cohesion and competencies among rural development actors, and increasing the reputation of PGS-certified local products.

409 Pro-sustainable viticulture: views and perspectives from Prosecco wine growers in Italy

Elisa Giampietri, Alessandro Caputo, Samuele Trestini

University of Padova, Italy

As a novel contribution, this study aims at eliciting and better understanding the pro-sustainable viticulture behavioural intention of wine growers in the Prosecco wine region in Italy, where in the last decade social conflicts arose between residents and wine growers around the sustainability of wine production. A survey 100 wine growers in the area was administered and data are analysed through a partial least square-structural equation model. Following the literature, the research tests the role of some antecedents (individual knowledge, sensitivity, and responsibility towards sustainable viticulture) on the investigated behavioural intention, also analysing the effect of self-identity and attitude towards sustainable viticulture. Information provided are strategic to facilitate the social relationships through common views among the actors (residents and winegrowers) in the area, with the broader objective of pursuing and promoting the sustainable development of Prosecco wine production.

500 Making consumer food choices more sustainable: a restaurant based natural field experiment

Elena Claire Ricci[1], Claudio Soregaroli[2], Elena Castellari[2], Stefanella Stranieri[3]

[1]University of Verona, Italy. [2]Università Cattolica del Sacro Cuore, Piacenza, Italy. [3]University of Milan, Italy

The paper aims at studing if consumer food choices are influenced by sustainability considerations in a specific setting: that of eating out. To do so, we implemented a natural field experiment in three restaurants in the Milan area (Italy), based on nudging techniques affecting the saliency for environmental-sustainability and health-related attributes. More in detail, we modified the menu cards to highlight the most environmentally friendly or the most healthy choice of the daily specials menu. We also included the 'chef choice' to test a nudge with no socially-relevant significance. Each of the items of daily special menu was analyzed and classified on the basis of a set of indicators to identify its environmental sustainability and health attributes. Results provide insights on consumer real preferences for sustainability attributes and their trade-offs with other decision variables in the context of eating-out behaviour which can provide insights for policy-making promoting more sustainable food choices.

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TRANSFORMATIONS: ECOLOGICAL MACROECONOMIC MODELS

Chair: Adrian Saldarriaga-Isaza

210 The challenges of a just ecological transition in poorer countries: A policy scenario analysis in Colombia

Adrián Saldarriaga Isaza[1], *Tiziano Distefano*[2]

[1]Universidad Nacional de Colombia, Medellín, Colombia. [2]University of Pisa, Italy

Poorer countries often face a severe trade-off; the need to improve socio-economic conditions is hard to balance with key ecological processes. As a case study, we select Colombia, whose "Long-Term Green Growth Policy" (LGGP) aims to achieve several of the UN's Sustainable Development Goals. Despite the potential benefits of this policy, it is still not clear its societal barriers and effects. What are the pros and cons, both at the social and environmental level, of the LGGP plan? Are there viable alternatives? What features ecological macroeconomic models should include to take into account the challenges of this transition in relatively poorer countries? We run EUROGREEN system dynamics model whose core is represented by the application of the Input-Output approach. With this model, we evaluate the possible threats and promises of the LGGP policy, and alternative scenarios to 2050. We extend the model by including water and land modules.

310 Waiting for the transition: The role of expectations and narratives in the decarbonisation of the electricity sector

Cahen-Fourot Louison[1], *Campiglio Emanuele*[2,3], *Daumas Louis*[4,5], *Michael Gregor Miess*[6,7,8], *Andrew Allan Yardley*[9]

[1]Institute for Ecological Economic - Wirtschaftuniversität, Vienna, Austria. [2]Università di Bologna, Italy. [3]Grantham Research Institute - LSE, London, United Kingdom. [4]Ecole Nationale des Ponts et Chaussées, Champs-sur-Marne, France. [5]CIRED, Nogent-sur-Marne, France. [6]Institute for Ecological Economic -Wirtschaftuniversität, Vienna, Austria. [7]Environment Agency, Vienna, Austria. [8]Institute for Advanced Studies, Vienna, Austria. [9]Wirtschaftuniversität, Vienna, Austria

We propose a formalism for expectations in the context of the low-carbon transition. This framework starts from the notion that narratives are key in structuring agents' behaviour. We apply this expectation structure to sectoral model of the electricity sector accounting for financial variables and constraints. Investment choice between two technologies (high-carbon and low-carbon) is affected by heterogenous fictional expectations about the pace and intensity of the low-carbon transition, along two dimensions. First, our investors refer to two "focal" transition narratives. Second, we represent expectation heterogeneity by with idiosyncratic beliefs normally distributed around reference narratives. We use a Probit framework to determine aggregate investment behaviour. This framework allows us to study how a transition-contrarian narrative can emerge. We show that a large dispersion of individual expectations can lock expectations in a transition-contrarian norm. We further show that a carbon price and ambitious climate targets are enough to counter adverse dynamics.

568 Shapes of emissions decline: Carbon pathways

David Collste, *Thomas Hahn*

Stockholm Resilience Centre, Stockholm University, Sweden

Carbon budgets have been allocated based on estimates on what is needed to reach the Paris climate agreement (Le Quéré et al., 2018). The Carbon law (Rockström et al., 2017) suggests that emissions need to be halved every decade from 2020. Patterns of emissions decline are essential to be able to estimate the needed degree of transformation, and this is the focus in our manuscript. Different assumptions about how the transformation will look results in different shapes of emissions decline: declines in carbon emissions may, e.g., be linear, logistic or depict exponential decay. The expected results are better understanding the often implicit assumptions behind different formulations of carbon emissions decline.

464 Green macroeconomic policies, consumption patterns and household financial fragility: a stock-flow consistent perspective

Ali Berk Kokbudak, *Maria Nikolaidi*

University of Greenwich, London, United Kingdom

We use an ecological stock-flow consistent (E-SFC) model to investigate how macroeconomic and financial policies that promote investment in green houses can affect economic variables, the financial fragility of households and the environment. A novel feature of our analysis is that we explicitly formulate the emissions that are generated by houses and we make a distinction between green and conventional mortgages. We assess the effects of (i) the introduction of green loan subsidies, (ii) the implementation of green targeted refinancing lines and (iii) the use of policies that affect consumption patterns and reduce consumption. All these policies have both positive and negative implications for the economy and the environment. The favourable effects on the financial position of households and the level of emissions are maximised when these policies are implemented in combination.

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SPECIAL TRACK: INTERPLAY BETWEEN POST-GROWTH TRANSITION AND FINANCIAL SYSTEM DYNAMICS

Chair: Adrian Saldarriaga-Isaza

177 Comparative Computational Analysis of the Properties of a Monetary System that Combines Money Creation for a Guaranteed Income with Demurrage vs Post-Keynesian Endogenous Money Systems

Stef Kuypers

VUB, Brussels, Belgium

While the debate on whether the dominating monetary systems, based on the post-Keynesian money supply model (Nayan et al., 2013; McLeay et al., 2014; Werner, 2014, 2016; Deutsche Bundesbank, 2017; Gross and Sienenbrunner, 2019), have an inherent growth imperative goes on, another question is being ignored: is there a better alternative? That's what this paper is about: researching an alternative monetary system where money is created ex-nihilo for the purpose of giving everyone a basic income and where it is destroyed by charging demurrage on accounts, thereby creating a mathematically stable money stock. No assumptions on net wealth accumulation or borrowing (Cahen-Fourot and Lavoie, 2016; Jackson and Victor, 2015; Richters and Siemoneit, 2017) need to be made for this model and the comparative computational analysis with Kuypers, 2021 indicates better stability under a wide range of situations, including a steady state economy.

465 Preliminary results of the research project "Finance Change for Resilience and Sustainability" (FIRN)

Christoph Freydorf

Cusanus Hochschule für Gesellschaftsgestaltung, Koblenz, Germany

The research project "Finance Change for Resilience and Sustainability" (German Acronym FIRN) aims to examine a role the financial sector can take in (and consequently has to be tasked with) supporting a rapid socio-ecological transformation towards a resilient and sustainable economy. The research traces crucial disruptions and developments in climate and post-corona policies and the professional discourse on sustainable finance, which is contrasted with the critical discourses on systemic vulnerability of the financial sector, thus taking into consideration more fundamental reform propositions. On basis of a literature review and semi-structured interviews with experts and practitioners on sustainable finance from commercial and public banks, impact investment funds, NGOs and regulators in Germany, the project aims to conceptualize concerted emergency action aiming on a consequent shift in the financial sector and the real economy.

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SPECIAL TRACK: TRANSFORMATIVE PLANNING FOR URBAN NATURE: THE CHALLENGE OF CONSIDERING SOCIAL IMPACT IN NATURE COMPENSATION
Chair: Meri Juntti

67 How to understand "social" in ecological compensation: the case of Lahti, Finland

Kaisa Pietilä[1,2], Iikka Oinonen[1], Suvi Huttunen[1]

[1]Finnish Environment Institute, Helsinki, Finland. [2]Tampere University, Tampere, Finland

Ecological compensation in urban contexts is piloted as a novel way of halting biodiversity loss. The urban context sets specific challenges to ecological compensation, as urban greenspaces have different meanings, values, uses and benefits to the local residents. Hence, we detail the challenges associated with the social side of implementing ecological compensation in the city of Lahti, Finland. A first of its kind in Finland, Lahti ecologically compensated in 2021 for developing and building a new residential area, Kytölä. Using qualitative content analysis of workshops, community engagement reports and interviews with stakeholders, we trace and analyse the views of Lahti residents and city officials on the Kytölä development and the following ecological compensation. The preliminary results shed light on the values, views and experiences of different actors, thus constructing different ways of how 'social' ought to be understood and taken into account in ecological compensation in urban settings.

163 Green infrastructure, ecosocial compensation, and the future of environmental well-being in Turku, SW Finland

Juha Hiedanpää1, Misa Tuomala[2], Aleksis Klap[3], Miika Meretoja[4], MInna Pappila[5], Idamaria Laine[2], Timo Vuorisalo[2]

[1]Natural Resources Institute Finland (Luke), Turku, Finland. [2]University of Turku, Finland. [3]Regional Council of SW Finland, Turku, Finland. [4]City of Turku, Finland. [5]Finnish Environment Institute, Helsinki, Finland

Concise urban construction and urban sprawl are both urban megatrends, also in Finland. Although urban densification has many benefits, it fragments green spaces which are important for humans and non-humans. Ecosocial compensation could be one solution to the problem of the fragmenting urban nature. The idea of ecosocial compensation is to conjointly provide nature-based social values to compensate the negative impacts of urban development at one place. We studied how to apply the mitigation hierarchy (avoid, mitigate, restore, and compensate) as part of land use planning of the city of Turku. We interviewed urban planners, decision-makers, civil society organizations and researchers, organized three workshops, and conducted a Maptionnaire-survey with residents. We were also able to insert a question on ecosocial compensation to the candidate selection engine of municipal elections. In our presentation, we explicate the reasons for the warm reception of ecosocial compensation and discuss the next taken step.

282 Understanding the social impact of urban greenspace in the context of regeneration

Meri Juntti[1], Sevda Ozsezer[2], Nicholas Dash[2]

[1]Middlesex University, London, United Kingdom. [2]London Development Trust, United Kingdom

The beneficial social impact of greenspace is increasingly recognised in urban planning. But attempts to deliver better greenspace in regeneration are often viewed suspiciously by communities who fear becoming priced out of newly green neighbourhoods. Our findings from two London housing estates demonstrate that while its wellbeing and liveability benefits are undisputed, urban greenspaces can be exclusionary and their benefits thwarted in the fraught context of regeneration. While the default solution to these problems is participation, the willingness of communities to engage is dampened by the normalisation of the logic of austerity, where public space provision happens on the terms of developers rather than communities. For many urban residents, public greensapce is not truly public and the new divisions that it creates subvert its potential benefits. Alongside fundamental changes to urban housing delivery, there is a need to build trust and inclusive practices in participatory design and planning.

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SPECIAL TRACK: TRANSFORMATIVE PLANNING FOR URBAN NATURE: THE CHALLENGE OF CONSIDERING SOCIAL IMPACT IN NATURE COMPENSATION
Chair: Meri Juntti

348 The threat of green gentrification in 'Red Vienna': about the implementation of nature-based solutions in urban planning and their potential negative trade-offs

Michael Friesenecker[1,2], *Thomas Thaler*[2]

[1]University of Vienna, Austria. [2]University of Natural Resources and Life Sciences, Vienna, Austria

With managing the current pandemic, questions about spatial (in)justices - such as the unequally distributed access to urban public green and blue spaces - have become more prominent. Against this backdrop, this contribution investigates trends regarding the (un-)even provision to green spaces vis- à-vis social-spatial dynamics in Vienna and the City's strategies for improving access to green spaces. Preliminary results hint at a certain risk of green gentrification for low-income householders in areas dominated by the private, historic housing sector. These areas are affected by housing de-regulations and lower densities of green spaces alike, whereas the implementation of nature-based solutions increases the risk of green gentrification. Yet, the City of Vienna shows little awareness of green gentrification, although policy and planning instruments to reduce negative consequences of gentrification exists. That is why we conclude that potential trade-offs need to be considered already in the planning and decision-making processes.

501 Nature-based solutions, ecosystem services and participatory processes: a Brazilian case-study of catchments protection in peri-urban metropolitan areas

Nilo Nascimento, Heloisa Costa, Geraldo Costa, Vanessa Cançado, Deyvid Rosa

Federal University of Minas Gerais, Belo Horizonte, Brazil

Assuming water and land policies as closely connected, this contribution discusses recent developments of last decade participatory planning in Belo Horizonte, a 5.9 million inhabitants and 34 municipalities metropolitan region in Southeast Brazil. It adopted a blue and green weave concept, interconnecting water, biodiversity, culture, agriculture and active mobility as key territorial restructuring elements. It stimulates environmental protection of strategic drinking water supply catchments. However, trade-offs between competing interests can create or exacerbate socio-spatial inequalities. Ecosystem services approaches associated with blue and green solutions may offer compensations, in densely occupied urban and peri-urban areas, for water security, environmental justice, and welfare distribution. Hydrology and climate modelling assesses water security and climate resilience in Vargem das Flores. Environmental and social justice, and welfare distribution are evaluated through two payment for ecosystem services approaches: the Copasa water utility led "Pro-Manancial Programme", and a funding conservation simulation compensating water and land use restrictions.

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TRANSFORMATIONS: COMPLEXITY AND CLIMATE CHANGE
Chair: Veronica Karabaczek

95 Perceptions on intolerable climate-related risks and potential limits to adaptation in Austria

Veronica Karabaczek[1], Thomas Schinko[1], Linda Menk[2], Stefan Kienberger[2]

[1]International Institute for Applied Systems Analysis, Laxenburg, Austria. [2]Department of Geoinformatics - Z_GIS, University of Salzburg, Austria

The focus on adaptation to climate change within policy and research has increased over the last decades. The accelerated rate of climate change and the increased frequency and intensity of natural hazards raise new questions regarding the effectiveness of adaptive measures, and whether limits to adaptation could be reached. Within the research project "TransLoss" ("Transformational risk management to tackle climate Loss and Damage in Austria and beyond"), we aim to provide empirical policy-relevant scientific insights into climate-related risks "beyond adaptation" in Austria, now and in the future. We carried out semi-structured interviews (n=26) with experts from research, policy and practice to identify sources of concern related to climate-related risks and factors impeding adaptation. Many perceived adaptation limits in Austria are linked to lacking awareness of the need to act, which is partly due to the belief that sufficient financial means and know-how are available to deal with future climate-related risks.

100 A modelling framework for the representation of economic climate change impacts and adaptation options

Paola López-Muñoz[1], Íñigo Capellán-Pérez[1], Óscar Carpintero[1], Iñaki Arto[2], Ana Morales[2], Elisa Sainz de Murieta[2], Kurt Kratena[3], Stavroula Papagianni[4]

[1]University of Valladolid, Spain. [2]BC3, Bilbao, Spain. [3]CESAR, Vienna, Austria. [4]CRES, Athens, Greece

Integrated Assessment Models (IAMs) have been widely criticized for their failure to provide a solid representation of climate change economic damage and adaptation policies. Here, we introduce a new modelling framework that focuses on capturing direct shocks, indirect effects and adaptation with a high level of detail. Direct impacts are captured through several multi-regional and multi-sectorial non-linear damage functions that calculate impacts from different extreme weather events on labour productivity and capital stock. Indirect impacts involve cascading effects among economic industries/agents as well as interrelationships with other non-economic modules, which implies guaranteeing coherence with biophysical and social impacts. Results are expected to achieve more coherent and realistic impacts in relation to estimates provided by other IAMs as well as to offer a better understanding of the causal chain mechanism. The final aim is to produce baseline scenario pathways consistent with the systemic risks.

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TRANSFORMATIONS: DESIGN OF POST-GROWTH ECONOMIES
Chair: Veronica Karabaczek

495 Forestry based social enterprises as business models for pluralistic value creation

Satu Helenius

University of Eastern Finland, Joensuu, Finland

Whiles forest-based bioeconomy is argued to hold solutions to several pressing sustainability challenges does the research in forest management tend to merely focus on the notion of weak sustainability. Therefore, this study approaches the Small-Diameter Wood (SDW) management from a strong sustainability paradigm with the emphasis on the importance of interactions between the economy, society, and the environment recognising the sustainability's embeddedness in the economy as a biophysically-based social subsystem. Moreover, this study focuses on investigating how post-growth organisations like the Social Enterprises (SEs), could help move toward more multi-functional and resilient forests by facilitating the coexistence of forestry and the social values of forests in the wider social and cultural contexts. The overall research aim is to develop a "Forestry Social Enterprise institutional applicability" framework by applying the methods of literature and practice review and interviews.

287 Digital sufficiency: Conceptual considerations for ICTs on a finite planet

Tilman Santarius[1], Jan Bieser[2], Vivian Frick[3], Matthias Höjer[4], Eva Kern[5], Johanna Pohl[1], Friederike Rohde[3], Steffen Lange[6]

[1]Technical University Berlin, Germany. [2]Universität Zürich, Switzerland. [3]Institute for Ecological Economy Research, Berlin, Germany. [4]Royal Institute of Technology, Stockholm, Sweden. [5]Leuphana Universität, Lüneburg, Germany. [6]Humboldt-Universität zu Berlin, Germany

ICT hold significant potential to increase resource and energy efficiencies and contribute to a circular economy. Yet unresolved is whether the aggregated net effect of ICT overall mitigates or aggravates environmental burdens. While the savings potentials have been explored, drivers that prevent these and possible counter measures have not been researched thoroughly. The concept Digital Sufficiency constitutes a basis to understand how ICT can become part of the essential environmental transformation. Digital Sufficiency consists of four dimensions, each suggesting a set of strategies and policy proposals: (a) Hardware Sufficiency, which aims for fewer devices needing to be produced and their absolute energy demand being kept to the lowest level possible to perform the desired tasks; (b) Software Sufficiency, which covers ensuring that data traffic and hardware utilization during application are kept as low as possible; (c) User Sufficiency, which strives for users applying digital devices frugally and using ICT in a way [...].

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TRANSFORMATIONS: DESIGN OF POST-GROWTH ECONOMIES
Chair: Veronica Karabaczek

253 Building new houses or restructuring old ones: using a feminist-degrowth framework to analyse the impacts of recent urbanization dynamics in Europe

Lorenzo Scalzitti

University of Pisa, Italy. Trier University, Germany

This essay claims that a degrowth-feminist perspective on profit-making and production boundary is crucial to understand how the urbanization trend relates to demographics and socio-climate crisis. Second section focuses on the micro shifting from for-profit (FP) to not-for-profit (NFP) scenario developed by J.B. Hinton (2020) and how impacts single agents' (firm and consumer) behaviors in the market to achieve social sustainability. It proceeds with a macro inversion, of the ICE model by Jochimsen and Knobloch (1997), of finance towards new social and ecological purposes to serve in the economy. Third section analyses urbanism dynamic through the lens of the frameworks developed in the second section, highlighting how accelerating urbanization trends influences real estate overvaluation. This acceleration, through cost-benefit logic, prevents climate sustainable realities in favour of financial gain and profits, through demand-supply dynamics on sustainability, resulting in overpopulated urban areas, increasing the demographic gap and worsening the climate crisis.

516 Determinants of Top Income Shares in Developing Countries: The role of Environmental Injustice

Niklas Uliczka[1], Sebastian Kripfganz[2]

[1]Tohoku University, Sendai, Japan. [2]Exeter University, United Kingdom

This paper's objective is to advance the understanding of impact factors determining income inequality at the top of the income distribution in developing countries. Importantly, this is the first cross-country panel data research project that accounts for the role of weather by analyzing the role of major natural catastrophes, temperatures, precipitation, soil moisture, and defined periods of droughts and floods on top income shares. We empirically exploit an unbalanced panel data set of annual country-level observations, applying two-way clustered standard errors that are robust to heteroskedasticity, serial correlation, and cross-sectional dependence. Expected results related to environmental injustice are ex-ante ambiguous due to the theoretical foundation of two competing arguments. According to the vulnerability argument, income inequality is expected to widen in the wake of natural disasters. The risk argument anticipates decreasing income inequality between the rich and the poor.

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ALTERNATIVE ECONOMIES

Chair: Andrew Fanning

417 Learning to live in a finite world

Peter Timmerman

York University, Toronto, Canada

The model of the human deeply embedded in standard economics is one of the great stumbling blocks to an acceptance of ecological economics as the alternative; and EE does not yet have a robust model of the human to match its other excellences and research priorities. This paper approaches such a model by exploring the elements of the psychological and social dimensions of a shift from the current "frame" within which modern economic actors operate -- a constantly reinforced belief in an infinitely desiring self, devoted to expressing itself and its need for "freedom" in a society characterised by a dynamic of constant progress -- to a new "frame" of an interdependent, "no growth", bounded, and finite world. In this exploration, the paper argues that the recent drawing of boundaries around the Earth (visually and scientifically) is already beginning to cause an "implosion of sensibility". What is sketched out in this paper in support of this implosion are the resources for a finite and bounded ethos, particularly drawing on non-Western traditions, and earlier Western traditions (e.g. Classical Stoicism). Also, aspects of this shift in sensibility can be found in new emerging philosophies and contexts, already underway in "philosophies of immanence" and "the new materialism".

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ALTERNATIVE ECONOMIES
Chair: Andrew Fanning

109 Building a caring world beyond growth - Degrowth, health and caring commoning practices

Winne van Woerden

Commons Network, Amsterdam, Netherlands. Universitat Autònoma de Barcelona, Spain

Although a core aim of degrowth is to enhance human well-being, little is known on what a degrowth transformation could mean for the field of health. If then we are to accept a degrowth transformation in the global north as the only sane and just response to safeguard human and planetary health, how should we reorganize care and reconceptualize health? In my research, I am exploring this question by diving into collective acts of organizing care through commons, i.e., caring commoning practices, throughout the Netherlands. What can we learn from these commoning dynamics, that currently manifest themselves within the context of a growthist society, for building a caring world beyond growth? And what transformative policies would structurally support such caring commons infrastructures and enable them to flourish in the absence of growth? I look forward to an engaging discussion about the building blocks for a care-full degrowth transformation.

604 A "return forward": The potential of rural traditional practices and knowledge in the Global North for a degrowth transition

Lucía Muñoz Sueiro

Institute of Environmental Science and Technology (ICTA-UAB), Barcelona, Spain

So far, the potential of traditional knowledge, practices, and worldviews still present in some rural areas of the Global North (understood under the umbrella of "Intangible Cultural Heritage") has been little studied in relation to degrowth. We suggest that some of them offer crucial elements to face the socio-ecological crisis, that should be revalued, safeguarded, and reinterpret. We refer, in particular, to those that follow degrowth principles such as localized small-scale production, collective decision-making mechanisms, reciprocity and conviviality logics, or practices of "dépense". We propose the concept of "return forward" to revalue, update and promote ways of doing, thinking, and feeling of the traditional rural local culture aligned with degrowth; we then suggest a systematization of criteria to distinguish and select them, together with some illustrative examples, and we finally anticipate the challenges and risks that this task must take into account.

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ALTERNATIVE ECONOMIES

Chair: Andrew Fanning

377 Creating doughnut portraits for places

Andrew Fanning

Doughnut Economics Action Lab, Oxford, United Kingdom

In April 2020, at the peak of the first wave of the COVID-19 pandemic, the City of Amsterdam announced that it was engaging with Doughnut Economics to help navigate the city's recovery from the crisis. This announcement was accompanied by the first public presentation of the "Doughnut Portrait" methodology, a place-based tool for holistic thinking and decision-making that can be distilled down to a single core question for a place: "How can this place become a home to thriving people, in a thriving place, while respecting the wellbeing of all people, and the health of the whole planet?" This question combines local aspiration – to be thriving people in a thriving place – with a global responsibility to live in ways that respect all people, and the whole planet. Since then, there has been a remarkable and inspiring process of peer-to-peer inspiration as cities and regions all over the world have been picking up [...]

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RESOURCES: MATERIALS, ENERGY, WASTE

Chair: Rosa Lago Aurrekoetxea

224 Bases for building a methodology for calculating rooftop solar photovoltaic potential and its contribution to the formation of energy communities

Alvaro Campos Celador[1], Rosa Lago Aurrekoetxea[1], Itziar Martínez de Alegría[1], Estitxu Villamor[2], Jon Terés Zubiaga[1], Aratz Erementeria[1], Jose Daniel Gutiérrez Porset[1]

[1]University of the Basque Country, Bilbao, Spain. [2]University of the Basque Country, Gasteiz, Spain

The creation of energy communities and cooperatives throughout Europe opens the door to the possibility of more effective democratic control over the destination of the energy, so it satisfies basic human needs. Knowledge of rooftop photovoltaic potential and the potential for electricity self-consumption provides important keys to facilitate the creation of new energy communities. This article provides important keys to be taken into account in order to develop a methodology to estimate the rooftop photovoltaic potential, electricity consumption, self-consumption potential, and the most convenient type of energy community. It has been identified that the calculation methodology should contain a filtering of optimal zones for installation of photovoltaic systems based on the EROI. In a premilinary way, the methodology has been applied in several case studies, including the University of the Basque Country (UPV/EHU), and a neighborhood in Bilbao (Basque Country).

573 Modeling the economy as a dissipative structure with scarce resources

Gregoire Noel[1,2], Gael Giraud[2]

[1]Paris-1 Sorbonne University, Paris, France. [2]Georgetown University, Washington, DC, USA

We provide a formal framework allowing to embed macroeconomic modeling within a thermodynamic realm. An economy is viewed as a dissipative structure, that is, an out-of-equilibrium complex system obeying the laws of irreversible thermodynamics, perpetually trading energy and matter flows with its environment to grow, sustain, and complexify itself. Industrial production of commodities is modeled as a thermodynamic conversion whose physical consistency obtains courtesy of a minimal disaggregation of firms into two sectors of complementary thermodynamic roles. The resulting stock-flow consistent thermo-economic dynamics highlights the effects of resource scarcity on GDP and other economic indicators like under-employment, production costs and income distribution. Useful power is identified as the key through-flow of the economic process. We show that energy shortages result in immediate recessions. By contrast, the progressive dilution of mineral resources critical to industry can result in long-standing secular stagnation accompanied with rising inequalities.

322 Socioeconomic drivers of business and farm based solar installations in Germany

Sebastian Brun, Axel Schaffer

Universität der Bundeswehr München, Neubiberg, Germany

The new German government is aiming for 80% of electricity from renewable sources. Given the expected increase in electricity demand this is an ambitious target. Solar power generation will be a crucial building block to reach this goal. In particular business and farm installations will become mandatory on new roofs and are on average substation ally larger than private installed solar units. With new data from the Bundesnetzagentur agent-based date on installed solar units is available. Our study will use a regression model with spatial and panel methods to identify determining factors for installation by farms and businesses. Given the spatial differences in installed capacity as well as the already known differences in business and farm structure in Germany it is expected that region profiles that are beneficial or detrimental for installed solar units on business and farm roofs can be found.

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THEORY AND NEW IDEAS: ECONOMIC DEVELOPMENT, POST-GROWTH AND HUMAN WELL-BEING

Chair: Dalia D'Amato

4 The role of the green, circular and bioeconomy in forwarding sustainability transformations

Dalia D'Amato

University of Helsinki, Institute of Sustianability Science, Finland

This presentation addresses the diversity and relative value of the green, circular and bioeconomy as sustainability solutions, and draw some considerations for their integration towards sustainability. These three politically mainstreamed narratives propose concrete and distinctive sets of solutions to operate interventions in our current linear, fossil-based brown economy to forward economic development in conjunction with environmental and social goals. Jointly, the solutions proposed by the three narratives – the circular, bio and green economy – point towards decreasing dependence on fossil resources through a more efficient and biodiversity-based economic system. In practice, however, it is unclear how to reconcile potential conflicts between solutions proposed by different narratives. Additional concerns regard the compatibility of the three narratives with degrowth or post-growth ideas, and the role of smaller actors and citizens to supplement governments and markets. There is thus a need to assess these three narratives and their synergies, (in)compatibilities and alternatives towards coherent sustainability pathways.

558 A unifying framework for post-growth organizations: a qualitative investigation

Giacomo Buzzao[1], Thomas B. Long[2], Daniele Vico[3]

[1]University of Perugia, Italy. [2]Rijksuniversiteit Groningen Campus Fryslân, Groningen, Netherlands. [3]Facultat d'Economia i Empresa - Universitat de Barcelona, Spain

Understanding the role of organizations in post-growth economies is fundamental for a practical application of macro-level post-growth intuitions. Attempts in this sense vary greatly across niches (e.g. rightsizing-organizations, degrowth business). The aim of this study is to bridge together these theoretical reflections, to ontologically define a comprehensive set of foundational characteristics that post-growth organizations should possess. As a result, a unifying framework for post-growth organizations is built based on the sufficiency business model canva, and combined with elements of institutional analysis. Eventually, this theoretical contribution is verified against a sample of existing post-growth organizations. An exploratory inductive qualitative approach is adopted, through semi-structured interviews with ceo and founders of European-based organizations, explicitly addressing post-growth principles. Expected results should contribute to the understanding of what are the most appropriate organizational settings for a transition to post-growth paradigm, with a focus on drivers and barriers.

477 Neoliberal anthropocentrism

Fabiano Coelho[1,2], Peter May[3]

[1]Federal University of Rio de Janeiro, Brazil. [2]Panteion University of Social and Political Sciences, Athens, Greece. [3]Federal Rural University of Rio de Janeiro, Brazil

Neoliberal anthropocentrism differs from the historical version of anthropocentrism built upon views of philosophers, religious thinkers, or ancient myths. Microeconomics replaces the centre and purpose of reality from humankind to the individual and, further on, from the whole person to his consumer-facet. Environmental problems are solved through markets, whose norms permeate environmental conservation. Value has become an attribute external to objects, bestowed by humans or "consumers" willing to pay to restore withdrawn ecological quality. Microeconomics praises The Market as God through its constructs, methodological frailties, and forms of affecting institutional and policy design, creating reality in its image. We expose microeconomics' undemocratic and anti-nature values instead of being value-free science or a technical framework whose primary predictions are testable. The upshot of such Outside the Planet Economics is to unfold the religious character, or significant intersection with it, of this scientific program. Dangerous economics, especially in the Anthropocene.

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TRANSFORMATIONS: SUSTAINABLE TECHNOLOGY DEVELOPMENT AND TRANSFER

Chair: Laura Merz

258 A simultaneous innovation-diffusion model including additional sustainability goals

Fabian Rocha Aponte[1], *Kirsten Wiebe*[2], *Nikki Luttikhuis*[1,3]

[1]SINTEF, Trondheim, Norway. [2]SINTEF, Tronheim, Norway. [3]NTNU, Trondheim, Norway

The 2030 agenda for sustainable development calls for a sustainable energy transition towards renewable energy sources for mitigating climate change. Solar Photovoltaics (PV) is a key technology in this energy transition and this technology has diffused rapidly over the last decades. The sustainability dimension of technologies is one of the main factors often ignored by diffusion models, this is a result of a lack of understanding and measuring of the way sustainability aspects influence the scaling-up process of new technologies. This paper aims to develop a combined technology innovation and diffusion model that accounts for additional sustainability aspects. New technologies that are not only a more beneficial alternative to incumbent technologies but that have additional positive sustainability effects such as e.g. lower land use for solar panels or affordability of granular technologies, go down in costs and diffuse even faster than technology options without these additional sustainability benefits.

328 SDG impacts of new technologies in global value chains

Kirsten Svenja Wiebe, *Moana Simas*, *Fabian Aponte*

SINTEF, Trondheim, Norway

Assessing only the technical feasibility and economic costs of new technologies at early stages of development is not sufficient. Sustainability impacts need to be assessed as well, to ensure maximizing positive and minimizing negative implications. Here, we focus on analysing how new technologies change global value chains (modelled based on trade and input-output data) and, through that, impact progress towards the Sustainable Development Goals (SDGs) around the world. We combine this with models of technology diffusion to analyse what-if scenarios. We find that both centralized (offshore wind) and decentralized (solar PV) renewable power technologies can have positive effects on most of the SDGs. Overall, the effects depend on the structure of the economies and the nature of the technology with offshore wind - large scale - mostly benefitting advanced economies and global players, while solar PV - small scale - distributes the positive effects better around the world.

429 Conceptualising (truly) sustainable technology development (for all)

Asimina Kouvara

Ragnar Nurkse Department, Tallinn University of Technology, Estonia

A critical discussion regarding the relation between technology, sustainability and economy is more relevant than ever today, considering the multifaceted crisis linked to the rapid technological advancement taking place within global capitalism. In this direction, the development of sustainable technology is crucial. Motivated by the need for new theoretical perspectives to help overcome the negative impact of technology upon the environment, society and culture, aim of the paper is to propose an integrated conceptual framework for the development and assessment of sustainable technology. Framed by a critical understanding of the dominant sustainability and technology narratives, the paper follows an interdisciplinary approach focusing on the ideas of technological awareness, techno-diversity, and technological sovereignty on a social/community level. Overall, it is argued that technology should follow a middle path-instead of a predetermined hi-/low-tech one; and is explained why and how sustainable technology development can (and should) flourish within alternative, commons-based socio-economic configurations.

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TRANSFORMATIONS: SUSTAINABLE TECHNOLOGY DEVELOPMENT AND TRANSFER

Chair: Laura Merz

559 Building impact pathways for digitalization in agriculture and rural areas: the case of hydrogeological risk management in North of Tuscany

Fabio Lepore[1], *Gianluca Brunori*[1], *Alessio Ferrari*[2], *Livia Ortolani*[3]

[1]University of Pisa, Italy. [2]ISTI CNR, Pisa, Italy. [3]AMIGO S.r.l., Rome, Italy

Digitalization is considered as an opportunity to enhance sustainability in agriculture and rural areas by several international institutions and policies. However, this approach risk underestimating the possible undesirable effects due to the social complexity of digital technologies and the need to take into consideration contextual specificities. Digitalization is increasing the flows of information from the field to the decision-making levels and vice-versa with different purposes (e.g. policy monitoring, environmental performance evaluation, improved management, e-governance, etc.). Policies and institutional structures represent important factors to address the diffusion of such technologies, especially if such diffusion should contribute to broader sustainability goals.
The present research wants to explore the connections between digital solutions and impacts in a specific application scenario, considering contextual specificity.
The research has been carried on in the framework of one of the H2020 DESIRA project Living Labs (www.desira2020.eu). Engaging relevant stakeholders in a participatory process anticipating future impact pathways trajectories is the method applied in DESIRA Living Labs in order to contribute to the reflection on digital transformation in agriculture and rural areas. The Living Lab Toscana Nord has been organized around the activity of land and water management carried on by the local public authority Consorzio Toscana Nord with the aim of looking at how digital technologies can improve ordinary land management in order to reduce the hydrogeological risk.

178 Golf beyond growth: The scope of innovation in ecological economic industrial frameworks

Robbie Fitzpatrick, *Rehema White*, *Iain Matthews*

University of St. Andrews, United Kingdom

In this paper, we explore how golf can innovate to support an ecological economy. A literature review, ~80 key-informant interviews and closing interdisciplinary workshop explored possibilities for radical de-materialisation across golf. Experts from fields as diverse as space science, urban planning and permaculture re-imagined the value(s) of golf. We found a spectrum of possibilities that can enable golf to transform in line with ecological economic principles. These included minimising maintained turf, creating closed-loop material systems and embracing regenerative practices to optimise the biological diversity of soils and non-play areas. Opportunities for adopting at scale included government regulation, player education and consolidative, win-win economic frameworks. We conclude with an ecological economic industrial strategy for golf, extending from an emphasis on community and learning at clubs to ecological tax reforms and markets for ecosystem services. We thus offer practical and methodological contributions on the scope of innovation in post-growth industrial contexts.

619 System dynamics of solution attempts to combat unequal exchange along global value chains

Laura Merz

ESCP Berlin, Germany

In a highly fragmented world economy, unequal exchange allows economically leading actors to grow profits beyond planetary boundaries whilst associated costs are endured in peripheries. The externalisation of environmental and social costs is an immanent part of the prevailing economic rationale, often left out in liberal narratives of business success. In the wake of the climate crisis, the asymmetry and interdependency of consumption, typically in the global North, and production, typically in the global South, is increasingly scrutinised. Approaches on combating this unsustainable order include corporate due diligence, national policies, and international treaties. The research aim is to analyse these measures on the basis of their implementability into an agent-based macroeconomic model which depicts a stylised three-sector and two-region world economy. The model is meant to serve as a 'virtual lab' to generate better system understanding on the effectiveness of solution attempts targeting the unequal exchange along global value chains.

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WHAT IS CRITICAL ENVIRONMENTAL POLITICS: ROUNDTABLE PRESENTATION OF THE NEW HANDBOOK WITH AUTHORS

Chair: Viviana Asara

105 The Common(s): a genealogical exploration of the concept and its political implications in its singular and plural form

Angelos Varvarousis

Autonomous University of Barcelona, Spain. Hellenic Open University, Patras, Greece

The literature on the common(s) is expanding during the last decades and its frontiers have been pushed in new directions. One of the most vivid debates concerns the use of the term in its single (the common) or its plural (the commons) form. Both terms have long histories, and their roots can be traced back to precapitalist England if not in the Aristotelian philosophy and the ancient Greeks. In recent years, however, both have been used in so many different ways that can connote almost anything and thus they run the risk of losing their transformative potential. This contribution attempts to summarize this debate and examine the main stakes that it involves for critical environmental politics. Many theorists are put in discussion with each other to explore the strengths and shortcomings of each approach and finally make a clear proposition about which term can better nurture transformative societal dynamics.

473 Feminisms and the Environment – contribution to the Edgar Elgar Handbook in Critical Environmental Politics

Corinna Dengler[1], *Birte Strunk*[2]

[1]Wirtschaftsuniversität Wien, Vienna, Austria. [2]The New School, New York City, USA

Our chapter 'Feminisms and the Environment', which will appear in the Edgar Elgar Handbook of Critical Environmental Politics, retraces feminist academic engagement with the environment since the 1970s. We give a concise overview of debates on the subsistence approach, materialist ecofeminisms, feminist ecological economics, postcolonial ecofeminisms, feminist political ecology and feminist new materialism, as well as their interrelations. All streams critically question power hierarchies within capitalism, focusing on different conceptual realms and material practices where this power manifests. Venturing beyond theory, the chapter also pays special attention to activism, and the role women-led groups play in environmental struggles around the world. Lastly, theory and practice are brought together by transposing the insights to degrowth, an activist-academic approach to environmentalism, and discussing what a critical feminist degrowth approach can learn from the various streams described.

493 Critical social science: addressing the financialisation of nature

Tone Smith

WU Wien, Austria

My approach to critical environmental politics starts from critical realist philosophy of science and a specific understanding of critical social science as critical empirical studies of substantive objects, e.g. environmental-political phenomena. This means that critical social science is critical of the practices which are its objects of study. According to Sayer (2000), it must be critical in order to be explanatory, and this is what gives social science a potentially emancipatory character. What constitutes a critical study of environmental politics will depend on the specific issue being studied. 'Financialisation of Nature' is both a phenomenon and a critical concept, critical of the practice and solutions it describes. Hence the approach is different from the study of an established concept such as 'sustainable development' for example. In my chapter, I have seen it as necessary to explain in detail the underlying logics and practices involved in [...]

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FEMINISMS AND DEGROWTH ALLIANCE (FADA): FADA OPEN MEETING

Chair: Anna Saave, Corinna Dengler

The Feminisms and Degrowth Alliance (FaDA) is an inclusive network of academics, activists, and practitioners. FaDa aims at fostering dialogue between feminists and degrowth proponents and at integrating gender analysis and reasonings into degrowth activism and scholarship. The network was launched in September 2016 at the 5th International Degrowth Conference in Budapest and has since then organized various tracks, roundtables, panels, and workshops at Degrowth, Ecological Economics, and Feminist Economics conferences. In addition to topical sessions, such as the session "Special Sessions: Advancing the Feminisms and Degrowth Alliance" taking place later today, we invite you to this FaDA open meeting to get to know each other and exchange our thoughts on feminisms and degrowth in an informal setting.

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BUSINESS AND TRANSITION

Chair: Lucie Wairt

154 Examining Alternativity facing CE discourses: A Neo-Gramscian Organizational Approach

Lucie Wiart[1], *Nicolas Béfort*[2]

[1]NEOMA BS, Chair: in Bioeconomy and Sustainable Development, REIMS, France. [2]NEOMA BS, Chair: in Bioeconomy and Sustainable Development NEOMA BS, Chair: in Bioeconomy and Sustainable Development, REIMS, France

In this paper, we explore alternative organizing within the organizational field of the "market for waste". Drawing both on a critical neo-gramscian organizational approach and on a social ecological economics perspective, we examine how the market for waste is a power arena for a socio-political contest over the meaning of Circular Economy. While ecological economics tends to study transitions from a macro-level approach, the organizational perspective provides a complementary perspective, allowing us to study the conditions under which the flows of matter can be recomposed. Studying multiple case studies of organizations evolving within this field and the social and solidary economy, we focus on the organizational processes which lead to the conceptualization of radical versions of circularity. While the hegemonic definition of Circular Economy is oriented towards growth, ecomodernism, and a weak version of sustainability, an alternative and post-growth definition would problematize and dislocate our production and consumption patterns.

334 Strategies and drivers of eco-innovations in the circular context: the case of Italian SMEs

Emy Zecca[1,2], *Andrea Pronti*[1,2], *Massimiliano Mazzanti*[1,2]

[1]University of Ferrara, Italy. [2]Sustainability Environmental Economics and Dynamics Studies (SEEDS), Ferrara, Italy

The transition to the Circular Economy (CE) system implies technological, organisational, and social innovations adoption and diffusion (Cainelli et al., 2020). In this context, the knowledge of firms' strategical choices becomes crucial to support them with proper decisions and policy instruments. This work aims to study the reasons behind firms' strategic decisions exploiting a two-waves survey on Italian SMEs based on specific sustainable and circular topics. Using different countable models, the paper tries to analyse factors influencing the propensity and the intensity of the adoption of several circular practices. In particular the work focuses on the role played by green R&D investments, institutional support, level of environmental knowledge and training activities in green context. The exploitation of panel microdata represents an element of novelty in the circular context, the panel framework of the dataset allows us for controlling for unobserved heterogeneity. This research on the circularity of SMEs provides useful information on potential public interventions to boost the adoption of circular and sustainable practices.

525 The potentially transformative power of sustainability-oriented hybrid business organisations

Ellen Stenslie

Norwegian University of Life Sciences (NMBU), Ås, Norway

This article explores sustainability-oriented hybrid organisations that apply business methods to address social and environmental issues. These are a type of businesses that challenge persistent institutions like shareholder primacy and profit maximisation, by putting societal benefit at the core of their organisation. They are different in how they grow and compete; how they see profit and social/ecological systems; and in how they integrate sustainability. The research is based on empirical data where various dimensions of hybridity are explored, and organisations are evaluated in their potential towards the transition to a sustainable economy. If such hybrid forms of businesses are to contribute significantly, this entails amongst other things an emphasis on social and environmental aims over commercial ones. There is also a need to improve our understanding of necessary policy developments to strengthen the potential sustainability contribution of such enterprises in the transition towards a sustainable economy.

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BUSINESS AND TRANSITION

Chair: Lucie Wairt

443 The geography of corporate misconduct

Davide Fiaschi, Elisa Giuliani, Luigi Marangi, Angela Parenti

University of Pisa, Italy

A rich literature in political science, international law and related fields has documented how companies' operations and strategic choices can harm people's fundamental rights. All in all, these literatures suggest that organizational misbehaviour is a significant and non-erratic phenomenon, which has long lasting negative effects on territories and their people, undermining development processes accordingly. For these reasons, it has become important to include considerations of organizational misbehaviour in accounts of regional economic growth, as some regions may grow economically while causing major damages to local communities and/or their natural environment.

140 The impact of multicriteria decision aid methods on the perceived value of energy-system investments in the building sector

Therese Guttmann[1], Steffen Bettin[2]

[1]Austrian Institute of Technology AIT, Vienna, Austria. [2]Institute of Technology Assessment, Austrian Academy of Sciences, Vienna, Austria

Developers interested in innovative energy systems appeal to planning-bureaus to provide them with suggestions. Conventionally, these bureaus assess system alternatives by comparing financial and energy-related criteria. Arguably, this approach discriminates in favour of carbon-based technologies, as many (social and ecological) benefits of renewable systems are non-monetary in nature or accrue in the long-run, and are thus disregarded. This study investigates the impact of the ELECTRE III multi-criteria analysis for the perceived value of cooling alternatives in a residential building. Five alternatives are assessed based on eight criteria. The method ranked two alternatives in first place: a passive system (maximal shading) and an active system (air-water heat pump). Ranked purely on the basis of investment costs, a third alternative (multi-split air conditioning, penthouse only) scores highest. The result is robust to changes in the criteria weights. Findings can prove interesting for researchers and practitioners in energy-building nexus.

336 What drives the relationship between digitalization and energy savings in manufacturing?

Janna Axenbeck[1], Anne Berner[2]

[1]ZEW Mannheim, , Germany. [2]Universität Göttingen, Germany

The ongoing digital transformation has aroused hopes of climate protection potentials of information and communication technologies (ICT) within manufacturing. Environmentally beneficial effects may range from the dematerialization of products to energy and resource efficiency gains. However, at the same time, ICT themselves consume energy and resources. Detrimental direct and indirect effects of digital technologies are increasingly coming into focus. Accordingly, whether there are trade-offs or synergies between the use of digital technologies and environmental outcomes cannot be answered unequivocally ex ante. For instance, effects may depend on firm and sector-specific characteristics. Our analysis sheds light on the most important moderators of the relationship between ICT and energy use in manufacturing. We apply a flexible tree-based machine learning algorithm to an official administrative panel data set including more than 25,000 German manufacturing firms. Results confirm effect heterogeneity but suggest that digital technologies relate more frequently to an increase in energy use.

379 Energy efficiency paradox: Evidence from a Dutch firm survey

Leon Bremer[1,2], Sacha den Nijs[1,2], Henri de Groot[1], Mark Koetse[3], Lynn Bouwknegt[1]

[1]Vrije Universiteit Amsterdam, Netherlands. [2]Tinbergen Institute, Amsterdam, Netherlands. [3]Institute for Environmental Studies, Amsterdam, Netherlands

Governments are seeking to implement policies that stimulate firms to produce in a cleaner, less polluting manner. We set up a survey amongst firms in the Netherlands focusing on the firm's decision to invest in the decarbonization of its production. We distinguish three ways for firms to invest in cleaner production, namely (1) improvements in energy efficiency, (2) fuel switching and (3) environment-related innovation. The survey asks firms to identify perceived barriers and drivers to such investments, following from a theoretical framework based on previous work and a taxonomy of barriers to energy efficiency investments. We also collect data on various firm characteristics, allowing us to delve into possible heterogeneity in the results. And we evaluate past policy by comparing results over time. The survey results provide useful input for optimal policy design to stimulate reductions of greenhouse gas emissions. The results allow for designing better evidence-based targeted policies.

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SPECIAL TRACK: ADVANCING THE HISTORY OF ECOLOGICAL ECONOMIC THOUGHT

Chair: Marco Vianna Franco

26 Ecological economic thought in the long run: challenges and emerging insights

Antoine Missemer[1], *Marco Vianna Franco*[2]

[1]CIRED/CNRS, Paris, France. [2]Konrad Lorenz Institute for Evolution and Cognition Research, Vienna, Austria

From a historical perspective, ecological economics can be considered as the latest manifestation of a more long-lasting intellectual movement – ecological economic thought (EET) – that started, at least, at the Renaissance, and which has consisted in various forms of interlinkages between the natural and social sciences for the sake of better understanding human-nature relations. Based on a forthcoming book entitled 'A History of Ecological Economic Thought' (Routledge, 2022), we briefly discuss the historiographical challenges associated to the writing of this history, present an overview of its contents, and then move on to reviewing some structuring debates that have transcended single episodes in the history of EET (i.e. theory of value, role of capitalism, etc.). These overarching topics appear as foundational for the identity of this extended body of thought, which also means that discussing them may provide fresh perspectives for research in contemporary ecological economics.

122 Slavtcho Zagoroff, a forgotten forerunner of thermodynamics and energy in economics

Nona Nenovska[1], *Eric Magnin*[2], *Nikolay Nenovsky*[3,4]

[1]University of Paris, France. [2]University of Paris, France. [3]University of Amiens, Amiens, France. [4]HSE Moscow, Russian Federation

The article focuses on the history of Balkan thought, in particular on the work of a forgotten Bulgarian economist : Slavtcho Zagoroff (1898-1970). One of his main contributions is in the field of environmental economics and the concept of energy in economics. Zagoroff was a Bulgarian economist and statistician whose main works date from 1954 and are mainly focused on the concept of energy stream in economics and human metabolism explained through the lens of thermodynamics. By criticising the mainstream economic approach on national income in terms of "value" he developed a novel approach of "motion of national income". According to Zagoroff, the national income is a "motion of energy " which he computes in terms of primary energy sources. His conclusions and train of thought emerged by observing mainstream theory in practice and taking significant insights from its application in rural Eastern Europe countries.

173 Nicholas Georgescu-Roegen's bioeconomic ethics: An ethics for ecological economics in the Anthropocene

Sylvie Ferrari

University of Bordeaux, France

The contribution focuses on how some leading authors in the History of the Ecological Economics Thought have addressed the relationships between economics, physics and ethics and what insights can be drawn from such an analysis with respect to the challenges posed by the Anthropocene. The present analysis is mainly concerned with the writings of N. Georgescu-Roegen and with the identification of the components of a new ethics, stemming from his bioeconomics approach, which I call bioeconomic ethics. Bioeconomic ethics is a new ethics, an ethics of limits that is based on the acknowledgment of interdependencies, qualitative changes and dissipation of matter-energy resources. I then show how bioeconomic ethics can help us to meet part of the challenges posed by the Anthropocene, at least how to stay within a safe operating space for humanity, within which a form of global justice can be warranted.

184 From human scale to planetary scale: the influence of Max-Neef's thought on climate and sustainability research

Lina Brand Correa

York University, Toronto, Canada

This presentation will explore and synthesize three avenues in which Max-Neef's thought has been taken forward in relation to climate change and sustainability, in particular his distinction between human needs, satisfiers and economic goods. The avenues are: (1) demand-side climate change mitigation strategies, (2) "lifestyle changes" as modifications in need satisfier configurations, and (3) the systemic analysis of provisioning systems as the determinants of need satisfier configurations. In doing so, I will highlight the impact of ecological economics ideas in other disciplines within academia, but also in policy discourse. I will also highlight the avenues for social change that are embedded in Max-Neef's thought, and provide pointers for future avenues of enquiry and action.

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SPECIAL TRACK: ADVANCING THE HISTORY OF ECOLOGICAL ECONOMIC THOUGHT

Chair: Marco Vianna Franco

375 Decommodifying Wealth: The Lauderdale Paradox, and Lauderdale's contributions to ecological economics

Simon Hupfel[1], *Antoine Missemer*[2]

[1]Université de Haute-Alsace, Mulhouse, France. [2]CNRS, Paris, France

The Lauderdale paradox has been used in ecological economics since the end of the 1990s. The objective of this article will be to trace the recent emergence of the concept in this field, to clarify its relationships with the works of Lauderdale at the beginning of the 19th century, and to suggest relevant research perspectives associated to his reflexions on wealth and value, ecological accounting, commodification and steady state economics.

392 Grinevald Translates Georgescu-Roegen: Carnotian Revolution, Degrowth and the Anthropocene

Romain Debref, *Franck-Dominique Vivien*

University of Reims Champagne-Ardenne, Reims, France

In this communication, we propose to show the key role played by Jacques Grinevald in the creation of a research programme in ecological economics for the French-speaking world since the 1970s. We demonstrate how this author and Nicolas Georgescu-Roegen collaborated whilst insisting on their conceptual differences and commonalities. This study will help us to better understand the use that can be made of the Nicholas Georgescu-Roegen's concepts at the time of the bioeconomy and the Anthropocene.

