

## BOOK OF ABSTRACTS

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### I. SESSION DESCRIPTION

ID: T11

Telecoupling and interregional flows of ecosystem services: methods and applications

Hosts:

|           | Title        | Name                | Organisation                                | E-mail                          |
|-----------|--------------|---------------------|---|---------------------------------|
| Host:     | Dr.          | María Felipe-Lucia  | Helmholtz Centre for Environmental Research | maria.felipe-lucia@idiv.de      |
|           | Dr.          | Catharina J. Schulp | Free University Amsterdam                   | nynke.schulp@vu.nl              |
| Co-hosts: | Dr.          | Evangelia Drakou    | University of Twente                        | evangelia.drakou@gmail.com      |
|           | Prof.<br>Dr. | Thomas Koellner     | University of Bayreuth                      | Thomas.Koellner@uni-bayreuth.de |

Abstract:

Multiple ecosystem services are provided by ecosystems that are distant from regions in which people benefit. These interregional ecosystem service flows happen through trade, species migration, biophysical or information flows. The appropriation use and management of these services can cause environmental and societal burdens in distant regions, and ecosystem degradation which in turn can influence their sustained provision through telecoupling. However, such telecoupling can be also beneficial for both the sending and receiving region. This session invites presentations on current developments on the study of interregional flows and telecoupling of ecosystem services. Presented work will include recent methodological developments on how to (spatially) assess and model interregional flows and telecoupling across flow types and ecosystems (e.g. linking terrestrial with marine ecosystems), including evaluations of established methods, data needs and development of new models and visualization methods. Contributions can also address valuation of interregional flows and telecoupling against the background of socially optimal allocations of service provision, including aspects of equity and



justice (green grabbing, distributions of costs and benefits). Moreover, contributions are invited that address questions of applicability and policy relevance of assessment of telecouplings and interregional flows. This includes the development of policy instruments to govern and manage different flow types, as well as opportunities to communicate such assessment results.

### Goals and objectives of the session:

Scientific exchange on recent scientific work, meeting of the thematic working group.

### Planned output / Deliverables:

Policy brief

### Related to ESP Working Group/National Network:

Thematic working group: TWG 11 – Global ES Flows

## II. SESSION PROGRAM

**Date of session:** Wednesday, 9 June 2021

**Time of session:** 11:00 – 12:00

### Timetable speakers

| Time           | First name | Surname      | Organization   | Title of presentation  |
|----------------|------------|--------------|--|--|
| 11:00<br>11:15 | Charis     | Chalkiadakis | University of Twente                                 | Assessment of marine ecosystem service flows: A critical literature review                         |
| 11:15<br>11:30 | Giorgio    | Bidoglio     | Senckenberg Biodiversity and Climate Research Centre | Trade-induced displacement of impacts of global crop production on marine ecosystem eutrophication |
| 11:30<br>11:45 | Maria      | Brueck       | Leuphana University Lueneburg                        | Ecosystem service flows from southwestern Ethiopia: a disaggregated analysis with regard to scale  |
| 11:45<br>12:00 |            |              |  | Discussion   |



### III. ABSTRACTS

*Abstracts are ordered based on the session program. The first author is the presenting author unless indicated otherwise.*

#### *1. Type of submission: Abstract*

**B. Biome Working Group sessions: B1 – Bridging the gap between science and policy on marine ecosystem services operationalization in the light of the upcoming EU agenda for 2030**

### **Assessment of marine ecosystem service flows: A critical literature review**

*First author:* Charis Chalkiadakis

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Former research on the concept of marine ecosystem service (ES) flows has emphasized the importance of developing a consistent quantification, modelling and mapping approach towards their assessment. Still, the notion of ES flows has been treated with ambiguity, which limits our efforts towards the implementation of this concept in policy decision-making and marine spatial planning. We outline these knowledge gaps and provide the first systematic review on marine ES flow studies. Our selection was based on explicit eligibility criteria. The large diversity of case studies ranging from ES flows that focus on the biophysical aspect of services to those focusing on the socio-economic side of flows, led us to propose a definition spectrum where we positioned the ES flow indicators accordingly. Our results show that most indicators referring to provisioning or cultural ES flows, measure the benefit flow rather than the service flow, and indicators for regulating ES flows are mostly biophysical in nature. We also extracted information on spatial, non-spatial and monetary methods and provided additional classifications based on the attributes of ES flows, e.g. spatial, temporal and administrative scales, location, etc. Explicit spatial approaches appeared more frequently especially the past five years. Moreover, the large majority of marine flows are examined at local spatial scales (50%), while across-scale interactions are rarely taken into consideration. Our goal is to increase our understanding on ES flow mechanisms in marine social-ecological systems and contribute towards a complete integration of the concept in assessment frameworks. Our research provides guidance on the



selection of assessment methods based on the habitat/service type and spatial scale of the study. Research is still required to cover additional ES flow aspects, including visualization approaches or tools needed for the operationalization of the marine flow concept in diverse assessments.

