SOCIAL-ECOLOGICAL SYSTEMS INSTITUTE ANNUAL REPORT 2020



→ FACULTY OF SUSTAINABILITY LEUPHANA UNIVERSITY OF LÜNEBURG GERMANY



FOREWORD

The year 2020 posed many challenges around the world. To many, the most visible challenge was, of course, the Covid-19 pandemic. But numerous other challenges that are emblematic of the early 21st century also took their toll in 2020: Multiple records of climatic extremes were broken, wildfires destroyed people's homes, plastic waste found its way into oceans, forests were cleared to make space for industrial agriculture, armed conflicts affected the lives of many, record numbers of refugees left their homes, and species still undescribed by science were forever lost. Global social and ecological connectedness shapes everything, it seems – enabling connections among people across cultures, but also careless exploitation of distant communities and ecosystems to further boost excessive consumption.

It has never been clearer that social and ecological phenomena are intricately intertwined. We cannot solve our socioeconomic problems without addressing our ecological ones. The lives and well-being of all of us directly or indirectly depend on the many contributions of ecosystems – be they food, clean water, fresh air or pollination.

The Social-Ecological Systems Institute was founded at Leuphana University of Lüneburg in 2020 to respond to the interlinked social and ecological challenges that so prominently mark our era. Leuphana's Faculty of Sustainability has engaged in social-ecological systems research for many years. In 2020, researchers interested in social-ecological systems were given a common home in this new institute. This report provides an entry point to find out more about the topics we work on in the Social-Ecological Systems Institute. We hope you will find it interesting – feel free to get in touch with questions or feedback!



Joern Fischer & Berta Martín-López

(Heads of the Social-Ecological Systems Institute)



Some of the social-ecological systems landscapes in which SESI works.

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ABOUT THE SOCIAL-ECOLOGICAL SYSTEMS INSTITUTE (SESI)

The Social-Ecological Systems Institute (SESI) was founded in 2020. It is part of the Faculty of Sustainability at Leuphana University of Lüneburg, Germany. The Faculty is internationally known for its integrative teaching and research in the growing arena of sustainability science. The institute was created to provide a space for like-minded faculty members at Leuphana who are particularly interested in links between social and ecological phenomena. The SESI logo was inspired both by an unfolding fern leaf and by the Celtic double spiral – which symbolises the balance between opposing forces. Arguably, many social-ecological systems are now on an unsustainable trajectory because they have lost this balance.



Leuphana University's central building hosts several research projects conducted by SESI members.

VISION AND MISSION

OUR VISION

We envision a fair world where the benefits generated within social-ecological systems are shared sustainably with other species, both within and across generations. Solutions to sustainability challenges are developed collaboratively across diverse scientific disciplines, knowledge systems, and social interests.

OUR MISSION

To realise our vision, we recognise the need for transformative change. In pursuit of such change we:

- Use place-based social-ecological systems thinking to understand and resolve sustainability challenges such as biodiversity loss and environmental injustice
- Bring together insights and approaches from the natural sciences, social sciences and the humanities in genuinely collaborative endeavours
- Integrate experiences, practices, and understandings from diverse knowledge systems
- Embed tools for transformative change into social-ecological systems thinking via a leverage points perspective
- Develop and apply methods to bridge multiple scales and governance levels
- Provide spaces for people sharing our vision to meet and exchange ideas.

PEOPLE



Prof. Dr. David Abson (secondary affiliation), Junior Professor in Sustainability Economics. I am an interdisciplinary scientist working at the intersection of the natural sciences and economics. I focus on land use change, ecosystem services, systems thinking and transformative changes in social-ecological systems.



Camila Benavides-Frias, Research Associate and PhD student. I am an agroecologist. My research is part of a transdisciplinary project on biocultural diversity, I focus on agroecosystems functioning (integrating social and biological components) and linking it to sustainability topics such as food sovereignty.



Maria Brück, Research Associate and PhD student. I am a sustainability scientist with a background in economics. My PhD work focuses on equity issues related to land use change and ecosystem services in southwestern Ethiopia.



Patricia Santillán Carvantes, Research Associate and PhD student. My project aims to co-design sustainable management strategies that foster biodiversity conservation, nature's contributions to people, and farmers' good quality of life in the context of a tropical dry forest socio-ecological system.