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POLICIES: SUSTAINABLE WELFARE AND ECO-SOCIAL POLICIES

Chair: Paula Saikkonen

131 Exploring policy interventions for a just low-carbontransition: A scenario discovery approach

Nicola Campigotto[1], Marco Catola[2], André Cieplinski[1], Simone D'Alessandro[1], Tiziano Distefano[1], Pietro Guarnieri[1], Till Heydenreich[3]

[1]University of Pisa, Italy. [2]Maastricht University, Netherlands. [3]Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Spain

There is currently no consensus among scholars on how to achieve a just low-carbon transition. This paper subjects a macrosimulation model to an extensive sensitivity analysis, and trains random forests on the simulation results to identify which policy combinations are most effective in reducing carbon emissions while improving the income distribution. The results suggest a trade-off between inequality and emissions, which limits the extent to which inequality can be reduced through the growth of bottom incomes alone, and indicate that carbon and inequality goals can be met jointly only through a variety of coherent policies in different domains.

403 Labour and welfare policies as the bedrock of a socio-ecological transformation: Towards socially sustainable Degrowth

Jefim Vogel[1], Gauthier Guerin[2]

[1]University of Leeds, United Kingdom. [2]Catalyst Collective Ltd., Hebden Bridge, United Kingdom

In contemporary economies, livelihoods depend on wage incomes which depend on jobs which depend on economic growth. This dependence renders livelihoods vulnerable to secular stagnation and environmental, economic, and pandemic crises, and blocks stringent environmental policies that would curtail production or consumption.
Here, we explore policies that could overcome this dependence and secure livelihoods in a volatile or shrinking economy: Labour Productivity Reduction, Working Time Reduction, Job Guarantee, Minimum Wages, Universal Basic Income, and Universal Basic Services. We analyse their effects on well-being, environmental footprints, and inequality, and explore key implementation challenges in the context of stringent environmental policies.
We find the greatest potential in decommodified, democratically-controlled Universal Basic Services. As a transitional strategy, we suggest a similarly effective but politically more palatable combination of the above policies. We argue such policies could form the bedrock of a radical socio-ecological transformation, and foster alliances between social, environmental, and labour movements.

594 Romanian Farmers' Markets: An instrument for bioeconomy development

John Polimeni[1], Raluca Iorgulescu[2]

[1]Albany College of Pharmacy and Health Sciences, USA. [2]Institute for Economic Forecasting, Romanian Academy, Bucharest, Romania

Farmers' markets are a source of income for many farmers and can be used to develop the bioeconomy. The piața is the most important version of a farmers' market in Romania, where everything from food staples to clothing to everyday household products can be purchased. With the entry of supermarkets into the food market in Romania and a focus on sustainability issues by the European Union, Romanians have become more educated and aware of items such as organic produce, increasing demand for those products. In order to develop the agricultural sector, rural areas and the bioeconomy, the attitudes of the farmers selling at the market must be understood. This paper presents primary data on sustainable agriculture in Romania and logistic regression analysis is performed to illustrate farmers attitudes to different environmental scenarios. The results suggest that sustainably produced agricultural goods are an important economic development tool reducing economic and environmental vulnerability.

548 Welfare policy – a burden or an accelerator in sustainability transitions?

Paula Saikkonen[1], Ilari Ilmakunnas[2]

[1]Finnish Institute for Health and Welfare, Helsinki, Finland. [2]Finnish Centre for Pensions, Helsinki, Finland

The paper asks how welfare policies support or hamper sustainability transitions in the welfare states? A country case is Finland, country to be the world's first carbon neutral welfare society by 2035. The Nordic welfare states are offering a strong social foundation, but they heavily overuse natural resources. A set parliamentary committee is preparing a social security reform that should take place at the end of decade. The reform is scrutinised to recognise the role of welfare policy in transitions by utilising socio-institutional approach to sustainability transition. The approach emphasises the roles of powers, interests, discourses and regulations creating the path dependency and institutional dynamics. As a socio-institutional system Nordic welfare state should go through fundamental structural change. The qualitative content analysis of the policy documents shows that the government's programme creates possibilities for sustainability transitions, however, the problem framing of social security reform does not support transitions.

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POLICIES: SUSTAINABLE WELFARE AND ECO-SOCIAL POLICIES

Chair: Paula Saikkonen

162 Green Consumerism and firms' environmental behaviour under monopolistic competition: A two-sector model

Luisa Giallonardo, Marcella Mulino

University of L'Aquila, Italy

We investigate the pro-environmental behavior of green firms in a context where consumers value the eco-quality features embodied in the goods consumed. We present a two-sector monopolistic competition model with green and brown goods displaying both horizontal and vertical differentiation. By means of analytical and quantitative techniques, we derive the optimal eco-quality level selected by green firms and the industry structure both in the short- and long-run equilibrium. We then study the effectiveness of three policy tools (green incentives, MQS and green campaigns) with respect to the regulator's objective of increasing the overall level of greenness, which we measure through a specific indicator. We find that each policy alone is apt to stimulate an increase in the greenness intensity compared to the unregulated equilibrium and that the joint use of the three policies helps to attain a greater level of greenness than that resulting from just one of them.

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THEORY AND NEW IDEAS: INDICATORS AND COMPOSITE INDICATORS

Chair: Jayeon Lindellee

370 Measuring climate and disaster resilience: Approaches, implementation and outcomes

Finn Laurien, Stefan Hochrainer-Stigler, Adriana Keating, Stefan Velev, Reinhard Mechler

International Institute for Applied Systems Analysis, Laxenburg, Austria

Climate and disaster risks are increasing worldwide, driven by population and asset growth in high-risk areas as well as changing climate patterns. There is an urgent need to better understand the investments into building resilience, and the decision-making processes that determine them. Given the increased of managing these risks there is growing need to invest in measurement approaches including composite index and alternative indicator-based approaches to improving the management and the overall accountability of "resilience strengthening" initiatives. There is a major gap in evidence about what actually makes communities more resilient when an event occurs because there is no empirically validated measurement framework of disaster resilience. Yet, data collection limitations including standardized and practical resilience indices for communities and cities are a critical challenge and barrier for fostering resilience strengthening efforts. Traction to address the proliferating climate and disaster risk requires a shift in approach, away from the status-quo to one that can shine more light on the underlying drivers of risk and motivate investment in a systemic [...]

169 Towards ISEW and GPI 2.0: Is Europe faring well with growth? Evidence from a welfare comparison in the EU-15 from 1995 to 2018

Jonas Van der Slycken, Brent Bleys

Ghent University, Belgium

We compile two welfare measures with distinct time and boundary choices for the EU-15 as a whole and for each of its member states individually. From 1995 to 2018, GDP/capita in the EU-15 increased by 32.4%, while welfare/capita increased by only 10.5% and 14%. We observe a growing divergence between welfare and GDP, especially after the financial crisis when welfare started stagnating. At the end of the study period, the EU-15 had recovered from the financial crisis from a GDP perspective, but not from a welfare view. We find that welfare levels in 2018 are lower than historical peak values for a majority of the EU-15 countries hinting at welfare thresholds being hit. Finally, we argue that welfare levels could be increased beyond previous peak levels with effective social and environmental welfare policies in place that focus on redistribution and respecting environmental boundaries instead of promoting economic growth.

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SPECIAL TRACK: FROM AN ASPIRATIONAL POLICY FRAMEWORK TO A REAL AGENT OF CHANGE?

Chair: Martin Fritz

315 Understanding eco-social policies: a conceptual-analytical exercise

Matteo Mandelli

University of Milan, Italy

As complex challenges like climate change and inequality become more and more salient, eco-social policies are emerging as suitable instruments to achieve ecological and social objectives simultaneously. However, despite their rising relevance, a precise and operationalizable definition is still lacking in the reference literature. Thus, this paper attempts to provide a framework to conceptualize and classify eco-social policies, while also reflecting on their potentially-problematic connection to economic growth. From a methodological point of view, it consists in a conceptual-analytical exercise, drawing insights form a systematic literature review. First, the paper presents the eco-social-growth trilemma, a heuristic constructed to understand the governance of economic, social and ecological policy objectives. Then, it elaborates on the definition of eco-social policies, advocating for an output-based conceptualization with policy integration as its core fundamental element. It also distinguishes eco-social policies along two dimensions: the direction of eco-social policy integration and the link to economic growth.

367 Towards an ecowelfare state: transforming provisioning systems in Finnish welfare state context

Tuuli Hirvilammi[1], *Johanna Perkiö*[2]

[1]Tampere, Finland. [2]Tampere University, Finland

We study the transformation of Finnish welfare state towards an ecowelfare state from the perspective of provisioning systems as physical and social systems that mediate the relationships between biophysical resource use and social outcomes. Provisioning systems can be government institutions, communities, households, and markets. In this paper we ask, how to transform the provisioning systems in the complex system with many institutional players and how is carbon efficiency of needs satisfaction improved by transforming the provisioning systems in Finnish welfare state context. We first describe selected, concrete examples of novel practices (e.g. local trials of 1,5 degree lifestyles, climate budgeting, and sustainable public procurements). Second, we examine the outcomes and steering mechanisms of the institutions. The analysis is based on data that has been collected in an ongoing interdisciplinary research project "ORSI: Towards an ecowelfare state".

371 Eco-social transition on the ground: trade-offs and dilemmas from a context -based research

Matteo Villa, *Marta Bonetti*

University of Pisa, Italy

The paper analyzes the role of context-based processes of implementation and governance in the transformation of social and labor policy as engendered by combined ecological-technological transition programmes/action. It discusses three qualitative local case studies which are part of a larger research project aimed at deepening the understanding of welfare and climate policies integration.
The cases investigate strategies, patterns and practices of transitions underway, identify emerging trade-offs and conflicts, as well as strategies to manage social risks including the possible role of welfare.
First outcomes show that eco-social policies on the ground are currently extremely scarce and more based on ex-post reactions than on ex-ante planning. Likewise, they highlight the need for more multi-level analyses to look more closely at contexts and life stories, organizational patterns, as well as the capacity of territorial and trans-local systems to adapt to, and cope with, unpredictable events overtime and in shifting spatial designs.

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SPECIAL TRACK: FROM AN ASPIRATIONAL POLICY FRAMEWORK TO A REAL AGENT OF CHANGE?

Chair: Martin Fritz

410 Manageable complexity in theorising a just socio-ecological transition in industrialised countries: the continuing case for welfare capitalist regime theory

Paul Bridgen

University of Southampton, United Kingdom

Faith has diminished in Welfare Capitalist Regime Theory (WCRT) as a foundation for theorising about contextual variation in socio-ecological transitions in industrialised countries. Empirical tests have proved inconclusive and theoretical attention has recently focused more on general theorising influenced by Critical Political Economy (CPE). The latter focuses more on complexity within states than variations between them.
This paper argues the case for greater exploration of WCRT's potential as a means to add manageable complexity to socio-ecological transition theorising. It first critically reviews empirical tests of WCRT finding them better as tests of policy succession than socio-ecological policy synergies. Secondly, the paper suggests complementarities between WCRT and CPE perspectives, particularly with regard to postulated relationships between institutional divisions within the state and external social and ideological forces. The paper finishes by using these insights to propose a new theoretical framework for analysing regime-related variation in socio-ecological transitions.

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BEHAVIORS AND SOCIAL CHANGE: EXPERIMENTAL/BEHAVIOURAL ECOLOGICAL ECONOMICS

Chair: Alexandra Koves

166 Negative spillovers from green labels on pro-environmental behaviour: Consumption vs policy support, and the role of prices

Juana Castro Santa, Stefan Drews, Jeroen van den Bergh

Universitat Autonoma de Barcelona, Spain

Green labels and green advertising have emerged as a way to signal products associated with less environmental impact. There are indications, though, that being exposed to green products may trigger negative spillover effects to subsequent moral behaviours. A policy-relevant question is whether spillovers apply equally to different kinds of 'pro-environmental' behaviours, and what determines any differences. Using an experiment, we compare whether being exposed to green products affects participants likelihood of performing two distinct behaviours at a later stage, namely purchasing green products and supporting climate policy. We examine potentially moderating factors of spillover effects, notably signalling the price of green products (cheap versus expensive) and priming pro-environmental identity. We find spillovers are positive for green consumption choices and negative for climate policy support. Moreover, signalling green products as cheap encourages subsequent green choice while it reduces climate policy support, and the opposite if green products are signalled as expensive.

383 "I will if you will" in climate cooperation

Marco Casari, Monika Pompeo, Alessandro Tavoni

University of Bologna, Italy

International efforts to mitigate climate change are lagging behind. We study in a laboratory experiment the behavioral effects on cooperation along the lines of Nordhaus proposal of a climate club. We also evaluate the effects of each element of the agreement in isolation. Overall, a climate club substantially raises cooperation with respect to voluntary cooperation in a plain public good game. The effect, though, is similar to offering decision makers the possibility of conditional cooperation and punishment without a club structure.

92 biodiversity conservation and the ethical dynamics of transformative action on ecological resilience: A conceptual and empirical assessment

Yee Keong Choy

Faculty of Economics, Keio University, Tokyo, Japan. Institute of Biodiversity and Environmental Conservation (IBEC), University Malaysia Sarawak, Malaysia

Despite a wide range of global efforts initiated by the United Nations over the past five decades to promote biodiversity conservation, our planetary ecosystems are rapidly moving into a more biologically impoverished state. Using a causality approach, this study first critically evaluates the underlying causes of the apparent environmental paradox. This is followed by an examination of the ways to motivate humankind to reverse the dysfunctional relationship between man and nature, and to undertake the transformative actions needed to halt further loss of natural life on Earth. To achieve this, it is critical to promote a scientific understanding of the causal relationships between nature connectivity, ecological resilience, man-nature mutual interdependency, and human long-term existence. This provides the best vantage point for individuals to make a connection to nature, and thus allowing them to conceptualize the ethical arguments for environmental conservation in an emotionally meaningful way.

216 The rationale for the emergence of a green premium in bond markets: the role of certifications, framing and cooperation

Annarita Colasante[1], Andrea Morone[2], Piergiuseppe Morone[1]

[1]UnitelmaSapienza University of Rome, Italy. [2]Bari University, Italy

The current study aims at identifying the role played by certifications in shaping the willingness to invest in green bonds. We run a lab experiment in which, after eliciting pro-environmental, pro-social and risk attitude, we ask participants to invest their endowment in either a green option, a brown option or both by providing them information with a different degree of accuracy. Results show that provide low quality information confuses people rather than help them in their investment decisions, whereas high quality information positively affect the likelihood to invest in the green option. We also measure the greenwashing effect by highlighting how this practice has a clear effect on both the trust investors have toward the signal and on the amount of the investment devoted to green bonds. Disclose high quality information, hence, is useful to both reduce the uncertainty produce by the greenwashing practice and drag investments in green bonds.

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BEHAVIORS AND SOCIAL CHANGE: EXPERIMENTAL/BEHAVIOURAL ECOLOGICAL ECONOMICS

Chair: Alexandra Koves

598 Let's think about the future: Does priming on positive and negative future events influence pro-environmental behavior?

David Hauser, Andrea Essl, Frauke von Bieberstein
University of Berne, Switzerland

In an online experiment (N=832), we examine whether priming on future events affects pro-environmental behavior. We use questions to prime participants on positive and negative future events and examine whether these primes influences pro-environmental behavior measured by an incentivized decision task with true environmental consequences. In this task, individuals decide between keeping money for themselves or investing parts or all of the amount in planting trees. Results show that participants primed on future events planted significantly more trees than participants in the control group who responded to neutral questions unrelated to the future. However, we found no statistically significant effect between the positive and the negative future priming conditions. Moreover, results revealed that participants had significantly higher pro-environmental intentions when primed on future events. Together, these findings suggest that the salience of future events can help to promote pro-environmental intentions and behavior.

218 The power of context – how situational factors drive circular food behaviors

Joana Wensing, Daniel Polman, José David Lopez- Rivas, Roger Cremades, Eveline Van Leeuwen
Wageningen University, Netherlands

Individual actions are an important driver of the transformation of our food system towards more circularity. However, it is still not understood whether peoples' pro-environmental values or rather situational factors such as spatial and social factors affect peoples decisions to engage in circular food behaviors. Therefore, we will explore how individual vs. situational factors influence citizen engagement in circular behavior, taking their meat vs. plant-based meal choice as an example. In this study, participants are first provided with a baseline survey measuring their values and demographic variables. The second part entails a two-week ecological momentary assessment (EMA) study in which individuals repeatedly report their states and behaviors in real time. The results will be used to inform an agent-based model to explore and predict the diffusion of circular behaviors to inform policymakers for the governance of interventions in the future.

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ALTERNATIVE ECONOMIES

Chair: Irma Emmery

300 Principles and Models of Community-based Organizations in the Anthropocene

Tamas Veress

Business Ethics Center, Corvinus University Budapest, Hungary

Acknowledging the deepening reality of the Anthropocene, the current paper aims to theoretically and empirically research the possibilities for non-destructive forms of social organizing. Community-based organizations are directing collective action towards societal wellbeing and ecological restoration rather than towards contributing to economic growth (and/or individual wealth accumulation). Current interview-based multiple case study qualitative research is sampling 15 of such organizations operating in various fields such as housing, energy, healthcare, food, and mobility. One expected outcome is to gain a map of the enabling/enhancing conditions for and organizational practices of socioecologically non-destructive forms of social organizing. By collecting real world cases the paper thickens the narrative that other worlds are possible. Also, the research could contribute to our understanding on how various forms of extractive design and domination can be avoided or crowded-out on the organizational level, while at the same time to regenerate the socioecologically sustainable practices.

121 The Degrowth Doughnut – visualizing challenges for the 21st century

Tomislav Cik[1], Mladen Domazet[2], Branko Ančić[1], Jelena Puđak[3], Marija Brajdić Vuković[1]

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The doughnut economy is a visual framework for assessing the performance of social metabolism or development goals, shaped like a doughnut or lifebelt. It usually combines the concept of planetary boundaries with the concept of (social) development foundations. The COVID-19 pandemic provides a unique research context for applying the model to a selected group of countries to explore their sustainability performance patterns, along with possible distinctions of their transitional trajectories. For the explorative analysis of the pre-vaccination phase and corresponding post-pandemic projections, a total of seven countries were sampled: Austria, Croatia, Czechia, Germany, Italy, Slovenia, and Spain. Whilst even the global pandemic does not simply 'turn an ocean liner' of national metabolic throughput and associated prevalent ideology, inroads into effects of emergency on sustainability transformation potential will be analyzed. We will present the resilience and sustainability lessons of the pandemic in the holistic presentation of the (modified) doughnut visualization.

301 Structural transitions towards the "safe and just operating space". Defining sectoral goals in countries with high ecological overshoots

Lukas Godé

Norwegian University for Life Sciences, Ås, Norway

The "safe and just operating space" or "doughnut" framework gives a powerful representation of the conditions for global socio-environmental sustainability. Its recent downscaling at national levels also promoted its use at sub-levels of governance and emphasized the need for differentiated strategies across countries. In those with high ecological overshoots, sectoral transitions towards meaningful economic output and jobs with low levels of resource use and environmental impacts are urgently needed. This study further investigates how the doughnut can inform structural transitions at the sectoral level in countries with high ecological overshoots, with application on Norway. Ecological overshoots are first disaggregated between the different economic sectors they are related to. An existing framework to determine sectoral goals focusing on their final energy use intensity is then extended and empirically tested, using this time the seven environmental dimensions of the national doughnuts. This study is primarily based on Extended Multi-Regional Input-Output analysis.

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ALTERNATIVE ECONOMIES

Chair: Irma Emmery

364 Performing the diverse circular economies? A diverse economies lens on informal waste reuse

Irma Emmery

Ghent University, Belgium

The current circular economic (CE) framings of 'waste' as the newest resource for commodity production and of 'waste management' as state-of-the-art recycling, have been criticised as inadequate to realise strong sustainability. The framings fail to tackle systemic overproduction and -consumption in the Global North, reproduce the unsubstantiated promise of decoupling and green growth, and reduce 'the economy' to waged labour, commodified products and services, and a competitive single market. Diverse economies (DE) scholarship, drawing i.a. on ecological economics and feminist political ecology, offers a promising framework to challenge this prevalent 'capitalocentrism' in the CE. I will theoretically and empirically explore (1) how the DE perspective may bolster more transformative understandings of both the 'economy' and the 'circular', (2) how informal collectives engaged in diverse waste reuse practices and relations conceptualise system change, and (3) what these collectives' potential roles could be in the transition to a post-capitalocentrist circular society.

274 Struggle for the sands of xolobeni – from post-colonial environmental injustice to crisis of decoloniality

Hali Healy

Unversity of Johannesburg, South Africa

In recent decades, communities on South Africa's Wild Coast have resisted state-imposed development projects, carving out alternative development pathways based on sustainable agricultural and ecotourism. This paper presents a historically contextualised account of conflicts over the sands of Xolobeni, a proposed N2 Wild Coast highway, a looming coastal "smart city", and offshore oil and gas exploration. An analytic lens of post-colonial environmental injustice reveals the captured state as the leading agent of "slow violence" in the region, and forms the basis of arguments that these conflicts symbolise a wider crisis of democracy in contemporary South Africa . Reflecting on an ongoing court battle with Shell over seismic testing, the article concludes the state cannot be trusted to protect the interests of rural communities pursuing development alternatives, or wider objectives of decolonisation. The onus instead lies with organised civil society, backed up by the protective powers of an independent South African judiciary.

401 Collective and contextualized strategies to promote resilient and sustainable agricultural systems in Lebanon

Rim Alamin[1], Hatem Belhouchette[2], Salem Darwich[3]

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This study aims to propose and assess the performance and social acceptability of adaptation strategies to climate change and market uncertainty in the agricultural production plain of Bekaa, Lebanon. This study should help in identifying and evaluating technological innovations combined to socio-economic incentives targeting to promote more resilient farming systems. To achieve our desired objectives, the first step of the methodology was to build two typologies, the first one is based on the agricultural census while the second one is based on experts' opinions. The latter was carried out by organizing a workshop with the participation of more than 20 people (farmers, NGOs...). The second step of the methodology was the collection of data from 94 farmers who responded to a survey to deal with agricultural practices to finish by confronting the typology by expertise with that declined from the surveys by carrying out a PCA and then CAH.

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SPECIAL TRACK: A JUST TRANSITION TO THE CIRCULAR ECONOMY

Chair: Emanuele Leonardi

365 Past, present and future of just transition

Emanuele Leonardi[1], *Paul Guillibert*[2]

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The concept of "Just Transition" was born, rather confidentially, in some trade unions in the mid-1990s. It soon became an important idea in international organisations (COP, International Labor Organisation), trade unions (International Trade-Union Confederation) or environmental justice movements (Climate Justice Alliance). In this talk, we will briefly present the history of the concept, before showing that it gives rise to very different and even contradictory uses.
The concept of JT tries precisely to define a political agenda that overcomes the conflict between defending workers on the one hand and protecting the environment on the other. To quote Brian Kohler, one of the American trade union climate activists, in 1996: "the real choice is not jobs or environment. It is both or neither. This idea was taken up by the International Trade Union Corporation in 2010: "No Jobs on a Dead Planet". The problem raised by the concept of Just transition is therefore how to support at the same time the most ambitious objectives for the ecological transition and that it is fair for workers and communities who are already suffering the full effects of climate change.
Finally, we will formulate some hypotheses (to be discussed collectively) of general definitions of a just transition adapted to the JUST2CE framework.

397 Framing circular economy in the context of environmental justice

Teresa Meira, *Giacomo D'Alisa*

Centre for Social Studies, University of Coimbra, Portugal

This paper aims to contribute to the debate around the limits of circular economy as an alternative paradigm able to shift the doomed linear take-make-waste pathway of our contemporary society. While a just transition to a circular economy will require a rethinking of economic and political models, this shift mustn't occur without guaranteeing ecological and social equity. The goal of this work is to draw a comprehensive and systematic analysis of the literature on circular economy and environmental justice. Due to the neglect in addressing how changes in the production system impact the living conditions of those directly affected, we expect to find very limited recognition of the need for a system shift in the way the circular economy is framed and few explicit linkages to the concept of environmental justice.

517 Circular economy and gender: a Feminist Ecological Economics (FEE) approach

Stefania Barca

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Gender is a key dimension for a Just Transition to the circular economy. Rather than an 'equal opportunities' approach, however – which tends to reduce gender to women's mainstreaming into pre-existing models – this paper calls for expanding the theoretical toolbox of CE research by including Feminist Ecological Economics (FEE). Emerging in the early 1990s at the crossroads between Ecological and Feminist Economics, FEE is a specialised field of theoretical and empirical research that aims to address sustainability of production within a socio/eco-systemic approach that includes (rather than leaving out) reproductive and care work. Key concepts in FEE are 'sustainable provisioning' and 'sustaining production', 'caring economy', 're/productivity', 'wellth economics'. The paper will discuss how these key FEE concepts can contribute towards a gender-sensitive reformulation of the CE.

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SPECIAL TRACK: A JUST TRANSITION TO THE CIRCULAR ECONOMY

Chair: Emanuele Leonardi

518 Assessing transitions to a just Circular Economy through humility. A multidimensional framework.

Maddalena Ripa[1], Mario Pansera[2,1], Stefania Barca[3,4], Meletios Bimpizas-Pinis[5], Dilay Celebi[6], Tess Doezema[1], Andrea Genovese[5], Emanuela Girei[5], Andrea Jimenez[5], David Soto[2], Joana Sousa[4], Brais Suárez Eiroa[2]

[1]Autonomous University of Barcelona (UAB), Spain. [2]University of Vigo, Spain. [3]Santiago De Compostela University, Spain. [4]University of Coimbra, Portugal. [5]Sheffield University Management School, United Kingdom. [6]South East European Research Centre, Thessaloniki, Greece

This work draws upon the critical view on Circular Economy (CE) transition as an epistemological challenge that predominantly stems from the proliferation of the narrow-technological and the economic-positivist views on CE that patently neglect a systemic reflection on the political and socio-cultural dimensions as well as on the unintended (global) consequences that a transition to circularity would entail. In order to tackle this gap, JUST2CE project proposes a multidimensional framework that provides an epistemological, theoretical and methodological scaffolding for the ethical questions we should be asking about the future of CE. "Whose voices and interests are heard and whose voices and interests are neglected? How are costs, benefits and opportunities of CE distributed at different scales and among different social realities?" These leading questions guide the analyses of ten cases of organizations engaged at different stages of transition towards CE, both in Global North and Global South.

520 Circular economy in a simplified input-output stock-flow consistent dynamic model

Marco Veronese Passarella

Link Campus University of Rome, Italy. Leeds University Business School, United Kingdom

The aim of this paper is twofold. First, a simplified input-output stock-flow consistent model is developed, in which money is endogenously created, prices are defined in a Sraffa-like fashion, and mark-up rates depend on temporary output gaps. Second, the model is used to test the impacts of alternative "circular economy" practices and policies.

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SPECIAL TRACK: SCIENCE-POLICY-SOCIETY INTERFACES FOR RESILIENT AND SUSTAINABLE RURAL DEVELOPMENT

Chair: Sabrina Arcuri

512 A multi-actor perspective on the vulnerability of bee-pasture quality in Slovak mountains

Diana Surová, Lukáš Zagata

CZU - Czech University of Life Sciences Prague, Czech Republic

Bio-honey production presents a new niche involving innovative thinking and practices in the Slovak Carpathian Mountains. The sustainable development of this value chain requires to identify its vulnerability towards exogenous and endogenous drivers of change and to identify adaptive mechanisms to increase the resilience of this value chain in the mountains.
The study aims to evaluate the vulnerability of key resources for bio-honey production in a case study of the Slovak mountains. A multi-actor perspective is taken into consideration.
A combination of methods was used, including semi-structured interviews, questionnaires, and one participatory workshop to obtain the results. During the application of each method, a variety of actors were targeted, including beekeepers and other relevant stakeholders.
Results describe an interconnectedness between the quality of bee pasture and the occurring climate changes and endogenous changes. A territorial approach and collaborative governance are indispensable for safeguarding the resilience of the high-quality bee pasture.

531 Preliminary assessment of climate change impacts on socio-ecological systems of the Central Apennines through a multi-actor approach

Corrado Ievoli, Ivano Scotti, Letizia Bindi, Luca Romagnoli, Angelo Belliggiano, Sara Bispini

University of Molise, Campobasso, Italy

Climate change affects contexts in different ways because of their socio-environmental features. For this reason, appropriate resilient actions imply local communities' awareness and skills to imagine future climate conditions. Thus, the socio-economic development of rural areas requires improved resilience to climate change, building links between science and local communities, sharing different forms of traditional and innovative knowledge, and developing "new" visions and appropriate governance systems. Based on these considerations, the contribution proposes a first reflection developed in the H2020 MOVING project of the perception of climate change effects on crucial resources in a small rural area of central Italy to evaluate the interconnection gaps between local society, science, and local institutions. The research identified gaps in collaboration between research institutions and the local community, a mismatch between social needs and the vision of the local government. The research aims to support communities in managing this gap for effective resilient initiatives.

56 Escaping the unsustainable pathway in lithuanian countryside: diversification of the rural economy

Rita Lankauskienė, Živilė Gedminaitė-Raudonė

Lithuanian Centre for Social Sciences, Institute of Economics and Rural Development, Vilnius, Lithuania

The COVID-19 pandemic situation highlighted the green transition potential of rural areas for escaping from the unsustainable pathways and dealing with pandemic situations and outcomes so far. Recently collected scientific evidence elucidates examples of successful escape from the unsustainable paths, as well as the pandemic outcomes in the rural countryside by diversifying the rural economy. In the light of green transition and recovery from the COVID-19 pandemic, different pathways might be used to address the outlined challenges by offering development opportunities for rural communities.
The main aim of this research is to examine Lithuania's case of escaping the unsustainable pathway by diversifying the rural economy. Research results outlined particular shortages of existing strategies for Lithuanian rural areas and highlighted the crucial role of selected approach towards diversification itself and the common understanding of the critical concepts in the context of rural development, namely 'smart rurality', 'smart communities', 'digitalization', etc.

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SPECIAL TRACK: SCIENCE-POLICY-SOCIETY INTERFACES FOR RESILIENT AND SUSTAINABLE RURAL DEVELOPMENT

Chair: Sabrina Arcuri

372 All-goes-together: leading by personal examples – supporting sustainable living communities in Hungary

Gusztav Nemes[1,2], Pál Balogh[3], Éva Orbán[2,3], Balázs Tőgyi[4], Regina Csatlós[4]

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Eco-communities are important reference points for the ecological movement. They innovate, combine traditional knowledge with new technology, show alternative, lived solutions to important problems of our times. Important questions are: How can such communities be established? What is needed to make them sustainable and flourish? How can they be supported? We explore a Hungarian initiative, consciously aimed at supporting communities and individuals willing to change their life in a more ecological direction. Cold Mountain Shelter is a small community of young, educated environmentally conscious lifestyle migrants. They produce food through permaculture, forest-agriculture, contour farming, extensive animal husbandry, etc. Though, their main product is knowledge on sustainable livelihoods. They organize courses, events, and exhibitions, run a yearly festival, and help to develop local and regional nods of environmentally conscious communities. They also represent an important socio-economic trend, spreading fast in developed countries, trying to find links between innovation and tradition.

412 Cereal production in a Swiss mountain region: Analysing drivers of change for more resilient mountain food systems

Emilia Schmitt, Isabel Jaisli, Geiser Anna

ZHAW, Zürich, Switzerland

Organic cereal production in the Grisons mountains in eastern Switzerland is an example of innovative diversification of agricultural production. Despite the difficult growing conditions, farmers used their pioneering spirit, the available space and synergies with animal husbandry to establish a very successful organic mountain cereal brand in Switzerland some 30 years ago. This work - studied in the framework of the H2020 MOVING project - explores the drivers and barriers that influence cereal production in the Swiss Alps, ensuring that the value chain persists in a way that supports the well-being of the natural area and its inhabitants. These drivers of change are identified by analysing historical and current data on production areas, agricultural policies and social networks. Then, actors' different perceptions thereof are examined. From this, it is deduced how production decisions are influenced by perceptions and how best to respond to threats or opportunities for mountain grain production.

419 Putting the private sector into practice – Recognising the stages and types of practice actors involved in Communities of Practice and Partnerships

Alhassan Ibrahim, Kirsty Blackstock, Kerry Waylen, Esther Carmen

James Hutton Institute, Aberdeen, United Kingdom

New environmental governance paradigms stress the need to work beyond traditional governments to engage with both civic society and the market economy. Increasingly, there are calls to harness private finance in the EU Green Recovery; work with firms to make supply chains more sustainable; and enable consumers to reward sustainable production with premium prices. The research will consider the role of the private sector in making rural areas stronger, connected, resilient and prosperous, recognising that the 'private sector' is a heterogenous and complex set of actors that engage in different ways with the processes of socio-ecological systems. The work considers data from three projects (H2020 MOVING, H2020 MERLIN and Scottish Government Catchment Partnerships) that consider how actors work with nature to generate positive outcomes for natural, social and economic capitals. Paying particular attention to reviewing the roles, stages and types of non-State but for-profit actors require stakeholder mapping to become more nuanced and highlights different engagement pathways for Science-Policy-Society interfaces. It should make space for both vernacular knowledge and technical knowledge (Lowe, 2019) required for socio-technical innovations. Understanding the diverse roles, stages and types of the private sector actors is also useful for transformation of socio-ecological systems required to address our climate, biodiversity and social crises – when and how these non-State actors are allies in the quest for radical reform.

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SPECIAL TRACK: BELIEFS, CLIMATE CHANGE AND THE GREEN TRANSITION: INSIGHTS FROM HETEROGENOUS AGENTS MODELS
Chair: Francesco Lamperti

38 The double materiality of climate physical and transition risks in the euro area

Irene Monasterolo[1], Regis Gourdel[2], Nepomuk Dunz[3], Andrea Mazzocchetti[4], Laura Parisi[5]

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The analysis of the conditions under, and extent to which climate financial risk assessment affects firms' investment decisions in the low-carbon transition, and the realization of the climate mitigation trajectories, still represents a knowledge gap. Filling this gap is crucial to assess the double materiality of climate financial risks. By tailoring the EIRIN Stock-Flow Consistent model, we provide a dynamic balance sheets assessment of climate physical and transition risks for the euro area, using the scenarios of the Network for Greening the Financial System. We find that an orderly transition achieves important co-benefits already in the mid-term, with respect to GHG emissions abatement, economic output and financial stability. In contrast, a disorderly transition would increase risks for banks, worsen firms' credit conditions. This, in turn, limits firms' investments in low-carbon activities that could decrease their exposure to transition risk and help them recover from climate physical shocks.

82 Linking macro-financial ABMs to large scale climate-energy models: the DSK - WiTCH soft coupling

Luca Eduardo Fierro, Francesco Lamperti

Scuola Superiore Sant'Anna, Pisa, Italy

In the last years macro-financial ABMs have been extensively and successfully applied for studying a variety of green transition risks and adverse economic impacts of climate change. This class of models is particularly attractive for analysing the disruptive impact of climate change, given their intrinsic non-linearity and ability to model bounded rational behaviours. Such promising strand of literature has so far been missing a granular and precise description of the energy sector, together with its evolution in terms of energy mix, energy price and greenhouse gasses emission. On the other hand, energy models often miss an explicit link between the financial and energy sector, which is central in analysing the macroeconomic and financial effects of stranded asset and related transition risks. This paper aims at filling this gap by engineering a soft link between two very well established models: the DSK and the WiTCH model.

85 More data, more climate-smart practices? Exploring data sharing governance models through an agent-based model for the agricultural sector

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Flanders Research Institute for Agriculture, Fisheries and Food, Merelbeke, Belgium

Data and digital technologies show significant potential to support climate actions and the transition to more sustainable production and consumption practices. Besides the promises, it remains to be seen to what extent and how data and digital technologies will increase the impact of climate actions (adaptation and mitigation) and the overall sustainability (economic, environmental, social) of farming. In this regard, this paper investigates two research questions, (1) under which conditions actors will increase data sharing and data (re-)use to accelerate the transition to more climate-smart agricultural practices and productions? (2) which corresponding governance models are the most effective? In doing so, we rely on the case of the Flemish agricultural sector facing data sharing and develop a participatory agent-based model. Our preliminary results show the effect of different governance models with three different foci – farmers, data platforms, market actors – on data sharing as well as the economy and environment.

94 Climate change attitudes and housing markets: insights from a data-driven agent-based model

Marco Pangallo[1], Matteo Coronese[1], Francesco Lamperti[1], Francesca Chiaromonte[1,2]

[1]Scuola Superiore Sant'Anna, Pisa, Italy. [2]Penn State University, State College, PA, USA

Climate change has negative effects on housing prices, as properties are exposed to a growing risk of natural hazards such as floods and sea level rise (SLR). Several studies find that exposed homes sell at a discount. Interestingly, the discount is higher in areas with a higher share of population believing in climate change. The literature quantifying the effect of beliefs of climate risk on housing prices either uses standard econometric and statistical methods or uses general equilibrium models that are very loosely calibrated from real-world data. Here, we combine theory and data by building an Agent-based Model of the housing market that is initialized from several large-scale datasets. We initialize our model on the Miami metropolitan area, extensively validate it comparing the time series of prices and incomes across census tracts, and study scenarios that differ based on beliefs towards SLR.

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SPECIAL TRACK: BELIEFS, CLIMATE CHANGE AND THE GREEN TRANSITION: INSIGHTS FROM HETEROGENOUS AGENTS MODELS
Chair: Francesco Lamperti

98 Shadows disappear at night: an agent-based IAM simulation of environmental permits and climate change

Lilit Popoyan[1,2], *Alessandro Sapio*[1]
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In this work, we develop an agent-based model to study how individual environmental and tradable emissions permits impact the micro-/macro dynamics of the economy and emissions level. This version of the Dystopian Schumpeter meeting Keynes (DSK) model is populated by firms belonging to capital-good, consumption-good, and energy sectors that locally interact in different markets. Simulation results show that decentralised environmental permits without adaption strategies yield the worst macro/micro and climate outcome among individual permit scenarios. In individual scenarios, environmental permits with adaptation strategies deliver significantly better results, increasing the likelihood of transition to sustainable growth concerning business as usual scenario, but it is not a panacea. We modeled the emissions trading scheme akin to the EU-ETS mechanism and found it yields the first-best macro, climate outcome, and transition likelihood. Our analyses also point to a drop in the market concentration in the case of centralized adaptation strategies.

380 The Entrepreneurial State in the green transition: insights from an agent-based model

Marco Amendola[1], *Francesco Lamperti*[2], *Andrea Roventini*[2], *Alessandro Sapio*[1]
[1]University of Naples Parthenope, Italy. [2]Scuola Superiore Sant'Anna, Pisa, Italy

Limiting climate change requires substantial and sustained reductions in greenhouse gas emissions. In this regard, a promising way to lower emissions is by reducing the energy intensity of the economy via energy efficiency improvements. Based on this premise, the paper builds a macroeconomic agent-based model, in which the energy efficiency of the economy varies as a result of a process of endogenous technical change that emerges from the bottom up, to study the effects of different policies aimed at fostering the energy efficiency. Public policies analyzed range from "direct technological policies", akin to the idea of the entrepreneurial state, in which the state directly invests in R&D to shape energy efficiency technological opportunities, to more indirect ones based on taxes, incentives and subsidies. Simulation results show that most of the policies tested are effective in fostering the energy efficiency of the economy. A big difference in terms of effectiveness between the policies, however [..].

485 Policies for the net zero in an agent-based model

Marcello Nieddu[1], *Linda Ponta*[2], *Marco Raberto*[1], *Andrea Teglio*[3], *Silvano Cincotti*[1]
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To respond to the climate change many countries have committed to net-zero emissions by the 2050. However, what is the pathway to be followed is argument of debates in the climate change economics literature. The present work studies two policies, a carbon tax and a feed-in tariff. By means of Monte Carlo computational experiments with the Eurace agent-based model, six different scenarios has been considered: one with no policy (business as usual, BAU), three scenarios with a carbon tax implemented and two scenarios with a feed-in tariff. Both the policies lead to emissions and consumption reductions compared to the BAU. The carbon tax increases the energy efficiency and the renewable energy capacity.The feed-in tariff is more effective in reducing emissions, but it has no effects on energy efficiency. The results suggest that a mix of the two policies can be more cost-effective.

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SPECIAL TRACK: "WITHIN LIMITS IAM" (WILIAM)

Chair: Iñigo Capellán-Pérez

226 Environmental Module of the Integrated Assessment Model WILIAM

Tomas Calheiros[1], Margarita Mediavilla[2], Noelia Alonso[3], Iván Ramos-Diez[3], Tiziano Distefano[4], Tiago Lourenço[1]

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The main objective of LOCOMOTION research is to generally improve the current Integrated Assessment Models. The Environmental module of the WILIAM includes the carbon and the water cycle, together with the main aspects of land competition between energy generation and other land uses. In particular, includes the contribution of land use changes to greenhouse emissions, the contribution of agrofuels and the land requirements for energy production.
In addition, the climate submodule intends to calculate the total radiative forcing of each gas and their contribution to the global temperature change, including the regionalization of climate variables at each Koppen climate zone, to model impacts considering the heterogeneity of climate in the Earth.
Preliminary results indicate that land for forest and irrigated crops will decrease in the all climate zones and future scenarios, for 2050. In climate module, temperature change will be larger in polar than in tropical climates.

233 A macroeconomic multi-regional IAM with input-output linkages: physical boundaries, climate change feedbacks and energy poverty

Iñaki Arto[1], Kurt Kratena[2], Óscar Carpintero[3], Ignacio Cazcarro[4,1], Manuel Tomás[1], Mikel Rueda[1], Paola López-Muñoz[3], Luis Llases[3], Jaime Nieto[3]

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The WILIAM economic module considers biophysical constraints and interlinkages between monetary and physical flows, embedding the economic system into the ecological system. Its core is a dynamic econometric multi-regional input-output model that accounts for several feedbacks between the economy and nature. Labor, energy, capital and other inputs in each industry depend on input prices, technical progress and policies. Output prices are the mechanism used to deal with natural resource scarcity. Climate change damages affect industries and households. It also takes into account household heterogeneity, assuming different consumers' reactions to price and income shocks and capturing the distributional effects of policies. Household income generation is linked to production and the labour market is represented by household labour supply functions and wage-setting equations. For policy purposes, the public sector and its relationship with all other agents are modelled in detail. Finally, the model also integrates financial feedback into production, consumption and investment.

255 Simulation of scenarios towards sustainable energy systems with the "Within Limits IAM" (WILIAM) model

Iñigo Capellán-Pérez[1], Natasa Markovksa[2], Tiziano Distefano[3], Nathalie Wergles[1], Elisabeth Böck[4], Stavroula Papagianni[5], Tommaso Luzzati[3], Ignacio de Blas[1], Luis Javier Miguel[1]

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This presentation will focus on the potentialities and take-aways from simulating a new IAM WILIAM which is being developed in the H2020 project LOCOMOTION (https://www.locomotion-h2020.eu/), characterized by the close integration of a detailed representation of the economic processes in consistency with its biophysical counterparts in terms of land, water, climate, energy and materials. The model represents focus on techno-sustainable potentials for renewables, an appropriate portfolio of energy variability management options to reach high renewables shares, the implications of future energy investments (and its financing) required to achieve the transition to renewables for the whole system. Different sustainability transition paradigms, such as Green Growth, Green Deal and Post-growth storylines are planned to be simulated. A comprehensive review of overall goals, policy targets and policy measures linked to each of the storylines was based on revising institutional, academic and grey literature in order to ensure consistency in the implementation of these storylines.

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SPECIAL TRACK: "WITHIN LIMITS IAM" (WILIAM)

Chair: Iñigo Capellán-Pérez

259 Overview of WILIAM Energy & Materials Modules

Lukas Eggler[1], Ole Van-Allen[2], Harald Svendrup[2], Iñigo Capellán Pérez[3], Martin Baumann[1], Alexandros Adam[4], Stavroula Papagianni[4], Gonzalo Parrado[3], Luca Herc[5], Neven Duic[5], Antun Pfeifer[5], Ilja Batas-Bjelic[5], Vladimir Gjorgievski[5], Ignacio de Blas[3], Iñaki Arto[6]

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Because energy production is one of the most important sources for GHG, and society is based on the use of materials, their adequate representation is essential to assess future sustainability pathways and of key importance in WILIAM.
The main function of the energy module is to quantify the primary energy requirements for satisfying the economic demand. It includes the calculation of final energy demand from economic demand, detailed representation of the energy transformation sector taking into account sub-annual time scale effects of variability and storage on annual energy balances.
The materials module simulates the extraction of metals, materials, and fossil fuels from the geosphere to the international market as metal, rock phosphate or primary fuels. Both bulk and technology materials are considered. Material resources are differentiated by material concentration, energy requirements and extraction cost. The extraction rate includes feedbacks from technology development, extraction costs and market price.

303 Humanising Integrated Assessment Models: Putting the "I am" in IAMs

Juanjo Mediavilla[1], Robert Oakes[2], André Cieplinski[3], Gonzalo Parrado[1], Lukas Eggler[4]

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The framework of the SDGs presents the links between natural, social and economic systems and the necessity of taking an integrated approach to transition sustainably. However, until now IAMs have focused on modelling economy, energy and environmental systesm at the expense of other factors with direct impacts on society and human wellbeing. Social variables have often been left out or proxied by economic aggregates such as GDP, value added and unemployment.. Nevertheless, we can not ignore the fact that non-economic aspects of human well-being are interconnected with economic and environmental systems.
This paper introduces the approach to model society and describes the feedbacks between society and other modules of WILIAM (WIthin Limits Integrated Assessment Model) and how these affect different facets of human wellbeing. This proposal is an attempt to "humanise" IAMs by endogenising population and migration as well as representing human development indicators, income inequality, health and wellbeing.

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SPECIAL TRACK: A 'BUSINESS ECOLOGICAL ECONOMICS' PERSPECTIVE ON CORPORATE SOCIAL IRRESPONSIBILITY

Chair: Beatriz Macchione Saes

47 TOTAL, a French fossil fuels company active across the world

Joan Martinez-Alier

ICTA UAB, Barcelona, Spain

On 20 May 2021, several EJOs demonstrated in Paris in front of the Ministry of Economy and Finance against a project by TOTAL to extract and build a plant for LNG in the Arctic financed with €700 million of public money according to the organizers. The protest took the form of large ice sculptures that slowly melted down. This was noticed by the media. One cannot claim that Total's actions are done in secret and remain unknown to the French state, to its shareholders and even to the interested public. We take Total in this presentation as one case-study for research and teaching on business management. We describe and analyze the 15+ cases related to TOTAL in the EJAtlas. The topics are environmental injustices, lack of environmental liability, and Corporate Social Irresponsibility (CSIR). As environmental conflicts intensify in the commodity extraction and waste disposal frontiers (including excessive carbon dioxide emissions), the EJAtlas aims to research, exchange and disseminate information. In this presentation we focus on TOTAL, and in particularly on LNG exploration and exploitation, from the Arctic to Cabo Delgado in Mozambique.

213 What Values Are Shared? Corporate Narratives and Conflictive Renewable Energy Projects of the ENEL Group

Daniela Del Bene[1], Giuseppina Siciliano[2], Roberto Cantoni[3], Antonio Bontempi[1], Louisa D Felicei[4]

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As policies in favour of renewable energy (RE) expand worldwide, energy companies increase their investments in the sector. Their narratives for the energy transitions call for ¨creating a shared value¨ to fight climate change among all stakeholders. However, the energy transition triggers urgent questions about what values count, who controls and decides, and who defines the solutions in the energy transition. Communities affected by RE projects have extensively raised environmental and justice issues and denounced bad practices and crimes. In this article, we depart from the dataset of the Global Atlas of Environmental Justice (EJAtlas) to analyse conflicts and diverging valuation languages around RE projects of one of the biggest energy companies in Europe, the ENEL Group. This article builds on the extensive literature of Environmental Justice studies, Ecological Economics, Business Ethics and Management, and Energy Justice, and contributes to establishing a growing research field in Business Ecological Economics.

206 New environmental injustices based on a new ESG agenda? An analysis of the mining company Vale

Beatriz Macchione Saes

Unifesp, Osasco, São Paulo, Brazil

The article analyses the Corporate Social Irresponsibility (CSIR) of Vale SA in light of its new Environmental, Social and Governance (ESG) agenda, which has been introduced since the last major mining disaster caused by the company in Minas Gerais (Brazil) in 2019. Vale's recent changes are analyzed based on a database of 30 conflict cases registered in the Environmental Justice Atlas (EJAtlas). We update the cases and include new ones related to Vale's ESG strategies. In the last three years, as part of these strategies, the company has increased investments to reduce emissions and carried out divestments in highly contested projects around the world. The article investigates the implications of these changes for the production and reproduction of environmental injustices. As it seeks to remake its image and gain legitimacy to operate, Vale continues to ignore opposition to its operations, producing new environmental injustices.

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SPECIAL TRACK: A 'BUSINESS ECOLOGICAL ECONOMICS' PERSPECTIVE ON CORPORATE SOCIAL IRRESPONSIBILITY

Chair: Beatriz Macchione Saes

404 Corporate impunity and oil extraction in the Peruvian Amazon

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Energy corporations have extracted oil from the northern Peruvian Amazon since the early 1970s, resulting in severe environmental pollution and adverse impacts to public health. In this region, 7,090 million barrels of produced water, the main waste product of oil extraction operations, have been discharged into the environment. Local indigenous communities have pursued different avenues, from national and international lawsuits to grievance mechanisms, to seek justice and redress. They demand the environmental remediation and restoration of 2,000 allegedly oil-polluted sites left behind when one of the corporations ceased operations in their territory in 2015. Weak and poorly enforced domestic regulations, loopholes in legal liability built into international investment arbitration tribunals and transnational corporate structure prevented victims from obtaining remedy and reparation. Vast oil pollution remains and continues to damage the tropical ecosystem and the health of local inhabitants. These barriers require further attention from researchers, policy-makers and practitioners.

456 The relationship between modern slavery and the abaca industry in Ecuador: the case of Furukawa Plantations C.A.

Rossana Torres[1,2], *Gabriel Weber*[3]

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In 1963 the company Furukawa was established on the Ecuadorian coast, the company was dedicated to the production and export of abaca fiber, a monoculture which after a rudimentary production process becomes a versatile commodity. However, in 2021 a constitutional judge recognized that Furukawa kept hundreds of racialized families in conditions of modern slavery for almost six decades. The consensus of commodities marked the entry of Latin America into the new economic and ideological order. At the same time, the capitalist discourse assumed environmental awareness as its own, social responsibility programs invaded business schools and companies worldwide. Although, in reality, often there is no question about the place, the form, or the working conditions where these inputs come from. Multinationals continue under the same colonial dynamics, where the center has a "sustainable development" thanks to the periphery, which continues with the colonial historical process of social and environmental degradation.

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SPECIAL TRACK: CUTTING-EDGE TOOLS FOR SHAPING THE GENERATION OF ENVIRONMENTAL PUBLIC GOODS IN AGRICULTURE

Chair: Daniele Vergamini

624 Successful management of the collective agri-environmental schemes? A path towards a generic decision support system tool

Janja Rudolf, Andrej Udovč

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The main goal of EU Agri-environmental (AE) collective schemes is to provide AE public goods (such as drinking water, healthy soil, carbon restoration, etc.) to all EU citizens. Therefore, decision-makers are keen to compare the existing AE collective schemes and learn from each other. Decision-making tools are needed to successfully lead their implementation. In this research, we are using an MCDM method called Decision Expert (DEX) and a SWOT scorecard technique, that enables us to compare several SWOT analyses simultaneously and transforms SWOT results into quantitatively evaluated data that can be fed into the DEX program. This clarifies the synergy between aspects that affect AE public goods provision for every AE scheme investigated. The technique is tested via five AE collective schemes in the DEXi program and gives deeper insight into factors that affect each scheme's performance. It is the first step toward building a generic decision support tool.

625 Evaluating the impact of Policy-mix on landscape investments to minimize soil erosion

Fabio Bartolini[1], Daniele Vergamini[2], Matteo Olivieri[2], Maria Andreoli[2]

[1]Agricultural Economics, University of Ferrara, Italy. [2]DISAAA-a, University of Pisa, Italy

Soil protection is one of the main priorities of the environmental regulation in agriculture; nevertheless, up to now, the CAP has shown poor effectiveness in reducing soil erosion and landslides. The abandonment of marginal land, the lack of effective soil conservation practices and the consequences of climate change have exposed agricultural mountain systems to growing pressures and vulnerability. The paper aims at analysing the effectiveness of the EU payments in preventing erosion phenomena due to climate change in mountainous areas. We assess the impact of various environmental policy-mixes (i.e., eco-schemes/cross-compliance and agri-environmental schemes) in managing hydrological and erosion problems. We use mathematical programming models to estimate the impact on the soil of different practices under different climate-change scenarios. The preliminary results show that a more incisive set of measures of soil conservation is needed to mitigate soil erosion across the EU within the 2021–2027 CAP.

