ISOE
Institute for Social-Ecological Research

The Institute's Strategy 2024—2030

Content

1 A World in Transition: Starting Points for Our Research

Can sustainability be achieved through technological developments or does it require profound transformations of lifestyles? What demands are associated with social-ecological transformations and how are these demands linked to the increase in anti-democratic tendencies? What does a good life mean today, who can afford (non-)sustainability and what futures and development pathways are desirable? Such questions are currently the subject of extremely heated and controversial debates in society – not just in Germany. The fundamental changes experienced in recent years have led to a massive increase in the intensity of these debates.

While more and more people in civil society, business, administration and politics are committed to sustainability, resistance is also growing – especially when it affects one's own way of life or economic sector. In addition, growing uncertainty in parts of society triggered by the rapid succession of overlapping exceptional situations is also contributing to this palpable resistance. Crises such as the COVID-19 pandemic, the wars in Ukraine and the Middle East and the associated economic rifts and social tensions have stoked fears: many people are not only concerned about the consequences of global warming or the loss of biodiversity, but also see their economic situation and social status threatened – by the rising cost of living, an increasingly multi-ethnic society and interference with their personal life, work and mobility habits. The increasing erosion of trust in democratic institutions, growing political polarization and the emergence of new geopolitical power blocs and anti-democratic movements are making the search for political agreements at national and international level more and more difficult.

There is clear scientific consensus about what needs to be done to sustain the foundations of life and provide a good life for all. Staying within planetary boundaries will require far-reaching changes in current lifestyles and economic practices, and thus in the relationship between society and nature. This is emphasized by the latest reports of the World Biodiversity Council IPBES and the Intergovernmental Panel on Climate Change IPCC. But while scholars increasingly agree on the need for far-reaching transformations, and a variety of ideas and solutions have been developed, one crucial question remains unanswered: In the face of escalating conflicts and inequalities, how can society achieve the necessary transformations?

For this reason, we, the ISOE – the Institute for Social-Ecological Research – are placing the question of how sustainability transformations can be shaped at the center of our Strategy 2024–2030.

How can transformations towards sustainability be shaped?

Our transdisciplinary research aims to demonstrate how the current challenges can be adressed in specific contexts in a sustainable and fair way, and how conflicts can be handled collectively and constructively. We focus on situations where transformation conflicts are manifesting in relation to use of water, land and biodiversity, as well as to human settlement and consumption, in order to analyze causes and effects of conflicts, and to identify creative management and governance approaches to address them. We focus on examples of where change is happening because people are working on solutions for a more sustainable society – whether through social innovations such as post-fossil mobility cultures or technical infrastructure systems – to learn from their experiences. Finally, we focus on the relationships between science and society, because science itself must be transformed in order to produce knowledge that can genuinely influence societal change.

Given the magnitude of the challenges ahead, new ideas and approaches are needed to shape transformations towards sustainability; these must respond to the urgency of the global and local social-ecological crises, take into account options for action available to different societal actors, and create the conditions for a fair distribution of benefits and burdens.

In the coming years, our strategy will guide us in our efforts to generate knowledge that is both critically reflected and effective, and to help shape changes toward sustainability in collaboration with our partners in science, civil society, administration, and business. In doing so, we aim to raise ISOE's profile as a regionally, nationally, and internationally acknowledged organisation for knowledge production, critical reflection and shaping of transformations towards sustainability.

2 What we stand for: ISOE's strategic goals

2.1 Vision

> "We explore transformations towards sustainability,
> in which people participate with all their diversity,
> in which conflicts are negotiated constructively and
> in which society and nature can flourish together."

2.2 Mission

1. **We investigate the complex interactions between people, society and nature** to understand how transformation processes unfold, are enabled or blocked, and how they can be shaped towards sustainability.
2. **We combine approaches and understandings** developed by the natural and social sciences, engineering, and humanities as well as between science and society in order to jointly gain new, critically reflected insights and unfold innovative sustainability pathways.
3. **We develop systemic solutions** that address the complexity of current challenges. In doing so, we consider societal, economic, political, technological and ecological aspects, as well as potential risks, trade-offs and synergies between sustainability goals.
4. **We contribute our scientific expertise to current societal and political debates** and work closely with actors from civil society, administration and business. **We also teach at Universities** to help build younger generations' knowledge and enhance their competencies for change agency in science and society.
5. **We create and shape spaces for fundamental change** in society and science where transformations towards sustainability can be explored and reflected upon, and where social learning becomes possible.

2.3 Institutional culture

Transdisciplinary excellence: Our staff members conduct research in inter- and transdisciplinary teams according to the highest ethical and scientific standards. Their diverse professional backgrounds, methodological expertise and practical experience enable us to implement effective and transformative research

Critical reflexivity: Throughout the entire research process, we always critically reflect on our role as researchers, the assumptions and limitations of available knowledge and possible unintended side effects. In doing so, we become aware of conflicting interests, power asymetries and the limitations of the various forms of knowledge. We make uncertainties and non-knowledge transparent in the team and in our research results.