Annika Drews-Shambroom, project coordinator, sustainability scientist. I am mainly in charge of the administrative and team processes, budget, website and social media in the research project "Biocultural Diversity in Farming Landscapes of the Global South".



Dula Wakassa Duguma, Research Associate and PhD student in Ecology. I am working on land use change, biodiversity and ecosystem services in social-ecological systems in southwestern Ethiopia.



Prof. Dr. Joern Fischer, Professor of Sustainable Landscapes. I have a background in landscape ecology and work at the intersection of social and ecological systems. I am particularly interested in biodiversity conservation, food security, and sustainable development in the Global South.



Dr. Jan Hanspach, Junior Research Group Leader. I have a background in ecology and conduct interdisciplinary work on biocultural diversity in the global south as well as on the integration of biodiversity conservation in farming landscapes.



Roman Isaac, Research Associate and PhD Student. I am interested in the role of governance in human-nature interactions. More specifically I focus on the multi-level governance of natural and anthropogenic capitals in the co-production of ecosystem services.



Dr. Tolera Senbeto Jiren, Postdoctoral researcher. My research interest is on the governance of rural development and social-ecological systems. My current work focuses on teleconnected stakeholders' power analysis, and the application of transdisciplinary scenario backcasting in southwest Ethiopia.



Rhoda Nthena Kachali, Research Associate and PhD Student. I am particularly interested in the interface between people and nature and how a better understanding of these interactions can enhance protected area effectiveness and capabilities among people living in and around them.



Dr. David P. M. Lam (secondary affiliation), Scientific Director of the project tdAcademy - Platform for transdisciplinary studies and research. I work on transdisciplinary research methods, processes to increase the impact of sustainability initiatives, and the role of indigenous and local knowledge in change processes.



Prof. Dr. Jacqueline Loos (secondary affiliation), Robert-Bosch Junior Professor in the Sustainable Use of Natural Resources. I research environmental justice in development and biodiversity conservation, applying a social-ecological understanding of protected areas to scrutinize interdependencies between governance arrangements, management effectiveness and social-ecological outcomes.



Prof. Dr. Berta Martín-López, Junior Professor in Sustainability Science. I am a collaborative, inter- and transdisciplinary researcher aiming to understand the role of values, knowledge and institutions in supporting transition pathways towards sustainability. My research relies on the principles of reciprocity and reflexivity, which means that I deeply respect and take care of those who are part of the research process, particularly junior women* researchers and junior researchers from the Global South.



Steffen Pabst, Research Associate and lecturer for sustainable consumption in the sustainability science minor. My research interests include green economics, sustainable tourism and the degrowth economy.



Stefan Ortiz-Przychodzka, Research Associate and PhD student. I am an Ecological Economist with experience in transdisciplinary research with peasant and indigenous communities. I work on topics related to biocultural diversity, agrarian change and social-environmental conflicts.

* refers to all non-male people, which also includes trans-gender, non-binary people and gender fluid people.



Dr. Maraja Riechers, Postdoc researcher. My research interests include leverage points for sustainability transformation, especially in the domain of human-nature relations, including human-wildlife conflicts, and land-use changes.



Dr. Patrícia Rodrigues, Postdoc Researcher. I am an ecologist and my research intersects biodiversity conservation, ecosystem services and drivers of biodiversity change within social-ecological systems in tropical regions.



Tamara Schaal, Research Associate and PhD student. I am a sustainability scientist focusing on issues of biodiversity conservation and collective decision-making. I am interested in biodiversity governance, landscape governance and sustainable land management, conducting qualitative and mixed method research.



Dr. Jannik Schultner, researcher in rural social-ecological systems. I am interested in human-environment interactions, including ecosystem services, human-wildlife conflicts, biodiversity conservation, land use and rural livelihoods, and in mixed methods.



Katharina Janja Sevecke, Research Associate and PhD student. I am an interdisciplinary scientist working on nature valuation with a specific focus on human-carnivore relations.



Dr. Girma Shumi, Postdoc Researcher in social-ecological systems sustainability. I am deeply motivated to enhance the resilience of social-ecological systems and the ecosystem services they produce. My research focuses on land use change, biodiversity (woody vegetation), ecosystem services and human well-being.