626 Factors affecting farmer's perceptions of transaction costs in Agri-environment-climate measures (AECM)

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Agri-environment-climate measures (AECM) were devised with the intention of compensating land users for potential income losses generated from the uptake of more appropriate, less intensive management practices in areas considered environmentally sensitive. Considering Transaction Costs (TC) when designing these kinds of policies is essential, because if they are too high, farmers may feel less willing to participate, which can lead to lower efficiency of the policy. The goal of our research is to provide some insights into the perceptions of farmers regarding TC in AECM as well as the factors or combinations of factors that can influence those perceptions.

627 The design of result-base agri-environmental scheme: a value of information perspective

Stefano Targetti, Matteo Zavalloni, Davide Viaggi

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Result based agri-environmental schemes (AES) are considered more efficient and long-term solutions for the transition towards more environment-friendly agriculture. First, the possibility to adapt practices to local agro-ecological conditions, and then the less prescriptive approach. However, result-based schemes are currently not the mainstream solution for a range of practical issues. One of the limiting factors for the uptake of result-based contracts regards indeed the farmers' uncertainty of the practice and the effort needed to achieve the target result. In this contribution, we develop a model based on a decision analysis tool that analyses the impact of an AKIS support on the uptake of result based AES. The value of information approach is employed for the analysis of the farmers' decision to the uptake of a contract designed for increasing the carbon stock in agricultural soils. The theoretical model is then applied to a case study region in Italy.

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SPECIAL TRACK: CUTTING-EDGE TOOLS FOR SHAPING THE GENERATION OF ENVIRONMENTAL PUBLIC GOODS IN AGRICULTURE

Chair: Daniele Vergamini

628 Ecological and Economic Implications of Alternative Metrics in Biodiversity Offset Markets

Katherine Simpson[1], Paul Armsworth[2], Martin Dallimer[3], Nick Hanley[4]

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Markets for biodiversity offsets are emerging as a new tool to manage the conflicts between "development" and conservation. We developed an ecological-economic model to compare the outcomes of offsetting for a habitat-based metric and a species-based metric. We simulated a biodiversity offset market for a case study landscape, linking species distribution modelling and an economic model of landowner choice based on economic returns of the alternative land management options (restore, develop, or maintain existing land use). The biodiversity offset markets for the habitat and species metrics achieved no net loss of the intended metric. However, the underlying species distributions, layered with the agricultural and development rental values of parcels, resulted in very different landscape outcomes. Where policymakers are aiming for the metric to act as an indicator to mitigate impacts on a range of closely related habitats and species, then a simple no net loss target is not adequate.

629 The political and legal context in the EU for innovative contract solutions targeting the provision of environmental goods and services

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A quarter of the 1st pillar budget (around 48,5 EUR billion) from the Common Agriculture Policy (CAP) will be allocated to eco-schemes, and a further 35% of the 2nd pillar budget (around 20,9 EUR billion) will be ring-fenced for interventions beneficial to climate and environment. Participation in both eco-scheme measures and agri-environment-climate commitments (AECs) will be voluntary for farmers. Today's AECs are dominated by practice-based measures that do not always deliver the expected environmental outcomes. It is therefore important to look into the opportunities for result-based and collective contract solutions, each of these being relatively novel approaches eligible for EU funding, while their legal frameworks need to be further explored. At the same time, an extra boost for contract solutions, including those which involve private financing may come from increasing awareness of environmental sustainability in the private sector, as triggered by the EU Green Deal and subsequent regulations.

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INSTITUTIONS AND POWER: THE ROLE OF MULTINATIONAL CORPORATIONS
Chair: Pinar Gercek

378 Corporate financialization, Achilles' strength or heel for sustainability? An empirical investigation into the socio-economic realities of corporate financialization, its institutional counterpoises and its ambiguous relationship with sustainability using data on all OECD stock-listed companies

Bakou Mertens
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This paper first critically upholds the corporate financialization literature to a novel dataset of all OECD stock-listed companies and explores its consequences for investments and inequality. Secondly, it identifies those institutions that already cause interference on shareholder exuberance or, vice versa, exacerbate their power. Thirdly, it explores the ambiguity of the relationship between financialization and sustainability, first with the idea to connect the financialization literature with sustainability questions and second to map the potential interactions between the realities of financialization and the requirements of the sustainable transition. Power is key for transformative change. So understanding which social groups hold power, which institutions mediate this power and what the consequences are of the current distribution of power is important. If we want to bring about change, we need to leverage the right bastions of power and use it to set our society, step by step, on a desirable path towards sustainability.

549 Big profits, big harm? Exploring the link between firm-performance and human rights abuses

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We examine the relationship between the performance of companies relative to their global industry peers and their abuse of human rights. We exploit a unique database covering 245 large publicly listed companies from eight of the principal and most economically dynamic developing countries. We find that the more firms over-perform relative to their industry peers, the more they are likely to engage in abusive behaviours. However, this observed positive linear relationship becomes negative in the presence of high host country regulatory pressure. We find also that the proclivity for top over-performing firms to abuse human rights applies only to companies with no or limited prior commitment to addressing human rights issues as part of their corporate social responsibility (CSR) policies.

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RESOURCES: TRADE AND ECOLOGICAL IMPACTS

Chair: Pinar Gercek

209 Ecologically unequal exchange and uneven development patterns along global value chains

Jeff Althouse[1], Louison Cahen-Fourot[2], Bruno Carballa Smichowski[1], Cédric Durand[3], Knauss Steven[4]

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The ecologically unequal exchange (EUE) literature has provided ample empirical evidence but has not been able to clearly specify the causal mechanisms driving these processes. This paper relates participation in global value chains (GVCs) to development patterns and ecologically unequal exchange. We conduct a principal components analysis and a clustering analysis along six dimensions (GVC participation, GVC value capture, investment, socioeconomic development, domestic environmental impact and international environmental balance) for 133 countries between 1995 and 2015. We find three patterns: "curse of GVC marginalization", "ecologically perverse upgrading" and "reproduction of the core". While our results confirm the asymmetry in ecological degradation between high-income and low-income economies shown by EUE, they support the existence of alternative mechanisms to account for it. We argue that environmental asymmetries are driven in large part by differences in how countries articulate within GVCs, and therefore cannot be ascribed to relations of ecologically unequal exchange, alone.

407 The land-water-food nexus: measuring the ecological impacts of the international agri-food trade in Latin America

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In this paper we use a multiregional input-output model to analyze the ecological footprint linked to the participation of Latin America in the agri-food Global Value Chains (GVCs). We analyze the transfers of natural resources embodied in the agri-food trade of Latin America with seven regions: North America; European Union; Europe and Asia; East Asia and the Pacific; South Asia; Middle East and North Africa; and Sub-Saharan Africa. In the empirical application we use the Eora database with a coverage of 186 countries in the period 1990-2015, and we provide evidence of an unequal ecological exchange between Latin America and the different regions of the world, in a context of growing pressures on the national natural resources to increase production and supply the global demand for agri-food goods.

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RESOURCES: FOOD SYSTEMS

Chair: Pinar Gercek

16 Are stakeholders ready to transform phosphorus use in food systems? A transdisciplinary study in a livestock intensive system

Julia Martin-Ortega[1], Shane Rothwell[2], Aine Anderson[3], Murat Okumah[1], Christopher Lyon[1,4], Erin Sherry[5], Chirstopher Johnston[5], Paul Withers[2], Donnacha Doody[5]

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Global food security and aquatic ecosystems are in jeopardy if transformative actions to Phosphorus (P) management are not taken. This paper pivots from earlier (predominantly conceptual) work to develop and analyse a P transdisciplinary scenario process, assessing stakeholders potential for transformative thinking in P use in the food system. A Substance Flow Analysis of P flows and stocks was employed to construct visions for alternative futures and stimulate stakeholder discussions on system responses in Northern Ireland. These were analysed for their transformative potential using the triple-loop social learning framework. Stakeholder responses remained mostly transitional or incremental, rather than being fundamentally transformative. The process did unveil some deeper levers that could be acted upon to move the system further along the spectrum of transformational change, providing clues of what an aspirational system could look like.

115 Transforming the food system through food security versus food sovereignty: Comparing the metropolitan municipalities of Istanbul and Izmir in Turkey

Pinar Gercek, Pinar Ertör-Akyazi

Bogazici University, Istanbul, Turkey

Feeding the cities has gained importance due to increasing population in urban centers and vulnerabilities related to climate change. Local governments assume a big role in this, having the potential to quickly react via innovative local policies for an equitable and democratic agri-food system. In Turkey, the agricultural sector has always been a notable contributor to the economy, but its share in the GDP and employment has been continuously decreasing since 2000s. This study compares food policies in newly elected Istanbul and Izmir metropolitan municipal governments which differ in their potentials and food politics-related histories based on food sovereignty versus food security approaches. We performed qualitative content analysis using the data derived from official documents and in-depth interviews with the municipality representatives associated with the development of agri-food policies. The results of this comparative study will contribute to the debates on democratic agri-food systems in practical and theoretical ways.

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SPECIAL TRACK: RELATIONAL TURN IN SUSTAINABILITY FOR A RADICAL SOCIAL-ECOLOGICAL TRANSFORMATION

Chair: Barbara Muraca

133 Who stewards whom? A paradox spectrum of human-nature relationships when working with the soil

Lilian Pungas

Friedrich Schiller University Jena, Germany

This contribution is of empirical nature and based on more than 60 semi-structured in-depth interviews with people that 'work with the soil' and practice Food Self-Provisioning (FSP) in Eastern Estonia. The 'space of social relationships with nature' is used here as a relational approach to locate various manifestations of care and stewardship to each other and to explore their embeddedness in social relations of power and in specific societal nature relations. Directly perceived experiences and challenges towards nature (be it soil, insects or weather) within the FSP practice bring about manifestations towards nature that can seem paradox at the first sight, that are diverse, dynamic and context-dependent. This relational complexity needs to be considered if we want to overcome destructive human-nature relation(ship)s, in general, and cultivate more sustainable and caring agri-food systems, in particular.

157 Hook, Line and Sinker – The Life Frames as an anchor for diverse value perspectives in UK coastal communities

Jordan O. Lafayette[1,2], Jasper Kenter[3,4], Sebastian O'Connor[5], Sue Ranger[6,7]

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Although recent development has seen the Ecosystem Services framework become more inclusive of the plurality of values that reflect complex human-nature relations, we are yet to see relational values effectively invoked in the sustainability agenda. The Life Framework of Values (Life Frames) has been advocated as a tool to utilize multiple value systems simultaneously, and here we further explore its' potential through examining axiological plurality in a coastal community setting. We draw upon a community-based participation approach, pooling our findings from four independent UK coastal case-studies. We use the IPBES conceptual framework as a starting point, identifying sub-themes within three broader categories of values; relational, instrumental, and intrinsic values through interview transcripts alongside the Life Frames. Our approach reveals surprising themes within participants' preferences for a sustainable future, underlining the need for a holistic approach to values-based conservation, and strengthening the claim of necessity for relational values in sustainable development.

295 Grounding what matters; practicing ecological democracy through social and relational values

Seb O'Connor

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The relational turn in ecological economics mirrors recent developments within ecological democracy research that has drawn upon relational ontologies such as new materialism to innovate in democratic design and practice. This presents an exciting opportunity to explore the potential of social and relational values as conceptual tools that can operate at the intersections between economics and democracy to democratically facilitate socio-ecological transformations. Focusing on three case studies within the context of Flood Risk Management (FRM), this paper explores how social and relational values can be understood through grounding what matters to people in their everyday material relations. Introducing a 'pluriversal lens' for social values, these case studies reveals how innovations in valuation design to understand social and relational values can perform ecological democracy in ways that generate socio-ecological transformations.

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SPECIAL TRACK: RELATIONAL TURN IN SUSTAINABILITY FOR A RADICAL SOCIAL-ECOLOGICAL TRANSFORMATION

Chair: Barbara Muraca

323 Parsing multiple relationalities in sustainability research: Indigenous, post-structural, analytical and dialectical

Simon West[1], *Sanna Stålhammar*[2], *Stephen Woroniecki*[3], *L. Jamila Haider*[1]

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Lived experiences and articulations of 'relationality' have long been expressed through different practices of living, knowing and doing around the world. Within the global environmental movement from the 1960s onwards, (Western) scientific fields have been prominent in emphasizing the inextricability of people and nature. Yet other expressions of relationality have struggled for recognition, 'weeded out' and 'watered down' by incumbent practices and power relations. Over the past decade or so, Indigenous knowledge practitioners, social scientists and humanities scholars have infused additional relationalities within sustainability debates and have prompted renewed attention to the concept of 'relationality' itself. This attention has already resulted in significant advances, yet the differing meaning(s) of 'relationality' in such debates can be difficult to grasp. This paper identifies four approaches to relationality in sustainability research – analytical, dialectical, post-structural, and Indigenous – and explores their expressions within practice, policy and activism, and implications for sustainability transformations.

347 Operationalizing the relational turn beyond the coloniality of 'nature': how a critical relational framework can catalyze radical transformation and resist neoliberal pitfalls

Barbara Muraca

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After giving an overview of the current controversies in the relational turn for sustainability, the paper will show how a critical relational framework can catalyze radical transformation and resist neoliberal pitfalls. I will first critically discuss the concept of 'nature' adopted by IPBES as still embedded into a colonial framework. By engaging with relational values literature, with research on Indigenous and Local Knowledge (discussion of results from a collaborative project with the tribal organization Se'Si'Le about an indigenous-led framework for communication among different knowledge systems across Indigenous and non-Indigenous coastal communities), and the new global commons movement, I will show paths for a successful operationalization of the relational turn in two crucial dimensions for social-ecological transformation: institutions and the social imaginary. I will address how the relational turn can be blind to the neoliberal cooptation of life productivity to support capitalist valorization and show possible alternatives.

449 Digging for nature: Discourses on human-nature relations in context of cultivation practices

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[1]University of Leeds, United Kingdom. [2]Drumoak, United Kingdom. [3]Friends of the Earth Scotland, Aberdeen, United Kingdom

This work focuses on the interplay between specific relations to nature and more abstract values regarding the relationships between humans and nature. We conducted Q sorts and interviews with 25 individuals who were growing plants in gardens, allotments or different kinds of agricultural settings in Scotland. We identified three discourses representing different ways of conceptualising human-nature relationships, namely: 1) Guardianship of fragile nature; 2) Partnership with powerful nature; and 3) Rational human managers. The different discourses were in particular associated with distinct ways of seeing the role of humans and the nature of nature. The different discourses implied different ways of approaching environmental issues and the right way for humans to relate to nature. Bringing in a relational understanding and acknowledging the plurality of perspectives on human-nature relations, as well as their overlaps and tensions, can open up the space for policy approaches beyond those acting on fixed and uniform understandings of those relations.

553 Climate economics and the relational turn in environmental values

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How radical is the inclusion of 'relational values' in sustainability science? The answer seems to depend upon whether one works on climate change or biodiversity. On the one hand, the principal tools for formulating climate mitigation policy in IPCC assessments are Integrated Assessment Models, whose values are limited to what can be captured within their neoclassical welfare functions. In contrast, IPBES has emphasised the need for including diverse values of nature, including both intrinsic and relational values, which are difficult or impossible to include within neoclassical economics. As such, the policy significance given to non-economic values within biodiversity conservation has yet to be replicated in the climate context. This paper explores the implications of relational values for climate economics and for the modelling of politically representative and legitimate climate mitigation policies.

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SPECIAL TRACK: ADVANCING THE FEMINISMS AND DEGROWTH ALLIANCE

Chair: Anna Saave, Corinna Dengler

42 Women murdered at the frontlines of environmental justice conflicts

Dalena Tran

ICTA-UAB, Barcelona, Spain

This study illustrates how, despite the diversity of women environmental defenders and their movements worldwide, there are near-universal patterns of violence threatening their survival. Gender informs violence against environmental defenders, who not only shoulder disproportionate environmental burdens, but also face misogyny informing their vulnerability and in retaliation to their advocacy. Yet gender remains overlooked despite how women defenders make up a large proportion of those at the frontlines. Through comparative political ecology, this research analyzes cases from the Environmental Justice Atlas, an online open-access inventory of environmental distribution conflicts, in which one or more women were assassinated while fighting a diverse array of extractive and polluting projects. Although the stories showcase a breadth of places, conflicts, social-class backgrounds, and other circumstances between women defenders, most cases featured the same near-universal pattern of multinational large-scale extractive companies granted impunity from governments to violently suppress women defenders opposing their harmful projects.

279 From earthcare, to meta-industrial labor to the forces of reproduction and back. Towards an integrated ecofeminist concept of reproductivity

Anna Saave

Humboldt-University, Berlin, Germany

Reproductivity is a term both central to ecofeminism and material feminisms. It served as an entry point to decenter market-based economic production within economics and to make explicit the importance of gendered forms of labor/work for the 'official' economy. It also describes how nature contributes to the economic production of wealth, while criticizing the economic and cultural devaluation of reproductive activities and ecological processes. This paper compares four concepts of reproductivity developed in ecofeminist philosophy and ecofeminist political economic theory: earthcare (Merchant 1981, Clowney & Mosto 2009), meta-industrial labor (Salleh 1997, 2003, 2010), the forces of reproduction (Barca 2020), and (re)productivity (Biesecker and Hofmeister 2006, Netzwerk Vorsorgendes Wirtschaften 2000, 2014). The paper examines in which way the concepts can be compared regarding their key insights, scope, aim and practical implications. The paper aims to provide conceptional clarification of reproductivity as a concept in the face of multiple approaches.

330 HANJELI: Strengthening Local Food Economy Based on Social Inclusion and Gender

Aris Munandar, Erna Ernawati Chotim, Adilita Pramanti

Unas University, Jakarta, Indonesia

Geopark Ciletueh has a unique tourism that is different from other tourist areas in Indonesia. Geopark tourism combines tourism with cultural diversity and biodiversity with the diversity of the earth's heritage by combining the role of society in strengthening the economy. The local plant hanjeli is a geopark tourism attraction that attracts tourists to come to geopark tourism and community participation in local plants who are former migrant workers. This justice is manifested in the production process and the production tools used that do not damage the environment. Strengthening the local food-based economy also involves women ex-migrant workers who experience violence while working abroad. The social inclusion approach and gender perspective are the starting point for efforts so that every individual, woman and man from various social groups and in particular the marginalized can be accommodated in their interests so that their rights are not neglected and protected by the state and stakeholders in society. Marginal people can be interpreted as a group of people whose existence is marginalized by several factors. The method used is qualitative with a critical paradigm. Strengthening local food-based economy involving women in the production process of hanjeli agriculture in the Geopark area. Marginal women who initially had to sell their labor abroad are now able to provide for their reproduction by hanjeli farming with an agro-ecological production system.

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SPECIAL TRACK: ADVANCING THE FEMINISMS AND DEGROWTH ALLIANCE

Chair: Anna Saave, Corinna Dengler

458 Transformative Debt from Below: Rethinking the question of who owes whom

Corinna Dengler

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This paper proposes a feminist degrowth reading of debt that critically re-assesses the question of who owes whom. It draws upon the ecofeminist insight that the capitalist growth paradigm fundamentally relies on but at the same time invisibilizes, devalues, and destroys the three realms of nature, women, and exploited countries. It synthesizes the concepts of 'ecological debt' owed to the majority world that bears the consequences of the imperial mode of living fostered by global elites (mostly but not exclusively located in the Global North), 'reproductive debt' owed to those who subsidize capitalism with unpaid care work, and 'colonial debt' owed to those that have been colonized and enslaved. Although quantifying this debt is strictly speaking impossible, the idea of 'transformative debt from below' can be a useful tool for social movements to dismantle the hypocrisy inherent to narratives of, for example, the European Union as a 'climate leader.'

621 Women murdered at the frontlines of environmental justice conflicts

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This study illustrates how, despite the diversity of women environmental defenders and their movements worldwide, there are near-universal patterns of violence threatening their survival. Gender informs violence against environmental defenders, who not only shoulder disproportionate environmental burdens, but also face misogyny informing their vulnerability and in retaliation to their advocacy. Yet gender remains overlooked despite how women defenders make up a large proportion of those at the frontlines. Through comparative political ecology, this research analyzes cases from the Environmental Justice Atlas, an online open-access inventory of environmental distribution conflicts, in which one or more women were assassinated while fighting a diverse array of extractive and polluting projects. Although the stories showcase a breadth of places, conflicts, social-class backgrounds, and other circumstances between women defenders, most cases featured the same near-universal pattern of multinational large-scale extractive companies granted impunity from governments to violently suppress women defenders opposing their harmful projects.

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SPECIAL TRACK: HOW TO PAY FOR SAVING THE WORLD: MODERN MONETARY THEORY AND THE DEGROWTH TRANSITION

Chair: Christopher Olk

149 Degrowth and transformation: Radical possibilities of the job guarantee

BJ Unti

Bellevue College, USA

The job guarantee (JG) as originally conceived is narrowly focused on the problem of unemployment. As such the policy offers a means of stabilizing a capitalist economy and sustaining perpetual economic growth. However, revisited in light of impending socioeconomic and ecological crises, the JG offers much more radical possibilities that push in the opposite direction towards degrowth and away from capitalism. This paper explores these radical possibilities; specifically examining how a JG might serve both as a platform for the multifaceted strategies of the degrowth movement as well as offering a transformational pathway in its own right.

344 In search of a green macrofinancial regime

Benjamin Braun[1], *Daniela Gabor*[2]

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Recent debates identify several macro pathways to decarbonisation, including carbon pricing, derisking private investments, degrowth and green growth through public investment. Which of these paths are politically and economically viable? Answering these questions, we argue, requires a theory of green macro-financial regimes (MAF), understood as institutional modes of creation and access to green financial assets, including money. We map three alternative green MAF regimes – carbon shock therapy, small green (derisking) state and big green state – across mechanisms of coordination, industrial policy, the monetary-fiscal mix and political coalitions. The small derisking state extends the macrofinancial status-quo of contemporary financial capitalism, where finance exercises control-based structural power vis-à-vis firms and infrastructural power vis-à-vis the state. We discuss the associated power configurations and distributional conflicts against the path dependencies of the financial capitalism, and argue that degrowth is theoretically possible under any of these, but would be disorderly under the first two regimes.

472 An inflation control toolkit fit for the Degrowth transition

David Barmes

Positive Money, London, United Kingdom

Degrowth scholarship must grapple with the question of how to conceptualise and control inflation in a progressive manner under conditions of declining economic output. Understanding the causes and potential consequences of price increases and their implications for a Degrowth transition requires questioning the concept of inflation itself, how it is measured, and what lies beneath headline inflation figures. MMT scholars recognise that inflation rarely reflects a demand-driven general increase in prices across the economy. Rather, price changes vary significantly between sectors and goods at any given time, and price increases can have a wide range of different sources, such as supply chain disruptions, corporate profiteering, and financial speculation. This paper will review MMT and ecological economics literature on inflation, assess different inflation control options from MMT and Degrowth perspectives, and consider the relevance of inflation management for the realisation of a Degrowth society.

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SPECIAL TRACK: HOW TO PAY FOR SAVING THE WORLD: MODERN MONETARY THEORY AND THE DEGROWTH TRANSITION

Chair: Christopher Olk

507 Modern Monetary Theory and Degrowth: A coherent framework for climate and colonial reparations

Fadhel Kaboub[1,2], *Ndongo Samba Sylla*[3]

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This presentation will argue that addressing the climate crisis requires a rapid and radical transformation of the global economy from an extractive neocolonial system to a circular economy system. Using a modern monetary theory framework, we argue that most countries in the Global North have both the fiscal policy space and the technological basis to undertake such transformation. The Global North also happens to be responsible for most CO2 emissions since the industrial revolution, and is also responsible for the colonial and neocolonial socioeconomic damage in the Global South. Since the Global South lacks the fiscal policy space, the technological capabilities, and essentially bares little to no responsibility for climate change and neocolonial damage; we argue that a Climate and Colonial Reparations framework is the best approach to undertake such radical system redesign. We also argue that reparations starts with external debt cancellation, includes transfer of both financial and technological resources, and the establishment of a global network of truth and reconciliation commissions to process grievances and ensure fair and transparent implementation of restorative justice and equitable prosperity within a degrowth framework for a circular economy.

599 Climate change modelling and policy in the light of the failure of Neoclassical economics to understand energy

Stephen Keen

UCL, London, Thailand

The inability of Neoclassical economists to understand how climate change will affect activities not directly exposed to the weather is a product of the blindspot they have towards the role of energy in production. Once this is taken into account, the need, at some point, to abandon carbon-based energy sources is obvious. I illustrate this with two dynamic models, one of a pure energy economy, the other of a mixed energy-matter economy.
The urgent needs now are work out how to finance a transition to a non-carbon energy system and (c) to work out how to resource that system. Using the Minsky system dynamics software, I illustrate how MMT can guide the development of a system of carbon rationing to fund the transition. I then illustrate that it will be impossible to maintain the current level of human consumption while also resourcing the transition to a minerals based energy system.

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THEORY AND NEW IDEAS: ECOLOGICAL ECONOMICS: THEORETICAL AND EPISTEMOLOGICAL ISSUES

Chair: Sofia Belardinelli

12 Growth, technology and substitutability: confronting sustainability paradigms in a directed change Schumpeterian model

Guillaume Delafosse

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Degrowth is both prophetically defended by its partisans, and fearfully rejected by its detractors. Although it is in its core a statement about the economy, it is only marginally discussed in mainstream economics. Our ambition is to bridge the gap between degrowthers and economists. This paper is an economic theory effort relying on macroeconomic workhorse modelization à la Schumpeterian growth theory. We build on Julia based modelization and simulations to compare trajectories leading (or not) to collapse. It allows us to determine which assumptions are crucial for green growth to be feasible (or not). Our result is that we can represent ecological economics views in a directed change model as a constraint on substitution possibilities between clean and dirty inputs. This calls for new reflections around sustainability, for which ideas from the degrowth movement could be tested using transformations of workhorse growth models.

88 Sustained vs. sustainable (De-)Growth

Joachim H. Spangenberg

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When analysing the relation of economic growth and sustainable development, the lack of empirical evidence regarding human behaviour and political processes in academic and political debates is obvious. Hence the attempt to invoke new elements in the ecological economics discourse on growth, green growth and degrowth, to structure the discourse by distinguishing the growth discourse, the growth mechanisms and the growth impacts, and to formally describe the relationship between economic growth, work and employment, resource and labour productivity and resource consumption.This is done using elements from different bodies of theory, and introducing the "inequation of sustainability", a method to characterise the non-equilibrium relation of the factors mentioned. The inequation, plus the graphical analysis of the interaction of different institutional layers with environmental impacts, in particular with climate change and biodiversity loss, help focussing on the shortcomings of current policies rooted in neoclassical economic thinking, and indicate possible alternatives.

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THEORY AND NEW IDEAS: ECOLOGICAL ECONOMICS: THEORETICAL AND EPISTEMOLOGICAL ISSUES

Chair: Sofia Belardinelli

144 The unsustainability traps: ubiquitous (re)appearance of prisoner's dilemma at different scales. A game-theoretic illustration in a globalised economy

Alessio Carrozzo Magli[1], *Piero,Manfredi*[2], *Pompeo Della Posta*[2]

[1]University of Bologna, Italy. [2]University of Pisa, Italy

The threat of climate change calls for major cooperative actions at many different scales to ensure a rapid transition over a global "sustainable" pathway. We investigated the threats to cooperation by a suite of multi-agent, multi-countries, game-theoretic models encompassing most interactions relevant for sustainability choices. We show that unsustainability of the current development paradigm emerges as a ubiquitous phenomenon due to the ultimate nature of prisoner dilemma of economic interactions at all scales. Even if unsustainability is removed at lower scales, it re-appears when reconsidering the problem at the higher level. At the top of the hierarchy, that of between-countries interactions, no structural intervention deters defection. Things dramatically worsen in the presence of uneven distributions of resources because poor agents cannot but be unsustainable. Moreover, "bulimic" countries force globalization to persistently trigger unsustainability. This work offers a general background for political actions going beyond current palliative interventions.

202 The challenges of ethics in complex systems

Sofia Belardinelli[1], *Tiziano Distefano*[2]

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Interdependence between ecological and human systems makes decisions around climate change an ethical issue. The world's complexity challenges the oversimplified Neoliberal narrative; this Vision, focused on economic reductionism, has artificially removed the elements of complexity that characterise the biological and human spheres, leading to the climate crisis and increasing inequalities. The shortcomings of Neoliberalism are clear: a different ethical paradigm is needed to understand the complexity of the bio-cultural realm. Complex systems carry unescapable ontological uncertainties that make it difficult to weigh consequences. Evolutionary cognitive biases complicate grasping elaborate causal mechanisms and acting rationally when confronted with complex events.Therefore, is Neoliberalism still valid for guiding private and public decisions? Addressing the ethical positions underlying mainstream and ecological economics, we identify and discuss relevant ethical issues: the relationship between the natural and human spheres; non-rational individual choices caused by limited emotional capacities; how to reconnect individual interests with collective action.

84 Developing a context-sensitive approach for assessing value propositions for environmental goods and services

Philipp Cyrus

SOAS, University of London, United Kingdom

To enable climate change mitigation, it is necessary to develop and implement sustainability centred governance and management approaches for the environment, economies, and human societies. Economic methods used for valuing environmental goods and service inform environmental policy and management decisions. They tend to derive value propositions through a mix of market prices and preference-based methods, often leading to significant valuation errors, such as value transfer and measurement errors. This research project proposes a framework for context-sensitive value assessments, to address such errors and help inform sustainability centred environmental governance and management. Derived from value co-creation theory, framing and agenda setting analysis, the proposed framework enables a contextualisation of economic value propositions by linking value propositions to societal communication and its impacts on public perception of and engagement with environmental goods and services. It thereby sheds light on the process of economic value formation and how sustainability considerations inform value proposition.

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SPECIAL TRACK: ACADEMIA AND TERRITORIAL GOVERNANCE

Chair: Giuliana Biagioli

601 Landscapes, memories and glimpses of the future of sheep farming in Northern Tuscany

Lucia Giovannetti, Lina Pecini
Leonardo-IRTA, Pisa, Italy

The purpose of this survey, realised in the mountainous territory of the Tuscan-Emilian Apennines and the Apuan Alps between Lunigiana (MS) and Garfagnana (LU), was to collect the last oral evidence of traditional pastoralism and to read, on the ground, the archaeological post-medieval traces left by this long-lasting practice. We have verified that forms of pastoralism combining innovation and tradition have survived until nowadays; and we have identified local micro-economies, almost always in female hands, that constitute 'pockets of resistance' by activating small-scale production models, in antithesis to the productive models imposed by globalisation. These realities, associated with updated techniques of cheese making and the reuse of wool, trace possible future paths for a sustainable economy based in these mountains. The rise of sustainable economic models is particularly urgent in the Apuan Alps, since here the extraction of marble as prevailing economic activity is producing serious and irreversible eco-systemic damage.

603 MeNSA food hub project: An example of agro-ecological approach for environmental sustainability

Alessandro Agostini
Consorzio MENSA, Pisa, Italy

The demand for locally produced and source-identified food that addresses environmental concerns is growing. More and more consumers recognise the importance of an agro-ecological approach to food production to mitigate climate change and the related consequences. A system of food management that shifts the burden of responsible eating from the individual consumer to public and private catering services, and that spares them any additional logistic efforts, is required when trying to offer local produce that decreases food-related carbon footprint. M.e.N.S.A. (Mangiare sano e Naturale per la Sostenibilità Ambientale) is a food hub feasibility study that explores and implements innovative methods of aggregation of the local food offer to make agricultural products available, in terms of volumes and continuity, to the request of collective catering, both public and private. In an agro-ecological approach, food hubs can be considered as the major paradigm shift that can change the mindset of consumers.

602 Fragile areas as a laboratory: environment and cultural heritage

Rossano Pazzagli
Università del Molise, Campobasso, Italy

The so-called "internal areas" are not only a geographical expression, but an existential condition of places that have experienced abandonment and marginalisation as a consequence of a development model that has favoured cities, coasts and plains. The paper shows how in these territorial contexts (e.g. Apennine Italy, from North to South) culture and the environment can become an axis of development, provided that they are the object of a territorial integrated planning action that actively involves the local communities (democratic participation), effectively transforming them into those patrimonial communities to which the Faro Convention refers. To do this, however, differentiated policies are needed, aimed at reducing territorial disparities and social inequalities.

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SPECIAL TRACK: ACADEMIA AND TERRITORIAL GOVERNANCE

Chair: Giuliana Biagioli

608 The socio-economic sustainability of a non-renewable resource: the marble and Carrara city

Tommaso Luzzati[1], Andrea Apicella[1], Tommaso Rughi[2], David Burgalassi[3]

[1]Università di Pisa, Italy. [2]Scuola Superiore Sant'Anna di Pisa, Italy. [3]OECD, Paris, France

This work represents the results of a socio-economic inquiry developed by Leonardo IRTA team for the municipality of Carrara with a focus on the marble sector, which have been representing (and does represent) the most relevant economic sector, to the point that Carrara can be identified with it. The work began from the PIT's (Address Plan Territorial of the Region of Tuscany) regulatory definition of "sustainable" amounts of marble extraction, together with the presentation of its practical and theoretical limitations, which entail both the proper definition of "supply chain" and the concept of "short chain" in a context dominated by global value chains. The issue of defining sustainable quantities cannot be resolved with a mere technical definition but involves a political decision taken by the entire community of Carrara. The decision on sustainable quantities is therefore a question of local development, which will condition the future trajectories of the territory.

612 To re-think an environmental and socio-economic system: the PartecipArno project

Tiziana Nadalutti

Università di Pisa, Italy

The river Arno and its plain near Pisa face a combination of environmental challenges. Moreover, the traditionally strong local economy is going through a long-lasting crisis with a negative outlook, thus failing to ensure to the young the standard of living enjoyed by past generations. In 2015 the PartecipArno project launched a participatory process aimed at preserving and sustainably exploiting the river and its ecosystems and based on the model set by the Italian Table of River contracts. The stakeholders jointly elaborated a SWOT analysis and identified possible activities to put the river back at the centre of its territory, to counteract the effects of the environmental challenges and the economic crisis. In 2021, this resulted in the decision of elaborating a new project proposal for putting in place pilot actions and citizens science activities that will provide the basis for enhancing the environmental and socio-economic situation of the area.

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SPECIAL TRACK: WHICH LABOR FOR THE ECOLOGICAL TRANSITION?

Chair: Emanuele Leonardi, Matteo Villa, Marta Bonetti, Maura Benegiamo

28 From "Decent work and economic growth" to "Sustainable work and economic degrowth": a new framework for SDG 8

Halliki Kreinin[1], *Ernest Aigner*[2]

[1]Institute for Ecological Economics, WU, Vienna, Austria. [2]Institute for Law and Governance, WU, Vienna, Austria

The Sustainable Development Goal (SDGs) have successfully raised awareness and built momentum for taking collective action, while also remaining uncritical of the central causes of the environmental crises – economic growth, inequality, and overconsumption in the Global North. We analyse SDG 8 "Decent Work and Economic Growth" from the perspective of strong sustainability – as phenomena, institutions and ideologies – and find that it does not fit the criteria of strong sustainability. Based on this observation, we propose a novel framework for SDG8 in line with strong sustainability and the latest scientific research, "Sustainable Work and Economic Degrowth", including a first proposal for new sub-goals, targets and indicators. This encompasses an integrated systems approach to achieving the SDGs' overalls goals – a sustainable future for present and future generations. The key novel contributions of the paper include new indicators to measure societies' dependence on economic growth, to ensure the provisioning of welfare independent of economic growth.

543 The Just Transition Case for a UBI: a radical tool for degrowth

Lorenzo Filippo Velotti[1], *Gabriela Cabaña*[2]

[1]Scuola Normale Superiore, Florence, Italy. [2]London School of Economics and Political Science, London, United Kingdom

A policy that can be functional to a paradigm shift - that sees environmental protection and social security as mutually reinforcing processes rather than contradicting ones, thus opening real possibilities for enacting a just transition (JT), a sustainable welfare, and climate justice - is a Universal Basic Income (UBI). While many arguments have been put forward for a UBI, an argument for UBI built on a JT is still underdeveloped in the literature: a gap we aim to fill with our paper. The UBI is one of the key tools because: on the one hand, it directly tackles the issue of sustaining livelihoods in a context of employment issues produced by environmental protection. On the other hand, as a non-reformist reform that could use existing policy infrastructures, it is an important alternative to consider for accelerating the overall post-growth paradigm shift that is needed to live (well) on this planet.

468 "Voicing" Earth. Extractivism in Portugal and the ambivalence of ecological transition

Giada Coleandro[1], *Luca Onesti*[2], *Giorgio Pirina*[3], *Francesco Biagi*[2]

[1]University of Bologna, Italy. [2]University of Lisbon, Portugal. [3]Ca' Foscari University of Venice, Italy

The heightened awareness of ecological crisis by political authorities resulted in the EU's development of strategies aimed to contrast climate changes and foster the ecological transition. As this transition is based on the exploration of the critical resources through extractive processes, it is worth investigating the articulation of a top-down transition, to bring out divergent ideas of socio-economic development between local communities' representatives - that emphasize the harmful to environment and human's health of extractive activities - mining companies and political authorities - which choices may cause degradation of biosphere. To explore the ambivalence of the top-down ecological transition, this contribution focus on the extractives activities in Portugal, together with socio-natural reproduction ones expressed by local communities. In this way, it is possible to analyse the modalities by which "voicing" Earth, looking at the alliance between environment movements and workers aimed to propose a radical paradigm shift in the development plans.

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SPECIAL TRACK: WHICH LABOR FOR THE ECOLOGICAL TRANSITION?

Chair: Emanuele Leonardi, Matteo Villa, Marta Bonetti, Maura Benegiamo

402 Climate transitions on the ground: for an integrated research on labour, social policy and sustainability

Marta Bonetti, Matteo Villa

University of Pisa, Italy

The paper analyses the role of context-based processes of transition policy implementation and governance, to understand possible patterns of integration between welfare and climate policies.
By discussing three qualitative case studies based in Italy, where mixed processes of ecological and technological transition are driven by national and European regulations, it provides an opportunity to observe how policy actors cope with emerging social risks arising from emissions-reduction measures, including the effects of unemployment and mismatch.
First outcomes show the important role of welfare and employment regimes, the structure of local economy, as well as the interactions between bottom-up and top-down dynamics of planning, implementation, governance as well as of citizens and workers mobilization. These factors differently unfold, produce patterns of transition that enhance or hinder the local actors' agency and enactment, as well as the capability of systems to deal with trade-offs and conflicts and to reduce the risks of exclusion.

362 Environmental mobilisations of workers as instances of climate justice

Emanuele Leonardi[1], Paul Guilliber[2]

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The energy transition leads to the abandonment of certain sectors of the fossil economy and to the closure of some work places (e.g. wells, mines or refineries). This leads to the precarisation of some sectors of the working class. However, it also radicalises the antagonism between labour forces and traditional environmentalist movements, that are sometimes willing to sacrifice workers' rights to defend the biosphere (Krause, Morena and Stevis 2020). This form of 'jobs blackmail' prevents the greening of trade union strategies and the politicisation of the climate movement (Rätzhel and Uzzel, 2012), going as far as frontal oppositions between ecologists and workers (Ciplet and Harrisson, 2020). In this intervention, we explore an alternative path and argue that since the 1980s there have been forms of environmentalist mobilisation specific to the working class (Loomis 2021 ; Snell 2021), based on the defence of occupational health and safety (Mazzochi, 1993; Vachon, 2021) and more generally of social reproduction (Barca and Leonardi, 2018). Moreover, the ecologico-political interpretation of the pandemic - according to which the root-cause of zoonotic spillovers is to be found in the global metabolic rift (Wallace, 2020) - allows us to assess workers' demands as instances of climate justice. To make our analysis more concrete, we will briefly present two cases: a survey conducted among the workers of the Grandpuits (France), where the struggle against the closure of the refinery gave rise to an original alliance between trade unionists and environmentalists; the struggle in the logistic sector in the Padana flatland (Italy), where workers' demands were recognized as their own by climate justice movements, opening up the political space for a possible class-based climate advocacy.

311 Who owns the Just Transition? The role of unions and environmental groups in leading the socio-ecological transition in Canada

Becca Wilgosh[1], Alevgul Sorman[2]

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Green growth approaches are prevalent in Just Transition narratives in Canada, particularly among companies and governments, but also many labour unions who are concerned with their members' livelihoods in the immediate future. Meanwhile, some activists, organizations, and Indigenous peoples envision radical post-carbon alternatives that prioritize ecological sustainability and aim to restructure the economy. The points of convergence and conflict between unions and organizations are a vital but under-examined factor in the struggle to redefine work in a livable world. Our case study analyzes the Just Transition campaigns of Canadian organized labour and environmental groups, and explores the participatory processes and/or alliances through which these campaigns are formulated. Drawing on a critical review of public documents and supplementary interviews with labour and environmental organizers, we aim to contrast government-led Just Transition strategies, as framed in national and provincial policy, with regional movements offering place-based demands from the ground up.

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THEORY AND NEW IDEAS: ECOLOGICAL ECONOMICS: THEORETICAL AND EPISTEMOLOGICAL ISSUES

Chair: Chandni Dwarkasing

399 Metatheory, ontology and conceptualisations of the economy

Teppo Eskelinen

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The paper analyses the impacts of the 'metatheory' of neoclassical economics, and suggests an alternative to it. Unquestioned metatheories are seen to direct theorising, interpretation, and suggested remedies to various problems, as they entail the ontological basis of the theories. The key metatheoretical idea in neoclassical economics is seen to be methodological individualism, and the impacts of the commitment to this approach are also visible in environmental economics. For a more profound turn in theorising, hopefully able to ground an economic theory for more healthy human-nature relations, an alternative ontological starting point is suggested. The suggestion is to take the social and natural context, rather than the individual, as the entry point of theorising. Beginning theorising from such enabling contexts, we could perhaps form an economics more sensitive to limits, appreciating existing resources more than the current wasteful economy does.

13 Two decades of real economic growth in China: a Critical natural capital approach to Growth theory

Marius Andioc

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As knowledge on our place in ecosystems expands, economic models must be questioned and revised to cope with the 21st century's challenges. The debate on growth sustainability in economics took off with the awareness on climate change. Two views are generally opposed: weak sustainability which assumes substitutability of capitals, and strong sustainability which assumes complementarity. Critical Natural Capital is a concept which was coined as a middle-ground between both approaches.
This paper attempts to contribute to growth theory by integrating a factor trying to quantify the Critical Natural Capital level. It then applies this model to the Chinese case between 1993 and 2013. Six components are considered here: freshwater resources, climate, phosphorus, air quality, forests and biodiversity. Findings highlight the danger of unsustainable use of critical resources: a divergence between traditional economic indicators and real welfare, and the irreversible loss of current and future income due to CNC depletion.

470 Two tales of degrowth: The dialectics between transition threats and promises

Birte Strunk

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In this paper I argue that the degrowth transition discourse entails a core dialectic: it can be framed in terms of *threat* or *promise*. Although it is conventional wisdom that any transition implies both challenges and opportunities, the task of this paper is to work out how the degrowth discourse can be systematically structured around a threat- versus a promise-narrative, which in turn imply different ethics: an 'ethics of constraint' on the one hand and an 'ethics of abundance' on the other. While both valid, the two perspectives lead to diametrically opposed conclusions on ethical demands, and with that, policy advice and proposed leverage points. Although both carry the potential of a new ethics that goes beyond certain cornerstones of mainstream economic thinking, they do so with fundamentally different argumentative strategies. Being clear about the two different tales, I argue, is relevant to avoid misunderstandings, especially across disciplinary boundaries.

524 A formal approach to the metabolic rift theory: exposing the relevance of exhaustive working conditions

Chandni Dwarkasing

SOAS University of London, United Kingdom

This paper presents a microeconomic formalization of Marx's metabolic rift theory. We utilize a neo-Ricardian framework which operates on the basis of physical quantities and relates distributional conflicts to the command over a physical surplus. The novelty of our approach lies with the introduction of a metabolic parameter (M): a measure for the intensity of metabolic rifts. M is a function of labour conditions and its formalization is based on Marx's labour process theory and its two components: material metabolism (MM) and purpose realisation (MP). We establish a relation between labour conditions and appropriated soil fertility by treating the technical coefficient for land as a function of M. Results from our scalar form model suggest that the deterioration of MP leads to stronger metabolic rifts compared to the deterioration of MM. Finally, we present an extrapolation to the issue of climate change.

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THEORY AND NEW IDEAS: ECOLOGICAL ECONOMICS: THEORETICAL AND EPISTEMOLOGICAL ISSUES

Chair: Chandni Dwarkasing

539 How waste pickers in the global South are being sidelined: A network analysis

Federico Demaria[1,2], *Daniele Vico Master*[1], *Ksenija Hanaček*[2,3]

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Why is waste conflictive in Global South metropolises? Our hypothesis is that the socio-metabolic reconfigurations of waste management are driven mainly by changes in both the social metabolism (i.e. waste generation and composition) and the political economy (i.e. institutions defining ownership, access, and management of waste). These reconfigurations lead to the exclusion of informal recyclers from the access to waste, and therefore to socio-environmental conflicts. Using the Environmental Justice Atlas we have documented 70 conflicts in the Global South involving waste pickers. As methods for analyzing the conflicts, first, we have used qualitative coding, and second network analysis to map relational data, complex interdependencies, and connections among the codes. We identify three main threats: incineration, privatization, and restrictions in urban space. Last, we explain how waste pickers fight for environmental justice resisting these policy shifts that threaten to deprive them completely of their livelihood.

69 With limited power comes limited responsibility: a novel dynamic measure of causality under uncertainty and its implications

Michael Stecher, *Stefan Baumgärtner*

University of Freiburg, Freiburg im Breisgau, Germany

Sustainability puts moral obligations on currently living generations to preserve natural systems in a good state for future generations. Since it is a generally accepted ethical principle that one can only be obligated to do what one is able to do, an important question is whether present generations actually have the capacity to cause desired system states over the inherently uncertain long-term future. Causal efficacy is further limited by complex and stochastic dynamics of relevant systems. To gauge how far causal efficacy extends into the future, we develop quantitative measures for the degree of causation of the state of dynamical systems by different actions. In particular, we generalise the concept of partial causal responsibility to deterministic and stochastic dynamical systems. We find that the time path of causal responsibility varies substantially both across different types of systems for comparable actions and across different types of actions within the same system.

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RESOURCES: MATERIALS, ENERGY, WASTE

Chair: Ricardo Pinto

459 The role of capital in energy production and use: a useful stage net energy analysis of European countries

Marco Vittorio Ecclesia[1,2], *João Santos*[2], *Tiago Domingos*[2]

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Energy Return On Investment (EROI) is a crucial efficiency metric for societal development: the more energy is required to obtain energy itself, the less can be used to provide energy and services to society. However, societal EROI studies usually disregarded the role of capital investment in the energy sector as well as limited the analysis to the final stage of energy conversion processes. The only available empirical estimate of useful stage EROI was made for Portugal and shows a value around 3, and stable over a long-time range (1960-2014), thus suggesting an independence of EROI from economic growth.
Such results need to be verified for a wider scope in order to discern which of them are country specific and which are, possibly, generalizable. To do so, we calculate a useful stage EROI of European countries, by firstly providing an estimate of the capital investment corresponding to all energy converting machines.

108 World energy and exergy efficiency 1971-2018: results and key insights

Paul Brockway[1], *Matthew Heun*[2], *Zeke Marshall*[1], *Emmanuel Aramendia*[1]

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Using more efficient energy conversion devices (e.g. cars, lights, boilers) has not reduced global energy consumption, which grows at ~2%/year since 1970. World-level energy efficiency metrics are typically physical-based (e.g GJ/tes of steel) or economic-based (GJ/$GDP) intensities. In addition, by remaining at the final energy stage only limited insight is gained.
In response, we develop the most comprehensive world-level thermodynamic assessment primary-final-useful energy conversion efficiency from 1971-2018. We adopt the methods pioneered by the country-level studies of societal exergy analysis community, constructing a world-level database covering 153 regions, 7 end use sectors; 16 energy carriers; 80 end uses (machines).
We present aggregate results for primary-final-useful en/exergy flows, before decomposing to understand the efficiency differences by global sector, energy carrier and end use categories. In this way, we can present new insights into the global energy efficiency, that advance our knowledge beyond the current physical and economic-based metrics.

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RESOURCES: MATERIALS, ENERGY, WASTE

Chair: Ricardo Pinto

158 Peak Oil and the minimum EROI for society

Sabin Roman

University of Cambridge, United Kingdom

We propose a class of low-dimensional dynamical systems to model the production of non-renewable energy that highlights one key insight: the peak of production coincides with the minimum of the energy return on investment (EROI). Since Hubbert proposed the theory of peak oil there has been a growing concern for when worldwide production of crude oil would reach its maximum and then start declining. The early 2000s saw a flurry of predictions and increased distress regarding the topic which has since subsided.
The extraction of non-conventional oil resources has helped mitigate the problem but does not address the issue of declining EROI. There is a minimum EROI necessary for society with its modern facilities to function properly or otherwise face the possibility of collapse. Our model indicates that the concern for peak oil was misplaced: society can experience low, even unsustainable EROI, well before global production would ever peak.

272 Exploring the links between energy and growth in Europe: Panel cointegration analysis with useful exergy for EU countries

João Santos[1], Paulo Rodrigues[2], Tiago Domingos[1]

[1]MARETEC – Marine, Environment and Technology Center, LARSyS, Instituto Superior Técnico (IST), University of Lisbon, Portugal. [2]Banco de Portugal, Economics and Research Department; Faculty of Economics, Universidade Nova de Lisboa, Lisbon, Portugal

The energy-economic link is still poorly understood. Mainstream approaches downplay energy, struggling to justify historical growth and the impact of energy crises. Ecological economics argues for energy as an essential input. Recent work has shed light on the appropriate metric to account for productive energy uses, in a comparable manner – useful exergy. We use panel econometric techniques on EU-15 countries (1960-2009), identifying statistically significant economically plausible APFs linking output, (quantitative only versus quality-adjusted) capital/labor, and energy (final and useful energy/exergy). Subsets of total useful exergy consumption (sans residential, high-temperature heat uses; mechanical drive uses only) are tested in our approach. Results suggest panel cross-sectional dependence leads to misleading conclusions from first-generation unit root, cointegration, and Granger-causality tests. Tests accounting for cross-sectional dependence show stronger evidence for cointegration with energy, particularly useful exergy for mechanical drive end-uses only. Hence, not all exergy categories are equally important to economic development.

408 Electricity consumption of computers - the theoretical and practical limits for thermodynamic efficiency and implications

Ricardo Pinto[1], Tânia Sousa[1], Paul Brockway[2], Tiago Domingos[1]

[1]MARETEC-Marine, Environment and Technology Center, LARSyS, Instituto Superior Técnico, Universidade de Lisboa, Portugal. [2]Sustainability Research Institute, School of Earth and Environment, University of Leeds, United Kingdom

Electricity demand is expected to double until 2050. Computers and other information and communication technologies (ICT) are expected to represent a significant fraction of this increase, but ICT efficiencies are not well defined due to the difficulty of measuring information in energy units. In recent studies about electricity, final to useful efficiency stagnated due to the increase in share of the less efficient residential and commercial sectors. ICT share is increasing in these sectors and is partially responsible for the efficiency dilution effect. Aiming at improving estimations of future electricity demand and efficiency a better definition of ICT efficiency is needed. We establish two different metrics of efficiency, one based on the theoretical limit proposed by Landauer and the other based on the most efficient computer known the human brain. An enhanced understanding of past and future evolution of computer efficiency can change the way we look at information processing.

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RESOURCES: MATERIALS, ENERGY, WASTE

Chair: Ricardo Pinto

427 The impact of electrification in the decarbonization of the Portuguese energy system from 1960 to 2016

Laura Felicio[1], Sofia T. Henriques[2], Zeus Guevara[3,1], Tânia Sousa[1]

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To evaluate and forecast the impact of electrification on decarbonization of society the aggregated carbon intensity (ACI), defined as the tons CO_{2eq} emissions per unit of energy, can be used as an indicator. We estimated the ACI at the useful stage (ACI_{useful}) of Portugal for all energy carriers and for electricity only, from 1960 to 2016 and performed a decomposition analysis considering 5 factors. Electricity's increasing ACI_{useful} in the beginning of the period, was not contributing to decarbonize the Portuguese economy directly; however, having a much lower ACI_{useful} than other carriers it contributed indirectly to lower the total ACI_{useful}. Only after the 2000s, with policies directed to the use of renewable resources, electricity's decreasing ACI_{useful} contributed to the decarbonization of the economy directly. The main driving factors of the ACI_{useful} are the consumption of fossil fuels and the structure and efficiency of the energy system.