Social-ecological justice: Our work is based on a sense of responsibility for the well-being of society and nature. The principle of social-ecological justice guides both our research and our entrepreneurial activities.

Shared responsibility: At ISOE, we believe in teamwork and value the unique skills of each individual. By working together in a mindful and resource-oriented way and by sharing responsibility, we create the efficiency and goal-orientation that we need in order to meet our ambitions as a third-party-funded research institute.

3 What we do: Transdisciplinary research and teaching for shaping transformations towards sustainability

For more than 35 years, ISOE has been addressing issues of (un)sustainable development. ISOE scientists have been pioneers of transdisciplinary, social-ecological sustainability science. They developed key methods and theoretical insights for establishing and further developing the young area of social ecology science and applied them to various challenges such as water scarcity, mobility and urban development. Over the years, new topics such as biodiversity loss and plastic pollution were added. All along, the focus on transdisciplinary social-ecological research was maintained. Indeed, we are still convinced today that transformations towards sustainability pathways require effective and actionable knowledge that can only arise if different perspectives and forms of knowledge from science and society are critically reflected, valued and integrated. Therefore, a transdisciplinary approach is needed to generate knowledge for targeted action in practice.

We have realigned our organizational structure to focus even more on questions of how to shape transformations towards sustainability. Since 2023, we have been working in five research units and three hubs. In the research units, our scientists work on empirical questions related to topical sustainability challenges on a project-by-project basis and develop pathways for addressing them together with practitioners. In the cross-cutting hubs, we develop and scrutinize concepts and theories of social ecology. The systematic exchange between empirical research and theoretical work guarantees that our research is both scientifically sound and relevant to practice. In addition to research, we are also involved in teaching and science communication.

The strategic goals of our research units, hubs, teaching and knowledge communication are presented in the following sections.

Figure 1: Strategic goals and structures of ISOE

3.1 Our research units

In our five research units, we follow distinct research strands. But all of them also engage with and contribute to our overarching, common research question: How can transformations towards sustainability be shaped?

3.1.1 Water and Land Use Research Unit

Water and land are fundamental resources for food security, economic development, social stability and ecological integrity. The two resources are closely interconnected as a nexus and influence each other, for example when droughts lead to forest dieback, which in turn affects water quality. Global warming, competing user interests, and demographic and economic developments increase the complexity of these interactions and the uncertainties regarding resource availability and quality. This leads to problems because established forms of continuity-based management often cannot cope with dynamic change, be it in the form of gradual processes such as soil degradation and water pollution, or extreme events such as droughts and floods.

In the Water and Land Use Research Unit, we therefore investigate and develop sustainable management and governance strategies that take into account both gradual changes and extremes in the water–land nexus. We have two research strands: First, we want to identify critical developments at an early stage in order to prevent threats from extremes and tipping points for sustainable water supply and land use. Second, we want to understand how conflicts between different interest groups can be addressed in order to shape transformations towards sustainable and equitable resource governance.

Extremes and Tipping Points

Extreme events such as droughts and floods can be induced by the interaction between hydrological processes and land use decisions. Such extremes are becoming more likely, because hydrological processes are intensified by climate change and accelerated by the rate at which humans are altering the environment. We are investigating the causes of these extreme events and capturing the evidence-based risks they pose to better understand developments of the water–land nexus. How are droughts and floods likely to evolve in future? How will they affect ecosystems and society? How can society prepare itself for such extreme events?

Extreme events disrupt social-ecological systems or even cause them to collapse. For this reason, we are also investigating tipping points that develop in the water–land nexus not only due to disturbances such as extreme events, but also as a result of gradual changes. In this context, ecological processes and societal action are closely intertwined. For example, we're asking how the drought-related decline of large forests in Germany will affect water quality? We are interested in understanding what happens when large amounts of nitrate suddenly leach into groundwater in some regions of Germany? And how can ecological disasters such as fish death in the River Oder be avoided in future?

Conflicts and Governance

Competing usage interests between communities, agriculture and industry can lead to conflicts. Extremes and tipping points – similar to the development of adaptation and mitigation strategies – can either exacerbate these conflicts or create new ones, for example, when available water resources become scarcer in times of drought. In our research, we view such conflicts not only as a threat. We also see them as an opportunity to develop strategies for more sustainable resource management. For this reason, we study both the causes and the dynamics of the conflicts as well as the potential that can arise from them. What are the preconditions, obstacles and synergies for an adapted management of water and land resources? What can win–win situations look like?

A better understanding of the various actors and their everyday practices and decision-making processes is also crucial to understanding how governance can shape sustainable and just transformations. What values, interests and perspectives do actors have regarding the problem? How do they deal with norms? How do their use and regulation practices modify access to resources? In the face of rapidly evolving problems and increasing uncertainty, how can solution-oriented decisions be made? We are working on these and other questions together with partners from the field – aiming to develop transformative conflict management processes and governance strategies at the water–land nexus.