RESEARCH HIGHLIGHTS

RESEARCH HIGHLIGHT: BIOCULTURAL DIVERSITY IN FARMING LANDSCAPES OF THE GLOBAL SOUTH

CONTACT: Jan Hanspach (hanspach@leuphana.de)



The BioKultDiv team at the BMBF conference in Bonn (Photo by BioKultDiv): It includes (from left to right) Camila Benavides Frias (PhD student), Dr. Jan Hanspach (project lead), Stefan Ortiz Przychodzka (PhD student), Annika Drews-Shambroom (project coordinator) and Dr. Isabel Diaz Reviriego (Postdoc).

BioKultDiv is one of the junior research groups that are funded through the FONA program by the BMBF (www.fona.de). BioKultDiv is dedicated to assess the role of biocultural diversity for sustainability in farming landscapes of the Global South. In 2020, two PhD students joined the project and completed our team (see image below). Thus, we could jointly attend a conference for all new and running social-ecological research projects funded by the BMBF, where we presented and discussed our research plans. We also entered the second out of five project years. Unfortunately, all our plans to collect empirical data this year had to be canceled or postponed for reasons beyond our control. Instead, we started to conduct literature reviews on ecological aspects of food sovereignty and on economic practices related to biocultural diversity.

In July, our first paper on biocultural approaches in sustainability science was published in the journal People & Nature. In this systematic literature review, we analyzed the scientific publications of the last 30 years, showing that biocultural thinking is increasingly popular in sustainability science. Also, we identified seven different ways of understanding biocultural approaches. These show that biocultural approaches cover a broad range of applications across different contexts including biodiversity conservation, ecosystem restoration, ethics and societal transformations. The results also show that biocultural approaches still lack mainstreaming of issues related to gender, power, action and transformations. A stronger focus on these issues could add to a broader application of biocultural thinking in the future.



Example of biocultural diversity: Local fruits are laid out to share with guests in the Pamir Mountains of Tajikistan. Unfortunately, many traditional varieties and the associated knowledge and practices are in decline -- maintaining them can help to contribute to a sustainable future. (Photo by Jamila Haider)

This year we also started to work with our most important project partner, Fundación TIERRA, a Bolivian NGO dedicated to the search for ideas that contribute to the sustainable rural development of indigenous and peasant communities. As the basis for our collaboration we signed a memorandum of understanding and subsequently set up a first subcontract that further structures our work. In November, we received the first deliverable, which included a detailed social-ecological characterization of our study area, the Chiquitanía, as a preparation for our field work, which was postponed due to the Covid crisis and is now scheduled for 2021.

For further information, visit our project website: www.bioculturaldiversity.de

RESEARCH HIGHLIGHT: EFFECTS OF LAND MANAGEMENT ON THE SUPPLY AND DISTRIBUTION OF ECOSYSTEM SERVICES (ESUDIS)



CONTACT: Berta Martín-López (berta.martin-lopez@leuphana.de)

Ecosystem services are usually conceptualized as being supplied by nature alone. However, there is increasing evidence showing that most ecosystem services are jointly co-produced by different combinations of natural and anthropogenic inputs. The main goal of ESuDis is to understand the different pathways by which natural as well as human, social, technological and financial capitals can be combined to sustainably co-produce ecosystem services and contribute to the equitable distribution of these services.

ESuDis is a joint project by Prof. Dr. Berta Martín-Lopez and Dr. María Felipe-Lucía (UFZ and iDiv), with two PhD students, Jana Kachler (UFZ and iDiv) and Roman Isaac, and funded by Deutsche Forschungsgemeinschaft (DFG). ESuDis is embedded in the Biodiversity Exploratories project. Within three biodiversity reserves in Germany, we investigate how increasing land use intensity in forests and grasslands as well as the substitution of natural capital by anthropogenic capitals affect the supply of multiple ecosystem services, the distribution of those services across different stakeholders and multiple spatial scales, in terms of use and demand, and how supply and distribution relate to the governance of ecosystem services.

For further information, visit our project website: <u>https://www.leuphana.de/en/institutes/sesi/research-projects/esudis.html</u>

The Schorfheide, one of the areas studied in ESuDis.