196 Matrix Completion for the Prediction of CO2 Emissions

Francesco Biancalani[1], Giorgio Gnecco[1], Rodolfo Metulini[2], Massimo Riccaboni[1]

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In recent years, CO_2 emissions at the international level were studied from different points of view, due to their importance with respect to concerns about climate change. Nevertheless, data on CO_2 emissions (available at country-industry level and related to the last two decades) suffer from missingness and unreliability. To the best of our knowledge, the problem of solving the inaccuracy of such data has been overlooked. Thereby, with this work we contribute to the academic debate by analyzing CO_2 emissions data using a machine learning technique. Specifically, we propose to apply *Matrix Completion*, a method whose main idea relies on the minimization of a trade-off between the error on a set of observed entries of a matrix and a proxy of the rank of the reconstructed matrix. More precisely, with the final goal of providing robust CO_2 emissions data completion, we propose some specific improvements in the application of Matrix Completion.

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SPECIAL TRACK: INNOVATION WITHOUT GROWTH: SCIENCE, TECHNOLOGY AND INNOVATION IN A POST-GROWTH ERA
Chair: Mario Pansera

155 Transformative enterprises: Nine key dimensions of change agents for strong sustainability

Miriam Hug[1], *Heike Mayer*[1], *Irmi Seidl*[2,3]

[1]University of Bern, Switzerland. [2]University of Zurich, Switzerland. [3]Swiss Federal Research Institute WSL, Birmensdorf, Switzerland

Although unspectacular and often overlooked, small and medium-sized enterprises (SMEs) may initiate industry changes needed in times of grand challenges like climate change, biodiversity loss and recurring economic crises. With consistent regionalization strategies, fully renewable products or practices promoting sufficiency they forge new paths and become important change agents.This is what has been called a transformative enterprise – a pioneering SME that strives for fundamental changes towards strong sustainability. But despite SMEs accounting for up to 99% of all firms in European countries, knowledge on such enterprises is thinly sowed and dispersed in various research fields. Most contributions addressing enterprises in sustainability transformations either focus on macroeconomic questions or describe grassroots and amateur economies, neglecting ordinary economic actors like SMEs. We therefore ask: Hence what are the characteristics of transformative enterprises? And how do they bring about changes towards sustainability? With this contribution we aim at answering these questions by [...]

265 From Creative Destruction to Innovation Systems based on Conviviality and Use-value: The Case for Commons-based Peer Production

Ben Robra[1], *Mario Pansera*[1,2], *Alex Pazaitis*[3], *Chris Giotitsas*[3]

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The notion of Creative Destruction underpinning classical innovation management theory as well as having crystallised into technological determinism and productivism has come to a dead-end. Framing innovation's ultimate goal as the endless pursuit of economic growth is unrealistic if we wish to address pressing environmental challenges. Creative Destruction emerged as a historical ideology from a specific set of values aligned with capitalism and its need for valorisations. Capital valorisation imposes its logic on innovation, definition of needs, consumption, and organisation of work. The mantra of 'innovate or die' represent a hegemonic view on technology aligned with capitalism. We argue that a counter-hegemonic view emphasising conviviality and use-value is possible and needed for postgrowth. The (re-)emerging mode of production, commons-based peer production has such potential. Indicative cases show that innovation underlined by counter-hegemonic values already exists in the cracks of the dominant system and in constant danger of co-optation.

299 Circles, 'the city' and modern myth-making

Sofia Greaves

University of Vigo, Pontevedra, United Kingdom

The notion of circularity is currently widespread. This paradigm underpins and justifies change in cities. Circles directs everyday behaviour and practices; they have come to come to symbolise a range of values, from 'inclusivity' and 'innovation', to environmental solutions and technologies, like waste management and solar panels. This paper offers a new perspective upon the circular economy by providing a critical reading of the circle in the context of urban history. What visions, practises and socio-technical imaginaries has the circle facilitated? Historically, symbols, practices and stories have constructed myths, which have acted as organizing forces with the potential to transform and fix social structure. Are we creating our own twentieth-century myth? What happens if we think about the circle in a historic and mythical context?

519 Non-humans as co-innovators for post-growth: the case of two Catalan beer breweries

Elisa Schramm

University of Vigo, Pontevedra, Spain

This paper discusses two beer breweries and explores how they might add to our understanding of post-growth innovation in practice. Based on ethnographic data, this paper discusses two distinct ways of technological and organisational innovation that may be understood as post-growth. This paper argues in favour of a greater attention to the specificities of the product (e.g., beer) and ways of producing it in the study of innovation. If carbon-intensive production processes and a conceptual and practical 'deadening' of non-humans have been characteristic of capitalist innovation, post-growth innovations should consider not only environmental impacts, but the very vitality of the non-humans in production processes as part of the basis for technological and organisational reforms. Thus, non-humans in various guises should be taken seriously as co-innovators and co-organisers of post-growth organisations, which implies the necessity to rethink organisation and innovation principles needs to be rethought case-by-case rather than as general guidelines.

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SPECIAL TRACK: INNOVATION WITHOUT GROWTH: SCIENCE, TECHNOLOGY AND INNOVATION IN A POST-GROWTH ERA
Chair: Mario Pansera

600 A business model patterns perspective on organizational value creation for post-growth

Tobias Froese[1], *Florian Hofmann*[2], *Florian Lüdeke-Freund*[1], *Markus Richter*[1]

[1]ESCP, Berlin, Germany. [2]TU Berlin, Germany

The profound socio-economic changes that post-growth would imply for modern societies essentially concern the way organisations create value. However, there is a lack of concepts of organisational value creation that are compatible with post-growth. Against this background, we aim to explore (new) forms of value creation in the business models of post-growth organisations. To this end, we conduct an integrative literature review of existing case studies on post-growth and degrowth organisations. The literature identified is analysed using the concept of 'business model patterns'. Based on this concept, value is created for (and with) stakeholders when problems are solved through organisational activities. We start to identify patterns in both *what* organisations can contribute to value creation for post-growth and *how* organizations can make these contributions. Moreover, the specific business model patterns we identify capture problem-solution combinations that can inspire future business model innovations.

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SPECIAL TRACK: GREEN GAMES (GG): PROMOTING ENVIRONMENTAL EDUCATION THROUGH GAME-BASED LEARNING

Chair: Roberto Di Paolo

65 Game-based education promotes sustainable water use

Roberto Di Paolo[1], Ennio Bilancini[1], Leonardo Boncinelli[2]

[1]IMT School for Advanced Studies, Lucca, Italy. [2]University of Florence, Italy

In this study we estimate the impact of a game-based educational program aimed at promoting sustainable water usage among 2nd-4th grade students and their families living in the municipality of Lucca, Italy. To this purpose we exploited unique data from a quasi-experiment involving about two thousand students, one thousand participating (the treatment group) and one thousand not participating (the control group) in the program. Data were collected by means of a survey that we specifically designed and implemented to record students' self-reported behaviors. Our estimates indicate that the program has been successful: the students in the program reported an increase in efficient water usage and an increase in the frequency of discussions with their parents about water usage; moreover, positive effects were still observed after six months. Our findings suggest that game-based educational programs can be an effective instrument to promote sustainable water consumption behaviors in children and their parents.

76 Le Grande Jeu: Games of political economy for explorations of reality and hyperreality

Marcus Petz[1,2], Federico Bonelli[3], Raffaela Rovida[4]

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Why should we play games? What is the advantage of serious gaming or even non-serious gaming over scenarios as used in economic research? Here we explore the development of money games, how they can be used as an economic tool with a case study of the game Le Grand Jeu. Le Grand Jeu, a community arts game, is used to introduce cryptocurrencies. Electronic game currencies, such as found in Animal Jam, Second Life and other VCCs (Virtual Community Currencies) offer a way to explore not just small functioning economies, but with millions of international gamers, macroeconomic effects and trends. We conclude that the use of games in workshops and real-time play allow a more realistic, integral economics to be explored. A more ecological approach is possible than that offered by the commonly used economic labs, such as the Vienna Center for Experimental Economics, which run economic simulations via ORSEE.

141 Foodscape - are high levels of flow and simultaneous knowledge transfer in learning games compatible?

Ennio Mariani, Sonja Trachsel

ZHAW Wädenswil, Switzerland

The educational game Foodscape (www.foodscape.ch) conveys the complexities of the Swiss food system. It was developed for students at the age of 12-16 years. During the development of the game, the central question was: How can complex interrelationships – a core characteristic of food systems – be conveyed in a game so that it is still fun to play and causes flow feelings? The answer to this question resulted in a strategy game, where the players, as the ruler of an imaginary Switzerland have to make decisions in order to keep resources such as land, yield, the environment, and health in balance. Preliminary results indicate, that even though the content was reduced in the game and students enjoyed playing the game, the game flow levels were low. Nevertheless, the game proved to be suitable for initiating discussions about the food system and its sustainability.

180 Grasping ecological complexities: a Game-Based Learning approach centered on the use of the card game "gnAMP" to teach about the marine ecosystem

Federica Piazza[1], Alessia Bontempi[1], Silvia Cao[1], Chiara Fontanot[1], Elisa Moretti[1], Marco Paparot[1], Lisa Peratoner[1], Lorenzo Peter Castelletto[1], Alan Mattiassi[2]

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Ecosystems are complex systems combining biotic, abiotic, and human factors in a tangled web of dynamic interactions. Trophic webs, feeding relationships within a community, are a main feature of an ecosystem, implying transfer of food matter, but also energy transfer from plants through herbivores to carnivores. The Miramare Marine Protected Area objective was to create a game to make it easier to understand these complex ecological concepts. Toward this goal the card game "gnAMP" was created. Four different cards represent different role-players in the marine ecosystem, with an additional type of cards representing the organic wastes that fuel the food chain. Card are placed in a slot of a 4x4 grid representing a marine ecosystem that is being filled with organisms with different roles and role-specific mechanics. GnAMP will be used in schools with youngsters of age of 12-14 within a game-based learning session. Results will be presented.

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SPECIAL TRACK: GREEN GAMES (GG): PROMOTING ENVIRONMENTAL EDUCATION THROUGH GAME-BASED LEARNING

Chair: Roberto Di Paolo

230 Designing a serious escape eco-game for increasing social awareness on the role of the forest for the future of the planet: Pistoia mountain case study

Ginevra Virginia Lombardi, Ilaria Colivicchi, Leonardo Boncinelli, Isabella Negri

University of Florence, Italy

Forests play an important role in the ecosystems and they deliver fundamental services to social systems. Despite that very little consideration is posed by current society to forest enhancement and conservation. This paper deals with the design and the development of a serious escape game aimed at increasing social awareness towards ecological role of forest in guaranteeing life at global level. The game design is based on the fulfillment of the informational gap revealed by data collected through choice experiments, face to face interviews and focus groups. In this aim, according to Clarke et al. (2017), the research applies the escapED framework. After playing the game, the participants are expected to increase their recognition of ecosystem services provision by forest and of their contribution in sustaining earth life and ecosystem vitality at global level. The case-study escape eco-game will be carried out in a traditional animal farm located in Pistoia mountains (Azienda Agricola Le Roncacce, San Marcello Piteglio), within the ForLEAVEs project.

454 Role board games and behavioural experiments as learning tools

Martin Špaček[1,2], Tatiana Kluvánková[3], Stanislava Brnkaľáková[3], Tomáš Szabo[3], Natália Nováková[3], Dominik Horváth[3]

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Ongoing societal challenges in the management of global change require behavioral change. At the same time, it is necessary to look for suitable ways of transferring theoretical knowledge and insights to stakeholders as well as students. Our developed green experimental games build on Cardenas et al. (2013) and Castillo et al. (2011) and represent interactive agent-based models arranging for repeated interaction and learning in real-world situations. They are suitable as learning tools for both university students and communities, but also in a simplified form for primary school pupils. The integration of the game-based learning contributes to understanding a role of incentives provision, monitoring and sanctioning, mutual trust, communication or actors' coordination for the sustainable production of ecosystem services. We believe that through game-based learning we can help to understand and navigate purposeful behavioural change for long-term sustainability as well as for supporting knowledge exchange to raise awareness of sustainability issues.

620 Making change possible: Serious Gaming for a systemic change

Sylvie Geisendorf

ESCP Berlin, Germany

The paper proposes an educational approach, supporting a mind-set change towards more cooperative decisions and a regenerative energy system. "Sustainability requires a change in the vision of politicians and in the collective imagination" (ESEE Conference, 2022). How can such a change be supported and – ideally – initialized fast? The proposition discussed is the tool of "Serious Gaming". A serious game works with physical material or in a digital format. It consists of simplified, abstract versions of issues to be understood through the gaming approach. The "Newtonian Shift 2.0" starts with a mostly fossil based energy system. Its aim is to shift towards an affordable and reliable renewable energy provision while considering further sustainability dimensions. Next to being able to transmit systems understanding to the participants, serious games are also psychologically an educational tool. As intense experiences have been "lived through" by playing, gaming can provoke behavioral change in real life situations.

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SPECIAL TRACK: INTERPLAY BETWEEN POST-GROWTH TRANSITION AND FINANCIAL SYSTEM DYNAMICS

Chair: Anja Janischewski

62 Schumpeter, Keynes or Lenin? A stock-flow consistent model of Degrowth as Creative Destruction in three macrofinancial regimes

Christopher Olk[1,2], *Matthieu Bordenave*[1]

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Degrowth can be understood as a process of "creative destruction". In a Schumpeterian "bottom-up" notion transition, changes in consumption and work time preferences towards sufficiency, supported by eco-taxes, foster the creation of new industries alongside the destruction of old industries, which is greater than the creation in terms of output. In a Keynesian "top down" scenario, public investment, green monetary financing, expanded public services and a job guarantee support the transition. Finally, in an "Eco-Leninist" scenario, the state directly takes ownership over the fossil and financial sectors. We apply the theoretical framework of "macrofinancial regimes" to these three scenarios. We construct a simple stock-flow-consistent model and simulate the three scenarios. In particular, we examine the risk of financial crises due to stranding assets and defaults in the fossile sector. Our results suggest that fiscal intervention and socialization of key industries are required for a smooth and swift Degrowth transition.

101 Two nested circuits: the "socio-monetary metabolism"

Paul Hadji-Lazaro

Université Sorbonne Paris Nord, France

The proposal starts by building up a representation of the socio-metabolic system as a circuit. The four main operations of the social metabolism (appropriation, conversion, consumption, and excretion of matter and energy) are represented through a physical Supply-Use framework in matrices and directed graphs. The proposal then conceptually and functionally situates the role of money as a medium of exchange in the socio-metabolic system. In a second part, the proposal discusses the role of the financial system in monetary economies of production and presents the Post-Keynesian monetary circuit in a macro-accounting framework (inspired by the Stock-Flow-Consistent modeling tradition). Finally, based on the combination of these biophysical and monetary frameworks, the proposal constructs an integrated representation of the two circuits in matrices and graphs: the "socio-monetary metabolism". Based on that framework, a set of causal and coevolutionary channels between the monetary and the biophysical systems are discussed.

451 Impact of a post-growth transition on financial market dynamics - analysis via a heterogeneous agent model

Anja Janischewski

Chemnitz University of Technology, Chemnitz, Germany

A green transition under limits to growth may lead to additional challenges for financial stability compared to a green growth scenario. To illustrate possible dynamics and mechanisms, a stylized heterogeneous agent model of a stock market index with chartists and fundamentalists is used. The impact of a post-growth transition on financial markets is conceptualized by an announcement of environmental policies that lead to changes in investors' beliefs about future dividend payments. Results show that heterogeneous behaviour among investors increases the impact of limits to growth in the green transition in terms of the size of the devaluation as well as price volatility. However, heterogeneity among agents also has a smoothening effect on the price dynamics at the time of the announcement.

491 Financial capital accumulation as a barrier to degrowth transitions: A scenario analysis

Julien Vastenaekels

Free University of Brussels (ULB), Belgium

How to materialise degrowth (or postgrowth) from within modern capitalism and its institutions? The degrowth literature still lacks a comprehensive understanding of the related barriers to change and how they can be overcome. The development of degrowth narratives suffers from important uncertainties about the various entities which enable transformations and those which hinder processes of change toward degrowth. This research attempts to shed light on the role potentially played by coalitions of investors behind top corporations, which continuously evaluate and compare the value of their financial assets. With the backing of governments, they secure their capacity to accumulate financial capital through economic, legal, political, social, and symbolic means. From a methodological point of view, this research develops scenarios with an abstract agent-based model. It attempts to simulate the dialectical process through which large government-backed corporations and degrowth movements - such as alternatives, resistances, political movements... - struggle and restructure institutions of society.

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INSTITUTIONS AND POWER: MONETARY AND FINANCIAL SYSTEMS FOR SUSTAINABILITY
Chair: Stavros Pantos

7 Protecting the "green swan": evaluating the prudential supervision of climate change risks for the European banking sector

Stavros Pantos
University of Reading, United Kingdom

This paper presents a critical analysis of the supervisory approaches towards climate change risks, commenting on disclosures and financial metrics, with focus on stress testing and scenario planning development. Specifically, it documents the literature review on supervisory practices towards the management and reporting of climate change risks and the existing regulatory prescribed climate change scenarios, developed for financial services in Europe, providing a critical examination of their effectiveness. The analysis performed adds to the growing literature about the design of scenarios for physical, transition and liability climate change related risks for financial institutions. This research examines the financial stability implications of climate change, under the lens of supervisory approaches for the monitoring, management and reporting of climate change risks for financial services. Recommendations for enhancements towards supervisory practices about prudential governance and management of climate change risks are included, with advances to the underlying regulatory framework at European level.

381 Guardians of the regime: Central banks and the dual role of finance in socio-technical transitions

Emanuele Campiglio[1,2], Jérôme Deyris[3], Frank Geels[4], Christopher Schröder[1]
[1]University of Bologna, Italy. [2]RFF-CMCC European Institute on Economics and the Environment, Milano, Italy. [3]University Paris Nanterre, France. [4]University of Manchester, United Kingdom

Transitioning to a carbon-free economy will involve two intertwined dynamics: the phase-in of low-carbon niches and the phase-out of incumbent high-carbon capital. This paper studies how the financial system's role in these two dynamics may evolve throughout the sustainability transition. We rely on the Multilevel Perspective to conceptualise finance as a socio-technical regime. We present its evolution as being determined by the struggle to meet both 'intrinsic' and 'extrinsic' objectives which may cause political-economic frictions. Central banks and financial supervisors are in a crucial position to address these in order to achieve an orderly and rapid transition. In a single case study, we identify three patterns of negative feedback effects evoked by finance-energy regime interaction in the EU. We discuss how the interplay of these patterns and policymakers' response will determine whether the finance regime will shift to a transition pathway in line with the Paris Agreement.

433 The impact of the ECB strategy review on low-carbon listed companies

Cristiana Fiorelli
University of Rome Tor Vergata, Italy

The goal of this paper is to assess the differential short-term impact of the strategy review announcements on the stock market returns of low-carbon listed companies and carbon-intensive listed companies, exploiting high frequency financial data. An event study approach is employed to measure the impact of ECB news on financial markets in the euro area. The empirical setup will be extended with a spatial component to also account for the spatial heterogeneity among different location of firms. According to our results, the strategy review announcement had a significant positive impact on the stock market value of low-carbon listed companies. The opposite is true for carbon-intensive listed companies, which registered a contraction in their values. These results, based on a short period of time suggest that a monetary policy strategy considering climate issues in their targets might affect the market values of firms, thus favouring the allocation of resources from carbon-intensive to low-carbon firms.

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TEACHING AND COMMUNICATION: COMMUNICATION, EDUCATION AND PEDAGOGY, AND ARTS FOR EE

Chair: Thomas Schinko

6 makingAchange – transformative science and learning for empowering the youth amidst the climate crisis

Thomas Schinko, Magdalena Tordy

International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria

Empowering young people to become "systems changers" in the low-carbon transformation is challenging within educational systems that prioritize instrumental learning in an individualistic and competition-oriented environment over critical thinking, reasoning and reflection, and co-creation of creative actions. Transformative learning is needed to change unsustainable values, attitudes, habits, and behaviors, which are often learned and cemented at a young age. In this research we describe the co-development of the transdisciplinary makingAchange peer-to-peer training approach for transformative sustainability education in Austria and critically reflect on its first implementation phase. The first promising insights after one year of makingAchange indicate that our transformative learning approaches can support students' critical thinking and awareness of the climate crisis, enable them to reflect about their own stakes in the context of sustainability transformations, and provide them with a new sense of agency and empowerment towards real transformative action at both personal and societal levels.

72 Another way of teaching & another way of learning Water Ecological Economics

Esther Velazquez, Maria J. Beltran

Economics Department, Pablo de Olavide University, Seville, Spain

The course Water Ecological Economics (Degree of Environmental Sciences, Pablo de Olavide University, Seville) is taught under the principles of the Integration Paradigm and Holistic Education. We present to the students a different approach to water conflicts, in which active participation, critical attitude, the need to argue and defend different positions, empathy, creativity, cooperation and emotion, have a place in the classROOM X. To do this, we combine tools that promote rationality and emotionality. Thus, it is not only a matter of learning rationally but of "comprehend" it. After twenty years teaching this course, we have been able to contrast the good results of this teaching innovation. Students not only finish the course having scientific knowledge about water. They also develop an ability to understand water in a different way, being aware that we are not only rational and isolated beings but also complete and integrated in Nature itself.

156 "Penetrating the Very Rock". Or: How Japanese Haiku can support awareness-raising in ecological economics education

Sven Rudolph[1], Tamara Schneider[2]

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Haiku are an increasingly popular traditional Japanese art form of short poems, which emphasize human nature-relations and are grounded in Zen culture. The poetic style of and the themes broached in Haiku connect to several discussion in modern Ecological Economics including degrowth, post-colonialism, (eco-)sufficiency, and ecosystem services. In our study, we survey literary as well as social science studies on Haiku with a particular focus on their impact on raising environmental awareness and supporting general mindfulness. We also evaluate semi-structured interviews conducted with Haiku experts on the same subject. We expect to find a significant influence of practicing and studying Haiku on both environmental awareness and general mindfulness. Our findings indicate the specific value of using Haiku for enriching and diversifying education for sustainable development and Ecological Economics communication with respect to, inter alia, an inter-culturally informed view on the value of nature and mindful sustainable living.

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SPECIAL TRACK: SCIENCE-POLICY-SOCIETY INTERFACES FOR RESILIENT AND SUSTAINABLE RURAL DEVELOPMENT

Chair: Sabrina Arcuri

53 Do Europeans Dream of Electric Sheep? Co-constructing European digital rurality through participatory scenarios

Dominic Duckett

The James Hutton Institute, Aberdeen, United Kingdom. Glasgow Caledonian University, United Kingdom

The DESIRA project has engaged with stakeholders in Europe's rural areas to explore future digitalisation. In agriculture, forestry and rural communities, digitalisation will have impacts, however the nature of change is uncertain. Managing uncertainty calls for novel forms of knowledge production and DESIRA deploys participatory scenario planning and living labs in the creation of future visions. The particular Socio-Cyber-Physical Systems in each Living Lab will, in isolation, constitute an array of distinct possibilities, but we also encounter both complementarities and discontinuities discoverable through comparative analysis which go beyond descriptive visions of future socio-technical change across the continent by developing strategic proposals designed to seize opportunities and avert threats to the European Long-Term Vision for Rural Areas. Our scenarios facilitate the identification of areas of action towards stronger, connected, resilient and more prosperous rural areas including digitalisation strategies to help rural communities reach their full potential.

228 Pursuing research impact and positive social and environmental change through transdisciplinary communities of practice: Experience from MOVING H2020 Project

Sherman Farhad[1], Carmen Maestre-Díaz[1], Blanca Casares-Guillén[2], María del Mar Delgado-Serrano[1]

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Sustainability science and policy call for a greater attention to collaboration, learning, and commitment across disciplines, sectors, and scales. This paper focuses on the need for transdisciplinary approaches that enable collaborative development of actionable and solution-oriented knowledge. We concentrate our analysis on Community of Practice (COP), and we empirically apply it in MOVING, a H2020 project that aims to build capacities and co-develop policy frameworks across Europe for the establishment of new and/or upgraded/upscaled Value Chains (VCs) that contribute to the resilience and sustainability of mountain areas. The MOVING COP includes 23 regional and 1 EU level multi-actor platforms. By MOVING COP we aim to carry out: 1) participatory vulnerability analysis of the land use systems; 2) participatory appraisal of vulnerability and performance of the VCs; 3) participatory comparative assessment and benchmarking of the VC clusters; 4) participatory multi-level foresight analysis; and, 5) participatory policy analysis and roadmap.

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SPECIAL TRACK: SCIENCE-POLICY-SOCIETY INTERFACES FOR RESILIENT AND SUSTAINABLE RURAL DEVELOPMENT

Chair: Sabrina Arcuri

435 Alternative rural futures: how to get there? Insights from the H2020 SHERPA foresight study

Sabrina Arcuri[1], Gianluca Brunori[1], Elodie Salle[2], Brigit Zomer[2], Francesco Ladecola[2]

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Remote rural areas are facing major challenges that neither policymakers nor researchers alone can effectively address. Such challenges are driven by demographic trends, globalisation, environmental change, technological advancement, political, social and economic pressures (OECD, 2019; Woods, 2019). Due to rural heterogeneity, these trends affect different rural areas in different ways, meaning that, whilst some common key drivers can be identified, "patterns and experiences of rural change" (Woods, 2019, p. 623) may also differ greatly. The necessity therefore emerges for identifying key trends and major challenges with related opportunities and threats, and for uncovering the factors that may affect future policy actions. Anticipation processes and practices are increasingly being used to the purpose of imagining futures, questioning assumptions as to what futures will look like and developing strategies for change. Foresight studies are one of these anticipatory approaches. This study addresses the foresight exercise carried out [...]

515 Rural-Urban synergies and governance tools: insights from a Living Lab experience

Francesca Galli[1], Sabrina Arcuri[1], Massimo Rovai[2], Giovanni Belletti[3], Andrea Marescotti[3]

[1]Department of Agriculture, Food and Environment, University of Pisa, Italy. [2]University of Pisa, Italy. [3]University of Florence, Italy

The development of rural-urban synergies is one of the EU's objectives for the coming decades to contribute to smart, sustainable and inclusive growth of the territories. Understanding how rural-urban "functional" connections unfold on a given territory and how to govern them is important to improve quality of life, for urban and rural populations and strengthen environmental resilience. This paper reflects on the experience of a Living Lab, a multi-actor process carried out within the ROBUST project (H2020). It was based in Lucca and focused on the potential of open and agricultural spaces located in peri-urban areas, with specific attention to abandoned land, to generating mutually beneficial rural-urban relations. The Living Lab analysed governance tools affecting rural-urban relations in food system, cultural connections, eco-system services. We provide a retrospective critical reflection on the work carried out of the Living Lab and insights on strengths and weaknesses of a four-year long process.

564 Contractual networks and irregular work in agriculture, what is in the plate?

Lucia Palmioli, Silvia Rolandi, Gianluca Brunori, Francesca Galli

Department of Agriculture, Food and Environment, University of Pisa, Italy

Agriculture is one of the main sectors affected by the scourge of undeclared work and labor exploitation in Italy, counting around 430,000 irregular workers. To face this challenge, the Italian government recently adopted new laws containing both punitive measures and preventive efforts. Within this framework, the article seeks to explore whether contractual networks can create enabling conditions for farms and work as a preventive mechanism to tackle irregular employment in agriculture. In line with an in-depth analysis of the literature, we carried out a number of experts' interviews and we drew on an Italian case study to offer insights into the adoption of innovative processes in rural contexts that seek to increase regular employment integration throughout the national territory. Drawing on evidence-based innovations, this article helps to build a bridge across practice and policy, while adding to theories on social innovation to tackle current and evolving socio-economic challenges.

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BEHAVIORS AND SOCIAL CHANGE: RECONCILING CONSUMPTION, NEEDS AND WELLBEING

Chair: Marta Baltruszewics

23 How does sustainable water consumption in the shower relate to the perception of well-being?

Jorge Guardiola, Nazaret Ibáñez-Rueda, Francisco González-Gómez

Universidad de Granada, Spain

In this paper we analyse the relationship between subjective well-being and water consumption in the shower. Specifically, we aim to answer the following questions: 1) How does shower water consumption relate to subjective well-being, 2) Does this relationship with subjective well-being differ depending on showering habits (time spent in the shower, and number of showers per week), and 3) Does this relationship differ depending on the season (winter and summer). The dataset contains information on 937 students from different disciplines at the University of Granada, Spain. Results suggest that there is a negative relationship between water consumption and subjective well-being, in line with the literature that identifies a well-being dividend from green behaviour (being pro-environmental helps the environment and increases happiness). All subjective well-being dimensions are negatively related to time spent in the shower, regardless of the season. In contrast, the frequency of showering is not significantly related to well-being.

49 A framework for agent-based models of human needs and ecological limits

Joël Foramitti

Institute of Environmental Science and Technology, Universitat Autònoma de Barcelona, Spain. Institute for Environmental Studies, Vrije Universiteit Amsterdam, Netherlands

The social and ecological challenges of our time require a better understanding of the complex interactions between the multiple dimensions of human well-being and environmental impacts. This article introduces the Needs and Limits (N&L) framework, a theoretical and computational foundation for agent-based simulations of human individuals who try to increase their quality of life through the satisfaction of human needs. Based on psychological research, human needs are described as heterogeneous, satiable, adaptive, and interdependent with the social and bio-physical environment. The N&L framework represents a generic foundation that can be applied to a broad range of socio-economic and ecological scenarios. It can incorporate any number of agents, networks, life domains, activities, choices, resources, and environmental factors. The framework is illustrated for the topics of income inequality and climate policy, showing that the inclusion of additional dimensions can change or even reverse existing results from simpler models.

186 Implications of inequality reduction for carbon emissions: conceptual and empirical analysis of the carbon footprints from consumer survey profiles for the EU countries

Ignacio Cazcarro[1,2], Manuel Tomás[2], Iñaki Arto[2]

[1]ARAID (Aragonese Agency for Research and Development), Agri-food Institute of Aragon (IA2), Department of Analysis Eco. Univ. Zaragoza, Spain. [2]BC3-Basque Centre for Climate Change, Bilbao, Spain

The need of reducing poverty is widely recognized, e.g. with the United Nations SDGs (1), but also the reduction of inequalities within and among countries (e.g. SDG 10). The main point of the article (which is not new, but rarely emphasized in studies on inequality and emissions, many of which actually seem to imply the opposite) is that reducing inequality via income (and wealth) redistribution, without changing consumption habits, very likely will reduce emissions, but the opposite. This fact should be more bear in mind, since the desired avoidance of increased global temperature, dangerous effects of climate change, etc. should also consider the likely effects of the necessary accomplishment of improving the income and welfare of the poor. All these aspects are shown both conceptually and empirically, making use of the income and expenditure microdata statistics of the European Union, discussing the implications for the EU, but also globally.

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BEHAVIORS AND SOCIAL CHANGE: RECONCILING CONSUMPTION, NEEDS AND WELLBEING

Chair: Marta Baltruszewics

352 It is expensive to be poor and the rich just want to have fun –analysis of UK's energy footprints and consequences for well-being and climate justice

Marta Baltruszewicz[1], Julia Steinberger[2], Lina Brand-Correa[1], Jouni Paavola[1], Anne Owen[1]

[1]University of Leeds, United Kingdom. [2]University of Lausanne, Switzerland

How energy facilitates human need satisfaction, for whom, and with what wellbeing outcomes is under-researched. We address this gap by investigating the relationship between household energy footprint and well-being in the UK. Our results show car and air transportation contributed the most to the total energy footprint of the rich and high-energy users. We observe high inequalities in energy distribution and emphasize the role of the top energy users with high well-being in driving excess energy use. A more detailed analysis reveals that individuals with protected characteristics are especially vulnerable to energy poverty and their contribution to overall energy demand is negligible.
Focusing on well-being steers the attention towards questions of sufficiency, overconsumption as well as the context within which we satisfy needs. In this way, the efficiency can be discussed not only in the way of gains in energy reduction but in the light of gains for well-being.

138 Welfare neutral reductions of the carbon footprint

Bart Defloor, Brent Bleys

Ghent University, Belgium

Reaching carbon neutrality requires severe CO_2 reductions by citizens. One problem is that many people experience difficulty changing their behaviour, due to the impact on their welfare. Citizens might lack the resources, or might be locked in. In this article we analyse the sociodemographic determinants of both the ecological footprint (EF) and of individual welfare, conceptualised as achievement in a number of dimensions of life (health, material living standards..). Then we propose policy measures negatively impacting the EF but with minimal impact on welfare. We use the LEVO dataset collected in Belgium (n = 2000), allowing to calculate the ecological footprint based on behaviours in five domains: food, heating, electricity use, paper and mobility. There are two main results. First we will be able to judge the role of the antecedents relative to other determinants of the EF. Second we propose policy measures which reduce the EF in a way that hurts welfare the least.

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SPECIAL TRACK: SOCIO-ECOLOGICAL-TECHNOLOGICAL PERSPECTIVES ON AGRI-FOOD SYSTEMS ADAPTATION TO CLIMATE CHANGE

Chair: Michele Moretti

39 Adaptation to climate change: switching between irrigation technologies in Italian agriculture

Charlotte Fabri[1], *Michele Moretti*[1,2], *Steven Van Passel*[1]

[1]University of Antwerp, Belgium. [2]Università di Pisa, Italy

This research focuses on irrigation as a climate adaptation measure in Italian agriculture. Due to an increased need for irrigation as a result of climate warming and due to increasing water scarcity, farmers should increasingly adopt more water-efficient irrigation technologies, such as drip irrigation. Using Dirichlet regression modelling, this research analyses whether this trend is visible in practice. The study is based on data of over 3000 farms, distributed across Italy. For each farm, we have data on the fractions of land that are not irrigated or irrigated with surface, sprinkler or drip irrigation. These fractions sum to one and therefore require compositional data analysis techniques, such as Dirichlet regression. We find that, indeed, temperature and rainfall are significant determinants of irrigation choice. Other variables, like costs, consortium membership and whether the farm is located in a less-favoured area, also play an important role in the irrigation decision.

52 The economic impact of climate change on European agriculture: marginal and non-marginal impacts

Steven Van Passel, Charlotte Fabri

University of Antwerp, Belgium

Climate change already impacts agriculture and will continue to do so. These impacts are diversified across the European Union. This presentation will give an overview of both the marginal and non-marginal impacts using the Ricardian approach. Marginal impacts show the land value loss of 1 °C rise in temperature. Our research found that farms in Southern Europe will suffer value losses up to 9%, while gains will be in Western and Northern European countries. Non-marginal impacts present farmland values for long-term periods using the estimated relationship between land values and climate variables where we regionally adapt climate variables (temperature and precipitation) using long-term scenarios. The non-marginal impacts show the urgency to keep climate change below the 2°C increase. Total economic impacts (measured in land value change) can range from +5% (limited warming) up to over -30% (severe warming). This clearly calls for a transformational change in our agri-food systems.

113 How do quality agri-food systems (GIs) perceive and adapt to climate change? An exploratory study based on the case of the Veneto region (Italy)

Dana Salpina, Francesco Pagliacci

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Climate change heavily affects specific characteristics of *terroirs*, on which agri-food geographical indications (GIs) rely, including the change of the average annual temperature, precipitation patterns, water availability, and soil quality. Based on semi-structured interviews with key informants in the Veneto region (Italy), the research aims to understand whether and how agents involved in the production of agri-food GIs are addressing climate change. The research results outline the different levels of concern regarding climate change effects by different agri-food GIs agents depending on the type of GIs, crop systems and geographic areas. The research outlines the major climate change adaptation practices used on the levels of farms and Consortia, pointing out the best practices in terms of adaptation strategies that might be implemented at the community level, including the provision of advisory support based on phenological stages of crops.

313 Crops and livestock switching as an adaptation strategy to climate change: a plot-level analysis

Saul Basurto-Hernandez

National Autonomous University of Mexico, Mexico City, Mexico. Vrije Universiteit Amsterdam, Netherlands

Previous studies investigating the effect of climate change on farmers' choice of crops or livestock analyse production decisions using the Multinomial Logit model. It assumes that the Independence of Irrelevant Alternatives holds. Furthermore, the data is analysed using information on the 'main crop' or 'most prevalent' type of livestock, thereby ignoring diversification. In this paper, we seek to overcome these deficiencies. Taking advantage of a new plot-level data and estimating a Nested Logit model, we investigate the effect of climate change on farmers' choices in Mexico. Geographical Information Systems help us to combine data on 31 types of crops and livestock observed in 258,217 and 202,338 plots, corresponding to the years 2012 and 2014, climate, soil types, expected prices, subsidies, and access to markets. Our findings suggest that the IIA property is invalid and in the event of a warmer and drier future agriculturalists will modify their current production patterns.

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SPECIAL TRACK: SOCIO-ECOLOGICAL-TECHNOLOGICAL PERSPECTIVES ON AGRI-FOOD SYSTEMS ADAPTATION TO CLIMATE CHANGE

Chair: Michele Moretti

325 A Ricardian analysis of climate change impacts on Japan's agriculture: Accounting for solar radiation

Iori Okamua[1], Steven VanPassel[2], Charlotte Fabri[2], Tetsushi Senda[3]

[1]Meiji University, Kawasaki, Japan. [2]University of Antwerp, Belgium. [3]Kyoto University, Japan

This research aims to evaluate the climate change impacts on farmers' net revenue in Japan. We adopted the Ricardian model to capture the farmers' adaptation behavior. To reduce the omitted variable bias, we include geographical and socio-economic conditions in the regression model. The main findings of this research are as follows. First, temperature effects on net revenue are nonlinear and hill-shaped, indicating that the rising temperature caused by climate change is expected to affect farmers in warm areas adversely. Second, we found that solar radiation, the additional variable other than temperature and precipitation, positively and significantly affects farmers' net revenue. This result implies that we should consider solar radiation to evaluate the climate change impacts on Japanese farmers. By comparing this research to previous climate change impact estimations that do not consider adaptation, we will assess the importance and effectiveness of climate change adaptation in Japanese agriculture.

111 The economic sustainability of supermarkets' left-over food donations

Thomas Kopp[1], Lauren Chenarides[2]

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This paper examines the extent to which the presence of food pantries diverts food sales from retail grocers. Contrary to the belief that hunger-relief programs serve exclusively as emergency assistance to meet households' temporary food needs, a growing population regularly relies on these services. However, there is little empirical research that examines just how individuals factor hunger-relief programs into their planning horizons, whether the presence of these organizations diverts sales from grocers, and how that affects food retailers' profits and therefore the sustainability of these systems. We measure the statistical relationships between food pantry density and retail grocers' annual sales volume in Texas. Results indicate that food pantry presence does not significantly affect retailers' revenues, suggesting that food pantries and food retailers do not directly compete for market share and therefore the system of food banks effectively reduce the amount of food-loss without unintended consequences.

43 Considering environmental factors in agricultural efficiency analysis

Alexander Kaiser, Axel Schaffer

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Employing non-parametric methods in regional agricultural contexts is a growing subject of technical efficiency analysis. Interestingly, conventional models do not account for input heterogeneity, e.g., caused by climate conditions. Thus policy recommendations rely on the unadjusted efficiency estimates and neglect external and mostly environmental factors driving regionally varying technical efficiency estimates. The presented paper seeks to contribute to this issue by examining the effect of agroclimatic factors (e.g. soil quality, precipitation, climate) on crop production efficiency of 122 European regions (FADN) for the years 2004 to 2019 by employing a random effects Tobit model for panel data. Preliminary results for a reduced sample of 2018 (using a basic two-stage approach) suggest that precipitation and temperature significantly determine the distribution of technical efficiency among European crop producers. The findings suggest that analyses ignoring environmental factors in their framework might overestimate a decision-makers true capacity of increasing its degree of production efficiency.

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INSTITUTIONS AND POWER

Chair: Stanislava Brnkalakova

411 Applying the "SES Framework" to characterize collective environmental governance in the case of the Pyrenean pastoral commons

Simon Guédé

CIRAD, Montpellier, France

The governance of ecosystem services through collective action as an alternative to market or state governance is receiving increasing attention. In the context of managing a common pool resource, collective action mechanisms allow for the resolution of social dilemmas within a complex socio-ecological system. In the Pyrenees, collective pastoral areas are managed by a variety of legal structures that relate to a greater or lesser extent on forms of collective action. Social dilemmas faced by pasture managers are linked to the provisioning services but also new cultural and regulatory services which are increasingly in demand by society. Using data from the socio-economic survey, secondary data and the SES Framework from McGinnis and Ostrom's, the aim of this studynkalako is to i) describe the challenges and complexity of managing collective pastoral areas ii) analyze the diversity of local governance to describe if and how this governance is based on collective action.

605 Collaborative actions to promote sustainable irrigation management based on traditional knowledge in West Sumatra Indonesia

Ami Sukma Utami, Hiroki Oue

Ehime University, Matsuyama, Japan

The way water is managed, constitutes with indigenous community's cultural identity. Thus, understanding the community culture is essential for finding sustainable solutions to water problems. In West Sumatra, the Minangkabau community managed the natural resources collectively under customary law, such as in irrigation water management. Due to colonialism, the transformation of social structure, and the global economy, indigenous practices in natural resource management have been changing—the change in natural resource management results in institutional problems. For instance, conflict over irrigation water appears in some regions where the traditional value has been excluded from irrigation management. Thus, bridging traditional knowledge in the current irrigation management could be a possible solution for irrigation management problems and promote sustainable irrigation management. To implement the bridging action, collaborative action between stakeholders is essential to integrate relevant knowledge into local contexts.

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Chair: Stanislava Brnkalakova

623 Community-based natural resource management and social mobilization in Spanish irrigation communities: first insights from a large-n study

Sergio Villamayor-Tomas

ICTA-UAB, Barcelona, Spain

Community-based natural resource management and social mobilization are two forms of collective action which have tended to be studied separately by the theory of the commons and social movement theory, respectively. This has been the case despite the fact that many local resource-dependent communities regularly engage in both forms of collective action. Over the past few years, studies in political ecology and environmental justice have started to connect evidence on both fronts, giving shape to a new, distinctive body of research on commons movements. This paper aims to move forward the emergent theory on commons movements by systematically analyzing associations between community-based natural resource management and social mobilization features in the context of Spanish irrigation associations. As we find, there are positive associations between these two forms of collective action, but the strength of this relationship depends on characteristics of the mobilization and features of the self-organized communities.

395 Collective forestry regimes to enhance transition to climate smart forestry

Stanislava Brnkalakova[1], Mariana Melnykovych[2], Maria Nijnik[3], Carla Barlagne[3], Marian Pavelka[4], Andrej Udovc[5], Michal Marek[6], Urban Kovac[7], Tatiana Kluvankova[1]

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Forest ecosystem services face a traditional social dilemma of individual versus collective interests, which often generate conflicts, and result in the overuse of ecosystem services and resource depletion. In this paper, we elaborate a conceptual analytical framework and use it in case studies selected in European mountain areas to analyse the potential of socio-ecological systems to develop climate smart forestry. Collective self-organised forestry regimes, as a form of social innovation, are the main focus, compared with centrally governed state regimes and forest management practices in municipal forests. A conceptual framework to analyse collective self-organized regimes and compare these with other climate smart applicable forestry regimes is elaborated using a mixed-method approach, centred around the estimation of carbon sequestration potential. The results indicate that collective self-organised forestry regimes can play a role in fostering the transition of European forestry towards climate smart forestry.

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Chair: Stanislava Brnkalakova

276 Do the ends justify the means in European energy efficiency policy? A case study

Tessa Dunlops[1,2], *Thomas Voelker*[3]

[1]Autonomous University of Barcelona, Spain. [2]Joint Research Centre, Ispra, Italy. [3]University of Bergen, Vienna, Austria

It is commonly accepted that improving energy efficiency is a key ingredient to reduce energy consumption and thus, reduce greenhouse gas emissions in Europe as part of the European Union's carbon target. In 2018, the EU adopted new amendments to the Energy Efficiency Directive, aiming to reduce energy efficiency by 32.5% by 2030. The legislative process to amend the directive took an unusually long amount of time, given differences of opinion among lawmakers and institutions, and the complexity of the issues involved. While much of these differences was portrayed as a lack of ambition, this paper uses a social sciences lens to argue that the core issues themselves need to be understood at a deeper level as disagreement over technical issues to do with the legislation, including the definition of energy efficiency itself and how it is measured. The definition and measurement of energy efficiency involve subjective value judgements that can have significant impacts on political, societal, and environmental outcomes. This paper investigates [...]

181 Beyond "Blah Blah Blah". Using Experimentalist and Polycentric Governance Theories for a Critical Analysis of the COP26's Organizational Model

Claudio Marciano, Alessandro Sciullo

University of Turin, Department of Cultures, Politics and Society, Italy

Many experts shared a critical opinion about the results obtained in Glasgow 2021 that was mediatically expressed by the famous "BlahBlahBlah" of Greta Thunberg. Why do governmental bodies seem unable to find a consensus on how to put into practice the radical changes that climate change requires although they all agreed upon in principle? This article tries to shed light on the inherent limitations of the climate conferences' organizational model. In particular, the article analyses the COP26 organizational model through two paradigms (the Experimentalist and Polycentric Governance, promoted respectively by Sabel and Ostrom) that converge on the critics of the "command and control" model and the promotion of a decentralized and site-specific approach. The expected result of the paper is to assess the criticalities of the current COP organizational model to improve the concrete transformative performance of these events.

235 Policies for energy sufficiency - proposals and legitimacy in Germany

Benjamin Best

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Energy sufficiency is the strategy of achieving a level of enoughness of amount of energy-based services consumed and to provide well-being for all within planetary boundaries. Recently, such demand-side strategies are gaining attention due to a recent IPCC-report and the attempt of some EU member states to achieve higher degrees of energy independence. Our presentation will cover available policy options for sufficiency, based on an analysis of a policy database which currently includes about 300 unique instruments (https://energysufficiency.de/policy-database/). Examples for instruments are teleworking agreements with companies, minimum sidewalk width, improvements of rail interoperability and tax advantages for vertical densification. We will focus on criteria for prioritisation for policy mixes and issues of legitimacy. Even if sufficiency is increasingly perceived as relevant, it clashes with powerful coalitions of interests. We discuss problems and possible solutions how to move up sufficiency on the political agenda.

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SPECIAL TRACK: 50 YEARS AFTER «LIMITS TO GROWTH»: CAN WE MAKE LIMITS COMMON SENSE?

Chair: Erik Gomez-Baggethun

32 Two genealogies of limits: insights and diffractions

Luigi Pellizzoni
University of Pisa, Italy

The paper aims to provide elements for clarifying the political meaning of limits in the present historical juncture. To this purpose it compares two genealogical reconstructions. Both start from around 1970 with the case for the limits to growth and detect a shift since the early 1980s to a case for the growth of limits. They diverge however about the most recent phase. A prevailing reading sees in the current case for ecological transition an adaptation of the ecological modernization framework to global challenges. According to an alternative account, growth of limits has been replaced by a new rationale, whereby limits are internal differentiations within a unified (and commodified) nature-technical domain. The paper examines the implications of these two genealogies of the present for making sense of the resurgence of limits and of related issues, from the Anthropocene to the case for self-limitation, to the burgeoning role of experimental politics.

305 Four quarters or No Quarter? Limits to growth on a finite planet.

Andy Dobson
Princeton, USA

An appreciation of human dependence on the natural world requires a change in perception that underlines the dependence of key features of the global economy on natural resources. The most parsimonious way to divide land would be to set aside a quarter of the globe's terrestrial for each type of activity. This would set aside one half of the globe for biodiversity and one half almost entirely for humans. More detailed modelling, would certainly refine the proportions, but failure to realize the huge human dependence on non-fungible resources such as clean water, a stable climate, and the ecosystem services provided by biodiversity might lead to a transition from an equitable distribution of four quarters to one of "No quarter" for the global economy.

329 How to design income and wealth caps policies? An analytical framework built from 14 policy proposals.

Martin Francois
University of Liège, Belgium

Preventing rising economic inequalities in a non-growing economy is a major challenge to which no clear solution has emerged from postgrowth studies yet. However, within this debate, scholars agree that any strategy to reduce inequality must include a reduction of income and/or assets of the wealthy. Despite this acknowledgment, caps on wealth and income have surprisingly been poorly studied. This paper intends to fill this gap by exploring this innovative policy with the following question: what are the main parameters to consider when designing a policy of income and/or wealth caps? Using an inductive approach, a qualitative content analysis of 14 policy proposals was performed, including 4 concrete cases. An analytical framework emerges from data, to be used by policymakers and researchers. Finally, a comparison between academic and concrete proposals allows starting a discussion about how to increase political and popular support for such policies.

351 Defining a safe and just operating space for the Norwegian economy

Thomas Røkås[1], *Erik Gomez-Baggethun*[1,2]
[1]Norwegian University of Life Sciences (NMBU), Ås, Norway. [2]Norwegian Institute for Nature Research (NINA), Oslo, Norway

The safe and just operating space (SJOS) framework represents an alternative development tool to abate social inequality and environmental degradation by applying environmental limits and social boundaries for a "good life". Downscaling such limits to sub-global levels increase their policy-relevance, but remains a challenge as natural limits varies across spatio-temporal scales, and the lived human experience differ across cultures. Using Norway as an example, this paper examines how regulatory environmental and social limits can be established through a bottom-up approach. It develops an analytical framework that explores the compatibility between top-down vs. bottom-up approaches, and relative vs. absolute human needs assessments. Our results show that the Norwegian economy is close to meeting citizens needs and rights, but with significant disparity across demographic groups, and to a high ecological cost, transgressing all the assessed limits. Further methodological development is suggested to increase the relevance of the SJOS framework at national scale.

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SPECIAL TRACK: 50 YEARS AFTER «LIMITS TO GROWTH»: CAN WE MAKE LIMITS COMMON SENSE?

Chair: Erik Gomez-Baggethun

360 Degrowth Common senses: a political ecology of limits

Giacomo D'Alisa

Center of Social Studies, University of Coimbra, Portugal

Every human being face material limitation (time, resources) and relative scarcity (the need of A restrict the want of B) but liberal precepts and ideals legitimate each and every individual to accumulate all the needed resources and socialise the costs to pursue her own individual conception of the good life. Moreover, if markets function properly and economies keep growing more people will overcome environmental limits and societal obstacles to meet their needs and realise their wishes. These are the common senses of capitalist liberal economies without limits. Influential ecological economists have argued against this narrative, speaking about diseconomies of scale, ecological threshold, and physical limits. However, they have discussed little about how the cost-shifting practices affect the prevalent common senses about limits in westernised society. In this paper, I maintain that Kapp's ideas about cost-shifting can introduce a new effective criterion to the discussion about limits in ecological economics

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RESOURCES

Chair: Charan van Krevel

420 Extractive industries and the resource curse: a synthetic control analysis

Lorenzo Pellegrini[1], *Luca Tasciotti*[2]

[1]Erasmus University, Rotterdam, Netherlands. [2]University of Greenwich, London, United Kingdom

The potential of extractives-led development rests on the expectation that the rents generated can propel the growth of non-resource based economic sectors. However, the associated challenges were evident already in the 1930s when the Venezuelan economist Arturo Uslar Pietri described oil as a 'curse' that had transformed his country-mates into 'useless parasites'. Since then, many attempts have been made to exploit natural resource rents to facilitate development and the notion continues to hold currency. We propose a systematic analysis of countries that experienced a resource boom in the 1970-2000s and compare each individual case with a 'synthetic counterfactual'. That is, we find a weighted average of countries that mimicked the past socio-economic performance of the country 'blessed' by the resource boom and use it to estimate the impact of the resource boom. The application of the synthetic control method allows for the combination of quantitative and case study approaches.

9 Is there a fiscal resource curse? Resource rents, fiscal capacity and political institutions in developing economies

Tania Masi[1], *Antonio Savoia*[2], *Kunal Sen*[3]

[1]Università Gabriele D'Annunzio, Pescara, Italy. [2]University of Manchester, United Kingdom. [3]UNU-WIDER, Helsinki, Finland

While it is recognised that the ability of states to raise revenues (i.e., fiscal capacity) is important for the provision of key public goods in less developed economies, it is less clear what its determinants are and what explains cross-country differences. We focus on the impact of natural resources. Standard arguments suggest that natural resource rents may reduce the incentives to invest in fiscal capacity. However, political institutions that limit the power of the executive, by reducing rulers' discretion over the use of resource revenues, may mitigate or neutralise such negative effect. We investigate this hypothesis using panel data covering the period 1995-2015 for 62 developing countries. The results suggest that: (i) point-source resources are negatively associated with fiscal capacity, while diffuse resources are not; (ii) developing economies with institutionalised executive constraints are able to neutralise the negative effect of point-source resources; (iii) the effect of resource rents works mainly through institutions that make the tax system accountable and transparent to the citizens. Our findings imply that it is possible to develop both fiscal capacity and the natural resources sector, without any trade-off.