3.1.2 Biodiversity and People Research Unit

Biodiversity is indispensable. The diversity of natural habitats and species forms the basis of human existence. It provides food, clean water and recreation. Changes in biodiversity therefore have social consequences and the rapid loss of biodiversity is destabilizing ecosystems worldwide. Far-reaching consequences are manifesting in a "biodiversity crisis" that has the potential to affect human livelihoods as drastically as the "climate crisis". Many efforts have been made in recent years to reverse the trend, but measures taken to date to protect biodiversity have only been partially successful.

We are convinced that the social causes of the biodiversity crisis have so far been insufficiently considered and understood. In the Biodiversity and People Research Unit, therefore, we explicitly focus on the question of what attitudes exist toward biodiversity and how to promote behaviors that protect it. To this end, we examine the values and norms of societal actors such as farmers, gardeners, consumers, and businesses, as they influence the way biodiversity and ecosystem services are used. We want to understand what demands do different actor groups have and what are the patterns of use that contribute to biodiversity loss? What are the trade-offs with climate protection? How can behavioral changes that can promote a trend reversal be enhanced?

To gain a comprehensive picture of the multiple and complex interactions between biodiversity and people, we take an integrative approach. Building on this, our second research focus is to develop new perspectives on appropriate measures that combine the protection and use of biodiversity in new ways

Indirect drivers and societal causes of biodiversity loss

To bend the curve of biodiversity loss, the indirect drivers of biodiversity loss need to be better understood. Unlike direct drivers such as unsustainable land use or pollution, global warming, invasive species or pesticide use, indirect drivers are societal factors that have been the subject of little research. These include values and behaviors, demographic changes, different lifestyles, and framework conditions set by businesses and politics. We analyze the different roles of societal actors, their awareness of biodiversity, their motivations for action, their demands on and their practices in dealing with biodiversity. This enables us to identify the social-ecological causes of biodiversity loss and to identify options for effective change.

Conceptualizing and reorienting future biodiversity protection

To halt the loss of biodiversity and to influence changes in biodiversity in a positive way, there is a need for transformative change in society and politics. Such transformation requires a change in awareness, new practices and new perspectives for the protection of biodiversity. This is why we are addressing the following questions, among others: How can biodiversity conservation be better integrated into everyday practices? How can society come to an understanding of what biodiversity is worth protecting and who can make what contribution to this? For a new understanding of biodiversity conservation, it is crucial that biodiversity and people are no longer seen as separate entities. Instead, as a starting point for further research and future action, we need to understand the many connections and interrelationships between them. We are therefore exploring use and management strategies that reconcile the conservation and use of biodiversity.

3.1.3 Coupled Infrastructures Research Unit

Infrastructure is essential for the provision of public services, such as the supply of drinking water, energy and heat, or the disposal of wastewater and waste. It also plays a key role in efforts to adapt to climate change: With increasing heat waves and droughts, heavy rainfall events, anthropogenic pollution, and dwindling resources, infrastructures face profound challenges that could jeopardize their ability to function. How they are designed and transformed in future, and how they are used by society, will therefore have a major impact on whether resources can be used in an efficient and equitable way. Simple adjustments are not enough. Rather, the new conditions require transformations of the various infrastructure systems.

The aim of the Coupled Infrastructures Research Unit is to develop sustainable infrastructure systems for a circular society. In two research strands, we consider infrastructures as dynamic systems characterized by the continuous interaction of social patterns, political decisions and technical networks. We ask: How can infrastructures help to establish circularity as a principle of sustainable society based on resource efficiency, reuse and recovery? Starting with water infrastructures, we look at linkages with the energy and agricultural sectors, as well as with urban green spaces and urban waters. Equitable access and multifunctional use of these infrastructures are central concerns. How can the complex planning, implementation and management of such new coupled infrastructure systems be achieved? We design scenarios, evaluate sustainability options, and develop strategies for shaping social-ecological transformation processes.

Social-Ecological Transformation Management

Transformations of infrastructure systems require changes within several dimensions: in technology, knowledge, forms of cooperation and management practices. We explore how social-ecological transformation management approaches can be used to open development pathways for the sustainable

(re)design of infrastructures that take into account the potentials for change in these different dimensions. We focus on the following questions: How can infrastructure systems be sustainably transformed through social-ecological transformation management? How can existing path dependencies be overcome? How do social-ecological innovations influence the transformation of infrastructure systems? How can they be applied on a broad scale? With the help of transdisciplinary methods, we also investigate how social-ecological transformation management can be better designed and shaped, and what role the piloting of innovations plays in this process.

Coupling infrastructure systems for circular societies

Coupling different systems requires complex, synchronous transformation processes that must be well coordinated. Our research focuses on how this co-transformation of coupled infrastructure systems becomes possible: How does cross-sectoral infrastructure planning succeed? What barriers to transformation need to be overcome and how can cooperation between actors from different infrastructures be fostered? We want to understand what synergy effects can be achieved when different systems are linked and how trade-offs can be resolved. We also investigate how infrastructural transformation processes can be embedded in society in such a way that they contribute fairly and effectively to a circular society. We develop visions and transformation pathways across sectors and examine how user practices relate to the decisions of infrastructure operators.