RESEARCH HIGHLIGHT: LEVERAGE POINTS FOR SUSTAINABILITY TRANSFORMATION



CONTACT: Maraja Riechers (riechers@leuphana.de)

Humanity continues to exceed planetary boundaries. The unprecedented anthropogenic impacts on climate and natural habitats have shaped the new geological epoch, the Anthropocene – which is characterized by biodiversity loss, and degraded functioning and resilience of ecosystems. Despite intensified efforts over multiple decades both in science and society, numerous indicators of social and biophysical un-sustainability continue to worsen, and there is an ever-growing rather than shrinking "sustainability gap".

We argue that a leverage points perspective can help us to identify and trigger interventions for deep transformative change. Leverage points are places in a complex system in which small interventions can have wide ranging influences to bring about system change, and they hold great potential for system transformation. Donella Meadows highlighted 12 places to intervene in a system, which Abson et al. (2017) summarized into four system characteristics. Our current work seeks to further develop the leverage points concept. It specifically focuses on the realm of human-nature connections to unveil concrete interventions and leverage points that may foster a re-connection of humanity to nature.

A leverage points perspective, as developed in SESI, (i) focuses on deep leverage points; (ii) emphasizes and addresses links between shallow and deep leverage points; (iii) bridges between causal and teleological explanations for system change; and (iv) uses the leverage points concept as methodological boundary object to bridge multiple disciplines and

Typical social-ecological landscape in the Lüneburger Heide, Northern Germany.

stakeholders. We have drawn on these four advantages in synthesis work on human-nature relations, as well as in the context of interventions to combat marine pollution. Further work is underway on operationalising the leverage points perspective through combining different scientific epistemologies and methodologies.

To find leverage points and interventions to strengthen human-nature relations, we use the new concept of relational values. Relational values were assessed quantitatively and compared across six study sites in two countries. We uncovered links between the deterioration of human-nature connectedness, relational values and landscape simplification. How local indigenous knowledge plays into the concept of relational values, and how coastal ecosystems contribute to relational values is currently assessed in an international working group. Further, the empirical work done within SESI on relational values is currently synthesized to highlight the lessons learnt on working with this concept.

RESEARCH HIGHLIGHT: THE FUTURE OF BIODIVERSITY CONSERVATION IN FARMING LANDSCAPES IN SOUTH-EASTERN AUSTRALIA

CONTACT: Tamara Schaal (schaal@leuphana.de)



A rocky outcrop in the south-eastern Australian study area.

Ongoing expansion and intensification of agriculture are leading causes for biodiversity loss worldwide. Recent events such as the 2019-2020 bushfires in Australia, which are among the worst in recorded history, have resulted in further losses of habitat for species and ecological communities and added to the urgency of preserving existing habitats and creating on-farm biodiversity in working landscapes. However, protecting biodiversity is often in conflict with agricultural land use, and there is an urgent need to identify trajectories of sustainable land use.

Despite ample academic discussion on, for example, sustainable intensification and land sparing or land sharing, many approaches only provide incomplete solutions for preserving biodiversity, often neglecting complex interactions and wider societal issues. To overcome these limitations, we apply a systems thinking approach to integrate different perspectives, and embrace critical uncertainties and complexities of human-environment interactions. The overarching objective of our project is to harmonise conflicting priorities for land use in farming landscapes. We focus on the Muttama Creek Catchment area, a mixed farming area in South-Eastern Australia. Our study area is a productive farming area whilst at the same time having

remnant areas of box gum grassy woodlands, a threatened ecological community, and species such as the swift parrot, endemic to South-Eastern Australia.

We applied Q-methodology to identify and contrast different local perspectives on integrating farming and biodiversity. We developed a list of 36 statements, asking participants to rank the statements based on what should be considered to integrate farming and biodiversity. In spring this year, we interviewed 94 stakeholders that are affecting or are affected by biodiversity conservation in farming, including farmers, governmental staff and agricultural consultants. Currently, we are analysing these interviews. In spring 2021, we plan on running a series of scenario planning workshops building on these findings. The objective is to develop a range of future scenarios for social-ecological development that encompass the probable, plausible and possible range of futures. Through participatory scenario planning, we will identify the main drivers of change and critical uncertainties to develop scenario logics and narratives. We aim to develop a shared vision and understanding of how agricultural production and biodiversity conservation can be integrated. Last, we will analyse the implications of the scenarios, and identify opportunities to harmonise conflicting priorities.