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Chair: Charan van Krevel

87 Fragmenting the resource curse: how the chain of natural capital conversion matters for sustainable development

Charan van Krevel, Marlou Peters

Radboud University, Nijmegen, Netherlands

This paper develops and empirically tests a novel conceptual framework for examining exactly how natural resources impact sustainable development. We propose that the four stages of converting natural capital into other forms of capital, (1) discovery, (2) exploitation, (3) appropriation, and (4) investments, help explain heterogeneity among countries' development experiences. The framework matches stages in the conversion chain with known resource curse mechanisms and the most suitable empirical indicators commonly used by other studies. Using a comprehensive panel dataset comprising 100 countries spanning 39 years, results show that resource-richness does not cause unsustainable development directly. On the one hand, rent-seeking and corruption during the exploitation phase are primarily responsible for unsustainable development. On the other hand, governments invest whatever rents are obtained via resource taxation sustainably. However, this falls short of overcoming the resource curse. All in all, the recipe for success is diversification and bolstering resource taxation practices.

331 Mining, land use, and regional income in Brazil: Economic and environmental perspectives on resource-dependent "development"

Sebastian Luckeneder[1], Victor Maus[1,2], Tamás Krisztin[2], Michael Kuhn[2,3]

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Mined raw materials are an integral input to the socioeconomic metabolism of modern societies, but their extraction and processing may affect economic growth and environmental sustainability in opposite directions. This study provides a spatio-temporal analysis of the direct and indirect regional economic and environmental effects of mining activities, based on a panel of land cover data and subnational socioeconomic statistics over 14 years. We employ two spatial Durbin models in order to estimate economic growth rates and forest loss at the level of Brazilian municipalities. Preliminary results suggest that, on the one hand, the link between mining activities and economic growth is ambiguous. We find higher GDP growth in mining municipalities and their surroundings between 2005 and 2009, but the effect then fades and eventually turns negative. On the other hand, mining tends to translate into higher rates of forest loss per municipality, especially while economic stimulus is considerable.

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RESOURCES: PATTERNS OF TRADE, PRODUCTION, AND CONSUMPTION

Chair: Charan van Krevel

291 Regulated resources? An empirical exploration of how political economies and resource use patterns intersect

Anke Schaffartzik[1], *Melanie Pichler*[2]

[1]Central European University, Vienna, Austria. [2]University of Natural Resources and Life Sciences, Vienna, Austria

Greater aggregate resource use at the global level causes greater socio-environmental problems. The global pattern of accelerated resource use, however, is the result of fundamental differences at the subglobal level. Our quantitative empirical work, framed by regulation theory and social metabolism, seeks to better understand the interplay between societal organization and resource use. For an international sample of 160 countries, accumulation regimes and modes of regulation (from regulation theory) and resource stock and flow patterns (social metabolism) are identified. The data are analyzed longitudinally to identify country clusters of resource use and regulation. We expect that the results obtained will allow us to contribute to better understanding the roles of countries/country clusters in the global economy. These roles are essential for upholding the current trajectory of aggregate growth and will eventually also allow for the identification of potential points of intervention into the current unsustainable growth trajectory.

320 Physical risk propagation channels of climate extremes in the EU bioeconomy and beyond

Liesbeth de Schutter[1,2], *Martin Bruckner*[1], *Prajal Pradhan*[3], *Stefan Giljum*[1]

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In an effort to reconcile economic growth with climate constraints, the European Union has launched a bioeconomy strategy to support the transition towards the use of biological materials, energy and (bio)technologies in economic value chains. However, critical knowledge gaps exist regarding novel risks, interdependencies and potential inequalities related to bioeconomy activities and related transition paths under increasing climate hazard risk. In particular, data gaps and methodological inadequacies exist at the sub-national level of societies, where agricultural production takes place in heterogeneous agronomic regions that are subject to different and co-occurring climate extremes. In this study, we apply a mixed method to gain insights on the physical impacts of heat extremes, drought extremes, precipitation extremes, cold extremes and forest fires on economic activities and society. First, Granger causalities of extreme events and shocks in sub-national crop supply will be analysed in multivariate time-series (1986-2018) for a wide range of cr[..]

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16:30 - 17:00

BEHAVIORS AND SOCIAL CHANGE: ENVIRONMENTAL/CLIMATE JUSTICE AND SOCIAL CONFLICTS

Chair: Leonard Frank

15 Technological change, consumption patterns and income distribution: strategies for a low-carbon EU transition

Sara Miranda-Buetas, Rosa Duarte, Cristina Sarasa Fernández

University of Zaragoza, Spain

The environmental impacts of economic activity have been extensively analysed in the economic and environmental literature. In a context of high globalization and production fragmentation, consumption and production patterns cannot be considered in isolation, being necessary models that integrate both perspectives for the formulation of comprehensive measures of progress towards low-carbon economies. Moreover, disparities in income distribution and lifestyles between and within each country also modulate the effectivity of those measures. This work develops a dynamic multiregional and multisectoral computable general equilibrium (CGE) model, covering consumption and production behaviour for all the European Union countries, considering different income groups for each country. We design a range of scenarios to make environmental and inequality reduction goals compatible. We use the evolution of consumption patterns and production structures of each country to design strategies to go toward a more sustainable and just economy for 2050.

36 Dynamics of Carbon Emissions and Anti-coal movements in Japan from a Climate Justice Perspective

May Aye Thiri[1], Mihály Tamás Borsi[2]

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This study examines the relationship between carbon emissions and grassroots movements in Japan and associated climate justice disparities. Phillips and Sul's (2009) club convergence analysis was used to examine the evolution of fossil fuel carbon emissions in Japan, augmented by social movement analysis using the EJAtlas. The results strongly support the existence of multiple emission convergence clubs, indicating inequalities in carbon emission transitions at a sub-national level. Further, the framings and narratives of the movements' strategies were aligned with climate justice principles in the prefectures with historically high emissions. However, in rural areas, the narratives were linked with peripheral framings. The results imply growing emission gaps between regions despite national and international policies to reduce carbon emissions, thus raising questions about the current energy transition pathways and the ways in which grassroots movements can tactically address environmental and climate justice objectives through social mobilisation.

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SPECIAL TRACK: THE UNMAKING OF UNSUSTAINABLE SOCIO-TECHNICAL SYSTEMS: EXPLORATIONS OF THE EXNOVATION-INNOVATION NEXUS

Chair: Leonard Frank

55 Unlearning as exnovation at community level: the case of community-supported agriculture farms transitioning towards solidarity payment

Laura van Oers, Giuseppe Feola, Ellen Moors, Hens Runhaar

Utrecht University, Netherlands

There is an increased interest for processes of unmaking in studies of sustainability transitions. We witness a surge of concepts that aim to capture unmaking, including exnovation and deliberate destabilisation, but the individual and community levels are too often overlooked. To fill this gap, in this paper we originally combine theories of unlearning from organizational and decolonial studies. They help us understand unlearning as a the ability to critically reflect on biased behaviour and/or thinking patterns, and being prepared to give those up to learn new ones. We study unlearning around the introduction of solidarity payment schemes in two Dutch community-supported agriculture initiatives: members are asked to self-decide how much they want to pay for the farm work. Our study shows that unlearning should not be subsumed within so-called 'second-order learning', but be understood as a 'destructive' process of its own, which is entangled with 'constructive' learning processes.

307 The circular economy rebound (CER) or the case for exnovation policies as part of transition strategies to a circular economy

Solène Sureau, Ela Callorda Fossati, Wouter Achten, Tom Bauler, Aurore Fransolet, Bonno Pel

Université libre de Bruxelles, Belgium

Governments put forward innovations as a cornerstone of their transitions strategies. However, such a strategy limited to innovation support would be insufficient, it is argued: exnovation policies are needed to accelerate transitions, i.e. policies targeting the dismantling of unsustainable sociotechnical systems. We argue that such a strategy limited to innovation support could even work against its initial objective, because of its potential effects on overall produced and consumed quantities. On the basis of a literature review of sustainability impacts of circular innovations (and particularly 'car sharing'), we find that some circular innovations generate less impacts per unit than their linear counterpart, but also make the pie grow by generating so-called 'Circular economy rebound' (CER), including 'imperfect substitution' rebound effects and induction effects. In order to restrain this possible growth in demand, policy mixes should thus include exnovation policies targeting unsustainable (or linear in that case) production and consumption modes.

552 Assessing regime destabilisation through policy interventions. An analysis of english agricultural policy before and after brexit

Leonard Frank[1], Guiseppe Feola[2], Niko Schäpke[1]

[1]University of Freiburg, Germany. [2]Utrecht University, Netherlands

After leaving the European Union, English agricultural policy claims to break away from the Common Agricultural Policy. Here, we assess to what extent post-Brexit agricultural policy reform marks a destabilisation of the socio-technical regime of agriculture. To this end, we draw on sustainability transitions research, highlighting the deliberate destabilisation of socio-technical regimes as a central intervention point for systemic change. Methodologically, we approach the study through Socio-Technical Configuration Analysis. STCA allows mapping different actor statements around institutional and technological concepts as relational structures and enables to depict shifts in socio-technical configurations. Assessing transcripts of legislative debates, complemented by grey literature reports, we find that the previously dominant configuration is partly destabilised. This entails shifts in subsidy-based and regulatory policy instruments, and changes in the agricultural policy discourse used to justify these measures; yet, important aspects of agricultural productivism remain. This yields insights into sustainability implications of English agricultural policy reform.

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TRANSFORMATIONS: DISTRIBUTION, EQUALITY, AND SOCIAL JUSTICE, INCLUDING THE RURAL-URBAN DIVIDE

Chair: Guilherme Magacho

341 New commodity, old dependency? Exploring the impact of the transition to electric mobility in South American Lithium Triangle

Sara Caria

Instituto de Altos Estudios Nacionales, Quito, Ecuador. Università di Modena e Reggio Emilia, Italy

The purpose of this paper is to advance in the understanding of the transition to electric mobility, as a pillar of the decarbonisation strategy, and of its implications for poverty, inequality and international asymmetries at the global scale . Within the broader paradigm of the ecological transition to a greener economy, the existing literature has been concerned with the environmental and social externalities associated to the extraction of lithium. This research aims to complement these analyses and to estimate how much the electric automotive industry contributes to boosting the global demand of lithium, tracing the value chain of lithium, an essential input for electric car batteries, and mapping its geographical distribution. Additionally, it explores the macroeconomic impact of lithium extraction in the so called South American "Lithium Triangle" –Argentina, Bolivia, Chile– in terms of traditional aggregate indicators (share of lithium [...]

581 Justice in the water governance debate: definitions, debates and future directions

Stijn Neuteleers

Open Universiteit, Heerlen, Netherlands

Attention for justice, equity and fairness in water governance is increasing, but this debate is rather fragmented and it is still unclear what the main topics, approaches and definitions are. This study conducts a systematic literature review on water justice and the sample is analysed quantitatively and qualitatively. The quantitative analysis will provide data on: used justice concepts; definitions of justice; (macro)regions, countries and scales; and water justice topics. The qualitative analyse will focus on the following questions: What are central tensions in the debate? What is justice (dimensions, levels) and how is justice conceptualised (approaches, discourses)? We discuss three ways to move this debate forward: (i) being analytical about the normative, namely distinguishing evidence, normative goals and processes, and different justice dimensions; (ii) developing a contextual approach of justice, allowing for practical justice assessments; and (iii) integrating justice concerns into broader governance frameworks (e.g. adaptive governance, resilience).

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SPECIAL TRACK: TRULY SUSTAINABLE SHARED SOCIOECONOMIC PATHWAYS

Chair: Guilherme Magacho

97 The challenge of modeling deep societal transformation

Michael Roos

Ruhr-University Bochum, Germany

The paper introduces hybrid models that integrate the system dynamics approach and agent-based modeling as a new tool to analyze deep societal transformation in the context of climate change. These models can bridge conventional macroeconomic modeling and modeling in the tradition of complexity theory. Important insights from complexity theory for Shared Socioeconomic Pathway are that aggregate properties of the economic system can emerge and change in unexpected ways as a result of micro-level interactions. These emergent phenomena can exert downward causation on indivdual agents. A prime example is the emergence and evolution of formal and informal institutions which are significant determinants of economic growth and development. The paper provides a taxonomy of deep societal transformations and proposes design criteria for the development of SD-ABMs incorporating deep transformations. A simple conceptual model shows the benefits of the approach and how these models can complement conventional models based on neoclassical growth theory.

136 Ecological transition in natural-resource exporter countries: a structural stock and flow consistent model

Guilherme Magacho[1], Antoine Godin[1], Danilo Spinola[2], Devrim Yilmaz[1]

[1]AFD, Paris, France. [2]Birmingham City University, United Kingdom

The overall dynamics of the Ecological Transition will lead to inter-industrial constraints with the emergence of idle or over-utilised capital and employment tensions but also feedback loops between real and financial dynamics. This is particularly true for developing economies facing strong balance of payment constraints and difficulties to rely on domestic private banking only. We develop a Structural Stock-Flow Consistent (SFC) model aiming to understand the dynamics of this transition. The model considers different sectoral dynamics in terms of market competition, employment and investment behaviour. This is important because the dynamics of prices and other behaviour decisions determine how ecological transition policies will affect these industries differently. The contribution of the prototype model is twofold. Firstly, it provides evidence that some measures, such as financial subsides, are more effective than carbon-price. Secondly, it provides a framework easily adaptable according to countries' idiosyncrasies to analyse policies in different contexts.

321 Targeting employment, not growth in the sustainable shared socioeconomic pathway

Eric Kemp-Benedict

Stockholm Environment Institute, Somerville, MA, USA

The Shared Socioeconomic Pathways (SSPs) are part of the global climate scenario framework. The GDP trajectory for the SSP1 marker scenario, "sustainability", is from an OECD model. The model has a simple and straightforward parameterization, facilitating creation of GDP scenarios for a very large number of countries. However, its underlying growth orientation does not encompass all the possibilities offered by the SSP1 narrative. This presentation presents an alternative. Like the OECD method, it aims for simplicity and straightforward parameterization. However, rather than growth, it focuses desired employment in capital-intensive activities. This allows for various "post-growth" trajectories in high-income countries without requiring slow growth in low-income countries. Slower growth in high-income countries is a side-effect of the positive goal of reduced formal employment rather than an externally-imposed fall in technological potential. As with the existing SSP GDP quantifications, outputs from the proposed model could be used in climate-related scenario exercises.

577 Global risk of deadly heat and carbon taxes: how to avoid a collapse

Gael Giraud[1], Hugo Martin[1], Sylvie Charbit[2], Timothee Nicolas[3]

[1]Georgetown University, Washington DC, USA. [2]LSCE, Paris, France. [3]Ecole Polytechnique, CEA, Paris, France

We present the first coupled dynamics between a macro-financial model and an Earth Model of Intermediary Complexity (EMIC). The economic framework is based on a stock-flow consistent non-linear dynamical system with debts, default and collateral. We first show that pessimistic IPCC scenarios like the RCP 8.5 cannot be met: they would induce a collapse of the world economy in the second half of this century preventing the human sphere from emitting enough GHG to keep following these paths. Next, a carbon tax path reaching US$ 400/tCO2-e by 2050, would avoid a catastrophic scenario and allow to stay close to the +2°C threshold at the end of the century. Finally, in our business-as-usual scenarios, lethal peaks of heat and humidity will make a large neighborhood of the tropics uninhabitable. However, ambitious public policies can limit the devastation of human habitats while at the same time preserving the world economy.

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TRANSFORMATIONS: ECOLOGICAL MACROECONOMIC MODELS

Chair: Wadid Minh Rahhou

245 Insights into interdependence of growth, structure, and resource consumption using HARMONEY, a biophysically and stock-flow consistent economic growth model

Carey King, Elham Jahani

The University of Texas, Austin, USA

Due to differences in educational backgrounds physical scientists use different language than economists. Thus, creating models that can narrow the differences between economic and ecological viewpoints is important. The HARMONEY model uses a post-Keynesian economic framework that enables the study of relationships between resource extraction, consumption, growth, debt, profits, and wages. This paper discusses the addition of two new HARMONEY model features: (1) the role of government (for taxing and purchasing of economic output) to explore outcomes due to money creation via private banks (e.g., via loans) versus public money (e.g., government spending), (2) the modeling of both fossil and renewable energy resource to explore transitioning from a low-capital/high-fuel cost resource (e.g., fossil fuels) to a high-capital/low-fuel cost resource (e.g., renewable electricity). Thus, this paper explores differences in economic outcomes between private money creation by banks versus public money creation by the government to fund a renewable transition.

314 Energy requirements and emissions for a low-carbon energy transition

Aljoša Slameršak[1], Giorgos Kallis[1,2], Daniel W. O'Neill[3]

[1]The Institute of Environmental Science and Technology, ICTA-UAB, Autonomous University of Barcelona, Spain. [2]Catalan Institution for Research and Advanced Studies, ICREA, Barcelona, Spain. [3]Sustainability Research Institute, School of Earth and Environment, University of Leeds, United Kingdom

Achieving the Paris Agreement will require massive deployment of low-carbon energy. However, constructing and operating a low-carbon energy system will itself require energy, with much of it derived from fossil fuels. This raises the concern that the transition may consume much of the energy available to society, and be a source of considerable emissions. Here we calculate the energy requirements and emissions associated with the transition in fourteen mitigation scenarios that are compatible with 1.5 °C of warming. We find that the initial push for a transition is likely to cause a 10–36% decline in net energy available to society. Moreover, we find that the emissions associated with the transition to a low-carbon energy system are substantial, ranging from 70 to 350 GtCO2. The share of carbon emissions for the energy system will increase from 9% today to 26% in 2050, constraining the remaining emissions available to society.

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TRANSFORMATIONS: ECOLOGICAL MACROECONOMIC MODELS

Chair: Wadid Minh Rahhou

120 Representing a fall in agricultural labour productivity and an agrarian-led deep ecological transition in a dual-economy model

Wadid Minh Rahhou

CEPN, Université Sorbonne Paris Nord (Paris XIII), Villetaneuse, France

In order to face the challenges of modern, intensive methods of agricultural practices it is urgent to transition to agroecology and thus to decrease agricultural labour productivity. However such a trend would be at odd with the structural relationship between agriculture and industrialisation that has shaped modern industrialised economies. Indeed, modern agrarian systems has driven industrialisation by releasing labour and being the main source of effective demand for industry. We argue the interdependence between agricultural labour productivity gains and industrial development poses a structural obstacle to a deep ecological transition. Thus, how can such a transition overcome the dependence of industrial growth on environmentally destructive and unfair methods of agricultural production? To answer this enquiry, we represent a decrease in agricultural labour productivity in a Kaldorian variation of a Lewis-like dual economy model to identify scenarios where an agroecology-driven deep ecological transition is possible.

293 Modelling transition risks: stranded assets and energy return on energy investment in a stock-flow consistent, input-output framework

Andrew Jackson, Tim Jackson

University of Surrey, Guildford, United Kingdom

Limiting global temperature increases to 2°C may lead to the stranding of fossil fuel capital assets and a decline in the energy return on energy invested (EROI) of the energy sector. This paper aims to contribute to our understanding of the macroeconomic impacts of different types of energy transitions in which fossil fuel assets are stranded and EROI declines by developing a stock-flow consistent (SFC) model with an integrated input-output (IO) model. The SFC model consists of 6 sectors (households, banking, fossil fuel energy, renewable energy, capital, other). Novel or semi-novel aspects of the model include: multiple firm sectors and goods types; an integrated dynamic IO model, firms that produce distinct capital vintages which last for a given number of periods and have endogenously determined levels of labour productivity and material goods inputs.

343 Transition risks, asset stranding and financial instability in a stock-flow consistent model of decarbonation trajectories

Louis Daumas

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The Network for Greening the Financial System (NGFS) has developed a conceptual framework to study financial transition risks. Yet, related studies do not use models featuring an embedded representation of the financial system. Neither do they study the role of stranded assets in the dynamics of transition risks. To tackle these issues, this paper develops a model with an embedded financial system, and a representation of asset stranding. The framework is used to simulate decarbonation pathways and carbon price paths given by scenarios provided by the NGFS. The model shows that more climate-ambitious and more technically constrained scenarios yield higher transition risks. I also qualify the importance given to delayed-action scenario for credit risks. The model also illustrates the importance of accounting for the reaction of the financial sector along decarbonation scenarios, and the necessity to consider a wide array of scenarios generated by different models.

544 Green public investment, consumption patterns and the ecological transition: a macroeconomic analysis

Yannis Dafermos[1], Antoine Monserand[2], Maria Nikolaidi[3]

[1]SOAS University of London, United Kingdom. [2]Université Sorbonne Paris Nord, France. [3]University of Greenwich, London, United Kingdom

We develop an ecological stock-flow consistent (SFC) model to analyse the channels through which green public investment and a shift to more environmentally friendly consumption patterns can affect macroeconomic and environmental outcomes. We consider explicitly the impact that green public infrastructure can have on the consumption decisions of households. We make a distinction between different types of green public investment based on their impact on consumption patterns, macroeconomic activity and carbon intensity. We show that green public investment has the potential to lead to a reduction of the carbon footprint. However its favourable environmental impact is restricted due to the presence of rebound effects. Rebound effects can be attenuated when green public investment is combined with the adoption of sufficiency practices that lead to a direct change in consumption patterns. Hence, green public investment and transition to sufficiency need to take place in a complementary way, rather than in isolation.

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TRANSFORMATIONS: ECOLOGICAL MACROECONOMIC MODELS

Chair: Wadid Minh Rahhou

579 Stock-flow consistent Macrodynamics with natural resources regenerating at finite speed: why growth is non-sustainable, even with perfect substitutability

Camille Guittonneau[1,2], *Gaël Giraud*[1]

[1]Georgetown University, Washington DC, USA. [2]Université Paris 1 Panthéon-Sorbonne, Paris, France

Is growth sustainable? Despite the debate opened by the Meadows report, the impact of the availability of natural resources (vital to the industry) on economic growth remains little studied. We. build a dynamic stock-flow consistent macroeconomic model based on a productive sector and extractive industry. Numerical simulations of such model give the trajectories of GDP, prices, the employment rate, the wage ratio, and debts. Comparing scenarios absent resource constraints or with static or regenerating resources, we shall assess the potential impact of natural resources on short-run economic dynamics and long-run steady states. A numerical study of equilibria shall help us determine how sustainable the use of natural resources might be for the global economy. As soon as resources regenerate at a finite pace, we expect green growth to be impossible in the long run even in the case of perfect substitutability between capital, labor, and resources.

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SPECIAL TRACK: POWER AND POLITICS IN AGRI-FOOD SYSTEM TRANSFORMATION

Chair: Giuseppe Feola

35 Democratic praxis in agrifood collectives: transforming politics for social-ecological transformation

Jacob Smessaert, Giuseppe Feola

Utrecht University, Netherlands

Grassroots collectives have gained attention for their capacity to embody practices that subvert capitalism and foster autonomy. Yet, most analyses of these 'alternative' practices fall short of supporting a comprehensive investigation of their democratic praxis: the continuous, collective performance of being-together based on the premise of equality and working towards autonomy. In this paper we develop and test an analytical framework that aims to capture the scope and depth of democratic praxis in grassroots agrifood collectives. This framework covers collectives' democratic praxis according to their (i) foundations (institutions, membership, scope), (ii) operation (procedures, power distribution, conflict, interspecies collaboration), and (iii) symbolic and material (re)productions. We apply the framework to two collectives in the Netherlands and Belgium and find a diversity of practices that supports the linking of social equity and ecological regeneration, processes of collective politicisation, and the emergence of multi-species political alliances.

192 A politicization of packaged food: the emblem of an unsustainable growth-driven food economy

Sabrina Chakori

The University of Queensland, Brisbane, Australia

The globalised food system creates major social and environmental negative impacts. By studying, using a systems approach, the increased use of packaged food since the 1960s, this session exposes the drivers of the food economy. Packaged food serves the expansion of the international food trade and the centralisation of food retailers, while responding to the demand for convenience by time-poor consumers in the current growth-driven society. Degrowth is proposed as a systemic solution. Food systems within a degrowth framework would be able to be re-localised and decentralised. Additionally, in a degrowth society, time-deprivation would be able to be tackled. Rethinking the purpose of the economic model, in which food systems operate, is the only long-term solution to increase social and ecological well-being. This study contributes and responds to the need of more systems modelling in the field of degrowth.

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SPECIAL TRACK: POWER AND POLITICS IN AGRI-FOOD SYSTEM TRANSFORMATION

Chair: Giuseppe Feola

96 Power in the transformation of work relations in community-supported agriculture

Guilherme Raj, Giuseppe Feola, Hens Runhaar

Copernicus Institute of Sustainable Development, Utrecht, Netherlands

This paper investigates how power plays a role in the transformation of work relations in community-supported agriculture (CSA). From a postcapitalist perspective, CSAs are sites where various work relations are performed – i.e. capitalist (e.g. wage labour), alternative-capitalist (e.g. in-kind retribution of work), and anti-capitalist (e.g. affective retribution of work). While the CSA literature has examined the advantages and disadvantages of these different work relations, it has insufficiently investigated the processes that make such diversity possible. This paper looks into the micro-politics of CSAs and how power shapes the deconstruction of existing capitalist work relations and the construction of new postcapitalist ones. Three CSAs in Portugal serve as case studies, each employing different collective organisation and horizontal decision-making mechanisms. Data is collected through 30 semi-structured interviews and participant observation and analysed through Event-Structure Analysis. Results show how action-theoretical, constitutive and systemic forms of power influence transformations of work relations in CSAs.

99 Grassroots food practices and power issues: a discussion on possible inhibitors of just and sustainable socio-ecological change

Silvio Cristiano

Università Ca' Foscari Venezia, Italy

Would-be alternative grassroots practices are often proposed to counter mainstream economic dynamics, including food production in the overall imbalanced agri-food sector. These experiences allegedly pursue socially just and ecologically sustainable transformations. However, escaping from the multiple current unsustainable paths is a complex task since the issues driving today's interconnected crises are themselves interconnected, and solutions do not always keep up their pace. Systems thinking teaches that the highest leverage potential for change lies in mental models, and these are mostly unknown to (even before being addressed by) most people. Through a quali-quantitative systems thinking approach and through interviews and file mining, a professed Community Supported Agriculture project in Northern Italy is analysed from a socio-ecological viewpoint. A focus is dedicated to a crisis suffered by the project, to underlying power issues, and to the structural inhibition that these can yield in the pursue of just and sustainable socio-ecological change.

103 Nonhuman animals in agri-food transformations: from 'absent referents' to multispecies justice

Anne van Veen

Radboud University, Nijmegen, Netherlands

There is increasing attention for politics, power relations and justice in studying and steering sustainability transformations. This attention has largely been limited to human politics, power relations and justice. Effects of climate change and sustainability transformations are however not limited to humans but are also felt by individuals belonging to other animal species. Although nonhuman agency is generally acknowledged, nonhuman animals are usually not included as stakeholders or political actors in sustainability transformations and asymmetric interspecies power relations not identified as problematic. This is especially pertinent in research on sustainable agri-food systems transformations, in which the billions of nonhuman animals whose lives are at stake are rendered absent by reducing them to abstraction such as 'material flows' or CO2 emissions. In this paper I therefore explore how justice for nonhuman animals can become part of sustainability transformations through expanding concepts of politics, power and justice to include nonhuman animals and interspecies relations.

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SPECIAL TRACK: ACADEMIA AND TERRITORIAL GOVERNANCE
Chair: Giuliana Biagioli

283 Intervention without invitation – mistakes, problems, and solutions during action research – an honest conversation

Gusztav Nemes
Rural Bt, Balatoncsicsó, Hungary. Centre for Economic and Regional Studies, Budapest, Hungary

Generating 'real-life action' resulting in collaborative learning processes and tangible results is satisfying for the more active kind of academics. Action research, compared to more traditional research practices, however, brings up new ethical, methodological, and practical problems. One of them is about invitation, engagement, and commitment. In collaborative research projects, working with living laboratory researchers need to 'meaningfully engage' local stakeholders and maintain this engagement throughout the project. This is not an easy task by any means. A co-construction process between researchers and stakeholders, based on trust and a shared understanding, and a belief in creating relevant and useful knowledge and boosting sustainability processes for the local case should be achieved. This presentation explores problems and mistakes sharing relevant experiences from my 20 years of action research carrier. I will invite the audience to comment and also to share their own experiences, thus we can learn from each other.

556 Experiences of university social incubators: a comparative study between Europe and Latin America.

Mario Coscarello
University of Calabria, Rende, Italy

The objective of this paper is to understand to what extent local experiences of social incubation with the support of public universities are capable of generating social and solidarity-based economic networks through the development of social technologies. The project aims to give its contribution to the literature in the fields of social and solidarity economy, university incubation and social innovation. The research adopts a mixed method approach methodology. The case studies in Latin America and Europe will be investigated using a qualitative and quantitative approach. A comparative analysis will be carried out to understand the main organizational characteristics, the territorial contexts and the role of the key actors that can help to foster these experiences. The findings of this research project provide an attempt to shed light on the role of public universities in the construction of new knowledge and the socio-territorial development of the contexts in which universities operate.

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SPECIAL TRACK: FROM AN ASPIRATIONAL POLICY FRAMEWORK TO A REAL AGENT OF CHANGE?

Chair: Jayeon Lindellee

54 Eco-social mentalities and ways of living in the transformation to an eco-social policy – Empirical findings from a representative survey in Germany 2021/22

Martin Fritz

Mentalities in Flux (flumen), Institute of Scoiology, Friedrich Schiller University Jena, Germany

An important aspect in eco-social transformations are mentalities and practices. While, for example, mentalities oriented at the growth paradigm and fossil practices like frequent flying are obstacles to the political implementation of an eco-social policy, other more ecological mentalities and caring practices may function as drivers. Based on Bourdieu's theory of practice and concept of habitus this paper investigates the links between people's social positions, their eco-social mentalities and practices. In the paper the results of a representative multi-mode survey conducted in Germany 2021/22 are presented. We asked people about social and ecological attitudes, preferences and values, collected data about their everyday practices and their social status and position. Applying dimension reduction methods such factor-, correspondence- and cluster analysis we discover the eco-social mentalities and ways of living that currently exist in Germany and plot them into the space of social positions. Implications for social conflicts and inequalities are discussed.

90 What future for work in a socially and ecologically sustainable society? Unpacking the role of work in needs (dis-)satisfaction via citizen engagement

Jayeon Lindellee, Max Koch, Johanna Alkan Olsson

Lund University, Sweden

Scholars have identified the ways in which work in the fossil-driven industrial society has environmentally detrimental impacts and how our society is dependent on work, not least at the level of institutional structure but also at personal and relational level. This paper explores the ways in which work can contribute to or deter sustainable satisfaction of our fundamental needs by engaging in citizen involvement, via deliberative citizen forums and a population survey. The study is based on an ongoing research project in Sweden, aimed at exploring a new generation of social policy that is ecologically and socially sustainable. The paper analyzes the extent to which wishes regarding work and working life expressed by the forum participants and by the general public via survey resonate with different policy paradigms/approaches such as 'green jobs', 'just transition' and 'post-work' – all conceptualizing the relation between work and social-ecological transitions with different emphasis.

170 Mapping sustainable welfare: peaks and gaps in research on social policy and the environment

Katharina Bohnenberger

Institute for Socio-Economics, University of Duisburg-Essen, Duisburg, Germany

The paper analyses the current state of research on sustainable welfare and the interdependencies of climate policy and social policy. With a continuously growing number of publications on sustainable welfare, researchers require a map to navigate the research field. Based on a systematic literature review, the paper identifies different topics in the research fields, such as the role of welfare states in climate scenarios, the environmental impacts of pension systems or the normative justifications of sustainable welfare policies. Topics of sustainable welfare are researched to varying degrees, by different academic disciplines and some research questions have been more successfully answered than others. The paper summarizes the findings from the systematic literature review and identifies gaps and peaks in the research field. In the presentation we also discuss the implication for a strategic advancement of the research field of sustainable welfare.

204 Green Universal Basic Services – opportunities and barriers for advancing sustainable welfare

Milena Buchs

University of Leeds, United Kingdom

Sustainable welfare aims to promote human wellbeing within planetary boundaries. Green Universal Basic Services (UBS) have been proposed to advance sustainable welfare. This would require applying UBS, which currently focus on sectors such as health care and education, in new areas, including energy and transport. However, it remains unclear how UBS in the energy and transport sectors could be designed and implemented so that they can successfully address sustainable welfare objectives of needs satisfaction, fair distribution, environmental goals and democratic governance. This paper will discuss three dimensions related to the design and implementation of green UBS: 1) should green UBS be universal or targeted? 2) Who is best placed to provide green U/BS and which role should the state play? 3) Which roles can users/citizens play in the provisioning of UBS? The paper will conclude with reflections on implications for sustainable welfare in a postgrowth context.

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WHICH LABOR FOR THE ECOLOGICAL TRANSITION?

Chair: Emanuele Leonardi, Matteo Villa, Marta Binetti, Maura Benegiamo

79 Opposition to energy transition in Kozani, Greece: Envisaging alternative energy and labor futures?

Andreas Vavvos

Department of Social Anthropology, University of Saint Andrews, United Kingdom. Department of Psychology, University of Crete, Rethymno, Greece

In the Greek context, the region of Kozani (Western Macedonia) in Greece has been supplying electricity to the country for more than five decades through the nation's primary lignite 'dirty coal' power plant. Now, the region known as the "energy pillar of the country" is being transformed from fossil fuel to renewable energy production, with initiatives to create major photovoltaic parks and wind farms. The coal mines that were constructed in close-ranged areas are shutting down, while social initiatives that campaign against the imposed changes are sprouting. This ethnographic research is based on online interviews and field notes and attempts to chart the period of transformation in Kozani from fossil fuel to renewable energy generation. The aim is to explore how members of the trade unions and local collectivities construct their personal and communal futures and how they envision a just energy future for their community.

80 What just transitions for highly polluting industries? Comparing cases from the Global South and North

Lorenzo Feltrin

University of Birmingham, United Kingdom

This paper uses social reproduction theory and theories of extractivism to explore different varieties of just transition proposals. It does so by analysing the case studies of petrochemical production in Porto Marghera (Italy) and copper smelting and refining in Quintero-Puchuncaví (Chile) through the frame of working-class environmentalism both at the point of production (the workplace) and the point of reproduction (the community). In the two cases, the factories in question had a history of severe pollution and health effects on their workers and fenceline residents, which generated community-centred mobilisations demanding the closure of the factories, and workplace-centred mobilisations demanding that the factories be kept open albeit with increased investment in clean technologies. A provisional conclusion is that the type of product being manufactured in the plants and their position within the global economy are important factors in determining what just transition strategy should be encouraged.

126 A Just Transition or just a transition? The contested role of labour in the transformation of the German automobile industry

A. Katharina Keil

University of Lausanne, Switzerland

The role of organized labour in the restructuring of ecologically harmful industries in light of the ecological crises is highly contested. This paper synthesizes and advances previous research covering normative accounts of Just Transition requirements, theoretical analyses of trade unions' position towards sustainability and empirical research on union strategies in the context of the automobily industry. It focuses on the role of IG Metall, the German metalworker union, in the transition currently underway as the German automobile industry changes from internal combustion engines to electric vehicles. By inquiring into the history of the union's engagement with environmental questions and current developments through the lens of Gramscian theory, accounting for the German corporatist model of capitalism, I will answer the following question: what are the potentials and limits for German trade unions and organized labour generally to push for an ecologically sufficient and socially just transition of the German automobile industry?

175 The future of circular work in Flanders: contradicting discourses on labour in transitions

Matthias Multani, Kasper Ampe, Kris Bachus

HIVA - KU Leuven, Belgium

Among practitioners and academics, the circular economy (CE) and its influence on the labour market have received growing attention over the last decade. CE proposes to close material and energy loops by adopting distinct transition pathways or strategies. Scholars have indicated that low-ranked recycling strategies are becoming dominant, being closely intertwined with narratives of sustained economic growth and technological innovation. Employing discourse analysis on how labour market actors in Flanders understand this transition, we find that different political choices, investments, priorities, agendas and narratives for the CE transition are shaped. Although the literature on circular jobs generally finds only small changes in worker skills needed in the transition, we show that specific discourses shape incremental transitions that will not require radical shifts in the skills of workers and the related policies and systems. Other strategies however, may require new, marginalized or lost skills and fundamental changes in policies and systems.

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WHICH LABOR FOR THE ECOLOGICAL TRANSITION?

Chair: Emanuele Leonardi, Matteo Villa, Marta Binetti, Maura Benegiamo

208 Work in a post-growth future: The case for egalitarian sharing of minimal necessary labor

Erik Gomez-Baggethun

Norwegian University of Life Sciences, Ås, Norway. Norwegian Institute for Nature Research, Oslo, Norway

Robotization, climate change, and the COVID pandemic are destabilizing established ideas around work and working time. Many scholars advocate reducing working hours to reduce climate emissions, improve quality of life, and reduce unemployment. However, the dominant line of thinking in business, policy, and the media remains that substantive work time reductions are unfeasible, unaffordable, or undesirable, and many people conceive the standard 40h workweek as a 'natural' configuration of time. Drawing on insight from history and work utopias, this paper attempts to broaden the frames harnessing current discussions about work and working time. By exposing myths and prejudices pervading debates on work, it provides elements to rethink the meaning, purpose, volume, and distribution of work. After taking issue with universal basic income and full automation as leading aspirations in alternative imaginaries of work, a case is made for reorganizing work around the principle of egalitarian distribution of minimal necessary labour.

292 The politics of just transition in highly conflictual areas: the case of trade unions in Taranto

Matteo Jessoula, Matteo Mandelli, Luca Novelli

University of Milan, Italy

The present contribution deals with the politics of just transition in highly conflictual areas and it investigates the case of trade unions in Taranto (Italy). Home to an 'industrial monoculture' that has generated a massive environmental, economic and social crisis through its polluting activities, Taranto has been the centerpiece of a salient political debate for decades. This paper seeks to explore whether and to what extent trade unions are promoting just transition positions to tackle the complex crisis in Taranto. More precisely, the proposed contribution aims to explore unions' economic, social and environmental objectives and to map and analyze the solutions that they put forward to reconcile (or not reconcile) these objectives. Methodologically speaking, the study is based on desk research and semi-structured interviews to key unionists. It ultimately seeks to contribute to the labour environmentalism literature by applying a novel analytical framework to understand trade unions' complex positions.

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SPECIAL TRACK: BEYOND GDP: SUSTAINABLE DEVELOPMENT METRICS AND THEIR INSTITUTIONALIZATION

Chair: Miroslav Syrovátka

482 Is social progress compatible with environmental sustainability?

Jaromír Harmáček[1,2], Mohamed Htitich[1,2], Petra Krylova[1]

[1]Social Progress Imperative, Washington, D.C., USA. [2]Palacky University, Olomouc, Czech Republic

Beyond GDP-based approaches offer an innovative perspective on the wellbeing and development of societies. Therefore, the relationship between such progress (measured by the Social Progress Index, SPI) and environmental sustainability (proxied by per capita greenhouse gas emissions, GHGs) is worth investigating. While there is a positive correlation between production-based GHGs and SPI, this association turns negative if we control for GDP (using panel regressions). Additionally, we introduce the SPI-GHGs intensity as the ratio of GHGs to SPI and, for each of six defined SPI performance tiers, we identify a reference country with the lowest SPI-GHGs intensity. We then simulate a hypothetical scenario in which all countries in each SPI tier receive the intensity of the reference country of that tier. Preliminary results show that, in such a scenario, the World would reduce its GHGs dramatically. The robustness of our approach is also tested by using other measures of CO2/GHGs emissions.

545 The "fuzzy doughnut": revisiting planetary and social boundaries via uncertainty analysis

Gianluca Gucciardi[1], Tommaso Luzzati[2]

[1]University of Milan, Italy. [2]University of Pisa, Italy

According to the doughnuts-economics vision, it is possible to identify a "safe and just space" within which the population can maintain a recognized social standard, without exceeding the physical constraints of an acceptable level of environmental degradation. While previous works in this area focused on the identification of the indicators underlying the definition of such space, in this paper we propose a novel approach to determine an easy-to-interpret but robust safe and just space, determined by two synthetic "plausible" thresholds based on an uncertainty analysis and derived through the construction of different sets of composite indicators. Our methodology allows countries' performances to be more directly compared to social and planetary boundaries, leveraging on a suitable balance between the requirement for a more succinct overview when looking at several variables and the loss of significant information that occurs when indicators are aggregated into a single composite.

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RESOURCES: MATERIALS, ENERGY, WASTE

Chair: Paul Brockway

582 The map of waste production and disposal in Northern Italian LLMAs

Francesca Gambarotto[1], Giulio Pedrini[2], Chiara Magrini[3], Niccolò Stamboglis[4]

[1]University of Padova, Italy. [2]University of Enna, Italy. [3]University of Bologna, Italy. [4]Infocamere, Padova, Italy

Circularity challenges the current production system suggesting an industrial economy restorative or regenerative by intention and design. This means that future economic decisions will have to address smaller ecological footprints in seeking economic value. With this perspective in mind, we focus our attention on waste production and disposal sustainability. Previous analysis of waste dynamics detected the influence of socio-economic characteristics of local economies, the role of environmental and waste policies and the need to reduce the intensity of waste related to firms' production. We contribute to this investigation by mapping waste production and disposal in Italy's most productive regions, namely Lombardia, Veneto and Emilia-Romagna. The available dataset includes information on industrial solid waste generated by over 75,000 manufacturing plants. LLMA-based geography of waste generation is then reconstructed by correlating industrial specialization to the territorial quantity of waste for each item and to the diversification degree of waste.

269 Estimation of useful energy stage Energy Return On Investment of fossil fuel energy and comparison with renewable energy

Emmanuel Aramendia[1], Paul Brockway[1], Peter Taylor[1], Jonathan Norman[1], Matthew Heun[2], Zeke Marshall[1]

[1]University of Leeds, United Kingdom. [2]Calvin University, Grand Rapids, USA

While fossil fuel energy has traditionally been considered to have considerably much higher energy returns than renewable energy, recent work has shown that such results may be due to the scope of analysis. Indeed, when extending the boundary of analysis to the final stage of energy use, the EROI of fossil fuels decreases considerably. Taking into consideration that what is ultimately needed for productive and socially beneficial activities is useful energy, we extend previous work to determine the useful stage EROI of fossil fuel energy at the global and national levels. We show that when extending the analysis to the useful stage, renewable energy may have higher energy returns than fossil fuels, due to the low final-to-useful energy efficiencies of fossil fuels. Hence, conversely to what is usually thought, our results suggest that the energy transition could happen without a significant drop in the net useful energy available to society.

547 The energy and economic impacts of the EV transition: UK case study

Jaime Nieto[1], Marco Sakai[2], Paul Brockway[1], John Barrett[1]

[1]University of Leeds, United Kingdom. [2]University of York, United Kingdom

The global renewables-based energy supply transition is underway, as are key end-use switches with the leading example of electric vehicle (EVs). By transitioning to EVs, final-to-useful efficiencies of ICE-based vehicles (typically 20-25%) are replaced by much greater efficiencies of electric motors (typically 80-90%). Thus, significant fuel savings occur, in parallel to the switch to a lower carbon fuel. To study the energy and economic impacts of the EV transition in the UK, we update our original (Macroeconomic Resource COnsumption) MARCO-UK model covering the period 1971-2018. We model a baseline scenario (2018 -2050) of continued ICE-based road vehicles, and then compare to four scenarios based on varying EV fleet shares (50%/100%) and renewable electricity shares (50%/100%). Various effects are shown for the UK economy: 1. changing demand for primary/final/useful stage energy; 2. macroeconomic (GDP) impacts of the scenarios; 3. wider socioeconomic impacts including the labour market and disposable income.

183 Impact of renewables in rural areas: The case of wind power in a North-Eastern region of Spain

Raquel Langarita[1], Ignacio Cazcarro[2], Miguel Ángel Almazán[1], Jorge Bielsa[1]

[1]University of Zaragoza, Spain. [2]ARAID, Zaragoza, Spain

An increase of renewables is needed to mitigate climate change. However, social movements from several of the locations, usually rural areas (heavily depopulated, etc.), where the plants are installed claim that negative effects prevail whilst promoters of these projects assert the opposite. The aim of this paper is to analyze the impacts of the implementation of renewable plants at the locations where they are installed. Specifically, we analyze the effects of the implementation of windmills in the Northeast of Spain. To see the economic effects, we use several quantitative and qualitative approaches, including input-output (IO) tools to see the different spatial and temporal effects from the investments made on income and employment. The trade-offs of the installation of renewables (especially wind and solar) include the reduction of emissions, potentially creation of jobs and other income, while on the contrary having effects on the territory e.g. through biodiversity and landscape losses.

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SPECIAL TRACK: ECOLOGICAL MACROECONOMIC MODELLING – BENEFITS AND PRACTICALITIES OF MOVING TO THE USEFUL ENERGY STAGE AND BEYOND

Chair: Paul Brockway

246 Modelling at the useful stage - The MARCO-UK model – an example of a macroeconomic model which works at the useful energy stage

Jaime Nieto[1,2], *Paul Brockway*[1], *John Barrett*[1], *Marco Sakai*[3]

[1]University of Leeds, United Kingdom. [2]University of Valladolid, Spain. [3]University of York, United Kingdom

Economic models typically disregard the energy-environment-economy (E3) relationships. Moreover, even when these dimensions are taken into consideration, e.g. in Integrated Assessment Models (IAMs), the conventional approach considers the environment an externality that receives the economy's impacts. In addition, conventional optimization models tend to consider that resources can be gradually substituted by capital in the context of the utilization of the standard production function with perfect substitutability. Finally, the energy dimension is often considered at the primary and final stage, but not in the useful stage. Here we describe the MARCO-UK model, that overcomes these limitations by fully integrating the role of energy in the economic process. It relies upon a Post-Keynesian background, with a macro-economic approach and demand-driven. Energy is regarded at the primary, final and useful stage and its availability conditions the economic growth potential. We evaluate the economic growth prospects considering the possible evolution of thermodynamic efficiency.

335 Key energy-related limitations of mainstream energy models and IAMs and their implications

Paul Brockway

University of Leeds, United Kingdom

This opening presentation sets the scene, laying the groundwork for the Special Session topic: Ecological Macroeconomic modelling – Benefits and practicalities of moving to the useful energy stage and beyond. The presentation summarises three key energy-related limitations of mainstream energy models and IAMs. First is the lack of a role of energy in economic growth beyond typically a simple Aggregate Production Function (APF) approach, which relegates energy to a small 'cost-share' role in economic growth. Second is the lack of historical/endogenous energy-GDP relationships in their models even at the final/primary energy stage, as observed by a strong disconnect between historical-vs-future energy-GDP trends, which results in techno-optimistic modelling results due to lack of feedback mechanisms. Third, and impacted by the previous two, is the lack of extension to the useful energy stage, which has been shown to be a closer link to economic growth than the final/primary energy stages.

422 Exploring the Interface Between Human Well-Being and the Energy Conversion Chain

Matthew Heun[1], *Lina Brand-Correa*[2]

[1]Calvin University, Grand Rapids, USA. [2]York University, Toronto, Canada

In today's world, energy consumption (a) causes greenhouse gas (GHG) emissions, (b) provides energy services, and (c) enhances human well-being. GHG emissions and human well-being exist at opposite ends of the energy conversion chain (ECC); a separation that means studies of human well-being are often disconnected from primary energy and GHG emissions. Our thesis is that human well-being can also be considered a stage in an ECC, after the primary, final, useful, and services stages, thereby linking well-being to GHG emissions. If the thesis is correct, several benefits should emerge. (a) All ECC analysis tools will become available for human well-being analysis. Then, it should be possible to (b) quantify the GHG impacts of rising or maintaining human well-being under various future scenarios (high-carbon, low-carbon, aggressive electrification, demand reduction, etc.) and (c) obtain insights to transitioning energy conversion chains to optimize for enhanced human well-being within GHG budgets.

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SPECIAL TRACK: ECOLOGICAL MACROECONOMIC MODELLING – BENEFITS AND PRACTICALITIES OF MOVING TO THE USEFUL ENERGY STAGE AND BEYOND

Chair: Paul Brockway

484 Households energy end-use modelling in transportation and buildings in WILIAM, a new multiregional model integrating economic and biophysical dimensions

Iñigo Capellán-Pérez[1], Alexandros Adam[2], Ignacio De Blas[1], David Alvarez-Antelo[1], Gaspar Manzanera[1], Kurt Kratena[3], Iñaki Arto[4], Manuel Tomás[4]

[1]University of Valladolid, Spain. [2]Center For Renewable Energy Sources (CRES), Athens, Greece. [3]CESAR, Vienna, Austria. [4]Basque Center for Climate Change, Bilbao, Spain

This presentation describes the method to model energy use of households in buildings and transport in the 27 EU MS in the under-development multi-regional WILIAM IAM model. Two perspectives are combined: (1) a bottom-up "engineering" approach focusing in end-use (useful) energy demand, which is consistently integrated (2) within the IOT framework of the economy module. For residential buildings, the technology choice module determines the mix of technologies among the building stock for each energy use and the required fuel demand by type. Transportation is based on activity levels passenger*km, which can be supplied by a diversity of transportation options and under a number of policies (avoid, shift and improve). GDP is endogenous in WILIAM, and rebound effects are accounted in the framework. These features will allow assessing important topics for the transition such as the capacity of decoupling of economic production and environmental impacts.

357 A decade of insights on energy and economic growth from the useful exergy approach

Tiago Domingos[1], João Santos[1], Marco Vittorio Ecclesia[2,3,1], Tânia Sousa[1]

[1]MARETEC/LARSyS, Instituto Superior Técnico, University of Lisbon, Portugal. [2]Faculty of Engineering, University of Porto, Portugal. [3]INEGI - Institute of Mechanical Engineering and Industrial Management, Porto, Portugal

Consideration of energy flows in economies through the useful exergy metric has allowed a clear elucidation of the role of energy in economic growth, at the same uniting disparate observations and approaches and solving significant puzzles from the mainstream economic literature. Here, we review some of the progress in the last decade in this research program, starting with Portugal as a main case study but generalising wherever possible.

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SPECIAL TRACK: SUSTAINABLE PATHWAYS FOR THE FOOD SYSTEM: A CITIZEN-CONSUMER PERSPECTIVE

Chair: Elena Claire Ricci

146 Information, environmental attitude and the consumption of farmed fish fed with insects among older consumers

Maria Teresa Trentinaglia, Lucia Baldi, Massimo Peri

University of Milan, Italy

As the share of elderly increases, old people's consumption choices can affect the transition towards sustainable food pathways. This can be particularly relevant when it comes to aquaculture, where insect-based feed could alleviate the economic and environmental sustainability challenges of the industry. The acceptance of novel foods, such as farmed-fish fed with insects, should be favoured among also older age groups, typically more reluctant. We conduct a consumer analysis targeting older Italian consumers and see how their acceptance of this novel foods depends on their psychological traits. In particular, we exploit a by-dimensional measure of environmental attitude that can be a good predictor of acceptance also in the food domain. These dimensions of environmental attitude, i.e., toward environmental protection and toward nature, explain the acceptance process of novel foods also among older consumers. These findings further confirm the importance of developing effective communication strategies that target susceptible consumer groups.

176 Consumer's segmentation based on fish attributes. A case study in Italy and Spain

Ahmed Saidi Engineering, Carla Cavallo, Giovanni Fiorile, Sharon Puleo, Rossella Di Monaco, Gianni Cicia, Teresa Del Giudice

University of Naples Federico II, Italy

Consumer's behaviour is dynamic, and is always changing according to multiple social, environment and time related factors. The main objective of this study is to identify how consumers value the importance of finfish attributes according to various sociodemographic cues, and to segment consumers according to the most important factors that define their finfish consumption. National wide surveys were administrated in Italy and Spain to gather information regarding the importance of 13 preselected fish cues, using a best to worst analysis, and sociodemographic cues. Hierarchical and wards linkage cluster analysis were used to segment both populations separately. 4 and 3 clusters were identified successively for Italy and Spain. The findings of this study suggests that marketers should consider the differences in consumers' perceptions for fish and target the needs of each segment to satisfy consumers requisitions in terms of quantity and quality.

179 The contribution of community-supported agriculture to access to food and food literacy

Hannah Jona von Czettritz, Felix Zoll, Jonathan Friedrich

Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany

German society shows an increasing food-related social division. Low-income households lack the means for a balanced diet while high quality or organic food is only available to well-educated, high income earners. Simultaneously, especially small producers suffer from low prices and instable incomes. Community-supported agriculture (CSA) aims to reconnect producers and consumers, potentially both making organic food affordable and giving farmers financial security. However, it is also frequently criticized that CSA participation is limited to wealthy elites due to high membership costs and the requirement to pay upfront. This study aims to explore the potential of CSA to contribute to the improvement of food literacy and access to fresh healthy food and thereby reduce the food-related social division in Germany. It examines the payment schemes and costs of CSAs, demographic and income data of CSA members and the development of CSA farms.