3.1.4 Sustainable Society Research Unit

It is evident that maintaining current resource-intensive consumption patterns is not possible within planetary boundaries. Technological innovation alone is not considered to be enough to achieve sustainable development. The potential for social innovation to reduce resource consumption remains untapped because implementing social innovations requires far-reaching changes – not only in everyday routines and practices, but also in infrastructure and institutions.

In the Sustainable Society Research Unit, we are therefore investigating the factors that facilitate or impede the necessary changes in everyday practices in the areas of housing, transportation, recreation, and nutrition. We look at the tensions and blockages that can arise from various needs, conflicts of interest, and unequal power relations. We inquire into how needs and individual actions are linked to policies, regulations, technical infrastructure, and ecological processes. We are convinced that sustainability requires conceptual frameworks, strategies and spaces for experimentation. In these spaces, individuals and organizations are given the opportunity to recognize often unconscious unsustainable practices in everyday life, to break with established patterns and to try out new things. We support these processes of experimentation and learning in our three research strands.

Transformation of built environment for quality of life, climate adaptation and biodiversity

The challenges posed by urbanization, social change, global warming and biodiversity loss are particularly evident in cities. In addition to the question of how cities and municipalities can contribute to biodiversity and adaptation to global warming, we are also concerned with how citizens' quality of life can be improved by enhancing urban ecosystems. How can traffic infrastructure and urban and industrial sprawl be reduced and converted to green infrastructure, and how can the resulting conflicts be managed constructively? We investigate what opportunities cities should offer for experiencing nature, how conflicts between humans and nature can be resolved, and what role nature-based solutions play. Our research contributes to the effective and participatory design and shaping of such solutions.

Post-fossil mobility cultures

Motorized transport continues to be a major contributor to environmental degradation, global warming and health problems. But the necessary "mobility turn" is stalling and related discussions ignite conflicts about how to use public spaces. How can conflicts and obstacles be overcome on the way to a post-fossil mobility culture? We are researching how to establish environmentally friendly and climate-neutral means of transport, so that dependence on private cars is reduced and a combination of mobility options becomes the norm. Our research focuses on the question of how to develop such services in a fair and participatory way and how to roll them out broadly.

Sufficiency in everyday life and in companies

Sufficiency means meeting human needs while using fewer natural resources, so that a good life within planetary boundaries is possible for all.

There is great scope for change – from everyday life to municipal public services and entrepreneurial activity. But what strategies are appropriate for promoting efficient use of resources and energy and enabling sufficiency in the areas of housing, consumption and nutrition? We develop strategies to make everyday practices and value chains more needs-oriented and resource-efficient. In social learning processes, we investigate and test the potential for fostering sufficiency-oriented lifestyles within institutional, organizational, and political contexts. Additionally, we assess the feasibility of acquiring the skills necessary for sufficiency-oriented practices.

3.1.5 Transdisciplinarity Research Unit

Transdisciplinary research is considered a key mode of research in transformation-oriented sustainability science as pursued by ISOE in the four research units mentioned above. This is because the complex challenges associated with social-ecological transformations cannot be solved within the boundaries of individual disciplines. Addressing them requires cooperation between the natural sciences, social sciences, engineering and the humanities, and with societal actors from politics, business and civil society. As a comparatively young research mode, however, transdisciplinarity still meets with skepticism in parts of the scientific community.

The aim of the Transdisciplinarity Research Unit is to further develop methods and approaches for transdisciplinary research and to promote their establishment in the scientific system. We therefore address the full range of transdisciplinary issues in three research strands: conceptual and theoretical foundations, empirical applications, and science–policy questions. Quality assurance of transdisciplinary cooperation as well as research on impact are at the core of our work. In addition, we reflect on how the science system itself can be transformed and what role transdisciplinarity plays within the transformed system. With our research, our counselling services and our scientific support for transdisciplinary projects, research institutions and funding programs, we contribute to ensuring the high quality of transdisciplinary research and to strengthening its societal effectiveness.

Quality assurance in transdisciplinary collaboration

Classical evaluation and quality assurance procedures for scientific work fall short of what is needed in transdisciplinary research, as they do not sufficiently take into account the diversity of disciplines and social perspectives involved. Our research is therefore dedicated to central questions of quality assurance for good transdisciplinary collaboration: What are the quality criteria for good transdisciplinary research practice? What criteria are relevant for researchers, research funders and societal actors in the global North and global South? We also examine issues related to power relations and justice in

research processes, to knowledge transfer, and to the risks and potentials of digitalization and artificial intelligence.

Societal impact of transdisciplinary research

Impact is a central feature of transdisciplinary research. We see transdisciplinary collaboration as a way to shape social learning processes that goes far beyond projects' research activities. But how do the impulses for change initiated in transdisciplinary processes contribute to the overarching desired transformations? And how can societal impacts be effectively captured? We explore these questions as part of our studies of and reflection on impact. In doing so, we also consider the interaction between research and experimental spaces in which change can be tested and experienced.