For further information visit the project website:

https://www.leuphana.de/en/institutes/sesi/research-projects/farming-landscapesaustralia.html

The project is funded by the Deutsche Forschungsgemeinschaft (DFG).

RESEARCH HIGHLIGHT: A SUSTAINABLE BIOECONOMY IN SOUTHWESTERN ETHIOPIA

CONTACT: Joern Fischer (joern.fischer@uni.leuphana.de)



The project team discussing ecosystem services with local government representatives in Ethiopia.

2020 was the first year of this inter- and transdisciplinary project. The project aims to map land use changes, outcomes for ecosystem service flows and biodiversity, and changes in stakeholder roles under different future scenarios. It further aims to engage stakeholders in a process to envision a commonly desired future and to take steps towards that future. The study is set in the rural landscapes of southwestern Ethiopia.

Early in the year, our entire research team of six people went on a first visit to the study region. Here we collected initial empirical data on land uses and ecosystem service flows. We also identified key current and potential future stakeholders, and their influence and interests in the system. Further, we directly engaged with local stakeholders through presentations, handout materials and interactive workshops. Back in the office, we generated spatial maps of alternative future landscape scenarios, designed a novel framework for disaggregating ecosystem services in social-ecological systems, begun mapping ecosystem service flows, and started the analysis of stakeholders and their role in the landscape under the different scenarios. The first papers generated through this project are now being submitted to scientific journals for publication. In our project management and the overall work plan, we had to respond to two major and unforeseen challenges. Firstly, the Covid pandemic made project-related travels and fieldwork temporarily impossible. Secondly, Ethiopia has also seen an increase in political instability, which further restricted our options for data collection. We have now adjusted our work plan to accommodate these difficulties. We increased our use of available data from past projects in the study area, and made more use of remote sensing data and the literature. With some fieldwork now possible through our contacts to colleagues in Ethiopia, we have also been able to resume data collection, albeit not in person. With these adjustments, the project is thus on schedule.

For further information, visit our project website: https://www.leuphana.de/en/institutes/sesi/research-projects/eth-coffee.html and https://foodandbiodiversity.wordpress.com/

The project is funded by the German Ministry for Education and Research (BMBF).

RESEARCH HIGHLIGHT: INDIGENOUS PEOPLE IN SOCIAL-ECOLOGICAL SYSTEMS

CONTACT: David Lam (lam@leuphana.de)



A study landscape.

The role of indigenous peoples and local communities (IPLC) in social-ecological systems research and beyond is attracting growing interest. At SESI, we are convinced that IPLC with their knowledge systems can play a key role for biodiversity conservation, especially in the places where they live. They can contribute valuable insights for how to help society move onto more sustainable pathways because of their long history of stewarding ecosystems and often deep relations to nature. In 2020, members from SESI participated in research that involved IPLC in international environmental assessments, such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). In addition, SESI members led research on initiatives from IPLC and their biocultural approaches, and studied the role of their knowledge systems in sustainability transformations research. Some of this research was presented at the World Biodiversity Forum 2020 conference in Davos, Switzerland.

PUBLICATIONS

SESI publishes across a broad range of journals in ecology and the social sciences. The following list shows publications led or co-authored by SESI members in 2020.

- Acevedo-Osorio, Á., Ortiz-Przychodzka, S. & Ortiz-Pinilla, J.E. (2020). Contributions of agrobiodiversity to the sustainability of family farming in Colombia. Tropical and Subtropical Agroecosystems, 23.
- Adger, W. N., Crépin, A.-S., Folke, C., Ospina, D., Chapin, F. S., Segerson, K., Seto, K.C., Anderies, J. M., Barrett, S., Bennett, E. M., Daily, G., Elmqvist, T., Fischer, J., Kautsky, N., Levin, S. A., Shogren, J. F., van den Bergh, J., Walker, B., Wilen, J. (2020). Urbanization, Migration, and Adaptation to Climate Change. One Earth 3, 396-399.
- Aguilera-Alcalá, N., Morales-Reyes, Z., Martín-López, B., Moleón, M. & Sánchez-Zapata, J. A. (2020). Role of scavengers in providing non-material contributions to people. Ecological Indicators, 117.
- 4. Angessa, A. T., Lemma, B., Yeshitela, K., Fischer, J., May, F. & Shumi, G. (2020). Woody plant diversity, composition and structure in relation to environmental variables and land-cover types in Lake Wanchi watershed, central highlands of Ethiopia. African Journal of Ecology.
- Augenstein, K., Bachmann, B., Egermann, M., Hermelingmeier, V., Hilger, A., Jaeger-Erben, M., Kessler, A., Lam, D. P. M., Palzkill, A., Suski, P. & Von Wirth, T. (2020). From niche to mainstream: The dilemmas of scaling up sustainable alternatives. GAIA, 29, 143-147.
- Ávila-García, D., Morató, J., Pérez-Maussán, A. I., Santillán-Carvantes, P., Alvarado, J., & Comín, F. A. (2020). Impacts of alternative land-use policies on water ecosystem services in the Río Grande de Comitán-Lagos de Montebello watershed, Mexico. Ecosystem Services, 45, 101179.