252 Urban food strategies from a global sustainability perspective: a spatial scenario analysis

Liesbeth de Schutter[1,2], Stefan Giljum[1], Eveline van Leeuwen[2]

[1]Vienna University of Economics & Business, Institute for Ecological Economics, Austria. [2]Wageningen University, Urban Economics Chair: Group, Wageningen, Netherlands

From a food systems perspective, this research acknowledges the increasing role and responsibility of cities in the global resource system. We explore urban food strategies that can potentially reduce global resource use, adverse socio-economic impacts and emission of nutrients and greenhouse gases. In a multi-regional input-output approach, the spatial structure of the food system of a middle-sized European city has been analysed, thereby highlighting hotspots of social and ecological impacts and inequalities in the global resource system. Furthermore, in a scenario analysis, behavioral change towards more healthy and sustainable food choices (scenario 1) shows to result in significant reductions in adverse impacts in the global resource system. Regional sourcing (scenario 2) is likely to contribute to socio-economic opportunities at the local and regional level of the urban food system, whereas urban agriculture (scenario 3) is likely to support non-economic synergies and social change in an integrated urban food strategy.

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POLICIES: BIODIVERSITY AND ECOSYSTEM SERVICES: VALUATION AND POLICIES
Chair: Maria Brueck

342 Assessing economic instruments for sustainable management of forest ecosystems – the case of Norway

Elisabeth Veivåg Helseth[1], *Pål Vedeld*[1], *Erik Gómez-Baggethun*[1,2]

[1]Norwegian University of Life Sciences (NMBU), Ås, Norway. [2]Norwegian Institute for Nature Research (NINA), Oslo, Norway

Sustainable forest management challenges national governments to balance an array of different political aims, including social, environmental, and economic considerations. While there is growing interest in novel economic instruments aimed at protecting nature (e.g., diverse schemes for payments for ecosystem services), less attention is given to established economic instruments affecting forest ecosystems in both positive and negative ways. With Norway as our case, we assess if, and to what extent, existing economic instruments act as barriers or enablers for sustainable management of forest ecosystems. Our specific objectives are to i) map national economic instruments directed at forest management, ii) assess the relative size and importance of these instruments, and iii) examine the effect of the different economic instruments on important ecosystem services from Norwegian forests. Overall, we aim to provide knowledge on how economic instruments may be redesigned to turn barriers into opportunities for more sustainable forest management.

128 Assessing equity implications in the context of ecosystem services: disaggregation as a means for more equitable policy making

Maria Brück, *David J. Abson*

Leuphana University Lüneburg, Germany

Aggregate ecosystem service assessments are useful as a first approximation of how nature is valuable to people, but they tend to overlook important equity issues, which are vital in a policy context. We present results of two case studies in which we analyze ecosystem services in a disaggregated way. Our study area is a smallholder agricultural landscape in Southwestern Ethiopia where livelihoods and ecosystem services are tightly interlinked. In the first case study, we analyze the relationship between the degree of telecoupling and ecosystem service specialization (spatial disaggregation of ecosystem service production and flows). In the second case study, we study different types of values ascribed to ecosystem services, and how these differ depending on gender, wealth and occupation. This presentation shows how disaggregated assessments can highlight equity issues, and support local policy makers to design more equitable polices for natural resource management.

132 Rewilding as a part of England's Biodiversity Net Gain policy

Hanna Kalliolevo[1], *Pegah Hamedani Raja*[1], *Timo Vuorisalo*[1], *Joseph Bull*[2]

[1]University of Turku, Finland. [2]Durrell Institute of Conservation and Ecology, Canterbury, United Kingdom

England has confirmed a mandatory Biodiversity Net Gain (BNG) policy that requires all new development projects to increase the overall amount of biodiversity by 10 %. Rewilding is a potential method to increase biodiversity by restoring ecosystem processes to a self-sustaining level without continuing human intervention. The aim of this study is to identify suitable agricultural land areas for rewilding that is based on passive restoration and to assess whether this kind of rewilding could provide a way of generating BNG credits. We will use site suitability analysis to identify the rewilding potential of different sites in England and then calculate the potentially created BNG credits by using Biodiversity Metrics 3.0. Our study provides valuable information about the potential of rewilding abandoned agricultural land that would also be a low cost option in expanding native woodlands. As with the new BNG policy of 10 % biodiversity increase for most new developments in England and the overall aim of restoring England's forests, rewilding could contribute for both aims.

239 Remote sensing for the valuation of ecosystem services provided by urban trees: a case study from Warsaw, Poland

Zbigniew Szkop

Faculty of Economic Sciences, University of Warsaw, Poland

Remote sensing allows one to collect data about a large number of trees. Some of these data can be used to value ecosystem services provided by trees, supporting optimal urban greenery management. The exception here is DBH (Diameter at Breast Height) data, which cannot be identified from the top view. This issue has been addressed in the presented study. First, an on-the-ground inventory of over 500 Norway maple trees in Warsaw (Poland) was carried out and econometric models were designed to estimate their DBH based on other data that can be obtained by remote sensing. Second, this information was combined with the results of a remote-sensing study that has been conducted recently for the entire city of Warsaw. Finally, the value of the air purification and carbon sequestration ecosystem services provided by all Norway maple trees growing in Warsaw was estimated (at around EUR 500,000/year).

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POLICIES: URBAN AND SPATIAL PLANNING FOR SUSTAINABILITY
Chair: Miquel A. Gual

45 Private transport and local air pollution – a regional STIRPAT analysis for Germany

Johannes Lohwasser, Axel Schaffer
Bundeswehr University Munich, Neubiberg, Germany

Anthropogenic impacts substantially threaten the sustainable development of our cities and counties. The paper presents a regional STIRPAT (Stochastic Impacts by Regression on Population, Affluence, and Technology) model that adopts long-run estimation techniques to analyse environmental impacts of anthropogenous factors for 367 German districts and autonomous cities between 1990 and 2020. Results indicate that the development of local pollutants (nitrogen oxide emissions) is clearly related to motorization, regional population, industrial manufacturing as well as urban density. Further, findings show an ambivalent role of affluence on local emissions. While private car ownership can indeed be considered a driver of local pollutants, this is not true for GDP per capita. The results highlight the crucial role of private car ownership with regard to policies fighting local air pollution. Moreover, considering a more general aspect of STIRPAT modelling, the findings plead for a differentiated view on the role of affluence on the environment.

112 Park availability, accessibility, and attractiveness in relation to the least and most vulnerable inhabitants

Magdalena Biernacka, Edyta Łaszkiewicz, Jakub Kronenberg
University of Lodz, Poland

Analysing environmental justice through the prism of the three levels of park supply (availability, accessibility, and attractiveness) and the barriers associated with them helps to capture many different issues related to the unequal park provision in the city. Thanks to this, we are able to determine whether the most and least vulnerable groups actually live around parks depending on the assessment of each park. We found some inequalities for the most vulnerable groups and for seniors, which are in line with the reviewed literature on environmental justice. In our study, the starting point was the assessment of parks in terms of the presence of barriers on the three levels of UGS provision in the selected SA ranges, but this logic could be reversed and the distance to parks could be examined for selected groups of residents, while still keeping the lens of the three levels of UGS provision.

143 Towards agricultural intersectionality? Farm intergenerational transfer at the fringe. A comparative analysis of the urban-influenced Ontario's Greenbelt, Canada, and Toulouse InterSCoT, France

Mikael Akimowicz[1], Karen Landman[2], Charilaos Képhaliacos[3], Harry Cummings[2]
[1]Université Toulouse III Paul Sabatier, France. [2]University of Guelph, , Canada. [3]ENSFEA, Toulouse, France

In periurban areas, farm intergenerational transfer might be slowed down by strong social uncertainties. We tackle the beliefs that underlie farmers' decision-making to identify planning opportunities for farm intergenerational transfers. The institutionalist conceptual framework relies on Keynesian uncertainty and Commonsian Futurity. The dataset includes 41 interviews of farmers from the urban-influenced Ontario's Greenbelt, Canada, and Toulouse InterSCoT, France, during which farmers designed investment decision-making mental models. The results highlight the dominance of a capital-intensive farm model framed by a money-land-market nexus. Its existence results in access inequalities based on the characteristics of both farmers and their farm projects. The results support first the idea of the existence of an agricultural intersectionality. The results also highlight that when farmers' beliefs are well-aligned with the beliefs that shape their institutional environment, the frictions that slow down farm structural change in peri-urban areas are moderated by a shared vision of the future.

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POLICIES: URBAN AND SPATIAL PLANNING FOR SUSTAINABILITY
Chair: Miquel A. Gual

523 An evaluation model of the ESs supply of the agroforestry territory of Tuscany to improve the planning processes

Massimo Rovai[1], Tommaso Trinchetti[2], Francesco Monacci[2]

[1]DICI - University of Pisa, Italy. [2]University of Pisa, Italy

The mapping and clustering of agroforestry ecosystem services (ES) are playing an important role in land use planning and policies.
The present work proposes an evaluation model for Tuscany to create maps of five ES: food, breeding and supply of biomass; soil quality; erosion and mass movement control; regulation of the hydrological cycle; maintenance of the habitat. We used open-source geographic data, available in the main regional and national information portals processed with QGIS 3.16 and, to evaluate ES, the analytical hierarchy process (AHP). The maps created make it possible to classify the areas in terms of intensity of SE capacity and, with a cluster analysis, to identify areas with a homogeneous mix of SE in terms of quality and functionality.
Ultimately, the proposed evaluation model can be useful to support the public body in territorial planning and decision-making processes where an accurate mapping of ecosystem services is required.

10 A home for all within planetary boundaries: exploring pathways for meeting England's housing needs without transgressing national climate and biodiversity targets

Sophus zu Ermgassen[1], Joseph Bull[1], Christine Corlet Walker[2], Michal Drewniok[3], Mattia Mancini[4], Josh Ryan-Collins[5], André Serrenho[6]

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Secure housing is a fundamental human right. However, potential conflicts between housing and sustainability objectives remain under-researched. We explore the impact of current English government housing policy, and alternative housing strategies, on national carbon and biodiversity goals. Using material flow and land use change/biodiversity models, we estimate under current policy housing alone would consume 113% of England's cumulative carbon budget for 2050 (2.9/2.5Gt [50% chance of <1.5°C]); 12% from the construction and operation of newbuilds and 101% from the existing stock. Housing expansion also potentially conflicts with England's biodiversity targets. However, meeting greater housing need without rapid housing expansion is theoretically possible. We review solutions including reducing demand for homes as financial assets, and reducing underutilisation of floor-space. Transitioning to housing strategies which slow housing expansion and accelerate low-carbon retrofits would achieve lower emissions, but they face an unfavourable political economy and structural economic barriers.

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THEORY AND NEW IDEAS: ECOLOGICAL ECONOMICS: THEORETICAL AND EPISTEMOLOGICAL ISSUES

Chair: Michel A. Gual

541 Responsibility for regime shifts in managed ecosystems

Stefan Baumgärtner

University of Freiburg, Freiburg im Breisgau, Germany

I develop a quantitative measure of a manager's responsibility for a regime shift in an ecosystem with stochastic dynamics. I build on the established concept of responsibility, which I operationalize in a simple generic model. Causal responsibility is the degree of causation of an outcome due to the manager's action, which is in contrast to chance influences that may also have caused the outcome ("good luck" or "bad luck"). Normative responsibility is the manager's obligation to see to it that the system is in a specified desired state. It implies a particular management action. Virtuous responsibility is the degree to which the manager lives up to her normative responsibility when managing the system. The quantitative measurement of responsibility is relevant to judge management actions, to reward or punish the manager based on the extent of her (ir)responsibility, and to design institutions that enable and encourage responsible management.

561 New agreements for a post-capitalist society

Elke Pirgmaier

University of Lausanne, Switzerland

Scholarship can be liberating if it combines radical critique, which nurtures a deep willingness for social-ecological change, with imagination and inspiration, which awakens the real possibilities for a new society. This contribution focuses on the latter. Calling in on a desirable future in which everyone is allowed and supported to thrive, I explore different ideas and practices to enliven new social relations grounded in care, ecological reparation and healing. New agreements at this level could change the world. How to articulate such agreements and how to do so in the current predicament -- life in capitalist ruins, tied to inherited shackles that oppress, rather than liberate -- seems key. I seek to integrate ideas such as freedom, alienation, being, and collective trauma from Marxian political economy, integral theory, and indigenous wisdom traditions to weave a pattern towards this end.

442 Advances in socio-biophysical coevolution: unfolding empirical evidence for theory

Miquel A. Gual

Universidad Pablo de Olavide, Sevilla, Spain

Socio-biophysical coevolution has been a fundamental epistemology for ecological economics, used mostly as an heuristic to explore case-studies ranging from water, energy, technology policy or agri-environmental change, among others. Theory has been seldom developed due to the lack of empirical evidence and the difficulty to account for analytical boundaries, hierarchical levels, multiple scales and rates of change. However, in the last ten years, a significant number of coevolutionary empirical and theoretical publications from overlapping and adjacent fields to ecological economics have been produced. Consequently in this paper, we undertake a review on socio-biophysical coevolution in journal articles in the fields of Niche Ecology, Urban Evolutionary Biology, social-ecological resilience-coevolution, Cultural evolution, and other related fields. Main findings and empirical results are articulated into a general framework based on specified interaction modes, hopefully contributing to a synthetic theory of socio-biophysical coevolution.

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POLICIES: MITIGATION AND ADAPTATION TO CLIMATE CHANGE

Chair: Thomas Bassetti

60 Catapulting nature onto the agenda: opportunities and barriers of nature-based solutions

Juliette Genevieve Crescentia Martin[1], *JoAnne Linnerooth-Bayer*[1], *Anna Scolobig*[2]

[1]IIASA, Laxenburg, Austria. [2]University of Geneva, Switzerland

Nature-based solutions (NBS) have emerged as a critical umbrella concept encompassing all actions and measures that use nature's properties to systemically address societal challenges. Among their manifold co-benefits, there is great potential for NBS to contribute to disaster risk reduction, climate change adaptation and biodiversity conservation. However, despite the significant political traction NBS have gained, their implementation often remains too fragmented or context-specific. Based on a meta-analysis of grey- and peer-reviewed literature and workshop results, we identify and discuss the institutional, legal, regulatory, social and economic opportunities, as well as barriers to NBS. Results suggest three key barriers to NBS implementation: i) lack of knowledge about the effectiveness of NBS and their ability to deliver co-benefits, ii) path dependency aggravated by lack of qualified contractors, and iii) challenges for obtaining funding. Based on our findings, we suggest innovative new institutions, policies and instruments that can enhance NBS adoption.

536 Emission Abatement in the EU ETS - Evidence from Austrian Companies

Claudia Kettner, Daniela Kletzan-Slamanig

Austrian Institute of Economic Research (WIFO), Vienna, Austria

The European Emission Trading System (EU ETS) is the key instrument of the EU's climate policy. The credibility of the EU ETS has, however, been put into question due to a persistent oversupply of allowances. In this context, this paper focuses on two research questions: (1) Has the EU ETS despite a considerable surplus of allowances and low prices spurred abatement activities, and (2) have firms perceived changes in the incentives provided by the scheme over time? To answer these questions a case study for Austria is conducted in which a quantitative data analysis is combined with a survey among EU ETS firms. Our analysis confirms that the ETS has incentivized emission abatement, despite the regulatory shortcomings in the beginning. The survey results indicate increasing emission abatement over time as the regulation became stricter, and that the EU ETS is perceived as a highly relevant motive for reducing emissions.

24 Fiscal policy response of local governments to floods in Italy

Chiara Lodi[1,2], *Giovanni Marin*[1,2], *Marco Modica*[3]

1University of Urbino Carlo Bo - Department of Economics, Society, Politics, Italy. 2SEEDS, Ferrara, Italy. [3]Gran Sasso Science Institute, L'Aquila, Italy

Climate change is accelerating and turns out to have growing negative effects on local areas which are non-homogeneously distributed in space. This paper aims at empirically testing the dynamics of Italian municipalities fiscal outcomes in the aftermath of floods, by accounting for heterogeneous levels of resilience, vulnerability and exposure. Through a dynamic difference-in-difference with fixed effects model, we have found that the level of resilience and vulnerability of a municipality is highly relevant in determining the trends of total expenditures, total revenues and net surplus per capita. Less vulnerable municipalities are already prepared for extreme events, because they constantly invest in mitigation and adaptation of the risk. Otherwise, less resilient or more vulnerable municipalities show an immediate shock in expenditures after the flood. Through our analysis we account for multiple aspects of risk so we can support policy decisions related to both ex-ante and ex-post disaster occurrence management.

565 The new normal. Measuring balance-of-payments vulnerability vis-à-vis physical climate risks and climate mitigation measures

Anne Loescher

University of Siegen, Germany

Climate change and its accompanying transitional effects exercise considerable risks for economies both nationally and globally. These risks are unequally distributed among countries, where low-income countries bear the brunt. Despite the growing number of indicators measuring the empirically observable impacts of climate change, there is no measure for both physical and transitional risk exposure for countries' balance-of-payments. This is a severe lacuna as the balance-of-payments constitutes an important mainstay of macroeconomic policy making. The paper's novel contribution consists of designing an index which enables a classification of susceptibility to climate (transition) risks for balance-of-payments. The indicator addresses the combined vulnerabilities arising from the exposure to climate (transition) risks and a subordinated integration in the international monetary system. It provides an important tool both for policy-makers to make informed decisions and researchers to draw a more complete picture of the physical and transitional impacts climate change has on macroeconomic variables.

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POLICIES: MITIGATION AND ADAPTATION TO CLIMATE CHANGE

Chair: Thomas Bassetti

18 Exploring linkages between households' intended adaptations to climate-induced floods

Brayton Noll[1], Tatiana Filatova[1], Ariana Need[2]

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As climate change increases the probability and severity of natural hazards, governmental-level adaptation measures are essential, but insufficient in face of growing risks; necessitating complementary action from households. While past work has focused on the behavioral drivers of household adaptation, little attention has been paid to understanding the relationships between adaptation measures themselves. Using survey data (N=4688) from four countries, we analyze household structural adaptation to the most devastating climate-driven hazard: flooding. Accounting for the socio-economic, situational, and behavioral drivers, we analyze how past and additionally intended adaptations affect household behavior and find that both have a positive effect on intending a specific adaptation. Our analysis reveals that household structural modifications may be non-marginal and indicate that past action and intention to pursue one action trigger intentions for other adaptations; a finding with implications for estimating the speed and scope of household adaptation diffusion.

134 Population growth, emissions and climate change: demographic considerations and mitigation policies

Veronica Lupi[1,2], Simone Marsiglio[3], Danilo Liuzzi[1]

[1]University of Milan, Italy. [2]Fondazione Eni Enrico Mattei, Milan, Italy. [3]University of Pisa, Italy

Due to the uncertainty on future population growth, understanding how climate policy depends on population dynamics is crucial to identify effective mitigation tools. The population size interacts with different key elements of the integrated assessment models employed to analyze the desirability of alternative climate policy options. On the one hand, population determines social welfare, which plays an essential role in quantifying social costs of environmental policy. On the other hand, it represents a major determinant of climate change, contributing to emissions, that, in turn, affect individuals' utility function and thus social welfare. To account for the role of population in climate change debate, we extend an integrated assessment model (DICE). We explore how different assumptions regarding the role of population in the climate change debate impact the design of optimal mitigation policies in different scenarios.

261 CO2 emissions: the role played by traditional determinants in cross-country dispersion.

Thomas Bassetti[1], Filippo Pavesi[2]

[1]University of Padua, Padova, Italy. [2]LIUC (Carlo Cattaneo University), Varese, Italy

The design of climate change prevention policies heavily relies on statistical projections, which are based on the assumption that, conditional on their economic situation, countries are converging towards the predicted values of the model employed. By using a panel dataset of 127 countries over the period 1980-2019 and a recent non-parametric variance decomposition technique, this article investigates whether the dynamic of CO2 determinants is associated or not with cross-country convergence in emissions. We arrive at the following results. First, the convergent dynamic observed for CO2 emissions during the entire observational period can be fully explained by the evolution of traditional CO2 determinants. Second, economic growth represents the most important variable to explain CO2 convergence. Third, low-educated countries experienced a less significant convergence because of their human capital accumulation process. These results allow us to identify the factors that limit the possibility of implementing coordinated policies aimed at contrasting climate change.

260 A model-based policy exercise to examine climate migration policy in Europe

Michele Catalano[1], Michał Pajak[1,2,3], Piotr Magnuszewski[1,2], Sebastian Poledna[1], Nikita Strelkovskii[1], Elena Rovenskaya[1], Anne Goujon[4], Alessandra Conte[4], JoAnne Linnerooth-Bayer[1], Alberto Fresolone[1], Paolo Campo[2]

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Europe is facing challenging policy questions related to climate-driven migration, including whether a new classification of 'environmental refugees' should be instituted to take account of Europe's responsibility for climate loss and damage in the developing world, or climate justice. This presentation examines this and other questions within the Austrian context. A scenario- and model-based policy exercise has been developed where participants play the roles of political parties in Austria who take strongly differentiated positions on migration issues. The policy exercise is based on an agent-based model that analyzes the economic consequences of Austrian climate-migration scenarios. The specific case is migration from the MENA region driven by drought and locust infestations. The goal is to reach compromises on migration policy propositions including the reform of the European legal framework. This presentation illustrates the scenario and model-based game play as well as reports on results of policy exercises involving mainly students.

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SPECIAL TRACK: DECOLONIZING AND ECOLOGIZING AGRICULTURAL ECONOMICS
Chair: Stephanie Eileen Domptail

242 Rethinking agri-environmental measures: insights from sociology and anthropology

Bente Castro Campos

Justus Liebig University Giessen, Germany

The success of agri-environmental measures depends crucially on the will of farmers to participate and adopt good agricultural practices. Despite complex policy measures, however, the environmental problems of intensive agricultural production have not improved significantly. In this context, we are interested in better understanding why some conventional farmers in Germany are reluctant to apply less manure for fertilization. We discuss this topic from the perspective of Randall Collins's (1994) four sociological traditions with a literature review. Our research findings suggest that farmers' behavior could be based on a spectrum of possibilities, ranging from profit maximization goals, modern behavioral and production requirements to rituals and role-changing behavior for the common good. All of which would require different agricultural policy responses. This could explain why an agricultural policy largely based on monetary compensation does not necessarily contribute significantly to shifting conventional farmers' behavior towards sustainable agriculture.

376 Agroecology as an ontology decolonizing the human-nature relationship in agricultural systems

Stephanie Domptail[1], Hirsch Jennifer[1,2], Chukwuma Ume[1]

[1]Justus Liebig University of Giessen, Germany. [2]ISOE Institute for Social-Ecological Research, Frankfurt, Germany

Current industrialized agriculture and food systems worldwide jeopardize the ability of future generations to live a good life by contributing to major environmental and social crises. These were built on a foundational Western worldview, characterized by the Cartesian divide between Man and Nature. I postuliate that a shift to sustainable farming and food systems requires a new foundational worldview, a new mental model to guide their conceptualization and design based on a decolonized re-conceptualization of agricultural and food systems and their evaluation. Inspired from political ecology and feminist economics, the paper proposes elements of an ontology for alternative food systems – namely, reproduction as the aim of the system's activities and egalitarian Human-Nature relations. It then confronts these ontological principles with observations of agroecological farmers. The rise of agroecology questions about the values that shape agricultural and food systems and engenders a "new" target: the reproduction capacity of our societies.

438 Is post-normal science feasible to democratize environmental science and food policy in the Global South?

José Francisco Orozco-Meléndez[1], Jaime Paneque-Gálvez[2], Zora Kovacic[3]

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Post-normal science (PNS) has gained popularity for analyzing and managing complex problems in a democratic way. However, the feasibility of developing PNS-based processes in countries with weak democratic characteristics such as countries in the Global South is yet unclear. We assess the feasibility of conducting PNS processes in the social, institutional, and techno-scientific contexts of countries of the Global South. Our preliminary results indicate that the operationalization of PNS in the Global South faces challenges associated with the unequal distribution of power that limits the possibility of sustaining open and deliberative quality dialogues between agents with opposite visions. We suggest the need to integrate the analysis of power structures before adopting a PNS approach. Our study reveals that PNS may require the conditions of politically stable liberal democracies. Hence, we believe it is essential to adapt its theoretical and methodological foundations to the specific conditions found in the Global South.

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TRANSFORMATIONS: ACTIONS FOR SOCIAL CHANGE

Chair: Tatiana Kluvankova

463 A Participatory Action Research and Visual Ethnography of Food Localisation Movements in Italy: The Counter-hegemonic Account of a Socio-Environmental Transformation towards Food Sovereignty

Emma Marzi

Degrowth, Political Ecology and Environmental Justice; UAB, Barcelona, Spain

Food localisation movements have increasingly risen around the world and deserve academic attention as they offer an alternative to the corporate food regime. However, most studies focus on the relational and structural dimensions of these movements, often neglecting their cultural significance. Therefore, this engaged ethnography is interested in uncovering the ontology of growing and eating in the urban and rural area of Pesaro, Marche (Italy), through a visual and written account of existing and emerging local practices of supply, distribution and consumption. The contribution of this anthropological research is an empirically derived perspective that aims to challenge top-down, dogmatic and narrow views of policy-making, which often neglects the cultural formation and interconnectedness of agriculture and food domains. Particularly, Italy appears as the appropriate context to study the relation between the cultural and political meaning of food since identities are strongly connected with culinary practices and each region retains its peculiarity related to food production and consumption. Nonetheless, [...].

189 Media and economic growth: An insight into the mainstream and the alternative in Central and Eastern Europe

Tomas Profant

Comenius University, Bratislava, Slovakia. Institute of International Relations, Prague, Czech Republic

This paper analyzes the representations of growth in the mainstream and alternative media in Czechia and Slovakia and journalists' and commentators' perspectives on growth. It confirms the dominance of the positive representation of growth in the mainstream. This research also shows that all the respondents were to a certain degree critical of growth, which led in the progrowth group to the adoption of the green growth position. The respondents critical of growth often do not express their critique. This is due to the news and interview genre as the critique of growth belongs to the opinion pages, due to the perception that the readers would not accept a critique of growth and editors would follow the readers' perspective and due to a general progrowth stance of the mainstream media. The possibility for a change lies according to the respondents among other things in quoting credible sources criticizing economic growth.

339 Transformative social innovation: long term sustainability in marginalised rural areas?

Tatiana Kluvankova[1], Maria Nijnik[2], Stanislava Brnkalakova[1], Martin Spacek[3]

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Social innovation is perceived as a collaborative response recognised as a drive to advance sustainable development in a long term. Social innovation promotes civic values, particularly in marginalised rural areas that are often struggling with biophysical and market limits, as well as shortages of public funding. In order to identify development path for social innovation, in this paper we use meta-analyses of social innovation examples in diverse situations and contexts and 11 in-depth cases to reflect on the contexts and dimensions of social innovation. The elaboration of conceptualisation and deductive analyses result in the creation of a typology of social innovation for marginalised rural areas, with four key paths identified and explained their potential for transformative changes how to capture processes and resulting changes in marginalised rural areas in order to turn such areas' diversity into strengths.

361 Sustainability innovations: conditions and outcomes. A proposal for an analytical framework and two case studies.

Caroline Dabard, Carsten Mann

Eberswalde University for Sustainable Development, Germany

Sustainability innovations influence societal transformations through the development of new products, processes, organisations, behaviours or institutions. Yet, their specificities and enabling conditions remain rather unknown. We propose an analytical framework, built on learnings from the social-ecological systems and transitions literature. The framework features four dimensions: context, actors, process and outcomes, which are detailed in 31 variables. We apply the framework to analyse two case studies selected in the Schorfheide-Chorin Biosphere Reserve, Germany. The first refers to technological innovation in mobility, while the second relates to social innovation in agriculture. Resulting, we compare enabling conditions and variables between the two cases, which underpin the influence of trust, commitment, resource availability, experimenting, learning, advocating and cooperating for innovation development. The cases further demonstrate that sustainability innovations develop as bundles of interdependent, entangled novelties, due to their disruptive character. Their specificity thereby resides in positive outcomes in terms of social-ecological integrity and equity.

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TRANSFORMATIONS: DESIGN OF POST-GROWTH ECONOMIES

Chair: Yaryna Khmara

57 The potential of community-led economic initiatives for building a local structural basis for economic change: an empirical case study from a 'social provisioning' perspective

Roman Hausmann[1], *Anne-Kathrin Schwab*[2]

[1]Vienna University of Economics and Business, Austria. [2]University of Vechta, Germany

This paper explores the potential of community-led economic initiatives (CLEIs) to contribute to systemic changes towards more social-ecologically favourable provisioning processes. CLEIs are grassroots activities that develop and experiment with alternative forms of provisioning for the sake of actively restoring, maintaining and creating ecological and social qualities at a local or regional scale. This paper investigates the potential of CLEIs to create structural conditions that are more conducive for enabling social ecologically favourable provisioning processes beyond the membership of the initiative, albeit on a local scale. These structural conditions are conceptualised in terms of three categories, namely the material basis (e.g. technology and resources), the social basis (e.g. class and gender relations), and the cultural basis (e.g. dominant societal norms and values) which together shape the processes and outcomes of the economy. For the data collection, semi-structured interviews, focus groups, document analysis, and focused ethnography have been used.

304 On the road to urban degrowth economics? Learning from the experience of shrinking cities, Transition Towns, C40 cities and doughnut cities

Yaryna Khmara, *Jakub Kronenberg*

University of Lodz, Poland

Cities have special importance and potential to serve as places for social, economic, and ecological transition experiments. To achieve better results, they create organizations and networks. But the question if their actions are sufficient remains open.Broad transformational ideas do exist and one of them is degrowth. We postulate that a new narrative of 'urban degrowth economics' is necessary to operationalise degrowth on a larger scale. Analysing the strategies and policies of cities representing selected networks or phenomena) through the lens of such a narrative can demonstrate, which of the current approaches to urban development are the closest to degrowth values. Through juxtaposing degrowth postulates with main themes analysed in urban economics we propose criteria for urban degrowth economics. Then, we apply these criteria to assess selected case study cities representing the following networks and phenomena: C40 (Copenhagen), Transition Towns (Totnes), doughnut economics (Amsterdam), and shrinking cities (Detroit).

455 Financialisation and Social-Ecological Transformation – Addressing a Blind Spot in Ecological and Degrowth/Post-Growth Economics

Elena Hofferberth

University of Leeds, United Kingdom

Financialisation represents a key transformation of the global economy in the last decades. Although financialisation is in multiple ways connected to the aggravating ecological crisis, rising inequality and economic and financial instability, there has been strikingly little research on financialisation in both ecological economics and the emerging field of degrowth and post-growth economics. This paper seeks to advance ecological and degrowth and post-growth economics by bringing together the literatures on financialisation and social-ecological transformation. First, it discusses financialisation as an essential characteristic of contemporary capitalism and spells out its main effects. Second, it establishes more specifically the connections between financialisation and the current ecological, social and economic crises. Third, and on that basis, it assesses the adequacy of existing proposals for change and highlights necessary additions and elaborations, including but not limited to the global monetary and financial architecture.

44 Tackling growth dependency - the case of adult social care

Christine Corlet Walker, Tim Jackson, Angela Druckman

University of Surrey, Guildford, United Kingdom

In this paper, we present a systematic approach to identifying, analysing and transforming growth dependencies in the welfare state. We explore how three core processes (growing demand, rising costs and rent seeking) contribute to the creation of growth dependencies. Taking adult social care as our case study, we explore how rising demand for long-term care creates a dependency on ever-growing production of social care services; how rising costs, related to the time-intensive nature of care, demand growing revenues for care companies to stay afloat; and how the use of predatory financing practices by investment firms places growing financial costs on large parts of the sector. These growth dependencies can be attenuated or aggravated by physical, financial, legislative, and social factors, such as the privatised provisioning structure of many care sectors across the OECD. Understanding what these factors are can help to identify sector-specific pathways for transformation towards postgrowth welfare systems.

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TRANSFORMATIONS: DESIGN OF POST-GROWTH ECONOMIES

Chair: Yaryna Khmara

572 The uncomfortable rebound effects: a discourse analysis of Swedish green growth politics

Thomas Hahn[1], Oskar Lindgren[2], Mikael Malmaeus[3], Eva Alfredsson[4], David Collste[1]

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Sweden has since 1990 achieved absolute decoupling (rate of change GDP/GHG emissions). For 2011-2019, the annual decoupling has been 4.2% for territorial GHG emissions (1,02/0.979), or 39% decoupling 2011-2019. If rebound effects had been controlled, i.e. using increased carbon efficiency to reduce emissions, Sweden would be on track to achieve the 1.5 degree target with 50% probability, given an equal global citizen carbon budget https://carbonbudgetcalculator.com/country.html?country=Sweden However, Sweden has no policy to control rebound effects, because resource and energy efficiency without rebounds would result in reduced material production and probably lower GDP. We analyse political documents and find no problematizing of rebound effects or energy sufficiency. Instead, the sole focus is to reduce energy intensity, which often is assumed to result in lower GHG emissions. In reality, the lower GHG emissions in Sweden has not been achieved by lower energy demand, but replacing fossil fuels with biofuels and wind power.

78 A decade lost to idle worry: European semiperiphery and potential for degrowth

Mladen Domazet[1], Marija Brajdić Vuković[2], Branko Ančić[2], Tomislav Cik[2], Jelena Puđak[3]

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European semiperiphery is standardly characterised as a growth and development oriented block; a rich, but not rich enough population that is averse to degrowth and voluntary metabolic frugality. Whilst concern for global environmental stability and injustice is high, self-professed activation through the usual consumer and representative democracy channels is low. Based on comparison of continuous social research on nationally representative samples in Croatia over the last decade, we shall show the changes in trends of degrowth-supportive attitudes. We shall also indicate the socio-economic and socio-cultural drivers and obstacles of these attitudes and their changes over the decade characterised by the rise of degrowth theory and visibility in this part of Europe and a series of concurrent crises. Given the transformative potential of the semiperiphery, semiperiphery's transformative potential has notable consequences for the European society as a whole.

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RESOURCES: INDUSTRIAL ECOLOGY AND MATERIAL FLOWS ANALYSIS
Chair: Stefan Trsek

363 Mapping the land-use footprint of Brazilian soy embodied in international consumption: A spatially explicit input-output approach based on open data

Stefan Trsek
WU Vienna, Austria. BOKU Vienna, Austria

Here we present a transparent and reproducible approach to map consumption-based agricultural land-use footprints at a high level of spatial detail, applied to the Brazilian soybean complex. Using exclusively open data, we model the sub-national soybean supply chain on the level of Brazil's municipalities. The resulting flows are then linked to the multi-regional physical input-output model FABIO, allowing to trace soybean flows and land-use footprints from the municipality of origin via embodied products to the country of final consumption. Finally, we refine the spatial resolution of these footprints to the grid cell level using remote sensing land-use data. Results reveal considerable heterogeneity in the spatial distribution of land-use footprints driven by major consumption regions. The framework can serve as a blueprint for other agricultural products and regions and for the linkage of resulting local land-use pressures to related environmental impacts such as deforestation or biodiversity loss.

232 From resource extraction to manufacturing and construction: flows of stock-building materials in 177 countries from 1900 to 2016

Barbara Plank, Jan Streeck, Doris Virag, Fridolin Krausmann, Helmut Haberl, Dominik Wiedenhofer
University of Natural Resources and Life Sciences, Vienna, Austria

International data on economy-wide material flows (ew-MFA) currently is limited to national extraction, trade and consumption and does not integrate material processing and stocks. Further developments for ew-MFA are required, ranging from more transparent data compilation and uncertainty assessments and improved representation of socio-economic material cycles to large spatio-temporal coverage. To address these shortcomings, we herein present a novel ew-MFA database covering 14 major stock-building materials in 177 countries for the period 1900-2016. In the year 2016, 39.7 ± 6.1 Gt/year of raw materials were extracted globally, of which 23% turned into waste during processing, resulting in 30.7 ± 5.7 Gt/year of primary gross-additions-to-stock (GASprim). China has dominated global dynamics from the 1990s onwards. Across all countries, we find that per-capita GASprim and GDP decoupled over time. However, we find no indications for novel economic development pathways which are substantially less material-intensive in terms of stock-building than in the past.

478 FORBIO – the construction of the forestry biomass input-output model

Zully Rosadio, Martin Bruckner
Vienna University of Economics and Business, Austria

Globalization has expanded the networks of wood supply chains, resulting in consumption occurring in distant places from extraction and production sites. Harvested Wood Products (HWP) have been recognized as a human-made carbon pool in the global climate agendas but the universally used approach to account these flows focus on production, not taking in consideration the trade of HWP and their feedstock. This results in a misrepresentation of the national carbon flows. We want to contribute to this matter with our Forestry Biomass Input-Output Model (FORBIO). FORBIO covers 23 forestry-based commodities for the period 1997-2017 for 221 countries and territories. It is organized as multi-regional physical Supply-Use-Tables. With this model, we aim to show the structure and size of global HWP flows along processing chains expressed in tonnes of carbon, will identify regional differences and patterns, and discuss the evolution of flows of internationally traded HWP.

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SPECIAL TRACK: SOCIAL THEORY IN SOCIAL ECOLOGICAL ECONOMICS

Chair: Clive Spash

212 Where to look at when policies fail? A semiotic approach to institutions and habits (in Finnish wolf policy)

Juha Hiedanpää

Natural Resources Institute Finland (Luke), Turku, Finland

Policymaking is usually understood as a task of designing and implementing societal arrangements to direct individual and social action towards collectively desired direction. I offer a reading of institutions as policy designs and their implementation characteristics through the semiotic of pragmatist philosopher Charles Peirce. My starting point is Peirce's tripartite semiotics of sign, object, and interpretant, and I apply what Peirce called methodeutic to conduct a critical policy analysis. I will use Finnish wolf policy as an example and examine "how signs and arguments generate the habits and actions that lead to the growth of concrete reasonableness." (Aitkin, "Peirce", 2016: 151.) I reveal the general conditions of signs and arguments "not" managing to generate renewed habits of action, thinking, and feeling, that is, leading policies to fail. Classical institutional economics and pragmatism provide one critical social theory for social ecological economics to understand and modify the challenges of our time.

231 Insurgent Planning Practices: Reconceptualising Participation in Urban Planning for Social Ecological Transformation

Sarah Ware

Vienna University of Economics and Business, Austria

Responding to converging global crises requires the social-ecological transformation of various fields of practice. Abandoning existing dependencies on unsustainable practices demands new systems of governance and participation that challenge current hegemonic power-blocs. Participation in urban planning has primarily focused on greater inclusion within institutionalised, formal spaces, leaving limited capacity for counter-hegemonic and transformative alternatives to emerge. Engagement with actors involved in citizen initiatives, social movements or protest groups, is very limited. This research investigates broadening the scope of participation in planning by adopting an insurgent planning perspective, expanding the field of practice and reconsidering anew what planning is, who planners are and what transformative potential lies in the practice. Bringing this perspective into existing settings requires synthesis with theories on rationales of participation and power relations to analyse how and why insurgent practices emerge and how they might enrich planning outcomes, broadening the scope of participation in a radical way.

416 Conceptualising Un/sustainable Work in Social Ecological Economics

Maja Hoffmann

Vienna University of Economics and Business, Austria

Work is central to social theory, especially in the traditions of feminism, Marxism, anarchism, and critical theory. Yet, there is a lack in theoretical approaches that scrutinise work in its specific modern conception and form of organisation in relation to its ecological unsustainability. This contribution draws on the mentioned traditions, in particular in the form of postwork theory. It starts from the societal and biophysical reality of modern industrial society, i.e. understands 'work' primarily as gainful employment and as a matter of recognising its fundamental embeddedness within Earth's ecosystems and laws of physics (in line with a critical realist approach to Social Ecological Economics). This allows to develop an analytical framework for assessing the un/sustainability of work, for approaching questions about the societal value of work, and for understanding contested political implications. Ecological postwork theory thus provides a productive theoretical foundation for conceptualising un/sustainable work in SEE.

263 Discussing climate-social policies in Austria: insights from a book project

Ernest Aigner[1], Christina Plank[2], Mario Taschwer[3], Hendrik Theine[1]

[1]WU Vienna, Austria. [2]BOKU Vienna, Austria. [3]University of Vienna, Austria

The literature on sustainable welfare has expanded vastly, discussing the intersection of social as well as environmental policy. Research focuses on environmental and social-welfare states as well as regimes, and on particular policies in Sweden or UK. Building on a transdisciplinary book project we discuss climate-social policies i.e., climate-policies that contribute to social progress, in Austria. We present examples in 15 domains: gender, migration, poverty, inequality, health, care, nutrition, living, mobility, housing, work, public-budget, industrial, trade, raw-materials, and the financial system. We argue that (1) the institutional specificities and power relations are key, (2) policies require a social ecological normative backdrop, and (3) that climate-social policies reveal struggles to uphold capital accumulation.
We conclude that climate-social policies have the potential to shift focus away from mere compensation towards social progress and form counter narratives to social-ecological conflicts promoted to uphold capital accumulation despite the climate-crisis.

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SPECIAL TRACK: CRITICAL REALIST FOUNDATIONS FOR SOCIAL-ECOLOGICAL ECONOMICS

Chair: Corinna Dengler

286 Universal basic income, services, or time politics? A critical realist analysis of (potentially) transformative responses to the care crisis

Richard Bärnthaler, Corinna Dengler

Vienna University of Economics and Business, Austria

Using an (eco-)feminist Marxist-Polanyian theoretical lens, this article explores the diverse relations between contemporary care crisis symptoms in Western Europe and its generative structures. It investigates the potential of possible responses to the crisis – (un)conditional cash transfers, universal basic services (UBS), and time politics – to transform rather than reproduce these structures. Drawing upon critical realism with an emphasis on Jessop's three-step process of variation, selection, and retention, we seek to make sense of the dynamic between competing crisis construals and their effects on actuality. To answer our research question What transformative potential lies in different responses to the contemporary care crisis?, we move from meta-theoretical abstractions to a theoretically grounded, concrete application of critical realism in the social sciences. We conclude that a symbiosis of time politics and UBS together with a universal, but not unconditional, guaranteed (minimum) income offers substantial transformative potentials.

302 Mobility From a Social-Ecological Economic Perspective: a Critical Realist Approach

Marc Schabka

Vienna University of Economics and Business - Institute for Ecological Economics, Austria

The transportation or mobility sector plays and will play a substantial role towards an ecological transformation of societies.
The paper provides in the first part a literature overview on how the concept of sustainable transportation is perceived in the field of ecological economics and illustrates its main differences to current mainstream approaches. It shows that the latter is embedded in an unsustainable economic growth rationale that sees an externalised Nature and with the consequence that many of the current indicators used to measure 'sustainable transportation' are obsolete.
In the second part the concept of transportation is analysed in a theoretical and conceptual framework that is defined by a critical realist approach to social-ecological economics. This approach will shed light on the field of transportation from a critical realist perspective and plead for a 'social-ecological and economic transportation' as opposed to classical definitions of 'sustainable transportation' within ecological economics.

489 Critical realism and pluralism – (how) can the two go together?

Tone Smith

WU Wien, Austria

The paper first seeks to distinguish different kinds of pluralisms: pluralism in economics teaching, methodological pluralism, plural values, plural ontologies, plurality of life worlds. Against this background I will demonstrate how critical realism can take into account many of the concerns that have made (social) ecological economists and degrowth scholars turn to social constructionism and relativism, including power relations, standpoint theory, the fallibility of knowledge, the power-knowledge nexus (Foucault, Latour) and post-colonial concerns. Eventually form a perspective of emancipatory social science, some versions of pluralism will be dismissed, while others will be embrased.

522 Conceptualising the Role of Gender in the Human-Environment Interface: Ontology, Mechanisms and Critical Realism

Lisa Deutsch[1,2], Clive L. Spash[3]

[1]Eawag (Swiss Federal Institute of Aquatic Science and Technology), Duebendorf, Switzerland. [2]ETH Zurich, Institute for Environmental Decisions, Switzerland. [3]WU Wirtschaftsuniversität Wien, Institute for Multi-Level Governance and Development, Vienna, Austria

Explanations for the existence of an interactive relationship between gender and the environment have been prominently developed under the term 'Ecofeminism'. This body of knowledge draws similarities between the patriarchal exploitation of women and the environment. More recent conceptualizations of women as 'agents of change' by major intergovernmental organisations, assign women a special status in 'solving' the ecological crisis due to their role as daily resource managers. When suggesting such an epistemological privilege, its ontological underpinnings need to made explicit. This presentation revisits the ecofeminist arguments and presents a conceptual model that explains the role of gender in the human-environment interface. First the conditions that explain gender-environment interconnections are explored and will be situated in an ontological context of stratification and emergence. Second, mechanisms are identified that explain how gender-environment relationships have become actualised in modernity. Finally, the arguments brought forward call for a feminist social-ecological transformation, not a reformist transition.

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SPECIAL TRACK: INFLUENCING AND UNDERSTANDING PERCEPTIONS, EMOTIONS AND COGNITION FOR ENVIRONMENTAL SUSTAINABILITY

Chair: Veronica Pezziol

74 The Rise and Fall of the Bristol Pound: An Exploration of the Learnings from Bristol's Eponymous Currency

Marcus Petz[1,2], *Diana Finch*[3]

[1]University of Jyväskylä, Finland. [2]Sustainable Change Research Network, Helsinki, Finland. [3]Bristol Pound and Finance Innovation Lab, United Kingdom

Bristol Pound became one of the best known, largest, and longest running community currencies in Europe. Yet behind that apparent success story there were many issues that undermined its ability to become financially viable without grant funding. Lack of financial viability limited Bristol Pound's potential to create significant impacts on the local economy. Despite this, Bristol Pound gained a global reputation and inspired many to try to replicate its achievements. We seek to answer the question, 'How and why is the Bristol Pound changing into Bristol Pay?' We present a case study of the Bristol Pound, exploring its functionality and results, and drawing out the key learnings that must be addressed by Bristol Pay, its proposed successor. We here outline the novel approaches to influencing economic perceptions and social norms that are the focus of Bristol Pay.

190 Social media for ecological civilization

Leonardo Boncinelli, Ilaria Colivicchi, Ginevra Virginia Lombardi, Isabella Negri

University of Florence, Italy

The aim of this research is to explore the effectiveness of social media applications in raising awareness among young people on the environmental impact of individual consumption behavior and on the necessary ecological transition in everyday life. To this aim, we design an experiment based on the use of social media for nudging environmental behavior among young people. A randomly selected sample of Tuscany high school students will be enrolled in a two-step experiment to enhance environmental knowledge in an online contest to nudge environmental behavior. Both steps will take place through Instagram social media. The evaluation process will be carried out by comparing the answers to a questionnaire measuring environmental attitudes and intentions to behave pro-environmentally between treatment and control. Ex-ante measures will also be collected on treated and untreated subjects to better assess the effect of the interventions.

199 Money does it better! Economic incentives, nudging interventions and reusable shopping bags: Evidence from a natural field experiment

Armenak Antinyan[1], *Luca Corazzini*[2]

[1]University of Cardiff, United Kingdom. [2]University of Venice "Ca' Foscari", Venice, Italy

Little is known about the impact of policy interventions other than taxes and bans aimed at reducing the demand for single-use plastic bags. We report results from a natural field experiment conducted in a large supermarket chain to test interventions based on nudges (information provision), financial bonuses (which are assigned through a competitive scheme) and free provision of reusable bags. We manipulate the type of the intervention, i.e., either a financial bonus or a nudge, and the presence of a reusable bag, i.e., either provided for free or not provided. Relative to the baseline with no intervention, both the bonus and the nudge considerably reduce the demand for single-use plastic bags. Free reusable bags are effective when combined with the bonus, albeit not effective when combined with the nudge. Finally, the bonus is more powerful than the nudge, irrespective of the absence or presence of reusable bags.

369 The role of attitudes in modelling green growth

Lina Rinaldi

IMT School, Lucca, Italy

The climate change challenge must be faced by considering two branches of the economics, both linked to the partial denial of the neoclassical economic paradigm. This redefinition has two main goals: i) considering the irrationality of human decision-making processes; ii) finding a solution to the difficult coexistence between economic expansion and environmental protection. A fruitful mixture of the developments in these two areas (i.e., behavioural and ecological economics) is considered in the present work leading to the conceptualisation of a growth model that can provide guidelines for the implementation of concrete environment-protecting public policies. More precisely, the ways that the two mentioned study areas can impact the theorisation of the proposed macrodynamic model are mainly two: ecological economics allows us to systematically take environmental variables into consideration, while behavioural economics is the tool by which we can understand environmental "attitudes".

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SPECIAL TRACK: INFLUENCING AND UNDERSTANDING PERCEPTIONS, EMOTIONS AND COGNITION FOR ENVIRONMENTAL SUSTAINABILITY

Chair: Veronica Pizziol

530 Framing environmental transitions. How social-ecological interdependencies are perceived by policy actors?

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Environmental transitions face the challenge of incentivizing change and governing complexity. Changing perceptions is critical to address these challenges. Perceptions shape policy and directly determine the potential and pathway of environmental transitions. While often addressed through risk, ecological economists rarely study perceptions in regard of policy process and policy change. In this research, we focus on perception upstream in the policy process because perceptions are an important determinant of policy agenda by affecting political demand, policy acceptability, and policy-problem definition. We ask how are perceived the interdependencies? What are their main determinants? Do they associate with policy preferences? We administer an original survey to water stakeholders in Geneva canton to measure interdependencies among the main water uses. Responses serve the building of mental maps of the water uses interdependencies. We then look at associations between this mental map and policy actors and water uses characteristics, and policy preferences.

219 The role of cognitive dissonance on social tipping points: Applications to the circular economy

Roger Cremades, Angel Lázaro, Joana Wensing

Wageningen University, Netherlands

Cognitive dissonance is a form of psychological stress experienced by individuals exposed to contradictory beliefs and behaviours. It is assumed to play a role in behaviour change towards sustainability and on social tipping points, mainly because inconsistencies in pro-environmental behaviours are not deemed troubling for individuals who do not consider such behaviour morally imperative. However, social tipping points have not been approached from the psychological perspective of the individual, despite positive results on parallel approaches from the communities working on Covid-19 and human behaviour. In the environmental domain, for instance, plant-based protein consumption and recycling of the organic waste fraction are two examples of the requirements for achieving a circular economy; however, it is not well known how to trigger higher adoption levels. We are developing a complex systems model combining social and psychological interactions that depict the role of cognitive dissonance and explore their upscaling in [...]

618 Promoting energy sufficiency while addressing energy poverty

Nives Della Valle[1], *Marco Faillo*[2], *Chiara D'Arcangelo*[3]

[1]European Commission - Joint Research Centre, Ispra, Italy. [2]University of Trento - Department of Economics, Italy. [3]University of Chieti - Department of Economics, Italy

Energy sufficiency is an optimal strategy that policy makers can promote to limit the consequences of climate change. However, for the energy poor, the reduction in energy services cannot be considered as an optimal strategy that is achieved, but is rather a symptom that some basic needs are not met and that solutions would be required. While the experimental literature investigating the effectiveness of nudges at promoting pro-environmental behaviours is vast, only a few studies have experimentally tested the effectiveness of boosts. In addition, only two studies have so far investigated the role of behavioural interventions on promoting the energy poor's pro-environmental behaviour. This study investigates the role of different interventions at promoting energy sufficiency, while trying to also tackle the challenge of energy poverty, through a laboratory experiment using a modified public bad setting.

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POLICIES: THE SCIENCE-POLICY GAP
Chair: Nives Della Valle

151 Climate policies and policy feedback

Michael Roos, Elias Schmitt
Ruhr-University Bochum, Germany

This paper analyzes climate change mitigation policies from a political economy perspective. The main problem of climate policy is not to identify effective and efficient instruments, but to implement them in the political process. Efficiency and distributional analysis should be complemented by the analysis of political processes. This paper first collects arguments from the policy feedback literature and applies them to climate policy. Second, some of the described mechanisms will be formalized in a system dynamics (SD) model. We consider both short-run and long-run feedback and analyze the effectiveness of different policies such as carbon pricing, subsidies and command-and-control policies. The desirability of carbon pricing is significantly reduced relative to other policy instruments, if potential delays and countervailing effects due to policy feedback are considered. The model shows some factors that influence the implementability and effectiveness of different policies. It offers an organizing framework treating political decisions as endogenous.

238 The drawbacks of science-policy interfaces and possible ways forward

Eszter Kelemen
ESSRG, Budapest, Hungary

The lack of meaningful governmental responses to recent socio-economic and ecological crises indicate that science-policy interfaces – despite getting more well-known and respected – face significant challenges. This contribution shares reflections from a three-years long case study research which analysed and compared three biodiversity-related science-policy interfaces. First, the main challenges are identified in the case studies and corroborated with literature. Then, three potential ways forward are discussed from a critical perspective. Capacity building and structural or procedural reforms to science-policy interfaces are often mentioned in the literature, and examples for such interventions are already known. This contribution argues, however, that these reforms cannot lead to a significantly improved policy impact of science if governance processes remains the same. Not only should science-policy interfaces be formally built into the decision-making process, but equally important is to rethink and make transparent who is involved in decision-making, and to critically reflect on scientists' role and value commitments.