Transformations of the science system

To understand how transdisciplinary research can be better embedded in the science system, we are also studying its scientific impact. We ask what changes transdisciplinary research brings to scientific knowledge, to scientists and their careers, and to traditional disciplinary research institutions. We also examine how research institutions and funding agencies can integrate transdisciplinary research into their structures and incentive systems to promote scientifically excellent and socially relevant research. We discuss the results of our research in networks, with research partners and funding agencies, in order to contribute to the transformation of the science system.

3.2 Our theoretical foundation: social ecology

Social Ecology is a transdisciplinary research area that investigates how people, society and nature interact materially-energetically and culturally-symbolically, and how these interactions can be encouraged along more sustainable trajectories. Understanding and shaping are inseparable in such transformation-oriented science, because transformative potentials can only be studied by actively shaping and testing alternatives.

ISOE scientists were among the founders of this emerging field. They recognized early on that the theories, conceptual frameworks, and methods of established disciplines need to be expanded to understand the complex relationships between social and natural processes and to develop solutions to social-ecological crises.

The development of social ecology to date has focused on the investigation of social-ecological problem constellations, for example through social-ecological systems analysis. The focus on actors' unequal capacity to act, characterised by social power relations (gender, class, ethnicity), has always been key. However, the conceptual integration of transformation research approaches into social ecology is still in its infancy. For us, therefore, further development of the theoretical and conceptual foundations of social ecology at ISOE in the coming years will imply addressing the overarching question of how social-ecological transformations can be shaped towards sustainability.

By social-ecological transformations we mean fundamental, system-wide reorganizations of society–nature interactions enabling shifts towards more sustainable and just trajectories. These shifts are the result of deliberate societal interventions and emerging social-ecological dynamics that involve changes in ecosystems, physical infrastructure, social networks, practices, power relations, knowledge, values and norms. Transformations are usually contested and can spark hope, but also fears of loss, fuelling conflict. This understanding of social-ecological transformations involves analytic-descriptive, normative, and political-strategic dimensions.

Our theoretical work focuses on two strategic objectives:

- Advancing our social-ecological approaches through an in-depth dialogue with international sustainability and transformation research,
- Generalizing findings from transdisciplinary case studies by systematically relating empirical research and theory.

a) Advancing social-ecological approaches

At ISOE, we conduct research using three different epistemic approaches to social ecology and will develop these further. They all form their own, mutually inspiring, analytical-conceptual thinking space for structured, transdisciplinary research. Work along these epistemic paths is organised as three hubs.

Social-ecological systems

From a systemic perspective, we look at the complex and dynamic relationships between social actors and natural resources, as well as between the actors themselves. This is based on the conceptual framework of social-ecological systems. This approach is particularly well suited to understanding the multiple socio-environmental crises of our time, as they reflect highly interconnected changes, particularly in climate, biodiversity and land use, as well as related lifestyles and values in society.

The aim of our conceptual-theoretical research is, on the one hand, to advance the foundations of a social-ecological understanding of systems in such a way that problem constellations characterized by different scales and contexts of action can also be captured. On the other hand, we address the question of how deliberate transformation processes can be integrated into systems approaches in order to identify the conditions under which social-ecological transformations can be successful.

Practices and infrastructures

The second perspective focuses on the interactions of practices and infrastructures in shaping social-ecological transformations. The focus here is on societal actors and their everyday practices as well as the socio-technical systems that determine them. This approach focuses on the actors and their routines, motivations and interests as well as the path dependencies and inertia in the transformation of energy-, resource-, and land-intensive technologies and infrastructures that enable the social practices.

At the centre of the theoretical-conceptual development of this approach is the question how conceptualisations of infrastructurisation can be extended to include the perspective of collectively shaping change. In this way, we will contribute to the conceptualisation of the interplay between infrastructures and practices. This will open up new possibilities for empirically analysing the relationship between institutions, knowledge and technologies as key dimensions of shaping social-ecological transformations.

Knowledge processes and transformations

Finally, our third perspective focuses on the diverse relations between knowledge and social-ecological transformations. We ask how knowledge is generated, exchanged, used, and strategically mobilized in shaping or blocking transformations. We consider knowledge as situated, embodied and part of social practices, and thus as a dynamic process in formalized and non-formalized knowledge systems. This approach makes it possible to better understand the role of different forms of knowledge, including contested knowledge and non-knowledge, in processes of shaping transformations.

The aim of our theoretical-conceptual work is to adequately capture what roles knowledge has in power-driven and conflictual processes through which transformations and change are shaped, in

order to better understand how transformative practices can be strengthened through knowledge processes. In addition, we focus on novel challenges that need to be addressed by critical-reflective, transdisciplinary knowledge production, such as the proliferation of fake news, persistent epistemic (in)justice, and the risks of artificial intelligence.

b) Generalizing findings from transdisciplinary case studies

The second focus of our theoretical-conceptual work is dedicated to the generalization of case-specific research findings. In the many years of ISOE's empirical research, our scientists have gained insights into unsustainable development paths that have been of great importance on the ground. However, these findings are often not easily transferable to other contexts – be it other cities, municipalities or countries. The social, cultural, political, economic, and environmental contexts are usually too different to develop and implement what could be conceived of as more generalized solutions.