- 7. Barth, M., Bruhn, A., Lam, D. P. M., Bergmann, M. & Lang, D. J. (2020). Capacity building for transformational leadership and transdisciplinarity. GAIA, 29, 195-197.
- 8. Benavides, C., Arce, A., & Pacheco, L. F. (2020). Common opossum population density in an agroforestry system in Bolivia. In: Acta Amazonica 50 (3), p. 246-251.
- Burgos-Ayala, A., Jiménez-Aceituno, A., Torres-Torres, A.M., Rozas-Vásquez, D. & Lam, D.P.M., 2020. Indigenous and local knowledge in environmental management for human-nature connectedness: a leverage points perspective. Ecosystems and People 16 (1), 290–303.
- Caniglia, G., Luederitz, C., Von Wirth, T., Fazey, I., Martín-López, B., Hondrila, K., König, A., Von Wehrden, H., Schäpke, N. A., Laubichler, M. D. & Lang, D. J. (2020). A pluralistic and integrated approach to action-oriented knowledge for sustainability. Nature Sustainability.
- Dajka, J.-C., Woodhead, A.J., Norström, A.V., Graham, N.A.J., Riechers, M., Nyström, M. (2020) Red and green loops help uncover missing feedbacks in a coral reef social– ecological system. People & Nature 2, 608–618.
- 12. Díaz, S., Zafra-Calvo, N., Purvis, A., Verburg, P. H., Obura, D., Leadley, P., Chaplin-Kramer, R., De Meester, L., Dulloo, E., Martín-López, B., et al. (2020). Set ambitious goals for biodiversity and sustainability. Science (New York, N.Y.), 370, 411-413.
- Dorninger, C., Abson, D. J., Apetrei, C. I., Derwort, P., Ives, C. D., Klaniecki, K., Lam, D. P. M., Langsenlehner, M., Riechers, M., Spittler, N. & Von Wehrden, H. (2020). Leverage points for sustainability transformation: a review on interventions in food and energy systems. Ecological Economics, 171.
- Dorninger, C., Hornborg, A., Abson, D. J., Von Wehrden, H., Schaffartzik, A., Giljum, S., Engler, J. O., Feller, R. L., Hubacek, K. & Wieland, H. (In press). Global patterns of ecologically unequal exchange: Implications for sustainability in the 21st century. Ecological Economics, 179.
- 15. Engler, J. O., Abson, D. J. & Von Wehrden, H. (2020). The coronavirus pandemic as an analogy for future sustainability challenges. Sustainability Science.