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SPECIAL TRACK: POWER AND POLITICS IN AGRI-FOOD SYSTEM TRANSFORMATION

Chair: Giuseppe Feola

139 Invisible bioeconomies. A framework to assess the 'blind spots' of hegemonic bioeconomy models

Lilian Pungas

Friedrich Schiller University Jena, Germany

As one of the latest buzzwords in agri-food system transformation bioeconomy promises jobs, economic growth and decreased environmental pressure. I will explore the hegemonic narratives and political goals articulated within respective bioeconomy strategy papers of EU (2018) and Estonia (2022) with a specific focus on agriculture and agri-food systems. Doing so I will draw on the Bielefeld subsistence approach and on its three-dimensional colonialism-capitalism-patriarchy nexus. I will demonstrate how 1) different geographical regions, 2) environmental externalities, and 3) widespread BE practices that all contribute to, and constitute the very basis of the hegemonic bioeconomy model, remain unrecognised or devalued as ‚blind spots'. In fact, current BE models are all built on the prerequisite of the exploitation and devaluation of specific spheres of the BE. As such, the currently proposed bioeconomy models serve as just another label for a ‚green growth' program, and will additionally perpetuate the very same power relations while avoiding a 'genuine' socio-ecological transformation.

40 'What we'd like is a CSA in every town.' Scaling community supported agriculture across the UK

Bernd Bonfert

Cardiff University, United Kingdom

The COVID-19 pandemic has highlighted the vulnerabilities of global supply chains, not least in the food system. This has boosted demand for more resilient and sustainable forms of food provision and fuelled people's engagement in community-supported agriculture (CSA). In CSA, farmers and local households share the costs and products of agriculture, resulting in more sustainable food provision independent of the market. The local benefits and shortcomings of CSA are well-understood but we know little about how effectively larger networks can expand and consolidate CSA at scale. Drawing on concepts of the solidarity economy and social movement studies, this paper investigates the national CSA network in the UK. It characterises the network's politico-economic context, structure, aims and tactics, and explains how it scales CSA up, out and deep through institutionalisation, replication and politicization. Finally, it discusses the network's strategic limitations due to its dependency on external allies and societal conjunctures.

294 The politics of the Netzwerk Solidarische Landwirtschaft: from prefiguration to conventional repertoires

Leonie Guerrero Lara[1], Giuseppe Feola[1], Jessica Duncan[2], Peter Driessen[1]

[1]Utrecht University, Netherlands. [2]Wageningen University, Netherlands

Little is known about the role that Community Supported Agriculture (CSA) networks can play as an political actor in sustainability transformations, as extant research on CSA has foregrounded the prefigurative practices at the initiative level. This article addresses this gap by examining the politics of the German CSA network. In particular, we investigate how the network organises for political impact by engaging in both prefigurative and conventional politics. To this end, this article builds on the literature of action repertoires and political strategies of social movement theory. We collected rich data via participant observation and semi-structured interviews. Our findings show that the German CSA network adopts a wide range of action repertoires, reflecting its internal heterogeneity and differences in values that shape the multiple strategies that are pursued. The social movement perspective provides new insights into how the network negotiates and reconciles different understanding of politics among activists.

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SPECIAL TRACK: POWER AND POLITICS IN AGRI-FOOD SYSTEM TRANSFORMATION

Chair: Giuseppe Feola

446 Mapping stakeholders and their influence in agri-food systems to foster sustainability transformations: the case of arid Spain

Amanda Jiménez Aceituno[1,2], *María D. López Rodriguez*[3], *María Mancilla García*[1,4], *Antonio Castro*[3], *Jorge A. Ruiz Jovel*[3], *Blanca M. Gonzalez Garcia-Mon*[3]

[1]Stockholm Resilience Centre, Sweden. [2]Leuphana University Lüneburg, Germany. [3]Universidad de Almería, Spain. [4]Université Libre de Bruxelles, Belgium

Sustainability transformations of the agri-food systems require the involvement and collaboration of stakeholders with a plurality of perspectives and different roles and levels of influence in their system. This study aims to unravel the complex relationships between stakeholders in the arid agri-food system of South-East (SE) Spain, understanding their roles, collaborations and influence in the functioning of the system. Specifically, we focused on identifying (a) who are the most relevant stakeholders for the functioning of this agri-food system and why?; (b) which stakeholders collaborate between them and why?; and, (c) what is their influence to transform this agri-food system?. To answer these questions, we conducted five online workshops with key agri-food related stakeholders from the SE of Spain using the Net-Map tool. Net-Map helps participants to better understand, visualize and discuss the networks created between different system stakeholders, which can be part or not of the Net-Map workshop.

537 Agroecology in Switzerland: Grasping the understandings and the need for political action

Carmen Kummer

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This study addressed the understanding of agroecology in Switzerland and identified challenges, opportunities, and policy needs for an agroecological transformation of the Swiss food system. It shows that agroecology can be understood as a guiding framework for future sustainable food systems. Although many challenges, like prevailing power relations, still limit agroecology in Switzerland, the country also offers a wide variety of opportunities that could promote agroecology at the agroecosystem level but also the food system level. A range of policy changes could set favorable conditions for an agroecological transformation of the Swiss food system. There are existing policy instruments, like the direct payment system, which could be designed more agroecologically. There is also a need for stronger systems thinking and networking of the different food system actors to work on solutions together.

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SPECIAL TRACK: COMMUNITY-BASED LOW-CARBON ENERGY TRANSITIONS.

Chair: Giuseppina Siciliano

33 A review of Uganda's pro-poor electricity access initiatives using energy justice principles

Penlope Yaguma, Yacob Mulugetta, Priti Parikh

University College London, United Kingdom

Electricity access in Uganda has remained low (24%), despite the government's commitment to increase access through a range of initiatives. Most electrification initiatives have not achieved the intended targets and outcomes, particularly for the poor. We use energy justice principles to examine the effectiveness of access initiatives in increasing electricity access. The findings show that the absence of justice considerations during design and implementation has resulted in less impact than was anticipated. We recommend that justice be embedded in electrification programs through; inclusive stakeholder involvement, support for off-grid solutions, energy needs assessment for the poor, and energy planning that is informed by accurate data. 47% of Uganda's households experience multidimensional poverty, hence there is a need to develop policies and programs that enable equitable energy access for those specific groups. This will be vital to meeting SDG7 and ensuring that the poor are not bypassed by electrification programs.

61 Towards a just and inclusive assessment of community energy projects

Marula Tsagkari[1,2], Jordi Roca[1]

[1]University of Barcelona, Spain. [2]Research and Degrowth, Barcelona, Spain

Community energy projects are considered ideal vehicles for sustainable development and are associated with several benefits for the local community and the environment. Yet, there is limited research on whether the projects fulfill their sustainability promises, and how the local community perceives the benefits. This study focuses on two local energy projects at the post-implementation stage. Based on online surveys we analyze the impact of the projects on people's lives. We explore differences between various groups, with a focus on gender aspects using the Energy Justice Framework. We conclude, that although the projects seem to be quite successful, there are significant differences between economic, social, and environmental benefits, while women tend to be less satisfied with the projects. Based on the results we argue that community energy projects do not imply justice and ethics, on the contrary, they can enhance and perpetuate pre-existing power structures and hierarchies.

124 Global asymmetries in the rise of solar power: An LCA-based assessment of ecologically unequal exchange between Germany and China 2002-2018

Andreas Roos

Human Ecology Division, Lund, Sweden. Division of History of Science, Technology and Environment, Stockholm, Sweden

Conventional interpretations have largely neglected international trade flows and the globally uneven valuation of labor and resources as relevant for the commercialization of solar photovoltaic (PV) technology. This study relies on an LCA-based account of ecologically unequal exchange to understand how an uneven flow of embodied resources between China and Germany effected Germany's prospects of increasing its PV capacity 2002-2018. The results show that trade in solar PV modules for solar PV equipment was characterized by an ecologically unequal exchange through which Germany's prospect of installing large amounts of solar PV modules was gradually improved at the expense of increasing environmental loads in China. The study concludes that ecologically unequal exchange may have been an essential mechanism for the rise of solar power and cautions that environmental load displacements may be necessary for the economic and biophysical success of social metabolisms based on solar PV energy.

617 Deliberative devolution for community climate commons

Lina Isacs[1], Stephan Barthel[2,3]

[1]Department of Earth Sciences, Climate Change Leadership, Uppsala University, Sweden. [2]Department of Building Engineering, Energy Systems and Sustainability Science, University of Gävle, Sweden. [3]Stockholm Resilience Centre, Stockholm University, Sweden

Community climate commons is a new concept referring to people creating shared low-carbon assets such as renewable energy, housing and food production, empowering communities to greater ownership of the low-carbon transition. This study explores the tension between the needs for mixed bottom-up and top-down initiatives to such community-based commons for low-carbon energy transition, focusing on when there are no apparent bottom-up initiatives taken. Drawing on recent practical frameworks from deliberative ecological economics, we gather participants from Swedish rural municipalities in deliberative dialogues around low-carbon energy futures. A key feature is to form deliberation around shared and non-shared transcendental values, which has been found to deepen discussions, increase perspective-taking and help constructively address and respect value-conflicts. We contrast our findings to studies in community political ecology and urban green commons and discuss the potential for democratic devolution of climate mitigation and adaptation, particularly in areas where debates on rural-urban divergence intensify.

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SPECIAL TRACK: LAND, WATER, AIR AND FREEDOM: WORLD MOVEMENTS FOR ENVIRONMENTAL JUSTICE

Chair: Joan Martinez-Alier

116 Beach sand mining for metals: An analysis of ecological distribution conflicts around heavy mineral sand mining across the world

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Beach sand mining for metals involves the mining of heavy mineral sands (HMS), which are sedimentary deposits of dense minerals that accumulate in coastal environments. HMS are localized concentrations of ores such as ilmenite, rutile, leuxecone and iron. These metals have a wide variety of applications ranging from industries producing everyday products such as paint and pigment industries, and technologically advanced applications such as in the airline, and defense industries. HMS extraction requires strip-mining of mineral bearing coastal areas, which are often rare biodiversity ecosystems, or fragile ecosystems built up on sandy soils or dunes. The loss of such spaces has impacts ranging from ecological (loss of biodiversity and habitats), to socioeconomic (salt-water intrusion into agricultural lands and increased exposure to risks of climate change). The serious ecological and socioeconomic transformations at frontiers of sand mining for metals cause ecological distribution conflicts (EDCs) across the world. This article identifies, documents and analyses 22 cases of resistance at HMS frontiers.

236 Killing, in the name of business profit: environmental defenders, local elites, and transnational corporations in Central America

Grettel Navas[1], Francisco Robles-Rivera[2], Ximena Alvarenga Fournier[2], Arielle Landau[1]

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We analyse the factors that make violence against land and environmental defenders to occur in the Central American. We compare a database of 35 environmental conflicts from five different countries in the region: Costa Rica, Nicaragua, Honduras, El Salvador and Guatemala. In particular, we look at the active involvement of private specific actors (i.e., local elites, transnational corporations) to secure specific economic sectors (i.e., monocultures, mining) and profit through the extraction of specific commodities (gold, palm oil, electricity etc.). Furthermore, we discuss if in a region with weak institutions and strong elites, the economic model and the private business interests might be the immediate cause of violence and murder of land and environmental defenders. Our results call for the urgent need to secure policies and actions to support environmental defenders' actions in their path to protect nature and territories from extractive industries.

309 #Yo Prefiero La Vida (I Prefer Life). Environmental Justice movements in Mexico

Aida Luz Lopez

Mexico City Autonomous University, Mexico

This paper describes the environmental justice movements in Mexico analyzing all the cases reported in the Environmental Justice Atlas (EJAtlas) by August 2021, from the political ecology perspective and a regional approach. Prevalence of socioenvironmental conflicts by category will be discussed; as well as the main environmental, socioeconomic and health impacts suffered by local communities and populations and main groups mobilized; their mobilization forms and the outcomes of the struggles for environmental justice, emphasizing those cases with violent results, such as criminalization, attacks, or murder of defenders. Also, the various languages of valuation emerging from the creativity of the struggles will be shown, such as the social media slogan "#YoPrefieroLaVida" coined to respond the development narrative that justifies environmental degradation and territories dispossession for a "greater good".
The EJAtlas will be shown as a unique source of empirical information to sustain the thesis of an existing Global Environmental Justice Movement.

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SPECIAL TRACK: LAND, WATER, AIR AND FREEDOM: WORLD MOVEMENTS FOR ENVIRONMENTAL JUSTICE

Chair: Joan Martinez-Alier

318 Global assessment of environmental conflicts related to loss of traditional knowledge, practices, and cultures

Ksenija Hanacek

ICTA-UAB, Barcelona, Spain

This article contributes to research on environmental justice conflicts by analysing loss of traditional knowledge, practices, and cultures due to extractive and industrial projects globally (www.EJAtlas.org). The obtained results suggest that conflicts related to the loss are mainly related but not limited to conflicts on land acquisition, plantations, deforestation, and mining. The impact is distinctly expressed in commodities such as rubber, eucalyptus, palm oil, timber, fish, rare metals, and oil. In contrast to cases that do not involve the loss of traditional knowledge, where the main commodities in question are chemical products, industrial waste, and cement. Social actors who are mostly affected by such loss include Indigenous groups, artisanal miners, fisher people, religious groups, peasants, and pastoralists. We found that refusal of compensation appears in 70% of cases. The article finally argues that protecting and maintaining culture-nature bonds are critical components for achieving environmental justice worldwide and stopping damaging projects.

457 Environmental Justice struggles at the extraction frontiers of energy transition metals and minerals in the Americas

Mariana Walter[1], Yannick Deniau[2], Viviana Herrera Vargas[3]

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The World Bank estimates that more than 3 billion tons of metals and minerals could be required over the next 30 years to power the technologies for the global energy transition (electric cars, RREE, storage, etc). The American Continent holds a relevant share of global deposits and production of strategic metals and minerals such as copper, lithium, nickel or graphite among others. The research aims to study the conflicts of these commodity frontiers in the Americas. This research is the result of a collaborative mapping effort developed by the EJAtlas (ICTA-UAB), MiningWatch Canada and mobilized groups and grassroots organizations from the Americas. We built a dataset of about 160 conflicts and study these controversies, their actors (mobilized groups, companies, governments), discourses and the main socio-environmental, cultural and economic grievances. We explore relevant trends and problematize the implications and tensions of hegemonic energy transition policies and mining greening discourses.

490 Contesting coal in a carbon-constrained world

Brototi Roy

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Whilst global leaders have been discussing climate action for decades, the fossil fuel industry continues to compromise local livelihoods and global environment. This has led to a rise in resistance movements against fossil fuel projects. Out of all the fossil fuels, coal is the dirtiest. Their contention is provoked by the large range of local impacts of carbon intensive projects (violation of human rights, social and environmental disruptions); as well as by concerns about the climate impacts at larger scales. In some conflicts, the global climate impacts take primacy while in others, claims focus on the local issues. However not much is written on coal and climate change, and this article aims to address this gap in the literature. This paper explores the research question: How are environmental justice movements against coal connected globally and what are the commonalities in the characteristics of the struggles?

534 Arts, place and sacrifice zones. Artistic practices in the restoration of a Sacrifice Zone in Chile

Teresa Sanz, Beatriz Rodriguez-Labajos

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In the Quintero and Puchuncaví Sacrifice Zone, the socio-environmental degradation not only has affected the basis of traditional economies' livelihood (fishing and agriculture), but also devaluated local history, traditional identity and practices, and the social fabric. As in other environmental conflicts, local populations in resistance have found in creative actions, such as murals, music and acting, a way of recognition and restoration, which to date has been little theorized. Our objective is, therefore, to analyze artistic expressions as promoters of relational values towards the restoration of areas degraded by the accumulation of transnational capital.

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THEORY AND NEW IDEAS: ECONOMIC DEVELOPMENT, POST-GROWTH AND HUMAN WELL-BEING

Chair: Francesco Sarracino

349 Happier, pro-social and sustainable: possibilities for a post-growth society

Stefano Bartolini[1], *Francesco Sarracino*[2]

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Empirical evidence suggests that achieving sustainability requires reducing economic growth, not just greening it. This conclusion often leads to ecological pessimism, based on two beliefs. The first is that there is a human tendency to unlimited expansion; the second is that lack of consensus makes limiting growth politically unfeasible. We challenge both beliefs. The decline of fertility and per-capita income growth provide reasons to expect decreasing human pressure on ecosystems. Moreover, the lack of a clear alternative to growth as a means to increasing well-being creates the widespread perception of a trade-off between sustainability and current well-being. This restricts the consensus to the policy of limits to growth. We argue that ecologism could overcome its political impotence if it adopted a policy agenda pursuing sustainability through the expansion of well-being. Indeed, the crisis of social capital experienced by much of the world's population is at the origin of the current [...]

588 Human wellbeing in the Smart City. The case of Smart Bodø, Norway

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This paper applies a wellbeing lens to critically engage with a 'smart city' project in Bodø, a city in Northern Norway. By applying Manfred Max-Neef's Human Scale Development approach, the study examined the main priority areas of the Smart Bodø project and asked in what ways they may contribute to or detract from the satisfaction of fundamental human needs. The study aimed to explore this topic through a one-day needs-based workshop. Seventeen people participated in the workshop. Preliminary results show participants' skepticism towards the unclear concept of 'the smart city'. They discussed their concern that a top-down initiative that emphasizes the use of smart technology may alienate already existing districts in the city. Heavy use of technology may also alienate social groups such as the elderly that currently already experience isolation. Participants emphasized the importance of prioritizing shared spaces where social life could unfold unhindered.

66 The limits of degrowth: A systematic analysis of monetary and distributional policy proposals in the degrowth literature

John-Oliver Engler[1], *Max-Friedemann Kretschmer*[2,1], *Thomas Huth*[1], *Henrik von Wehrden*[1]

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With regard to humanity's long-term survival within planetary boundaries, the notion of 'degrowth' has gained traction since the dawn of the 21st century. Degrowth is a broad intellectual movement rather than a clearly delineated field of research, which aims at developing alternatives to the mainstream narratives of sustainable development and economic growth. However, the movement has been criticized for providing too little empirically tested concrete policy proposals to achieve its calls for institutional and behavioral change in actuality. Here, we systematically review the research landscape on degrowth published in English language scientific peer-reviewed journals from 2007 through 2019 (N=341). Our review confirms a wide lack of concrete distributional and monetary policy proposals. Moreover, through a multivariate full-text statistical analysis, we find that the scientific peer-reviewed literature on degrowth can be grouped into four major clusters with two major gradients, qualitative-quantitative and local-global.

249 Towards an ecological economy

Tim Foxon

SPRU, University of Sussex, Falmer, Brighton, United Kingdom

This paper synthesises recent academic work in ecological economics to identify three key elements of an ecological economy. These are (1) dependence of all economic activity on energy and material flows from and to natural ecosystems, including the dependence of economic growth on useful work provided by conversion of primary energy sources; (2) development of indicators and policies to meet basic needs and promote wider human wellbeing; (3) reform of current economic and political institutions, including the global financial system, to deliver the changes needed to achieve a transformation to an ecological economy. To achieve this transformation requires academic research to further develop and test the changes needed in these three areas, and for academics to more actively engage with social actors and movements to deliver these changes. It is hoped that this synthesis of recent research and action in these areas can help to facilitate these engagements.

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THEORY AND NEW IDEAS: ECONOMIC DEVELOPMENT, POST-GROWTH AND HUMAN WELL-BEING

Chair: Francesco Sarracino

266 Bringing Economic and Political Power Back In: A Call for Re-Politicising Development Research

Dimitrios Zikos

HTW University of Applied Sciences Berlin, Germany

The paper critically discuss three key approaches for developmental studies according to their analytical focus on the "natural", the "social" or the "social-ecological". We argue that although each approach has its own merits, they all fail to address hot issues in the realm of economic development. They give an incomplete cause-and-effect picture of ongoing-processes and are incomplete in the search for the main explanatory variables regarding development success and failure of "the natural" the augmented "social" and the forcefully merged "social-ecological". Our aim is not to discredit the valuable body of work on either of these approaches, but instead to spark a discussion that would enable more creative research into the missing causal links between the propositions of key authors representing the aforementioned approaches and the fallacies to be addressed. This leads to a meaningful synthesis that paves the way for a breakthrough in ecological economics and sustainable development studies.

538 Neo-humanism and COVID-19:Opportunities for a socially and environmentally sustainable world

Francesco Sarracino, Kelsey O' Connor

STATEC Research, Luxembourg

A series of crises, culminating with COVID-19, shows that going "Beyond GDP" is urgent. Social and environmental degradation are consequences of emphasizing GDP as a measure of progress. This degradation created the conditions for the COVID-19 pandemic and limited the efficacy of countermeasures. We leverage on defensive growth models to explain the complex relationships between these factors, and we put forward the idea of neo-humanism, a cultural movement grounded on evidence from quality-of-life studies. The movement proposes a new culture for a socially and environmentally sustainable future. Neo-humanism suggests that prioritizing well-being would benefit the environment, enable collective action to address public issues, which in turn positively affects productivity and health, among other behavioral outcomes, and thereby instills a virtuous cycle. Neo-humanism proposes a world in which promoting cooperation and social relations represents the starting point for better lives, and a peaceful and respectful coexistence with other species on Earth.

574 Queering Degrowth

Jo Becker[1], Scott Leatham[2]

[1]Universidad de Vigo, Spain. [2]University of Edinburgh, United Kingdom

By drawing on examples from public spaces, we highlight how economic liberalisation, modernization, and global urban competitiveness have often constructed queer liberation and narratives as economic assets, explicitly servicing 'growth'. Our motivation is to supplement degrowth's political economic critique of capitalism by focusing on the ways capitalism sanctions and aestheticises queer liberation in pursuit of urban branding and growth. To move beyond the criticism of the cis-heteronormative patriarchal arrangements of and for economic growth and open up pathways to enhance a discourse that transcends binaries, we offer two arguments. First, through a critical analysis we bring forth a new synthesis that helps reveal the erasing practises of growth mentalities in reducing queer identities and spaces to economic units, which renders them extractable for capitalist reproduction. Second, we caution that degrowth must learn from queer scholarship and liberatory practices to challenge reproductions of injustices and expand the propositions of degrowth.

575 A macroeconomic organism in a physical world: construction and analysis of a process-based multi-sectorial dynamical model for ecological coupling and crises.

Paul Valcke, Gael Giraud

Environmental Justice Program Georgetown, Washington D.C., USA

The climate crisis calls for a fast, profound transformation of existing production infrastructure, inducing an unprecedently fast shift of the demand, rapid destruction of a considerable part of the existing capital, important extraction of new resources, and a new respective weight for each productive sector importance. Our aim is to model a productive multisectoral macroeconomic system as a dissipative, auto-organized system metabolizing its environment and being affected by its state. We derivate it with a minimal foundational formalism based on Goodwin model, in order to make coupling with climate, resource scarcity, and other couplings at ease. We obtain a system of 8 vector differential equations that take into account sectors dependency, demand-offer variation, scarcity, saturating consumption, inflation, private debt crises, and we highlight both equilibrium and non-equilibrium dynamical properties. The sectors parameters are compatible for calibration with a resource disaggregation model such as Dymends for future quantitative studies.

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POLICIES: ECOLOGICAL FISCAL REFORM

Chair: Maria Grazia Pazienza

200 Can climate change be tackled effectively through a fair and widely accepted carbon pricing policy?

Manuel Tomás[1], Iñaki Arto[1], Petr Mariel[2], Ignacio Cazcarro[3]

[1]Basque Centre for Climate Change, Bilbao, Spain. [2]University of the Basque Country, Bilbao, Spain. [3]ARAID-Aragonese Agency for Research and Development and Basque Centre for Climate Change, Zaragoza, Spain

Carbon pricing is key in cutting emissions. One way to promote its acceptability is to recycle the revenues it generates through transfers to households. However, this implies a deviation from the climate change policy targets, as transfers typically boost consumption, generating additional emissions. This paper considers these trade-offs in the design of a carbon pricing policy for Spain that addresses climate change as effectively as possible, while it does not raise poverty and inequality and gains the support of the majority of society. Our analysis relies on a demand system with consumers' heterogeneous reactions to price and income shocks and on households' carbon footprints. This allows us to determine the total amount of benefits to be paid and the households that need to receive them to ensure that the policy is ecologically and socially optimal. These findings may help Spain develop an effective, fair and widely accepted carbon pricing policy.

424 Energy transition and social sustainability of carbon pricing in Italy

Rossella Bardazzi, Maria Grazia Pazienza

Università di Firenze, Italy

Although not without criticism, carbon pricing has been identified as a key instrument to support the energy transition process because it can convey the signal of the real cost of carbon in relative prices. However, it is clear that using market incentives for this important technological and consumption transition can disproportionally affect vulnerable consumers. By using microdata on household total expenditure and energy consumption (from Italian Household Budget Surveys) for the period 1997-2019, we built a dataset that we use both for pooled regression and as a pseudo-panel. In this paper we investigate the impact of excise taxation on Italian household fuel expenditure. Looking at different elasticities we firstly confirm for the Italian case the different impact of price and tax changes highlighted by the empirical literature and then consider the adaptation possibility of most vulnerable consumers.

450 On the world's first ecological fiscal transfers: Reforestation grant in Indonesia

Sonny Mumbunan

Research Center for Climate Change, University of Indonesia, Depok, West Java, Indonesia. World Resources Institute (WRI) Indonesia, Jakarta, Indonesia

Ecological Fiscal Transfers (EFT) transfer fiscal resources between or among governments, either at different or the same levels, within a country or jurisdiction based on ecological indicators. This paper analyses arguably the world's first EFT introduced in the late 1970s in Indonesia, the reforestation grants (RG) from central government to sub-national governments. A recent global review of EFT in Nature Sustainability (Busch et al, 2021) has brought up the RG into EFT references. What remains missing, however, is a conceptual take on RG as intergovernmental fiscal transfers. This paper seeks to address conceptual notions of active and passive fiscal transfers dealing respectively with allocating and distributing public revenues and assigning public functions to the appropriate competence. Applying this to a historical case of EFT, it expects to shed lights on overlooked elements in the EFT literature and reflect these on EFT instruments and schemes for forest and land use.

551 Carbon Pricing in Austria – An Analysis of the Macroeconomic, Distributive and Ecological Effects

Claudia Kettner, Mark Sommer

Austrian Institute of Economic Research (WIFO), Vienna, Austria

Carbon pricing is increasingly recognised as a key instrument for decarbonisation: Austria will introduce a national carbon price for buildings and transport July 2022 with revenues being recycled to households via regionally differentiated climate bonus payments. In addition, the EU aims at strengthening the role of energy taxation and carbon pricing after 2025 for achieving emission reductions in the context of the "Fit for 55" Package.

In this paper, we will analyse the effects of the carbon pricing in Austria with the macroeconomic DYNK (Dynamic New Keynesian) model. The simulated scenario will be based on the implementation of the Austrian national carbon tax in the period 2022 to 2025 and on the changes in energy taxation and emissions trading as proposed in the "Fit for 55" Package afterwards. We will present results on the policies' macroeconomic effects as well as the distributive effects on the different household groups.

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SPECIAL TRACK: IS IT POSSIBLE TO ADVANCE NEW ECONOMIC APPROACHES IN A POST-PANDEMIC WORLD

Chair: Ralph Hall

589 Exploring policy interventions towards increasing inequality in the United States and Europe: to what extent is an Ecological Economics Approach and Pursuit of the Sustainable Development Goals helpful?

Nicholas A. Ashford[1], Ralph P. Hall[2], Tiziano Distefano[3], Shyam Ranganathan[4]

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The twentieth century saw enormous progress in addressing numerous challenges pertaining to human development. However, since the 1970s, the U.S. and Europe have experienced a long period of increasing income and wealth inequality as a greater share of the nation's aggregate income was transferred to upper-income households. In addition to this trend, several forces have contributed to more inequality: (1) the increased imperative to address globate climate change which affects the sources of future energy creation, transmission, and use, (2) the Russian aggression in Ukraine that is introducing volatility and uncertainly to energy supply and availability in both the US and Europe, (3) changes in the nature of employment and work following the COVID-19 pandemic, (4) political dystopia favoring more autocracy and threatening democracy throughout the world. This presentation will address all these forces and suggests that ecological economics approaches and the SDGs represent only partial, although important, solutions.

194 Economic evaluation of the costs of overexploitation of groundwater resources in the Maghreb region

Georgios Kleftodimos, Abderraouf Zaatra, Mélanie Riquier-Desjardins, Hatem Belhouchette

Mediterranean Agronomic Institute of Montpellier (CIHEAM-IAMM), France

The objective of this study is to conduct an economic valuation of groundwater overexploitation in the Maghreb region due to the intensified agricultural activity. In order to do so, three different aquifers were selected, one in each country (Algeria, Morocco, and Tunisia). Then, a wide-field survey was conducted to characterize the existing agricultural systems in each Case study. Then, we integrate the selected farming systems in DABSIM bio-economic model as well as several exogenous indicators to simulate the other associated water consumptions. This is a dynamic model which runs for a series of 15 years and includes assumptions for the upcoming effects of climate change. Our findings highlight that the cost of groundwater overexploitation varies between €373 - €560 million per year per country. Moreover, without effective policy implementations, the continued degradation of water resources will conclude to important structural changes as the majority of the small farms will disappear.

188 Good (or bad) water governance. A macro empirical analysis of the determinants of Integrated Water Resources Management

Andrea Pronti[1], Elena Vallino[2], Massimiliano Mazzanti[1]

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Effective water management policies are crucial for water security. One comprehensive indicator of water governance and management at the country level is the Integrated Water Resource Management Index (IWRM) developed by the United Nations in the framework of the SDGs (SDG 6.5.1). Since the correlation between the country's income and IWRM is present but it is far from perfect, we aim at exploring at an empirical level the determinants of the quality of water governance. We analyze the determinants of good IWRM performances using different groups of indicators as independent variables. The first encompasses economic and institutional indicators, the second contains variables on the level of the country's commitment to environmental protection, and the variables of the third groups are on climatic risk and environmental quality level. We employ a panel data strategy to cope with unobserved endogeneity, and we disentangle the trends between high-income and low-income countries.

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SPECIAL TRACK: IS IT POSSIBLE TO ADVANCE NEW ECONOMIC APPROACHES IN A POST-PANDEMIC WORLD

Chair: Ralph Hall

205 The challenges of sustainability in South Asia: Exploring policy solution toward multi-level governance to promote sustainable development

Golam Rasul[1], *Tiziano Distefano*[2]

[1]ICIMOD, Kathmandu, Nepal. [2]University of Pisa - DEM, Italy

The agriculture and food sector is especially crucial in the fight against climate change because it is both a source of the problem and a part of the solution. South Asia (SA) has to feed 20% of the world population with just 5% of the land. SA is land deficient, water-stressed, energy-poor but has a large population. The agriculture sector in SA is closely linked to generating employment and the reduction of poverty. Taking a Nexus perspective, we aim at elaborating a wide framework to explore the interdependencies between the agriculture, water, and energy sectors, and the climate mitigation actions in SA. We combine the Environmentally extended Input-Output data, to assess the impact of domestic and international trade in both socio-economic and environmental terms, with a qualitative analysis of the main policy options and strategies to manage interlinking governance challenges to minimize trade-offs and maximize synergies toward regional sustainable management.

355 The long history of the international food trade

Marta Tuninetti[1], *Tiziano Distefano*[2]

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The international trade of food grew dramatically over the last decades with long-lasting impacts on food security and environmental sustainability. In this study, we try to extend the currently available database on country-pair bilateral trade by the application of the methodology recently developed by Distefano et al. (2019) to reconstruct the network topology with a minimum amount of information.
By applying the RAS algorithm, we show that it is possible to accurately recover the network architecture from 1961 to 1985, thus doubling the time series on bilateral trade of crops that is currently available, from FAOSTAT, from 1986 to 2018. In order to provide robustness results, we compare jey network indicators for the two periods. Moreover, we also include the information from the main international environmental agreements, during the period under assessment, to provide a better estimation of the main links of the network.

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SPECIAL TRACK: BELIEFS, CLIMATE CHANGE AND THE GREEN TRANSITION: INSIGHTS FROM HETEROGENOUS AGENTS MODELS

Chair: Francesco Lamperti

137 Believe me when I say green! Heterogeneous beliefs and climate policy uncertainty

Emanuele Campiglio[1,2], Francesco Lamperti[3,2], Roberta Terranova[2]

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Announcing a forward-looking carbon pricing schedule will trigger a shift of investment towards low-carbon technologies only if firms believe the government will actually go through with its plan. A sceptical attitude could lead to larger high-carbon investments, eventually making it costlier for governments to actually implement stringent policies, thus confirming initial policy pessimism and further delaying the decarbonisation process. We develop a model where firms take investment decisions depending on their beliefs on the credibility of climate policy announcements, and policy-makers can partly default on their commitments due to transition cost considerations. We show that firms' belief and investment dynamics interact with policy choices affecting the low-carbon transition and eventually preventing it. A negative feedback-loop between the policy-maker's credibility and firms' clean investment might emerge, hampering the transition. Also, a continuous downward revision of policy targets significantly reduces policy-maker's operating space to induce a transition, due to belief dynamics.

214 Heterogeneous transition expectations and capital investment choices

Cahen-Fourot Louison[1], Campiglio Emanuele[2], Louis Daumas[3], Michael Miess[4], Andrew Yardley[5]

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This article studies how heterogeneous expectations concerning the low-carbon technological transition affect aggregate capital investment choices in the electricity sector. We develop a simple model where firms choose between two technological options by evaluating their future profitability prospects, within a finite planning horizon. Profit expectations are affected by beliefs about the speed of the technological transition and the associated stranding of existing high-carbon capital stocks. We assume firms' transition expectations to be distributed around a central expectation scenario characterized by 'rational stranding', and heterogeneity of opinions to increase non-linearly in psychological time. We explore the behavioral parameters space, and study how central transition expectations, opinion diversity and planning horizons affect the allocation of physical investments between the two technologies. Our results show how the advent of the transition can be disturbed by dissenting expectations, highlighting the importance of anchoring transition expectations around a strong central expectation path.

220 Ecological macroeconomic agent-based modelling for the climate change, economic inequality and growth nexus

Giacomo Ravaioli, Tiago Domingos

MARETEC/LARSyS, Instituto Superior Técnico, Universidade de Lisboa, Portugal

Current action on climate change and economic inequality is insufficient and complicated by the interlinkages between them and with economic growth. The limited consideration of inequality in traditional climate macroeconomic models with representative aggregated agents has not allowed to properly inform policy-making to jointly reduce inequality and emissions. Agent-based models (ABMs) are a bottom-up modelling approach increasingly used in macroeconomics to consider distributional issues. Recently, some ecological macroeconomic models have been developed as ABMs. Here, we argue that ecological macroeconomic ABMs are well-suited to exploit micro-level data on individual income and consumption to study the inequality, climate change and growth nexus, and in particular to consider: the distributional impacts of climate change and climate policies; the dynamic effects of inequality on emissions, through individual economic behaviour and climate policy-making support; the drivers of inequality and growth, disaggregating capital and labour and assessing the role of energy and endogenous technological innovation.

244 The MICE model: a Multi-agent Integrated-assessment model with Climate and Energy

Davide Bazzana[1,2], Emanuele Ciola[2], Andrea Gurgone[2], Francesco Menoncin[1,2], Enrico Turco[2], Sergio Vergalli[1,2]

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We develop and validate a new macroeconomic agent-based model with endogenous energy sector to analyse the role of energy in the functioning of a complex adaptive system and assess the effects of energy shocks on economic dynamics. The economic system is populated by heterogeneous agents who take optimal decision rules and interact in decentralized markets characterized by limited information. We calibrate the model on US data and we investigate the economic and distributional effects of an exogenous increase in the price of natural resources and a decrease in the energy firms' productivity. We find that whereas the two energy shocks entail similar effects at the aggreagate level, but their sectoral distribution is driven by subsequent impacts on relative energy price. Our results suggest that, aiming to design effective measures in response to energy crises, policymakers need to carefully take into account the nature of energy shocks and the distributional effects.

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SPECIAL TRACK: BELIEFS, CLIMATE CHANGE AND THE GREEN TRANSITION: INSIGHTS FROM HETEROGENOUS AGENTS MODELS

Chair: Francesco Lamperti

389 Rewiring the energy sector towards low-carbon technologies: Implications for the labor market and job transitions

Anton Pichler[1], Rita Maria del Rio-Chanona[1], Joris Bücker[2]

[1]Complexity Science Hub, Vienna, Austria. [2]University of Oxford, United Kingdom

We study the effects on the labor market and occupational mobility induced by the transition of the energy sector towards low-carbon energy technologies. To quantify employment changes and job transitions, we propose a dynamic economic model which couples the production system and the labor market in a multilayer network framework. At the core of our model is the production network. We consider various decarbonization scenarios where investment portfolios are shifted from high- to low-carbon energy technologies. These investments percolate through the production network, leading to direct heterogeneous labor demand effects. Moreover, investments have lasting effects on installed production capacities and thus rewire the production network. We use an occupational mobility network model to quantify effects on labor demand, occupational structure, job transition and skill needs. Our preliminary results indicate strong effects on all these dimensions, and thus, highlight some key challenges in the labor market of the low-carbon energy transition.

428 Modelling Transition Risk: Towards an agent-based, stock-flow consistent framework

Andrew Jackson[1], Marco Valente[2], Tommaso Ciarli[3], Tim Jackson[1], Florian Botte[4], Tim Foxon[3]

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This paper presents an agent based, stock-flow consistent (AB-SFC) model for the study of the economic impacts of different energy technology transitions, with a particular focus on asset stranding and transition risks. Our model consists of a changing number of heterogeneous energy firms (fossil fuel and green), final goods firms (divided into 10 industries), and household income classes (related to the management levels within firms), as well as a fixed number of capital firms and a banking sector. We use the model to analyse the impact of different energy transitions on the following aspects of structural change: the shares of industry employment and output; the organisation of firms (hierarchical structure) and markets (distribution of firm size); wage and profit distribution; product and process innovation; labour and energy productivity; consumer classes (in relation to firm size and organisation); and the consumption shares and consumer preferences of different consumer classes.

466 Navigating the green transition: systemic relevance vs. CO_2 emissions of companies in production networks

Johannes Stangl[1], Christian Diem[1], Tobias Reisch[1], Stefan Thurner[1,2,3]

[1]Complexity Science Hub Vienna, Austria. [2]Medical University of Vienna, Austria. [3]Santa Fe Institute, USA

One of the biggest challenges of the green transition is the reorganization of economic production such that the least amount of greenhouse gases is emitted while the production of economic goods and services is kept at decent levels. Production processes depend on supply chains involving a multitude of individual companies that together form complex supply networks. Our goal is to find leverage points in these supply networks that minimize the system-wide greenhouse gas output, while keeping disruptions to production to a minimum. Companies with high emissions and low socioeconomic relevance are considered to be such decarbonization leverage points. Socioeconomic relevance is calculated from network measures for systemic risk in economic networks. Targeting these companies with policies results in a maximum of emissions saved and a minimum of production lost. We demonstrate this idea for the 30,000 companies in the Austrian pork supply network.

583 Interactions between inequalities and climate change: results from a dynamic climate-economic coupling

Loïc Giaccone[1], Matheus Grasselli[2], Hugo Martin[1]

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Inequalities are intrinsically linked to climate change. Economic inequalities, between countries or between social groups, lead directly to emissions inequalities, with top emitters representing a large share of emissions, a question at the center of climate justice. Also, socioeconomic inequalities define how different populations have different exposure and vulnerability to climate change impacts and policies. Few research explore how inequalities could be impacted by climate change. Do direct and indirect impacts from climate change could change the trajectory of inequality's evolution? And if so, in which direction? We aim to study this matter by using a model that simulates inequalities between two social groups, households and investors. Coupled with a climate module, we will explore the dynamics between climate change and the inequalities described in the economic model. It could also give some insights about the whole state of the economy: climate change might deviate the economy's trajectory from equilibrium.

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TRANSFORMATIONS: LABOUR AND JUST TRANSITIONS

Chair: Rita Maria del Rio-Chanona

308 Accounting for the firewood economy in the Green Jobs Assessment Model

Moana Simas[1], Kirsten Wiebe[1], Marek Harsdorff[2]

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About one third of the world's population rely on charcoal and firewood for cooking. This has large impacts to human health, deforestation, biodiversity and, ultimately, climate change. In addition to the health problems that occur due to local air pollution, the unregulated outtake of wood requires several hours per household per day on average. This is time that the households otherwise could spent on productive activities. Unpaid household services, such as collection of firewood by households, are still outside the production boundary of the System of National Accounts. Here, we present an approach to estimating both labour and emissions related to firewood and charcoal production and use and integrate it into the economic accounting system for Nigeria and Zimbabwe, developing a dynamic forward-looking supply-and-use table-based economic model to analyse the impacts on labour and emissions of different climate policies in Nigeria and Zimbabwe, including the switch to more efficient cookstoves.

312 Employment effects of the renewable energy transition in the electricity sector

Martin Černý[1,2], Martin Bruckner[2], Jan Weinzettel[3], Kirsten Wiebe[4], Christian Kimmich[5,1], Christian Kerschner[6], Klaus Hubacek[7]

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The electricity sector is a key part of the transition to a post-carbon economy. Restructuring away from fossil fuel electricity sources will contribute to job losses in sectors along the fossil fuels supply chain, but also job gains associated with renewables. To estimate the net employment requirements associated with the growing share of renewables in the electricity sector, we develop a forward-looking, multi-regional input-output model that takes into account the labour demand associated with capital investments in renewable energy infrastructure, separate from operation and maintenance, considering also the substitution effects associated with projected electrification and diversion from other fuels. The model compares the effects of an ambitious 100% renewables scenario with a reference scenario at five-year intervals until 2050. It focuses on the changes in the European Union (EU) and the United Kingdom (UK) and shows the impacts by skill level, industry and country.

382 What you do at work matters: new lenses on the green transition

Penny Mealy[1], R. Maria del Rio-Chanona[2], J. Doyne Farmer[3]

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The net-zero transition involves a shift in demand from emission-intensive industries, such as oil and coal, to green industries. This transition will relocate labor demand and require some workers to switch occupations. This paper uses a networks approach to study how the distribution of discrete work activities across occupations affects job transitions. We find that what people do in their current job matters for their future job - people are significantly more likely to transition into occupations sharing similar work activities. Moreover, we find that our measure of occupational work-activity similarity is more predictive of job-to-job transitions than existing benchmark measures. We highlight how our new networks-based lenses on labor can illuminate a range of labor market topics, including the gendered division of labor, the future of work, and the green transition. To study the green transition in more detail, we look into brown occupations i.e., occupations that are more likely to be demanded by emission-intensive industries. We find that many brown occupations are clustered in the network i.e., brown occupations share similar work activities. This finding suggests that workers of particular occupations may be locked-in during the green transition and may require relocation and retraining support.

268 Lost in the Dual Transition: Theoretical, methodological and normative cleavages in Labour/Decarbonisation transition discourse

Bonno Pel[1], Aurore Fransolet[1], Sarah Delvaux[2], Isabelle Ferreras[3], Mikkel Barslund[4], Pierre Delvenne[2], Karolien Lenaerts[4], Vincent Calay[5], Céline Parotte[2], Ela Callorda Fossati[1], Tom Bauler[1]

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The paper addresses the interlinkages between transition processes of decarbonisation and 'labour', i.e work and employment. The salience of these interlinkages is increasing as processes of low-carbon transition are progressing beyond their initial stages of pioneering and niche markets. Visions on this 'dual transition' proliferate – in utopian and dystopian forms. Prominent examples are 'just transition', 'future of work', 'green growth', 'digital transition' and 'fourth industrial revolution'. The abundance of future visions only underlines the fragmented knowledge development on this topic, however: How to understand the ongoing and future developments of the dual low-carbon and labour transition? The paper takes stock of relevant insights in studies on sustainable development and ecological economics, sustainability transitions and socio-technical innovation, just transition and environmental justice, labour economics, sociology of work, and foresight studies. Critically examining main assumptions, the study clarifies how'dual transition' discourse is fragmented along conceptual, methodological and normative cleavages.

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BEHAVIORS AND SOCIAL CHANGE
Chair: Nazaret Ibáñez-Rueda

25 The role of nature contact and connectedness to nature as determinants of household water use: A case study from Spain

Nazaret Ibáñez-Rueda[1], *Jorge Guardiola*[2], *Francisco González-Gómez*[3]

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One of the targets of Sustainable Development Goal 6 is to increase water-use efficiency in all sectors to ensure the availability of water resources. In the domestic sphere, water consumption is largely conditioned by the habits and behaviour of individuals, but the influence of their relationship with nature on those habits remains largely unexplored. In this study, we investigate the influence of connectedness to and contact with nature on five different uses of water at home. Using ordered probit regressions with a sample of 874 students from the University of Granada (Spain), we found that connectedness to nature and nature contact is positively or nonsignificantly related to different dimensions of water efficiency. The results indicate that in order to encourage pro-environmental water use habits at home, efforts should be made to develop an ecocentric vision in schools and to promote school trips to explore and understand the nearest natural areas.

475 Role of communities in transformative actions - impact on the individual lifestyle

Gabriella Kiss, Tamás Veress, Ágnes Neulinger

Corvinus University of Budapest, Hungary

As many research efforts in the ecological economics tradition have concluded, current social-economic systems are locked in unsustainable pathways. One main driver behind unsustainability is consumption fueled by affluence. The much-required sustainability shift of individual lifestyles is hindered by various structural and psychological barriers. In this paper, a meso level perspective is applied, taking individual sustainable behaviour as neither a narrow utility-maximizing endeavour nor an indiscriminate replication of social norms. In our research, we are looking at the role of civil society organizations (CSOs) when it comes to impacting sustainable behaviour against given socioeconomic barriers. Qualitative research was carried out based on 21 interviews with key stakeholders from CSOs doing work in different sustainability-related fields in the urban context of Budapest, Hungary. According to our results, the impacts of these meso level organisations are exercised through three main roles that are fulfilled by CSOs: translation, reinforcement and contribution.

11 The French citizen experience of Saillans (2014-2020): a real and concrete utopia of participatory democracy facing the challenge of ecological transition

Sabine Girard

INRAE, Saint Martin d'Hères, France

In the French village of Saillans, citizens mobilize, won the municipal elections and set up a radical and alternative project of governance. The revision of the Local Urban Plan challenges the village community to live, decide and do things together in face of environmental changes. The experience constitutes a real and concrete utopia: breaking with the planning tradition and the logic of strategic projects, the people are developing a new, more improvised mode of action. They combine 2 democratic practices, action and deliberation, based on the ethics of "doing" and "discussion". The article offers a situated analyze, presenting the intentions and practices of the municipal team of which the author was a part, the trials and tribulations experienced, and then an overview of the ongoing transformations. It concludes with a discussion of the transformative potential of this radical citizen experiment in social and ecological transition, foreshadowing a possible rural counter-anthropocene.

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BEHAVIORS AND SOCIAL CHANGE
Chair: Nazaret Ibáñez-Rueda

609 A study on determinants of participation in collective action: The case of food sharing

Karin Schanes[1], *Karin Dobernig*[2], *Barbara Hartl*[3]

[1]University of Natural Resources and Life Sciences, Vienna, Austria. [2]FH Wiener Neustadt, Wiener Austria. [3]Vienna University of Business and Economics, Austria

Collective action such as food sharing initiatives play an important role in re-distributing food surplus and thus reducing food waste. However, insights into the processes that determine members' motivation for continued participation in collective food waste movements are still scarce. The research presents the results of an online survey that was conducted with 320 members of the "foodsharing" initiative (so-called food savers) in Germany, Austria, and Switzerland. We test determinants for participation derived from a theoretical model of collective action. We discuss if an extended version of the encapsulated model of social identity in collective action (EMSICA) can explain collective action around food waste.The model is derived and examined through structural equation modeling (SEM). According to the results, people further engage in foodsharing, when (i) they believe that foodsharing can make a significant contribution to reach their goals to reduce food waste, (ii) they identify with the group mobilizing around food sharing, and (iii) they associate positive emotions with their participation in foodsharing. Thus, the current study reveals that social identity and collective efficacy beliefs consistently predict substantial variance in participation intention. Moreover, it shows that positive emotions are both a direct predictor of participation intention, and an indirect predictor, mediated by negative emotions and collective efficacy.

225 Time to listen: lessons from a deliberative dialogue in Spain for tackling the climate crisis

Ester Galende Sanchez[1], *Alevgul Sorman*[1,2], *Mikel Gonzalez Eguino*[1]

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Within this study, we present the results of a deliberation process on the opinions and perspectives of a sample of Spanish citizens for tackling the climate crisis. Our main aim was to offer participants a space for reflection on the policies they are willing to support and their willingness to act at the individual and community level, focusing on issues of mobility and consumption. Deliberative surveys differ from opinion polls as they give citizens the time and space to discuss pertinent issues with other citizens with professional facilitation to try to find common ground. Our initial results indicate that while individual-level behavioural changes are faced with challenges impacting low and middle-income families, people are more willing to accept public policies targeting all of the population. Overall, deliberative processes are seen as an effective means of achieving more inclusive policymaking processes, involving everyone in the design of the transformations to come.

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SPECIAL TRACK: ECONOMETRICS OF CLIMATE AND ENERGY

Chair: Alessio Moneta

31 Financial implications of the Emission Trading System: an analysis of volatility spillovers and wavelet coherence

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We study the degree of interdependence between the EU's Emission Trading System (ETS) carbon emission price and the stock prices of 37 large companies from four of the main industries subject to the ETS, aiming to understand the extent to which variations in the ETS allowances' price affect investors behaviour. First, we use Volatility spillovers to quantify the degree to which volatility spills from the ETS to the stock market (and vice-versa). Second, we carry out Wavelet coherence analyses to inspect co-movement between volatility in the ETS and volatility in the stock market across both time and frequency dimensions (if any). Preliminary results suggest the market performances of the companies considered are not particularly responsive to the ETS dynamics, except for temporary seasons of interconnection in correspondence of relevant ETS policy changes.

114 Calibration and Validation of Agent-based Models: A General Protocol by Causal Search

Mario Martinoli, Alessio Moneta, Francesco Lamperti, Gianluca Pallante

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We propose a general protocol for calibration and validation of complex simulation models by methods of causal search. The key idea is that model's configurations of parameters should be selected so that to minimize a distance between two structural models: one derived from the theoretical model, one derived from the observed data. Validation is conceived as a measure of matching between the theoretical and the empirical causal structure. Causal structures are inferred combining structural vector autoregressive and independent component analysis, so as to avoid a priori restrictions. We use model confidence set a tool to measure the uncertainty associated to the alternative configurations of parameters and causal structures. We illustrate the procedure by applying it to a large-scale macroeconomic agent-based model, the "Dystopian Schumpeter-meeting-Keynes" model.

165 The (very) short-term price elasticity of German electricity demand

Tarun Khanna[1,2], Lion Hirth[1], Oliver Ruhnau[1]

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This paper studies whether the demand for electricity responds to such price variations in the very short term (at an hourly timescale). To solve the classical identification problem when estimating a demand curve, we perform an instrumental variable regression employing weather-dependent electricity wind energy generation as an instrument. Using data from Germany, we estimate that a 1 €/MWh increase in day-ahead electricity price causes the aggregate electricity demand in Germany to decline by 70-80 MW or 0.12-0.14%. These estimates correspond to a potential reduction in aggregate demand of about 2 GW or 3% of the peak demand in the German power system. At the average price and demand, this corresponds to a price elasticity of demand of about -0.05. Our analysis indicates that the demand response can be attributed primarily to industrial consumers. The results are statistically significant and robust across model specifications and to sensitivity analyses.

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SPECIAL TRACK: ECONOMETRICS OF CLIMATE AND ENERGY

Chair: Alessio Moneta

207 The effect of climate change on economic growth: a Structural Global Vector Autoregressive approach

Maryam Ahmadi[1], *Chiara Casoli*[1], *Matteo Manera*[1,2], *Daniele Valenti*[1]

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Identifying the effect of climate shocks on economic growth is central to design effective policies aiming at managing the future global climate change challenge. In this study, we investigate the effects of temperature and precipitations shocks on economic growth across different countries by means of a new methodology, namely a Structural Bayesian Global VAR model that imposes economic interpretation to the shocks, accounts for cross-sectional spillovers among countries as well as endogeneity of the climate variables with respect to the economy. The results show that most of the countries are negatively affected by climate shocks, suggesting that – on the contrary of a consistent strand of the literature, finding hot and poor countries paying the most – climate shocks negatively affect also rich and cold countries' GDP growth. Accounting for the interdependence across countries, we find that trade plays a mitigation role in the responses of the economic growth to climate shocks.