Against this background, our future work will focus more on the possibilities of generalizing empirical and transdisciplinary findings. In particular, this will include developing middle-range theories that aim to integrate specific empirical findings into a broader theoretical framework. Through this approach, we will strive for robust insights that can support the shaping of social-ecological transformations in the various thematic fields of our research in an even more well-founded way.

3.3 Our methodological expertise: Inter- and transdisciplinary research

Our core competencies are inter- and transdisciplinary research methods and designs. We are specialized in the integration of research approaches from the social and natural sciences, engineering and the humanities. In joint learning processes with societal actors, we also bring together different perspectives, problem perceptions and practical knowledge and scientific questions and insights. To foster this integration and the co-production of new, critically reflected knowledge, we continuously develop appropriate transdisciplinary methods and concepts.

The transdisciplinary approach is crucial for us to adequately understand and scrutinise the complex social-ecological problems and transformation pathways we address, and to develop effective options for shaping change. This research mode enables us to gain a more comprehensive understanding of the interrelationships, causes, effects, and shaping practices, to envision new futures, and to develop innovative, alternative courses of action that are tailored to the needs of those affected. The resulting knowledge supports both societal transformations and scientific progress.

In addition to their comprehensive expertise in transdisciplinary research, our social, natural, and engineering scientists have a broad range of disciplinary methodological skills. Depending on their background, they are trained in qualitative and quantitative empirical social research, integrated modeling, multi-criteria sustainability assessment, forecasting and scenario development.

We design communication strategies and support implementation projects to transfer our research results in a way that is appropriate for target groups. We have expertise and experience in the evaluation of implementation measures and programs, as well as in facilitating stakeholder dialogues and real-world laboratories.

In developing our inter- and transdisciplinary methods, we will focus on three overarching challenges in the coming years: a) integrating the new possibilities offered by generative artificial intelligence, taking into account associated risks and potentials; b) dealing with the rise of anti-democratic forces that challenge trusted transdisciplinary dialogue, communication and transfer formats; and c) the need

to develop new methods and approaches to generate and scale transformation knowledge even more effectively.

3.4 Scientific and Societal Effectiveness

Our goal at ISOE is to generate both scientific and societal impact. This is reflected in our commitment to scientific advancement, societal transformations, and the teaching and training of young scientists

a) Scientific effectiveness: Contribute to scientific advancement

For us, being scientifically effective means contributing to scientific advancement in transdisciplinary and social-ecological sustainability research. But it also means actively participating in the transformation of the scientific system itself, in order to support the establishment of new scientific standards and structures that make transdisciplinary research possible in the first place.

Through externally funded research projects, we develop methodological, thematic and theoretical innovations. These results are published in peer-reviewed journals and presented at major national and international conferences. We disseminate our research results within the transdisciplinary social-ecological research community as well as in other disciplinary fields related to sustainability science, thereby making our insights accessible to a diverse professional community and contributing to scientific exchange.

To enhance our scientific effectiveness, we have established new internal structures in recent years. An important step was the establishment of a joint professorship in "Social Ecology and Transdisciplinarity" with the Goethe University Frankfurt and the support of numerous doctoral and postdoctoral projects. This has enabled us to enter into new research collaborations and to acquire new projects with prestigious funders.

In addition, ISOE has its own "Integration and Innovation" project to promote innovative thinking and publishing: All ISOE scientists meet several times a year for meetings and retreats to discuss central research aspects relevant to all and to promote exchange across research units and hubs. Special attention is paid to the integration of younger and new staff members.

Scientific advancement is also supported through funding available for basic research projects, so-called "innovation kitchens", and publication projects for which the scientists can apply. In the innovation kitchens, scientists discuss innovative approaches, plan interdisciplinary projects and test new methods independently of funding calls. We also provide time budgets to enable the writing of publications for leading peer-reviewed journals. Strengthening our presence and visibility in international scientific debates is an important goal for the coming years.

However, structural changes in external framework conditions are also necessary for scientific progress in transdisciplinary sustainability research. This includes organizational changes in institutions to enable interdisciplinary cooperation as well as funding programs that take into account the needs of transdisciplinary research. It also includes the creation of career paths and exchange platforms for scientists involved in transdisciplinary projects. ISOE has a long tradition of commitment to creating favorable conditions for transdisciplinary sustainability research. ISOE scientists have played a key role in the establishment and development of the BMBF funding program "Social-Ecological Research" (SÖF), as well as in the founding of the Ecological Research Network (Ecornet) and the German Society for Transdisciplinary and Participatory Research (GTPF). We would like to continue this commitment to

science policy in the future. Together with Ecornet and the GTPF, we want to ensure that the framework conditions for transdisciplinary sustainability research can be maintained and further improved.

b) Societal Effectiveness: Inspiration for transformations of politics, the economy and society

The transdisciplinary research approach is the basis for our ability to become societally effective and inspire sustainability transformations beyond the scope of scientific debates (see also Section 3.3). In addition, to support the impact of our research beyond the project context, we also rely on a broad range of knowledge communication activities. These include media and public relations work as well as using specific channels and dialogical formats such as the Frankfurt Citizens' University, sustainability labs, city walks, art collaborations, lectures, expert discussions, and professional publications.