*Keywords:* service flow, marine, coastal, scale, review

*2. Type of submission: Abstract*

T. Thematic Working Group sessions: T11 – Telecoupling and interregional flows of ecosystem services: methods and applications

## **Trade-induced displacement of impacts of global crop production on marine ecosystem eutrophication**

*First author:* Giorgio Bidoglio

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In our globalized world, local impacts of agricultural production are increasingly driven by consumption in geographically distant places. Current agricultural systems strongly rely on Nitrogen (N) fertilization to increase soil fertility and crop yields. Yet, a large portion of N added to cropland is lost as agricultural runoff potentially leading to eutrophication of coastal ecosystems. By coupling data on worldwide production and N fertilization of 151 crops with a LCA-based model, we first estimated the extent of oxygen depletion occurring in 66 Large Marine Ecosystems (LMEs) due to agricultural production in the watersheds draining into these ecosystems. We then linked this information to crop trading data in order to investigate the global dimension of agricultural production – as a consequence of telecoupled food systems – and the offsite marine eutrophication impacts embodied in the consumption of traded food products. In this way, we characterize how eutrophication impacts are distributed along traded and domestically sourced agricultural products. This allows us addressing questions relevant for sustainable management of food production systems and for analyzing trade-offs in land systems:

- Which crops contribute most to oxygen depletion in LMEs? Which LMEs are affected the most? Which countries exert the largest impacts?
- How much of these global impacts can be attributed to production for export?
- Do the “eutrophication intensities” of production, i.e. eutrophication impact per unit product, differ between traded and non-traded commodities? Does trade affect overall pressure on LMEs?

*Keywords:* international trade, food production and consumption, nitrogen fertilizers, eutrophication of large marine ecosystems, LCA–Life Cycle Assessment

*3. Type of submission: Abstract*

[T. Thematic Working Group sessions: T11 – Telecoupling and interregional flows of ecosystem services: methods and applications](#)

## **Ecosystem service flows from southwestern Ethiopia: a disaggregated analysis with regard to scale**

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*Other author(s):* David J. Abson, Dula Wakassa Duguma, Joern Fischer, Jannik Schultner

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The multifunctional landscape of southwestern Ethiopia is mainly characterized by subsistence agriculture, and well-being is thus tightly linked to ecosystem services. However, resource appropriators in the landscape are becoming more telecoupled to national and global markets. Ecosystem services, such as coffee and honey, increasingly flow to distant regions, with potentially significant impacts on equity, management and well-being within the landscape. Here we present preliminary results from recent fieldwork. We collected data on ecosystem service production and the spatial extent of physical flows of ecosystem products from local experts for nine ecosystem services. Due to lack of official data, we elicited knowledge on flows with the help of a ‘coffee bean’ game, to model spatially disaggregated flows of ecosystem services generated within the landscape (approximately 2,800 km<sup>2</sup>). Based on a hierarchical clustering analysis of nine variables, we split the 66 administrative districts in our study area into four social-ecological groups and use those to interpret the data. Results help to identify social-ecological factors that



influence ecosystem service production and flows. In particular, we can understand better where ecosystem services are generated in the landscape and where they are appropriated (in the landscape or at more distant regions). Showing the segregation of costs and benefits of ecosystem service production, such results can serve as a proxy for understanding who benefits from the ecosystem services generated in the landscape. The results are also relevant for local policy makers, because they can inform landscape management to decide between competing land uses and connected ecosystem services. For a more thorough understanding of the landscape, our approach can be complemented by further analyses of the values ascribed to the physical flows of services and the power relationships between appropriators and final beneficiaries.

*Keywords:* ecosystem service flows, multifunctional landscape, spatial disaggregation, sustainable landscape management, telecoupling