223 Disentangling the effects of climate change on economic performances: limits and possibilities

Tommaso Rughi

Scuola Superiore Sant'Anna, Pisa, Italy

The aim of the work is to better characterize and test the robustness of climate impacts on different macroeconomic channels. Founding on climate econometrics literature, I expand the previous contributions on two grounds: firstly, I have estimated climate impacts on a wider dimension that simple GDP per capita. Secondly, I have tested specific aspects which includes, among others, climate variability, role of lag, analysis by different income group. Besides to the well-established gdp impacts, relevant effects are present on a set of productivity measures, which only partially includes Total Factor Productivity, and on consumption per capita, negatively affected by both temperatures and precipitation anomalies. Instead, the results obtained from the exploration of other dimension and variable of analysis documented a profound complexity and heterogeneity. Results seems to suggest that only more fine-grained aggregation level analysis are capable to capture specific impact channels, while high aggregated spatial data present intrinsic limitations.

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POLICIES: AGENDA 2030 AND REGIONAL POLICIES

Chair: Nathalie Spittler

550 Modelling synergies and trade-offs between SDG13 and other SDGs in Austria

Nathalie Spittler, Mathias Kirchner

University of Natural Resources and Life Sciences, Vienna, Austria

The implementation of climate goals of the Paris Agreement and the UN Agenda 2030 with its 17 Sustainable Development Goals (SDGs) involve considerable challenges, but also new opportunities. Countries are now faced with the challenge of meeting these goals. To enable this, it is important to identify synergies and avoid or minimize trade-offs. It is important to understand how goals are achieved over time and how various measures affect individual goals and associated indicators. The aim of this research is to apply a System Dynamics model, to understand the interactions between the SDGs in Austria. Special focus is placed on development paths for SDG13 and their synergies and trade-offs with other SDGs. For this, the established iSDG model, which enables modeling of the SDGs and their interactions up to 2050, is calibrated for Austria and, together with stakeholders and experts, the basis for further development and adaptation is created.

384 Linking policies to an historical analysis of national planetary boundaries: the case of Portugal

Ricardo da Silva Vieira[1], Tânia Sousa[1], Ricardo Teixeira[1], Laura Felício[1], Tiago Morais[1], Daniel O'Neill[2], S. Marta Almeida[1], Tiago Ribeiro[3], Tiago Domingos[1]

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The planetary boundary framework defines and quantifies the biophysical limits of the planet in key-Earth system processes. Using the planetary boundaries framework, we downscale the planetary boundaries to Portugal and analyze the historical dynamics of seven biophysical categories (unfolded into a set of 32 biophysical indicators) from 1960 (or as far back as data allowed) to 2019. We also explore the contribution of different environmental policies to these dynamics. We find that Portugal exceeds its ecological limits in most of the indicators for most recent years. However, many of the indicators are on an improving trend. The environmental performance of the indicators was strongly linked to GDP dynamics but that, from the late 1990s onwards, environmental impacts began to decouple from GDP dynamics, largely due to the implementation of environmental policies.

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RESOURCES: RESILIENCE AND SUSTAINABILITY IN RURAL AREAS

Chair: Stefan Sorge

129 A just and clean energy transition: insights from the European regions

Álvaro García Riazuelo, Rosa Duarte, Cristina Sarasa

Universiy of Zaragoza, Spain

The increasing political and social pressure in the fight against climate change and its consequences have led to the need for a change in the current energy model. Environmental objectives must be linked to economic and social objectives, in order to achieve an energy transition process that is fair to the territories. The infrastructures associated with renewable energies cause a series of socio-economic and environmental impacts and externalities on the territory, which can be both positive and negative. In this context, the main objective of this work is to evaluate the impacts, retrospectively, that renewable energy facilities have on the territory, in the short and long term in these different areas. From the methodological point of view, the synthetic control method is applied to all those selected European regions, in order to try to characterize in the best possible way the compatibility of economic, social and environmental objectives.

168 Governance Innovations for forest ecosystem service provision – Insights from an EU-wide survey

Carsten Mann[1], Lasse Loft[2], Mónica Hernández-Morcillo[1], Eeva Primmer[3], Francesca Bussola[4], Enzo Falco[5], Davide Geneletti[5], Ewelina Dobrowolska[1], Carol Grossmann[6], Giorgia Bottaro[7], Christian Schleyer[8], Tatiana Kluvankova[9], Gino Garcia[1], Marko Lovrić[10], Mario Torralba[11], Tobias Plieninger[11], Georg Winkel[12]

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In this talk we analyse the occurrence of governance innovations for forest ecosystem service (FES) provision in the forestry sector in Europe. Based on a European-wide online survey, public and private forest owners and managers indicate what type of governance innovation activities they engage in, and why. The analysis focuses on biophysical, social and technical factors influencing innovation development. Our results show that most innovation activities are largely oriented towards biomass production. In contrast, the provision of regulating and cultural services is not yet a prominent part of forestry innovation activities. Reasons are rooted in a market-oriented economic rationale, which is related to a lack of financial resources to compensate for other FES provision or institutions to provide backup to forest owners and managers for engaging in innovation development outside wood production. If other FES beyond timber provision shall be provided, new forms of communication, cooperation and financing are needed.

426 Engaging stakeholders in landscape planning: a collaborative process to support rural fire prevention

Rita Lopes[1], Paula Antunes[1], Selma B. Pena[2], Inês Adagói[2]

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Rural fires are a complex problem affecting different regions with highly recognized impacts.This work proposes a mix-method approach where tacit and scientific knowledge are combined to build a long-term vision for the territory transformation; this was developed under the ongoing research project SCAPEFIRE that seeks to create a sustainable landscape planning model for rural areas fire prevention.The agroforestry system in Portugal has been transformed over the last century into large areas of fast-growing monoculture species often found in unmanaged and abandoned land. Pampilhosa da Serra municipality a highly affected area by rural fires was chosen to develop a participatory process based on three main steps, including interviews and collaborative workshops intertwined with the application of the FIRELAN model, to design a fire resilient and sustainable landscape. This approach allowed to integrate expectations, and experiences from people livingand working in the territory, with the expert knowledge on rural fire prevention.

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RESOURCES: RESILIENCE AND SUSTAINABILITY IN RURAL AREAS

Chair: Stefan Sorge

555 Pathways to smallholder resilience: A model of cocoa farmers' general resilience tested during the real-world shock of the COVID-19 pandemic

Moritz Egger[1], Michael Curran[1], Lina Tennhardt[1], Angela Boettcher[2]

[1]FiBL, Frick, Switzerland. [2]University of Koblenz and Landau, Mainz, Germany

Resilience concepts are often divided into general resilience capacities and specified resilience responses. We developed a model of general resilience capacities for smallholder cocoa farmers and verified it with data on actual impacts and countermeasures employed by the same farmers in response to the COVID-19 pandemic. The general resilience assessment consists of a hierarchical multi-attribute decision-making model. We developed the model using a selection of indicators from an extensive sustainability data set collected just prior to the COVID-19 outbreak from 395 smallholder cocoa farms in Ecuador and Uganda and developed a baseline evaluation of general resilience capacities. For the specified resilience assessment, we collected data from the same cocoa farms on impacts and countermeasures implemented in response to the paandemic. Through correlation of general resilience performance with an analysis of impact severity of the COVID-19 pandemic, we expect to demonstrate a positive link between general and specified resilience.

571 Understanding the Emergence and Development of Governance Innovations for Forest Ecosystem Service Provision: A socio-ecological-technical -analytical framework

Stefan Sorge, Carsten Mann

University for Sustainable Development Eberswalde, Germany

Little is known about the emergence and development of novel governance approaches for forest ecosystem services (FES) provision, what drives them, and how they can be fostered. Existing frameworks often deal with single aspects of resource management and thus fail to assess processes, multi-level influences, and interacting dimensions and factors in a system-based understanding. We introduce the conceptual foundation and first empirical application of an adapted SES framework with additional elements that builds on the idea of complex and interlinked social-ecological-technical-forestry-innovation systems that allows for the identification of key factors for revealing FES dynamics to better understand such governance innovations. Six governance innovations were examined such as a voluntary carbon market payment scheme in Germany and a network approach for forest-pasture management in Italy. The application of the framework reveals required adaptations to improve innovation by systematically unpacking the system dimensions and identifying fostering and hindering factors and their interdependencies.

345 Enabling Forest Ecosystem Services Governance Innovation Development

Tatiana Kluvankova[1], Martin Spacek[2], Natalia Novakova[1], Tomas Szabo[1], Stefan Sorge[3], Carsten Mann[3]

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High complexity of forest ecosystem service (FES) functioning, high levels of uncertainty, as well as imperfect and asymmetric information between transacting parties tends to result in market and regulation failure and calls for novel governance arrangements. We identify this as a prototype co-creation of novel FES governance. The empirical basis for such co-creation is a set of six cases that differ in their social-ecological, institutional, and forest management conditions, as well as governance innovation types. We determine i) innovation factors in a diverse forestry context, (ii) factors re- configuration for the sustainable provision of FES, and (iii) prototype coproduction in the selected three (out of six) cases that indicate sustainability transformation for FES provision and community well-being as a target of knowledge co-production. As such, should it constitute a question as to whether FES sustainable provision can be seen as a novel economic and business model for post growth era?

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POLICIES: CIRCULAR ECONOMY (INCLUDING ITS MEASUREMENTS)

Chair: Vito Pipitone

614 On the way to reduce plastic's accumulation in our sea. A systematic literature review on possible strategies and models of action

Stefania Bertolazzi[1], Angela Cuttitta[2], Vito Pipitone[2]

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Over the last few decades, a relatively new field of research has emerged within the scientific literature aimed at investigating the issue of plastic marine pollution. An interesting field of research, not yet sufficiently explored in literature, regards the analysis of possible solutions to this pressing and alarming issue. Therefore, our analysis moves in this direction focusing on the circular economic model applied to face the problem of plastics' accumulation in our sea.

453 The leaky loop – how far can recycling take fashion industry towards a circular economy?

Tiina Häyhä, Celinda Palm

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The fashion and textiles industry identifies recycling of textile waste as an important economic and environmental opportunity towards a circular and sustainable fashion system. But what role can the recycling of textiles play in reducing fashion industry's need for virgin materials? In this paper, we take a systems perspective and use empirical data and systems modelling to analyse the contribution recycling can make in reducing fashion industry's need for raw resources under alternative recycling and growth scenarios. For this purpose, we model the main textile and fibre flows in the global textile-fashion value chain to identify the most important material leakages and the potential of fibre recycling in reducing the industry's need for new resources. Our analysis highlights that effective recycling needs to tackle three main problematic aspects of the current fashion system: leakages, global growth of production and high-speed consumption.

483 Limits to Blue Growth: A Mediterranean Perspective

Borja Nogué Algueró[1], Miquel Ortega Cerdà[2,1], Giorgos Kallis[1], Santiago Gorostiza[3], Marta Coll[2], Ivan Murray[4]

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After several decades at the margins of the international sustainability agenda, the question of limits to economic growth is receiving renewed attention, especially in the marine realm. In recent years, a series of international organizations, financial institutions, governments think-tanks, and environmental NGOs, have been promoting the coupled concepts of 'Blue Economy' and 'Blue Growth' to mobilize interest on the Ocean as a global space of great untapped economic potential that can be realized sustainably through technological innovation and market intervention. This paper argues that the corollary of the Blue Economy agenda is the expansion of maritime and terrestrial industries that depend on the Ocean as a site of social-metabolic extraction, circulation and deposition processes. Using the Spanish Mediterranean as a case study, this article makes the case for setting limits to growth at sea in order to prevent further damage to marine and coastal environments and their communities.

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TRANSFORMATIONS: DEGLOBALISATION-REGIONALISATION

Chair: Katrin Karner

275 The inefficiency of regional brands and locality labels to support deglobalization

Emilia Schmitt

ZHAW, Zürich, Switzerland

In Switzerland and in many countries, consumers are increasingly motivated to "buy local" in order to protect the environment and support local farms. Producers and retailers are capitalizing on this motivation and successfully using localness as marketing argument. In a market review, a total of 109 labels or brands linked to regional branding or a label of origin have been found in Switzerland. The proliferation of these initiatives (thereafter named only "labels") leads to questioning their definition, use and impacts. In this paper I first describe how these labels work and how they can be categorized according to their ownership type and their strategies. Second, their definition of the regional or local origin is analyzed and the reasons why their effect against globalization is only marginal are explained. Third I furthermore analyze what their impact on the larger food system's sustainability might be.

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RESOURCES: FOOD SYSTEMS & AGRICULTURE

Chair: Katrin Karner

160 The hidden role of small-scale farming in our globalised food system

Oliver Taherzadeh, José Mogollón

Leiden University, Netherlands

The productive contribution of and need for smallholder farming is often assessed against the yardstick of domestic food supply. Yet, this ignores the role of smallholder farms in meeting the food demand of nations, directly and indirectly. In our globalised food system, smallholder farmers meet transboundary food needs. Only when viewed through the lens of global consumption can the importance of smallholder farming production be fully understood. This study distinguishes the role of small-, medium- and large-scale farms in meeting current food demands, across 180 countries. We find the role of small-scale farmers in national and global food security has been significantly underestimated due to the localised focus of previous studies. Such finding challenges the prevailing view that tackling the crises of the global industrial food complex (e.g. malnutrition, resource depletion, and food insecurity) requires a departure from smallholder farming and a shift towards industrial agriculture.

444 Not(h)ing of value: Trust in ecologic agricultural economics

Antje Risius Jun

University of Goettingen, Germany

Current approaches to agricultural economics and rural development are often grounded in inherent individualistic-utility formulations, they seldom include ecologic values nor even the production of communal production values. In order to establish wide acceptance for sustainable agri-food systems, it is of relevance to transfer extrinsic product values of sustainably produced foods along the value chain. Yet, standards and qualities are not well delivered and lack trust from both sides – consumer as well as stakeholder perspective. The paper frames the current state of tracing systems targeting to transmit the product quality of sustainable produced foods. Drawing on empirical research on organic food standards, values and trust in different sectors, in which eight different focus groups have been conducted in order to share common and distant views on value and trust. The paper discusses ways to integrate and measure interpersonal value/trust in consumer's and producers production function.

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RESOURCES: FOOD SYSTEMS & AGRICULTURE

Chair: Katrin Karner

332 Will innovative agri-environmental contracts transform the European Common Agricultural Policy? Lessons from a Delphi study

Boldizsar Megyesi[1,2], Eszter Kelemen[3], György Pataki[1]

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Current agri-environmental and climate measures (AECMs) are widely considered inefficient, thus new contractual measures (result-based payments, collective, value-chain, & land tenure contracts) are proposed. The research reported here analysed how decision-makers, farmers and researchers see innovative contractual solutions to overcome these problems. The paper aims at exploring the role of innovative contracts in AECMs by presenting the results of an ongoing, three-round online Delphi study conducted in 2021, as a part of the Contracts 2.0 Horizon 2020 research. Its main goal is to contribute to the debate around the renewal of the agri-environmental and climate measures of the CAP. Despite their acknowledged benefits, innovative contractual solutions offer no, or partial, answer to the challenges raised by current AECMs, thus one cannot expect transformative changes by applying them. By continuing research on the consensus and dissensus around the innovative approaches, the benefits of the novel contracts will be better explored.

591 Shared Socio-economic Pathways for Austria's agriculture and food system

Katrin Karner, Hermine Mitter, Martin Schönhart

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Scenarios allow to consider uncertain socio-economic development and describe a spectrum of plausible futures. The Shared Socioeconomic Pathways for European agriculture and food systems (Eur-Agri-SSPs) semi-quantitatively describe pathways along challenges for climate change mitigation and adaptation. However, additional drivers are relevant to frame plausible future developments at (sub-)national scales. We aim to downscale, refine and quantify the Eur-Agri-SSPs to Austria, i.e. develop the AT-Agri-SSPs. We follow an eleven-step protocol and engage a diverse group of stakeholders. The final scenarios describe the semi-quantitative (i.e medium/strong decrease/increase.) development for 79 scenario elements (i.e. drivers) along five thematic areas (population, economy, policies and institutions, technology and environment). Quantitative data are provided for a subset of the 79 scenario elements. The AT-Agri-SSPs can inform policymaking, decision making and research for the agriculture and food system. Their application in integrated land-use models can reveal their impact on land use and environmental goods.

532 Environmental, social, and economic consequences of six food system strategies for Switzerland

Anita Frehner[1], Imke J.M. De Boer[2], Adrian Muller[1], Hannah H.E. Van Zanten[2], Christian Schader[1]

[1]Research Institute of Organic Agriculture FiBL, Frick, Switzerland. [2]Wageningen University & Research, Netherlands

Consumption- as well as production-side changes are needed to improve the sustainability performance of food systems. We assessed multiple impacts of six food system strategies for Switzerland. Two strategies encompassed dietary changes: following a pescetarian diet and adhering to the national dietary guidelines. Two strategies employed alternative farming systems: increasing the share of organic production and, in addition, applying the circularity principle of avoiding feed-food competition by excluding livestock feed grown on arable land. A fifth strategy reduced food waste. The sixth strategy increased the share of domestic produce. For all strategies, we assessed greenhouse gas emissions, land use, nitrogen surplus, social risks, diet quality, and diet costs. The strategies revealed trade-offs between impact categories, unless combined in a synergistic way. Combining all proposed strategies could lead to substantial improvements in all impact categories assessed, but would require a thorough transformation of the current food system.

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11:15 - 12:00

TRANSFORMATIONS: ECOLOGICAL MACROECONOMIC MODELS

Chair: Dan Chester

215 Post-growth and the North-South divide: a post-Keynesian stock-flow consistent analysis

Dario Leoni, Andrew Jackson, Tim Jackson
University of Surrey, Guildford, United Kingdom

A fundamental problem within the post-growth literature is the need for economic development in emerging economies. One prevailing view is that developed nations should stop growing in order to guarantee a sustainable increase in GDP in developing countries. However, the macroeconomic and environmental implications of a post-growth transition in advanced countries while the rest of the world keeps growing have not been rigorously analysed yet. This work addresses this gap by using a 2-region post-Keynesian stock-flow consistent model to simulate a unilateral post-growth transition in one region while the other area pursues economic development. Although the analysis is subject to many caveats, this work highlights two crucial points: ecological macroeconomists need to be more aware of the international economic consequences of a post-growth transition and post-Keynesian economists must update their policy toolkit to account for the different challenges brought about by the current ecological crisis.

423 Exploring limits to a rapid energy transition with integrated assessment scenarios

J. Christopher Proctor
University of Technology of Compiègne, Compiègne, France. Roma Tre University, Rome, Italy

This paper will explore the limits, both physical and economic, of a rapid transition to a decarbonized energy system. Rather than developing least-cost pathways of decarbonization as is currently the standard practice, this study will create speed-optimized pathways which show various possibilities to achieve a maximum amount of decarbonization without violating certain economic and physical limits. The paper will use the open-source integrated assessment model MEDEAS in order to highlight different paths which could be taken towards a rapid global transition in the energy sector. In particular, limits regarding the use of labor will be analyzed, as the scenarios must respect both lower and upper bounds on overall employment. The possibility for sectoral rebalancing to adjust to the limits experienced in the labor market will be explored. The paper will be a contribution to the approach of integrated assessment modeling and a part of the growing field of ecological macroeconomics.

546 Understanding inertia in the economy: timescales of capital and the climate transition

Dan Chester
Lancaster University, United Kingdom

The timescales of capital investments, and therefore the turnover dynamics of capital stock, have limited representation in macroeconomic modelling. This hinders analysis of economic inertia, particularly in the context of a rapid net zero transition in which vast quantities of long-lived investments may need to be prematurely abandoned.
We set out to determine the minimum model that is required to accurately represent heterogeneous capital. We develop a quantitative framework for estimating the residence time of capital assets in the US economy, deriving an instructive annual distribution of investments across timescales which can be effectively aggregated into three major timescale components.

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TRANSFORMATIONS: LABOUR AND JUST TRANSITIONS

Chair: Dane Chester

197 Citizens' attitudes towards climate change: the role of occupational exposure

Gabriella De Sario[1], *Giovanni Marin*[2,3], *Agnese Sacchi*[2]

[1]Università di Roma La Sapienza, Italy. [2]Università di Urbino Carlo Bo, Italy. [3]SEEDS, Ferrara, Italy

Our work investigates how occupational exposure of individuals to different aspects of climate policy might result into heterogeneous willingness to support these measures. Individuals, when assessing the effects of environmental policies on their daily life, also evaluate their exposure on changes induced by green transition fearing of being displaced or not matching with the new skills requested. Our contribution to the literature is twofold. Firstly, we develop an original taxonomy of individuals based on their general attitudes toward climate change. Secondly, we provide econometric evidence about citizens' attitude towards different pro-climate policy tools by exploiting the heterogeneity across the previous clusters as well as the individuals' occupational exposure to climate-related policies. The citizens' attitude towards climate mitigation programs is evaluated with respect to three different policy instruments: a carbon tax; a Pigouvian subsidy for renewable energy; a technology standard.

41 Slowing the treadmill for a Good Life for All? German trade union narratives and social-ecological transformation

Halliki Kreinin[1,2], *Katharina Keil*[3]

[1]Institute for Ecological Economics, WU, Vienna, Austria. [2]Chair: for International Relations and Sustainable Development, Münster, Germany. [3]Universitê de Lausanne, Institut de géographie et durabilité, Lausanne, Switzerland

The "treadmill of production" economic system threatens to undermine the foundations of future human welfare. Conceptualisations of "the good life" (TGL) as the "imperial mode of living" (IML) of overconsumption, are justifications upholding the system and driving the crises. German trade unions, as part of the growth coalition, have historically tried to delay climate action in the name of jobs through "praising work", supporting the hegemonic commonsense of IML-TGL (an obstacle to environmental union organising and progressive coalitions). To investigate whether and to which extent divergent goodsense counter-hegemonic narratives are present within German trade union discourses, we analyse the three biggest German unions' narratives of TGL and good work, using Gramsci's theory of commonsense. We find that counter-narratives of TGL are present to different degrees within the unions, which can provide entry points for counter-hegemonic narratives of TGL.

340 Reasons for a critical appraisal of work in ecological economics

Stefanie Gerold[1], *Maja Hoffmann*[2], *Ernest Aigner*[2]

[1]BTU Cottbus, Cottbus, Germany. [2]WU Vienna, Austria

In this paper, we critically assess common perceptions of work to inform current debates on work and sustainability. Due to veiled moral values, work is usually uncritically conceived as (1) a productive activity (2) that satisfies consumer demand, (3) is conducive to health and well-being, and (4) ensures social inclusion and personal development. Drawing on the burgeoning literature of 'postwork' or critiques of work, we demonstrate that work may rather be understood as biophysically intense, consumption-causing, heteronomous institution that stabilizes societies in environmentally and socially unsustainable ways. A social-ecological transformation thus requires to fundamentally question modern-day work. Ecological economics could therefore greatly gain from a more critical perspective on work. We conclude that the aggregate volume of work and its cultural and material drivers have to be reduced substantially. Harmful work needs to be discontinued, and the remainder limited to meaningful, autonomous, and biophysically as well as socially regenerative work.

396 The changing measurability of working time and its implications for working time reduction

Bence Lukács, *Miklós Antal*

MTA-ELTE Lendület New Vision Research Group, Budapest, Hungary

The reduction of working time (WT) is a widely supported strategy within post-growth economics, potentially delivering environmental, social, and economic benefits. Since WT regulation is facilitated by accurate data on working hours, anyone who wants to understand the impacts of specific types of reductions must pay attention to the complexities of WT measurement stemming from the specialization, fragmentation, and often remote nature of work. This raises two fundamental questions: (1) What reliable WT data are available or how can such data be produced? (2) To what extent is it feasible to directly regulate WT? To answer the first question, we present a methodological review that identifies the main problems and their potential solutions on the basis of the literature, paying special attention to implications for research on WT reduction. To answer the second question, we explore the factors that influence data quality in different contexts, based on 28 interviews.

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BEHAVIORS AND SOCIAL CHANGE

Chair: Laura Pérez Sànchez

587 What makes a devoted buying club customer? A Hungarian case study

Zsófia Benedek[1], *Imre Fertő*[1,2]

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Our objective was to analyse the attitudes and preferences of Hungarian consumers in the light of the level they were interested in buying clubs (BCs). Hungarian BCs usually operate as non-profit food delivery schemes with a strong focus on social justice, ethical consumption, short transportation distances, and other sustainability aspects. The Theory of Planned Behaviour was used as a theoretical framework. A representative sample (N=1000) was classified into four groups: non-local food consumers, occasional and regular BC customers, and other consumers. Regular BC customers were compared to the other groups pairwise. Perceived behavioural control as well as attitudes towards local food and cooking played important roles in shaping devotion towards BC participation, while social norms apparently were less influential. Hungarian customers seemed to be motivated by hedonistic and altruistic features, the more they were devoted to BC participation, the better.

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RESOURCES: MATERIALS, ENERGY, WASTE

Chair: Laura Pérez Sànchez

254 Global and regional stylized facts for the primary energy intensity of economic growth of most countries since 1950

Gregor Semieniuk

University of Massachusetts Amherst, USA

Future projections of energy demand rely on a data sample from the IEA, excluding important periods of time (pre 1971) and countries (e.g. Soviet bloc). Here I make two contributions by presenting new evidence on the long-run relationship between energy and economic activity for most countries in the world for 1950-2018. (1) The evidence improves projections because the data isn't dominated by the 1970s oil crises and the transition of socialist countries in the 1980s/90s. (2) It uncovers previously unknown stylized facts both for the world and separately for its regions thanks to greater data coverage and because the lens of analysis places greater emphasis on long-run yet period-specific (e.g. golden age of capitalism) relationships and new region-specific relationships. Both contributions help appreciate the degree to which policy (and reference) scenarios of future worlds break with past trends and emphasize the need to explain how these breaks are achieved.

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SPECIAL TRACK: AUDITING METABOLIC PATTERNS WITH THE MARAUDER'S MAP

Chair: Laura Pérez Sànchez

262 Metabolic auditing of energy systems to inform the transition away from fossil fuels

Michele Manfroni[1], Raúl Velasco-Fernández[1], Mario Giampietro[2]

[1]Institute of Environmental Science and Technology, Universitat Autònoma de Barcelona, Cerdanyola del Vallés, Spain. [2]Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain

A metabolic auditing of the current energy production and consumption patterns is crucial to anticipate the viability of low carbon transformations of the energy metabolism. In this special session, we introduce a relational tool for energy governance based on the Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism (MuSIASEM) semantically open framework. We explore the global oil supply system and discuss case studies in the form of 'what if' scenarios related to EU energy policies. We flag energy security and climate issues emerging from aging fields and the transition to unconventional oils. Then, we discuss how policies that push for isolated technological innovations or substitutions, overlooking the transformation of the whole metabolic pattern, may not be effective to obtain the desired emission reductions. It is concluded that complementing commonly used methodological approaches with metabolic analysis is crucial to obtain solid quantitative assessments, to inform societal transformation toward a sustainable future.

319 Good quality of life from a metabolic perspective: identifying and characterizing social practices with MuSIASEM

Raúl Velasco-Fernández

Institute of Environmental Science and Technology (ICTA-UAB), Barcelona, Spain

Reducing socio-environmental impacts while maintaining a good quality of life (GQL) has proven to be a major challenge. Part of this problem can be explained by the lack of effective methods allowing conditional cooperation in self-limiting material standards of living transparently. This paper presents an exploration to advance in this emerging field by: (i) a literature review identifying key attributes associated with a GQL and a brief discussion of the major conflicts and synergies among them; and (ii) building on the Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism (MuSIASEM), develop and apply a toolkit to characterize the trade-offs over the identified set of GQL attributes concerning their environmental feasibility, technical viability and political desirability. The preliminary results identify key bundles of social practices with a great potential to reduce the overall socio-environmental impacts of enriched societies while ensuring an overall GQL of their population.

387 Complications of metabolic patterns in a globalized world: The externalization matrix

Laura Pérez-Sánchez[1], Mario Giampietro[1,2]

[1]ICTA-UAB, Cerdanyola del Vallès, Spain. [2]ICREA, Barcelona, Spain

Assessments of sustainability merely considering the territorial or residence perspective overlook the fundamental impact of global networks of production and consumption. Transport and IT have generated a spatial division of labor and transformed local economies. A country does not require to perform a specific function with its concomitant local impacts and resource uses (e.g. agriculture and land use) to be able to fulfill its demands. This is done instead in the form of exported products with embodied resources.
MuSIASEM is a quantitative framework for analyzing the metabolic pattern of social-ecological systems at different hierarchical levels, scales, and dimensions of analysis (economic, social, demographic, ecological, etc.). We present here the structure and quantification of international relations via the Externalization Matrixes, which allow us to analyze the change in local metabolic patterns and the security and resilience concerns. We present examples for the cases of food, energy, and working time.

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SPECIAL TRACK: AUDITING METABOLIC PATTERNS WITH THE MARAUDER'S MAP

Chair: Laura Pérez Sànchez

476 Virgil: A multi-language code library for accountants and auditors of the metabolic patterns of social-ecological systems

Ansel Renner

Institute of Environmental Science and Technology, Autonomous University of Barcelona, Bellaterra, Spain

This contribution presents virgil, a multi-language code library for accountants and auditors of the metabolic patterns of social-ecological systems. virgil is comprised of three core modules, emerging from the analytical and synthetical needs to (1) create knowledge spaces, (2) explore knowledge spaces, and (3) appraise knowledge spaces. In so many words, the first module supports the definition (formal representation of perceptions) of relevant categories and classifications together with the various measurements (sets across different descriptive domains) made of those relevant attributes. The second module supports the creation and use of dashboards both dynamic and interactive. The third module supports the communication of assessments and insights for internal (within the extended peer community of interest) review and third-party consideration—it supports acts of quantitative storytelling, especially where the storytelling in question engages with uncomfortable knowledge (a situation where traditional academic publication media/methods prove problematic).

479 Auditing the metabolic patterns of societies: Why is it needed and how can it be done?

Mario Giampietro[1,2], Ansel Renner[1], Michele Manfroni[1], Raúl Velasco-Fernández[1], Laura Pèrez-Sánchez[1], Sandra Bukkens[1]

[1]Institute of Environmental Science and Technology, Autonomous University of Barcelona, Bellaterra, Spain. [2]Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain

The marauder's map is a method for the robust identification and quantification of the factors determining the sustainability of the metabolic pattern of modern societies. It provides a heuristic characterization of the relevant attributes that are associated by laypersons with sustainability concerns. It integrates six lenses related to six different groupings of quantitative data: (1) a "good life" matrix; (2) a local end-use matrix; (3) a local environmental pressure matrix; (4) a local impact matrix; (5) an externalization matrix (import dependency); and (6) an externalized end-use matrix, together with an externalized environmental pressure matrix. The map can be used in diagnostic and anticipation mode. In the former mode, the map describes the current relations over the factors determining the metabolic pattern in relation to different concerns. In the latter mode, it explores series of "what if" scenarios across sustainability concerns of environmental feasibility, economic viability, and social desirability.

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THEORY AND NEW IDEAS: INDICATORS AND COMPOSITE INDICATORS

Chair: Kewan Mertens

388 The translation of ecological practices into ecosystem services: a laboratory study on environmental economics

Kewan Mertens[1], *Kato Van Ruymbeke master*[2], *Liesbet Vranken*[2]

[1]Centre de Sociologie de l'Innovation (CSI, Ecole des Mines), Paris, France. [2]KU Leuven, Belgium

This article contributes to exposing the guts of academic research on Ecosystem Services (ES) and indicators. We document the difficulties encountered by environmental economists in the process of reinterpreting reviews of agro-ecological practices in Europe to identify the delivery of ES.
We find that standardization and translation are required to "measure" the ES provided by agro-ecological practices in Europe. Specific ecological and spatial data are dropped in the process and replaced by new data which have little to do with the environment they are originally derived from. We argue that the newly formed data provide numbers for policy making that aims at a formal greening of European agriculture.
Interestingly, we demonstrate how researchers had to cast away some of their learned concepts from environmental science in order to fit the mould of ES. Researchers are willingly adopting this mould because of ES's promise of influence on policy making.

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RESOURCES: MATERIALS, ENERGY, WASTE

Chair: Kewan Martens

159 Macroeconomic dynamics of the energy transition: a global, biophysical, stock-flow consistent model

Pierre Jacques[1], *Louis Delannoy*[2], *Baptiste Andrieu*[2,3], *Devrim Yilmaz*[4,5], *Hervé Jeanmart*[1], *Antoine Godin*[4,5]

[1]UCLouvain, Louvain-la-Neuve, Belgium. [2]Université Grenoble Alpes, France. [3]The Shift Project, Paris, France. [4]Agence Française de Développement, Paris, France. [5]Université Sorbonne Paris-Nord, France

The transition towards renewable energies at a global scale – mainly solar and wind – will be one of the most powerful forces that will shape the global economy of the 21st century. In order to understand the dynamics at hand, we construct a biophysical, stock-flow consistent model at a global scale combining the insights from (i) Energy Return on Investment (EROI) dynamic estimates, (ii) a simple model of global economic and energy systems and (iii) a post-Keynesian macromodel incorporating the interactions between the economy, finance and climate dynamics. Results of our model show that even with conservative assumptions, the energy transition implies a profound socio-economic restructuring of our economies. The investments needed are such that the state must largely supervise the economy in order to force sufficient investment in the energy sector. Moreover, these investments require a saving rate that reaches levels unseen since the Second World War.

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BEHAVIORS AND SOCIAL CHANGE: RECONCILING CONSUMPTION, NEEDS AND WELLBEING

Chair: Pauline Smith

153 Would you prefer a pay raise or added free time? A multi-study empirical exploration of employees' preferences

Damaris Castro, Brent Bleys

Ghent University, Belgium

Working-time reduction (WTR) is a promising and highly relevant policy in today's industrialized societies. Despite the multitude of potential benefits of this policy – amongst others for the environment –, little empirical research has investigated to what degree people are receptive to the idea of working and earning less. In this paper we explore employees' preferences with respect to the income-leisure trade-off by means of two complementary studies. First, we analyze employees' stated relative preference for additional income versus additional leisure (hypothetical choice) with a single binary question (N = 864). Second, we investigate employees' revealed preference for additional vacation days (true choice) as an option offered in a flexible benefits plan of a Belgian company (N = 247). Preliminary results show that a significant fraction (about half of the respondents) prefers the option of additional leisure/vacation days, suggesting that WTR might be a desirable and feasible policy in the quest for sustainability.

570 Nature connectedness or entanglement? Contrasting approaches to our relationships with non-human life

Pauline Smith

Georgetown University, Washington DC, USA

Nature connectedness can play a role against the climate and biodiversity crises: indeed, nature connectedness is linked to both well-being and sustainable behaviors. This has led to research exploring ways to heighten this sense of connectedness through interventions such as immersing people in nature, asking them to notice life around them, etc. However, this literature still remains individualistic and human-centric: it supposes that our connection with nature is a feeling that one can opt in or out of, and a relationship where only humans have agency. This approach is grounded in a Western, naturalistic ontology as characterized. Philosophers, anthropologists and indigenous scholars have suggested a shift to recognizing the reciprocity in our relationship with non-human life, and our mutual responsibilities of care. Drawing on this literature and on interviews with students on French university campuses exploring their relationships with nature, I will contrast these approaches and their applications.

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INSTITUTIONS AND POWER: MONETARY AND FINANCIAL SYSTEMS FOR SUSTAINABILITY

Chair: Pauline Smith

102 Interest-bearing loans and unpayable debts in slow-growing economies: Insights from ten historical cases

Tilman Hartley[1], *Giorgos Kallis*[1,2]

[1]Autonomous University of Barcelona, Spain. [2]ICREA, Barcelona, Spain

Under what circumstances are interest-bearing loans compatible with an economy without much growth? The question is becoming increasingly important given a tendency towards declining growth in industrialised economies and evidence that continued growth is incompatible with environmental sustainability. Previous theoretical work suggests that when interest-bearing loans compound, this results in exponentially growing debts that are impossible to repay in the absence of economic growth. We here examine ten historical cases to assess support for this finding. We find that interest-bearing loans have typically resulted in unpayable debts in these non- and slow-growing economies. We further identify four broad category of measures to prevent or alleviate the problem of unpayable debts, and show how they have been employed in the past. Our Appendix compiles sources of debt regulation across the world over five millennia. The paper gives a fresh empirical impetus to important debates about money and interest in non-growing economies.

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RESOURCES: LAND USE AND DEFORESTATION

Chair: Nicolas Roux

17 Deforestation and human rights monitoring in Brazil: Due diligence for commodity trade with the EU or another means of corporate 'greenwash'?

Peter May[1,2], Nicole Polsterer[3], Saskia Ozinga[4], Valéria Vinha[5]

[1]Graduate Programme in Development, Agriculture and Society, Federal Rural University of Rio de Janeiro, Brazil. [2]Institute of Economics, Federal University of Rio de Janeiro, Brazil. [3]FERN, Brussels, Belgium. [4]FERN, Moreton-in-Marsh, Gloucestershire, United Kingdom. [5]Federal University of Rio de Janeiro, Brazil

Deforestation and human rights violations inspire consumer uneasiness over commodities sourced from forestlands cut to fuel export demand. The EU, UK and USA introduced legislation restricting imports to safeguard against illegal land use and labour practices. Simultaneous demand-side pressures embodied in corporate "zero deforestation" commitments must integrate with source governments' monitoring and enforcement. The Forest Observatory linked to EU regulation, would monitor "deforestation, forest degradation, ... forest cover, and associated drivers ... to facilitate ... information [sharing] ... for public entities, consumers and businesses". Information would enable traders conducting due diligence to better comply with regulation. Brazil's experience in monitoring deforestation, land tenure and human rights violations associated with commodity expansion illustrates how government, NGOs and suppliers have built due diligence capacity. Yet, unwillingness by EU traders to trace the source of commodity flows may perpetuate deforestation and human rights abuses, while corporate commitments may amount to only "greenwash".

592 Embodied HANPP of feed and animal products: tracing pressure on ecosystems along trilateral livestock supply chains 1986-2013

Nicolas Roux[1], Lisa Kaufmann[1], Manan Bhan[1], Julia Le Noe[1], Sarah Matej[1], Thomas Kastner[2], Alberte Bondeau[3], Helmut Haberl[1], Karlheinz Erb[1]

[1]University of Natural Resources and Life Sciences, Vienna, Austria. [2]Senckenberg Biodiversity and Climate Research Centre, Frankfurt am Main, Germany. [3]Aix-Marseille Université, Mediterranean Institute for marine and terrestrial biodiversity and ecology, France

Global livestock supply chains link producers of feed, livestock farmers, and final consumers, through international trade in (1) feed and (2) animal products. Studies analyzing the telecoupled pressure on ecosystems induced by livestock supply chains have so far not been able to distinguish between trade in feed and in animal products. We quantified pressure on ecosystems embodied in livestock supply chains based on the global flows of 174 feed and animal products for the years 1986 to 2013, using the embodied Human Appropriation of Net Primary Production indicator. 12% of livestock's pressure on ecosystems was linked to trade across world regions. Pressure linked to trade was nearly equally distributed between trade in feed and animal products. We discuss options to reduce livestock's pressures on ecosystems along livestock supply chains from a food theory perspective, especially reducing production and consumption in high consuming countries, and regulating international supply chains.

611 Integrating stakeholder engagement and artificial intelligence for sustainable land management: the Mijares watershed (Eastern Spain)

Itxaso Ruiz[1], Joao Pompeu[1], Nicola Perilli[2], Mario Cimino[2], Antonio Ruano[1], Maria Jose Sanz[1]

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The Mediterranean basin is a climate hotspot with a great potential for successfully adopting Sustainable Land Management (SLM) towards climate change adaptation. Our aim is to foster adaptation in the rural areas of a pilot basin (El Mijares, in Eastern Spain) through the strengthening of Ecosystem Services (ES) and stakeholder knowledge. To that, we provide spatially explicit information on the provision of ES to decide on a portfolio of potentially implementable SLM practices. Stakeholder's knowledge is integrated on socio-ecological scenarios with the spatially explicit ES maps with ARIES (ARtificial Intelligence for Ecosystems and Society), accessible through an web application. The maps of SLM and ES are discussed collectively with the stakeholders to identify the challenges for sustainable management and climate adaptation. The strategies, approach, and the methodology adopted in the Mijares watershed may be replicated in other Mediterranean watersheds which face similar challenges in water and land management.

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POLICIES

Chair: Janne I. Hukkinen

191 Ecological de-modernization in Brazil

Roldan Muradian

Universidade Federal Fluminense, Rio de Janeiro, Brazil

Since the Stockholm Conference on the Human Environment, in 1972, we assumed that the environmental agenda was slowly but steadily rising, concomitantly with changes in social values that resulted in increasing environmental concerns. However, with the governments of Donald Trump in the US and Jair Bolsonaro in Brazil, both with openly anti-environmental policy proposals, there was clear a break of such a trend. The aim of this article is to explain the foundation, ways of expression and implications of the anti-environmental movement in Brazil, making emphasis on the interpretation of this phenomenon (causes and historical background). Being a continental country and one of the major spots of bio-diversity in the planet, policy decisions in Brazil (and the ideologies driving them) have important global implications. The study of anti-environmentalism is also internationally relevant since it seems to be a social phenomenon associated with the rise of the far-right movement worldwide.

167 How to cope with strategic policy errors in an era of chronic socio-environmental crises?

Janne I. Hukkinen[1], Jussi T. Eronen[1], Nina Janasik[1], Paavo Järvensivu[2], Roope Kaaronen[1]

[1]University of Helsinki, Finland. [2]BIOS Research Unit, Helsinki, Finland

The unprecedented scale of resources mobilized to manage global socio-environmental crises highlights the need to consider the long-term consequences of decisions made under urgencies. The complexity of the crises would call for ample time and expertise which however are lacking as decisions are required immediately. The danger of making serious policy errors in the rush of things looms large. We propose design principles for decision platforms that can better cope with path-dependent policy errors. The principles are based on literature on decision-making and high reliability management, and empirical data from simulation exercises we conducted in 2019 on urgent long-term decision-making with university student groups and the top politicians and administrators of the City of Helsinki, Finland. Existing decision-making procedures need to be complemented with multi-sectoral and multi-disciplinary "policy operations ROOM Xs" that regularly revise long-term sectoral strategies in light of an updated strategic situational picture of ongoing socio-environmental crises.

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THEORY AND NEW IDEAS: ECONOMIC DEVELOPMENT, POST-GROWTH AND HUMAN WELL-BEING

Chair: Jeva Snikersproge

148 Quantifying energy needs for modelling multidimensional poverty

Jarmo Kikstra[1,2], *Jihoon Min*[2], *Narasimha Rao*[3,2], *Alessio Mastrucci*[2], *Keywan Riahi*[2,4], *Joeri Rogelj*[1,2]

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Pathways that limit global warming generally do not include detailed representations of inequality. Distributional considerations are generally not dynamically modelled, and multidimensional inequality or broader wellbeing is rarely considered. Our research uses an energy perspective to link multidimensional poverty and climate. We assess gaps in the provisioning of selected human needs using the Decent Living Standards framework. On a global scale, we find that energy for eradicating poverty and sustaining well-being is not likely to pose a threat for mitigating climate change, with current technologies. For many poor countries in sub-Saharan Africa and South Asia significant growth in national energy consumption is required alongside policies that stimulate a more equal access to services. This work juxtaposes sectoral energy needs for supporting a decent life with residual "affluence", identifying both gaps and mitigation potentials. We highlight this as a method of linking human development with planetary boundaries.

509 Pathways towards a post-growth economy: An empirical exploration of the relationship between the "productive," growth-based economy and the "reproductive," livelihoods-sustaining economy

Ieva Snikersproge

IIAC, EHESS, Paris, France

Based on long-term ethnographic fieldwork and a representative quantitative study in a relatively isolated rural area in France that attracts diverse back-to-the-landers, this paper will explore attempts to create an economy that is constructed on the (re)production of human livelihoods while profiting from the capitalist growth economy only marginally. It will analyze household-level data on livelihood strategies to learn how households combine informal economic practices, state redistribution measures and economic opportunities in the formal market economy to make a living in an economically poor area. The survey will reveal if and how internally diverse settlement in a relatively isolated countryside is conducive for creating new, more autonomous modes of life on the sideways of the productive capitalist economy. This paper aims to contribute to theory about how to create economies constructed around (re)production of livelihoods, not (re)production of capital and thus sketch pathways towards a post-growth economy.

480 Improving ecological life improves economic life

Katharine Farrell

Universidad del Rosario, Bogotá, Colombia

This text develops ecological economics value theory that supports design and implementation of projects of restoration and subsequent sustainable management of rehabilitated ecosystems of planet level relevance for conservation. The mangroves of the Caribbean coast of Colombia serve as the concrete example. Georgescu-Roegen's flow-fund theory of economic production is used to formalize theory concerning how the well-being of non-humans, when treated as a fund, which can be used to provide flows to both humans and non-humans, can be enhanced to support well-being of both humans and the ecosystems upon which they depend. Based on this theory a new ecological economics approach is developed that represents coherent, integral ecological-economic values. This makes it possible to identify concrete situations where it is possible to encourage human activities that improve the quality of non-human life by treating specific levels of quality non-human life as a necessary precondition for quality of human life.

16th June

Thursday
11:10 - 12:40

SUSTAINABLE FINANCE – WITHIN THE FINAL CONFERENCE OF AGREENFIN:
ASSESSING THE EU STRATEGY ON GREEN FINANCE AND ESG FACTORS

499 Sustainable financial investments, values and the climate policy stance

Adrian von Jagow
Vienna University of Economics and Business, Austria

This paper discusses unintended benefits of greening retail finance. Making investors beneficiaries of stringent climate policy could increase public support for policies such as carbon pricing. The threat of climate change necessitates additional investments in mitigation and adaptation by the public and, as has been recently stressed, the private sector. Little attention has been given to the role of small retail investors, despite their financial might. As retail investors are also citizens, buying into the ecological modernization of societies may increase their willingness to support swift climate policies needed to reach the goals of the Paris Agreement. Using new survey data from 1500 people in Austria, this research investigates the personal values and the climate policy stance of retail investors in relation to their green finance experience. The research is highly relevant to policymakers looking to simultaneously increase climate finance volumes and public acceptance of climate policies.

NOTES

17th June

Friday
14:30 - 16:00

SUSTAINABLE FINANCE – WITHIN THE FINAL CONFERENCE OF AGREENFIN:
ASSESSING THE EU STRATEGY ON GREEN FINANCE AND ESG FACTORS

195 Estimating biodiversity-related dependencies and impacts of the Swiss National Bank's equity portfolio

Adrian von Jagow[1], *Chiara Colesanti Senni*[2]

[1]Vienna University of Economics and Business, Austria. [2]Council on Economic Policies, Zurich, Switzerland

Environmental risks are increasingly recognized as a source of financial risks. While research advances on measuring the materiality of climate-related risks have prompted central banks to consider climate change in their monetary policies, biodiversity-related risks have received much less attention. In our research, we address the concern over the impact of financial investments on biodiversity loss and their exposure to biodiversity-related financial risks. Using the ENCORE database, region and sector-specific data at the company level and regionally disaggregated supply chain weights, we show the exposure/impact of the Swiss National Bank's equity portfolio to/on biodiversity. We also highlight the need for evidence-based scenarios of how biodiversity-related risks are endogenously created by economic activities and conduct first steps towards implementing such scenarios. Our results are relevant to financial supervisors and central banks, as their role in managing financial risks from climate change and biodiversity loss grows. Policymakers may benefit from understanding the most important levers to reduce investors' impact on biodiversity.

37 Carbon Risk Premium and Worries about Climate Change and Energy Disruption

Caterina Santi[1], *Angelo Moretti*[2]

[1]University of Liège, Belgium. [2]Manchester Metropolitan University, United Kingdom

This paper sheds light on the impact of public attitudes towards climate change and energy disruption on the pricing of emission (carbon-intensive) and clean (low-emission) stocks. We develop a regional indicator of worries about climate change and energy disruption using data from the European Social Survey Round 8. We classify European regions as little worried, worried and very worried. We confirm previous evidence that emission stocks tend to have higher returns than clean stocks. However, when we focus on stocks quoted in exchange markets located in regions with low level of worries about climate change and energy disruption, we do not find evidence of a carbon risk premium. Conversely, the carbon premium in worried regions is significant for medium-high quantiles of the return distribution.

540 Green finance: contribution to climate policy, supporting factors and barriers

Daniela Kletzan-Slamanig, *Angela Köppl*

Austrian Institute of Economic Research, Vienna, Austria

Public funds are not sufficient for the massive upscaling of investments in climate-friendly technologies, infrastructures, and R&D required for decarbonization. Private funds need to fill this investment gap. The EU's process for greening the financial sector highlights the role of capital markets, new instruments and financial market regulation to reduce investors' uncertainty and climate-related financial risks. We carried out a survey among experts and stakeholders to assess the relevance of green finance in financial markets and climate policy (in Austria) and identify key policies and actors. This allows conclusions about measures that should be integrated in stimulus packages to ensure a Paris-aligned recovery. Green fiscal measures are regarded as the most relevant supporting policies. Financial sector regulation, risk management and green public investments are also seen as important. Otherwise, inadequate national regulation, insufficient consideration of climate-related risks and lobbying by "brown" sectors are perceived as the main barriers.

NOTES

ANNEXES

Call for paper

In June 1972 the environmental crisis was internationally acknowledged by the first UN conference on the Human Environment in Stockholm. Exactly 50 years will have passed when the Pisa 2022 Conference of European Society for Ecological Economics takes place.

Countless papers, conferences, declarations, and policies have attempted to tackle the issue. While some progress has been achieved, overall environmental degradation has become increasingly alarming. Efficiency has dramatically improved; yet, because of rebound effects, consumption of energy and materials has hugely increased, and with it, the amount of waste and emissions that are returned to our environment. The system is locked into unsustainable trajectories and policies have not been capable of freeing us from them.

Many are still fascinated by the myth of exponential growth of the GDP and remain unable to see the other side of the coin, namely the harmful effects that render growth uneconomic. "Ecological transition" is too often thought of as a technological transition, concerning, in particular, the shift towards renewable energy, while there is little awareness that unsustainability is brought about by the abundance of energy. Indeed, energy furnishes us with huge power to interfere with the natural processes.

It was not just the Stockholm UN conference that took place at the beginning of the 1970s; in those fruitful times, Georgescu-Roegen gave us an early warning that technology alone cannot solve the situation; rather, we need to curb the huge waste of energy and matter that does not add to our well-being. After fifty years we know he was right, but we remain hesitant.

While it is true moreover that sustainability is seen largely as a concern for the future, it should be noted that this is a distorted interpretation of the UN's Brundtland report. The focus of the report is stated clearly: it is about needed, regardless of their temporal dimension. Needs are also central to the Agenda 2030 and many of its SDGs. Their achievement requires policymakers to abandon the dominant "growth-centric" paradigm and be brave enough to promote the many instances of change that come from engaged civil society.

The Zeno paradox means that movement, and hence change, is not seen as possible. Change is possible and needed, however. The paradox has been solved by a paradigmatic shift. Similarly, attaining sustainability requires a change in the vision of politicians and the collective imagination.

Will politicians catch up with science and engaged civil society?

What are the transformative actions to escape from the current unsustainable paths?

Student prize

Again, in this Conference the student prize for the best student contribution will be awarded!

To be eligible, papers must:

- be a complete, original, unpublished manuscript in English; hence published (or accepted by a scientific journal) papers are not eligible to take part in the competition
- be led by a student and written by a student as the first or only author
- the status of student is defined as follows: has been a student within the year leading up to the conference (15th of June 2021 in this case)
- where there are multiple authors, include a clear description of the contribution that the student(s) made to work
- represent an original work in ecological economics
- follow standard ethical requirements in research
- be presented as an oral presentation by the candidate during the ESEE conference (poster submissions are not eligible)
- must contain a maximum of 6000 words (excl. tables and figures) and be accompanied by an abstract of max. 150 words
- student representatives are not eligible for competition during their active terms as members of the ESEE board.

To be considered for the prize, students expressed their interest when submitting the abstract to the conference.

The first evaluation step was the preselection of about 20 submissions admitted to the competition. This selection was based on four gradings given by reviewers and used the following criteria: relevance to ecological economics, academic quality, and rigour/clarity/flair of writing. The selected students submitted the full paper by 15th of May. As papers are double-blind peer reviewed, the main text file had not to include any information that might identify the authors.

The second step was the assessment of the full paper by the jury, who selected 6 finalist papers to be presented at the conference in the best student prize session (to large audience). After the presentations the jury will select the three winning papers, which will be announced in the ESEE general meeting, and awarded in the final ceremony.

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Leonardo IRTA

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Pacini Editore published this booklet!

Pacini Editore 150

Finally, the generous contribution of Banca d'Italia made this conference inclusive, accessible to young researchers and open to the civil society.

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