Our communication strategy focuses on different target groups: In addition to the national and international scientific community, we are targeting civil society actors, professional associations, federal, state and municipal governments, and businesses, especially those providing public services. These actors play a decisive role in supporting and advancing social-ecological transformations in their respective fields of activity.

We actively participate in societal and policy debates to highlight social-ecological interrelations and options for shaping change, and to provide a sound basis for decision-making. For example, we are involved in discussions on water security in the face of increasing conflicts, on strategies for adapting to climate change in urban areas, and on enabling post-fossil fuel mobility. We provide our target groups with critically reflected knowledge that is tailored to their specific needs and their possibilites of shaping future action. To achieve this, we create spaces for learning and garnering experience, and we cultivate fruitful partnerships in trust-based dialogue with societal actors as well as initiatives committed to sustainability transformations.

In recent years, ISOE has built up extensive competence and expertise in knowledge transfer, making us a sought-after partner whose knowledge is increasingly requested by authorities and universities. For example, on behalf of a Hessian ministry, we are developing transfer formats for local authorities on climate adaptation, and supporting a university in developing and implementing a university-wide transfer strategy on viticulture in times of global warming.

In the coming years, we will focus even more systematically on the transfer and impact potential of our research with a view to further strengthening our societal effectiveness. We will translate this potential into concrete transfer opportunities. We aim to establish long-term transfer networks based on our existing partnerships with societal actors and initiatives committed to sustainability transformations. These networks will bring the relevant actors in a particular field – including companies, associations, start-ups, civil society, politics and administration – together with the scientific community, with a view to learning from each other and jointly implementing practical solutions on a broad scale.

In addition, we intend to intensify our communication and consulting activities at the interface between science and policy in order to better meet the growing need for knowledge among policymakers. We are currently doing this, for example, through our involvement in the Hessian state government's Scientific Climate Council and in the expert commission for the German government's 4th Gender Equality Report.

Finally, we will analyze and reflect on the potential for impact of our research, consulting, communication and teaching activities in an institute-wide learning process. This process will include self-reflection on our explicit and implicit assumptions about impact relationships (theories of change) against the backdrop of observable impact pathways and barriers.

c) Teaching and training the next generation: empowering young people to contribute to transformations towards sustainability in research and practice

ISOE is also enthusiastically committed to research-based university teaching and the training of young scientists. We want to inspire and empower young people to explore and actively shape transformations towards sustainability.

In our courses we teach the basics of social ecology. We emphasize systemic as well as normative and transformative aspects and encourage students to engage with the challenges and success factors of social-ecological transformations. Our courses are based on a solid foundation of theoretical frameworks, methods and empirical applications of social-ecological research, complemented by principles of sustainability education at universities. We also specifically promote skills in interdisciplinary and transdisciplinary research.

In our courses, we use innovative, interdisciplinary teaching concepts and formats. In this way, we enable students to confidently engage with knowledge from different scientific disciplines and fields, as well as from societal practice, including controversial knowledge. Students learn to analyze complex social-ecological challenges, such as dealing with the water crisis, the decline of biodiversity, or (un)sustainable consumption, in teams with colleagues from different disciplines. This includes envisioning and anticipating future developments and developing and testing ideas for action. Moreover, students are encouraged to reflect on their own values, motivations and collaborative skills. The working methods and the learning atmosphere in our seminars and lectures are characterized by scientific curiosity, openness and the willingness to expand the boundaries of one's own knowledge and experience. Masters and PhD students benefit from the opportunity to actively participate in our ongoing research projects and to write their theses in a practice-oriented context. This gives them not only a deep insight into current research issues, but also the chance to gain practical experience and apply their theoretical knowledge.

The main focus of our university teaching is at the Goethe University in Frankfurt am Main. Together with the Department of Social Sciences, we are responsible for the specialization in Social Ecology in the Master's program in Environmental Sciences. In addition, our professors, lecturers, postdocs, and doctoral students teach in other departments, especially biology and geography, as well as at other universities. Institutionalizing selected collaborations and making them permanent is our goal for the future.

Another important aspect of our training of young scientists is the promotion of skills in transdisciplinary research – "TD literacy". To achieve this goal, we organize training and further education courses on transdisciplinary methods and concepts, both for our own staff as well as for students and external scientists from Germany and abroad.

Finally, we are actively involved in initiatives to better anchor transdisciplinary, sustainability and social-ecological teaching at universities. One example is the certificate program "Goethe teaches sustainability" co-developed by the Goethe University Frankfurt and ISOE. This program supports structural changes at the university level and contributes to a more comprehensive integration of sustainability into university teaching.