- 16. Fazey, I., Schäpke, N., Caniglia, G., Hodgson, A., Kendrick, I., Lyon, C., Page, G., Patterson, J., Riedy, C., Strasser, T., Verveen, S., Adams, D., Goldstein, B., Klaes, M., Leicester, G., Linyard, A., Mccurdy, A., Ryan, P., Sharpe, B., Silvestri, G., Abdurrahim, A. Y., Abson, D., et al. (2020). Transforming knowledge systems for life on Earth: Visions of future systems and how to get there. Energy Research and Social Science, 70.
- 17. Fischer, J. (2020) A change of values is in the air. Nature Sustainability.
- Fischer, J., Riechers, M., Loos, J., Martin-Lopez, B. & Temperton, V. M. (2020). Making the UN Decade on Ecosystem Restoration a Social-Ecological Endeavour. Trends in Ecology and Evolution.
- 19. Fust, P. & Loos, J. (2020). Development perspectives for the application of autonomous, unmanned aerial systems (UASs) in wildlife conservation. Biological Conservation, 241, 108380.
- 20. García-Llorente, M., Castro, A. J., Quintas-Soriano, C., Oteros-Rozas, E., Iniesta-Arandia, I., González, J. A., Del Amo, D. G., Hernández-Arroyo, M., Casado-Arzuaga, I., Palomo, I., Gómez-Baggethun, E., Onaindia, M., Montes, C. & Martín-López, B. (2020). Local perceptions of ecosystem services across multiple ecosystem types in Spain. Land, 9.
- 21. Giliba, R.A., Mpinga, I.H., Ndimuligo, S.A., Mpanda, M.M. (2020). Changing climate patterns risk the spread of Varroa destructor infestation of African honey bees in Tanzania. Ecological Processes, 9, 48.
- 22. Giliba, R.A., Yengoh, G.T. (2020). Predicting suitable habitats of the African cherry (Prunus africana) under climate change in Tanzania. Atmosphere, 11, 988.
- Hanspach, J., Haide, L.J., Oteros-Rozas, E., Olafsson, A.S., Gulsrud, N.M., Raymond, C.M., Toralba, M., Martín-López, B., Bieling, C., García-Martín, M. and Albert, C., (2020). Biocultural approaches to sustainability: A systematic review of the scientific literature. People and Nature.
- 24. Horcea-Milcu, A. I., Martín-López, B., Lam, D. P. M. & Lang, D. J. (2020). Research pathways to foster transformation: Linking sustainability science and social-ecological systems research. Ecology and Society, 25.

- Iniesta-Arandia, I., Quintas-Soriano, C., García-Nieto, A. P., Hevia, V., Díaz-Reviriego, I., García-Llorente, M., Oteros-Rozas, E., Ravera, F., Piñeiro, C. & Mingorría, S. (2020). How can feminist and postcolonial science studies contribute to knowledge coproduction? Insights for IPBES. Ecosistemas, 29.
- 26. Ives, C. D., Freeth, R. & Fischer, J. (2020). Inside-out sustainability: The neglect of inner worlds. Ambio, 49, 208-217.
- 27. Jacobs, S., Zafra-Calvo, N., Gonzalez-Jimenez, D., Guibrunet, L., Benessaiah, K., Berghöfer, A., Chaves-Chaparro, J., Díaz, S., Gomez-Baggethun, E., Lele, S., Martín-López, B., et al. (2020). Use your power for good: Plural valuation of nature – the Oaxaca statement. Global Sustainability, 3.
- Jiren, T. S., Dorresteijn, I., Hanspach, J., Schultner, J., Bergsten, A., Manlosa, A., Jager, N., Senbeta, F. & Fischer, J. (2020). Alternative discourses around the governance of food security: A case study from Ethiopia. Global Food Security, 24.
- 29. John, E., Bunting, P., Hardy, A., Roberts, O., Giliba, R., Silayo, D.S. (2020). Modelling the impact of climate change on Tanzanian forests. Diversity and Distributions, 26, 1663-1686.
- 30. Klaniecki, K., Duse, I. A., Lutz, L. M., Leventon, J. & Abson, D. J. (2020). Applying the energy cultures framework to understand energy systems in the context of rural sustainability transformation. Energy Policy, 137.
- 31. Klaniecki, K. D., I.O. Engler, J.O. Leventon, J. Abson, D.J. (In press). Energy conservation attitudes and intentions: investigating place attachment in Eastern Transylvania, Romania. Psyecology.
- Kleemann, J., Schröter, M., Bagstad, K. J., Kuhlicke, C., Kastner, T., Fridman, D., Schulp, C. J. E., Wolff, S., Martínez-López, J., Koellner, T., Arnhold, S., Martín-López, B., Marques, A., Lopez-Hoffman, L., Liu, J., Kissinger, M., Guerra, C. A. & Bonn, A. (2020). Quantifying interregional flows of multiple ecosystem services – A case study for Germany. Global Environmental Change, 61.
- 33. Koricho, H. H., Shumi, G., Gebreyesus, T., Song, S. & Fufa, F. (2020). Woody plant species diversity and composition in and around Debre Libanos church forests of North Shoa Zone of Oromiya, Ethiopia. Journal of Forestry Research.