4 Our basis: ISOE as an organization with its partners

4.1 Attractive workplace and skilled staff

Comitted and skilled people are key to achieving our institutional goals. This includes our scientists from various disciplines in the natural and social sciences, engineering and the humanities, as well as to colleagues in internal services, knowledge communication, science coordination and teaching. Students and visiting scholars also play an important role in ISOE's research. Our goal as a team is to live the principle of shared responsibility and to enable all employees to take on and share responsibility. This form of cooperation requires a broad range of competencies from our staff, in terms of subject matter, methodology, pedagogy and communication.

To ensure good team structure and support our employees in their individual development and assuming of responsibility, strategic, competence-oriented personnel development is of central importance to ISOE. Recognizing and evaluating potentials and qualification needs is an important focus to maintain and expand the skills required for successful transdisciplinary sustainability research in the long term. In this way, we want to do justice to different conceptions of life and career paths.

When recruiting new employees and filling leadership positions, we are guided by our equal opportunity and diversity policies, with a special focus on social and cultural diversity in the coming years.

4.2 Partnerships, cooperations and networks

To strengthen our position in the field of transdisciplinary sustainability research, we build on strong partnerships and networks at regional, national and international level.

Cooperation in Hesse is particularly important to us due to our location. In Frankfurt am Main, we want to continue and expand our successful partnerships with Senckenberg Gesellschaft für Naturforschung (SGN), Goethe University (GU) and the institutions of the State of Hesse. With SGN, this concerns our joint research group on biodiversity and transformative change, as well as the implementation of institutionalized Synthesis and Solutions Labs. At the centre of our work with Goethe University are teaching and research collaborations with the faculties of biological sciences, social sciences and geography. We will also continue to strengthen and deepen our diverse collaborations with research institutions, political actors, and practice partners through joint activities and networks such as the Hessian Water Competence Center and the Hessian Alliance for Sustainability.

On a national level, our networking with and leadership role in the Ecological Research Network (Ecornet) and the Society for Transdisciplinary and Participatory Research (GTPF) are of key importance to us, both for research and for the pursuit of our science policy goals.

Expanding international cooperation is an important goal to advance Social Ecology in exchange with the international scientific community. In addition to thematic research networks such as Alternet and IPBES, the further development of transdisciplinary research through the ITD Alliance and cooperation with research institutions on social ecology and sustainability are of particular importance. Convinced that good social-ecological research requires long-term, trustful relationships with local stakeholders, we will also continue to invest in partnerships with ministries, municipalities and civil society organizations in our focus regions of Southern Africa, Central Asia and Europe.

4.3 Long-term financial security

As a non-profit, independent research organization, we need a solid financial base to be able to fulfill our mission and goals in research, teaching, and knowledge communication. Third-party funding (grants and contracts) form the basis of our financing; in addition, we receive institutional funding from the State of Hesse for specific tasks (currently about 20% of our revenues).

In the long term, we aim to achieve a funding ratio of 70% third-party funding and 30% institutional funding so that we can maintain our scientific independence, governance and societal relevance, as well as our jobs. On the one hand, such a ratio of institutional funding to third-party funding will allow us to participate in funding formats of the highest scientific quality that finance no or reduced overhead costs, such as the Volkswagen Foundation and the German Research Foundation (DFG). On the other hand, it will enable us to work on our core research questions on social-ecological transformations on a more continuous basis, i.e. more independently of call cycles and acquisition successes.

To secure our third-party funding, we will continue to diversify our funding sources: as part of our internationalization strategy, we will systematically tap into EU funding formats. In addition, for selected knowledge-driven research topics and for the promotion of young scientists, we intend to acquire funding formats from the DFG or the Volkswagen Foundation. At the same time, we aim to increase the proportion of our contract research by enhancing the value of our research findings for society and business.

4.4 ISOE as a learning organization

Our goal is to continuously develop as an organization in order to maintain and improve our high quality standards in a changing environment. To this end, we will continue to regularly reflect on our actions and processes, evaluate our research performance and organizational structure, and assess external developments for their relevance to our further development. Our quality assurance tools form the basis for all strategic issues and processes. They are therefore continuously being refined. For an independent view, we will continue to regularly seek the advice of our Scientific Advisory Board. This enables us to engage in forward-looking organizational development, in which we involve our employees in discursive and participatory formats.

The growing importance of artificial intelligence, the possibilities of open science, the need for new forms of flexible and remote work ("New Work"), the maintenance and strengthening of employees' mental health, and corporate sustainability are key challenges that we want to prioritize in the coming years. The integration of these trends into our work is guided by our values, in particular responsible conduct and a critical and reflexive approach to research, also in relation to ourselves.

In particular, we want to use the opportunities provided by artificial intelligence to simplify our work processes and further develop our research methods. However, we are also aware of the potential risks and negative impacts on our research topics (e.g. increased resource consumption). We aim to increase the accessibility and visibility of our research data and results by systematically using the tools offered by Open Science. To this end, we are intensifying our research data management and publication activities. We will integrate "New Work" concepts and ideas for workplace design and organization into our Institute's culture, to meet the changing desires and needs of our employees regarding the organization of their work. Of course, we also continue to be involved in sustainability networks of companies (eco-profit) in order to improve ISOE's sustainability performance.

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