- 34. Lam, D. P. M., Hinz, E., Lang, D. J., Tengö, M., Von Wehrden, H. & Martín-López, B. (2020). Indigenous and local knowledge in sustainability transformations research: A literature review. Ecology and Society.
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COURSES TAUGHT BY SESI

SESI members teach a diversity of subjects at the Bachelor, Master and PhD level. These include:

- African protected areas at the crossroads between justice and conservation
- Basics of inter- and transdisciplinarity
- ---- Basics of sustainable development
- ---- Biodiversity conservation and food security
- ---- Conservation ecology
- Current status and challenges of coastal systems a social-ecological perspective
- ---- Ecological restoration for sustainability
- ---- Environmental justice in conservation and development
- ----- Environmental sciences an introduction
- Finding leverage points to combat marine pollution
- ----- Fundamentals of sustainability economics
- Introduction to spatial sciences
- Indigenous and local knowledge in transformative transdisciplinary research
- ---- Knowledge, values and actions in sustainability science
- ---- Methods of environmental sciences
- Social-ecological systems thinking to integrate food security and biodiversity conservation
- ----- Sustainability economics and assessment
- The economics of biodiversity and ecosystem services
- Writing a journal article

THESES COMPLETED IN 2020

The following theses were completed in 2020 after supervision or co-supervision by SESI members.

PHD THESES

- Dr. Anoush Ficiciyan: Performance of organic and conventional crop varieties and species mixtures under stress
- Dr. David P.M. Lam: Bottom-up sustainability transformations: Supporting local actors fostering change towards sustainability
- Dr. Patricia Rodrigues: Prospects for tropical forest biodiversity in the landscapes of southwestern Ethiopia: conservation in a context of land use change and human population growth
- Dr. Emmeline Topp: Butterfly diversity and land manager decision-making in critically endangered South African renosterveld

MASTER THESES

- Food security and climate change resilience of communal farming systems A case study in rural Zambia
- Internal Carbon Pricing in Cities
- Development as freedom The case for a Universal Basic Income to supplement Local Food Sovereignty Movements
- Initiation of motivation in stakeholders to actively participate in digital real world laboratories
- Contributions of Wild Food Plants in Leveraging Household Food Security and as Climate Adaptation Strategy
- Knowledge Network Analysis of Conservation in Renosterveld a critically endangered ecosystem in the Cape Floristic Region, South Africa

BACHELOR THESES

- The impact of a possible CO2 tax on small enterprises in the agricultural sector
- Analysis of Vegetation and Ecosystem Functions in two National Parks in Tanzania and Zambia using remotely sensed satellite imaging and the normalized difference vegetation index
- Preserving Colias myrmidone in European cultural landscapes: requirements for the successful development from egg to higher larval stages in a Natura 2000 site in Romania
- Policies and governance affecting farmland biodiversity conservation A case study of Colias myrmidone in Romania
- Kollektives Mikrobecken-Management als nachhaltiger Beitrag zur Wassersicherheit --Fallanalyse Honduras
- ---- Food Hubs in Europe -- towards a sustainable food culture
- Socio-ecological resilience of smallholder maize producers to climate change in Tlazala, Mexico
- Eco-anxiety at Leuphana University -- to what extent are students at Leuphana University affected by climate fear?
- Evaluation of bird data in the protected area "Lueneburger Ilmenauniederung mit Tiergarten" for the years 2014-2019
- Diversity of butterflies and hoverflies and stability of flower inspection networks in flower strips of agricultural landscapes in Lower Saxony
- Regeneration potential of agricultural habitat management for floristic diversity
- How to understand and manage wild and domesticated species in Asia. A qualitative content analysis of the IPBES regional assessment on Indigenous and Local Knowledge and Practices related to Biodiversity Services in Asia
- Vision quest and personal sustainability: Exploring possible promotions of (sustainability relevant) inner resources through experiencing human-nature connectedness
- The focus of three European actors in sustainability problems on different marine pollution issues – a systemic problem analysis approach

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- The power of knowledge Local and traditional ecological knowledge in coastal ecosystems in the Global South
- What is a Cradle to Cradle Company and what measures need to be implemented to enable the transformation?
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