Federal Ministry
of Education
and Research

Climate Protection Demands Action

Contributions Made by Social-Ecological Research

RESEARCH

Igniting ideas!

Publishing details

Published by
The Federal Ministry of
Education and Research (BMBF)
Section 722 - Humanities, Social and Cultural Sciences
D-53170 Bonn
Germany

Orders
In writing to
The Federal Ministry of
Education and Research (BMBF)
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Printed by
Bonifatius GmbH, Paderborn

Bonn, Berlin 2009

Photo credits
Cover: Michael Prince/corbis; p. 2 BMBF; p. 3 BMBF; p. 4 BMBF;
p. 5 Peter H./panthermedia; p. 6 obs/IWO; p. 7 BMBF;
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panthermedia; p. 12 obs/Lieken Urkorn; p. 13 BLE, Bonn/
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Growing climate change constitutes one of the most pressing challenges of our times.

As resources become increasingly scare and the demand for energy grows in expanding economies, it is vital that the discussion on climate protection and sustainable development strategies be placed at the top of societal and political agendas worldwide. The benchmark for all efforts must be the well-being of coming generations.

In light of this, the German government has set clear, far-reaching goals for climate protection not only in Germany and the European Union. Its efforts include the High-Tech Strategy on Climate Protection, a comprehensive set of measures to combat global warming which it developed together with partners from the scientific community, trade and industry.

Each area of activity gives priority to innovation that generates jobs and ensures prosperity. All make use of the findings generated by Social-Ecological Research which examines the effects that climate change has on people in their natural environment and in society – realms that include not only biological diversity and access to clean drinking water but also the efficient use of energy.

This brochure examines the interaction between societal actors and their natural environment and explores the scope for action to protect systems and resources that constitute the basis for human life – because climate protection is everybody‘s business.

Dr. Annette Schavan, MP
Federal Minister of Education and Research

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Social-Ecological Research – The transdisciplinary approach in climate research

The findings from the latest report issued by the Intergovernmental Panel on Climate Change (IPCC) leave no doubt that climate change is growing, picking up pace and most probably caused by human actions and decisions. The scientific community and the political sector largely agreed that global carbon dioxide emissions must be reduced by half by the year 2050 if the rise in the global temperature is to be limited to less than 2° C above pre-industrial levels. In view of developing and newly industrialising countries' legitimate need to catch up, achieving this goal will require industrialised nations to reduce their greenhouse gas emissions by up to 80 per cent by that time. There is also growing agreement that fundamental structural changes will be needed in order to keep the consequences of climate change to a manageable scale.

Climate change also affects Germany. Numerous studies (such as The Stern Review which focuses in particular on the economic implications of global warming) have documented the massive economic impact of climate change and the German economy is already preparing itself for the changes it will bring. This is clearly shown by the business reports issued by reassurance companies and the analyses conducted by Deutsche Bank's research institute DB Research. Thus, issues revolving around adaptation or – to be more precise – around society's capability to adapt to the already noticeable effects of climate change are already on the agenda. The question of whether it will be possible for societies to develop the required adaptability will vitally depend on whether greater attention is given to social and ecological interactions in addition to technical and economic considerations.

The German government has responded to climate change in a number of ways, including its High-Tech Strategy on Climate Protection which it developed together with partners from the scientific community, trade, industry and the political sector. This strategy links climate protection with innovation that generates jobs and ensures prosperity. It lays down the research policy guidelines for climate protection for the coming years, taking

scientific, technological, economic and financial aspects into consideration. It also includes Social-Ecological Research which explores the scopes of action of consumers as well as of actors such as municipalities and non-government organisations and puts new behaviour options as social innovations to the test. The social-ecological approach also deals with methods for assessing and managing unintended effects of climate protection measures that might arise in connection with, for example, carbon capture and storage (CCS) technologies or with conflicting sustainability objectives like the production and use of bioenergy.

1) Stern, N. H. (2007): The economics of climate change: the Stern review, Cambridge University Press, Cambridge, UK; New York.

Fostering and progressively developing the production and use of carbon-free energy and tapping the full potential of existing energy-efficient technologies can make a crucial contribution toward reducing greenhouse gas emissions. However when one is clear about the challenges that arise in connection with the aim of limiting the rise in temperature to a maximum of two degrees, it is irrefutable that solving the problem of climate change will require more than technological innovation.

The average annual temperature in Germany has risen by nearly 0.9° C since 1901. Due to past decisions, we can expect the average temperature to continue to rise, to a total of 1.6° C over pre-industrial levels. Many efficiency technologies have not been able to hold their own in the marketplace. Some of the technology-driven potential for saving energy has gone hand-in-hand with a boomerang effect: Goods that are more efficient are often more economical. This can lead to an increase in their use or consumption, which in turn offsets any potential savings or results in even greater energy consumption than before. Institutionalised power and interest coalitions impede the introduction and continued development of renewable sources of energy and efficient energy technologies. Taking a global look, the 50 per cent savings target will share the stage with a nearly 50 per cent increase in energy consumption over the coming decades.

The IPCC report also makes it very clear that even if we manage to meet the 2° C target, serious consequences will still have to be expected for individual climate-sensitive ecosystems. These consequences will also have an impact on our ability to satisfy basic human needs such as water, food security and health. At the global level, climate change will lead to a decline in biological diversity and scarcity of drinking water resources. At the same time, soil erosion will increase. The floods in Bangladesh and the effects of hurricane Katrina in the USA already offer an inkling of how serious the consequences of a climate change induced rise in the sea level will be and at the same time reveal the particular vulnerability of poor regions and populations. These examples show just how urgent the need is for adaptation measures which include a reduction in greenhouse gas emissions.

Without radical changes in lifestyles, consumption patterns and forms of urbanisation – not only in industrialised societies but in newly industrialised and developing countries as well – it will not be possible to come anywhere near to taking the step from diagnosing crises to implementing strategies for overcoming them.

Towards a transdisciplinary climate research

In the wake of climate change, societies will be increasingly confronted with complex problems that exhibit a new type of structure. Economic, technical, political and societal action is so closely linked with environmental change that such problems can be dealt with only in integrative ways that acknowledge their ecological and societal dimensions. Characteristic for this kind of problems are complex interacting processes on different spatial, temporal

and social scales. Their effects bring the local together with the global levels, establish a connection between current events and long-term effects and link actions taken in everyday contexts with the actions taken by governments and non-governmental organisations in the context of their national and international policies.

In order to find solutions to such complex sustainability problems, Social-Ecological Research, which is funded by the Federal Ministry of Education and Research, has generated a broad, solution-oriented knowledge base, innovative methods and resources for examining the dynamic interaction between societies and their natural environments. As a rule, Social-Ecological Research does not conduct classical basic research. Instead, it merges previously separate stocks of knowledge to generate new knowledge for a more detailed understanding of complex systems contexts. Social-ecological, interdisciplinary and transdisciplinary research processes are better able to ascertain the driving forces and dynamics behind social and global change and incorporate them into descriptions of socio-economic and ecological trends. This systemic understanding provides the basis for developing context-specific orientational knowledge that makes it possible to see options for future developments,as well as transformation knowledge that points out possibilities for how these developments can be actively steered in the direction of sustainability in various fields of action, sectors and regions.

Many social-ecological research projects conduct participatory and discussion processes to tap the practical knowledge of societal actors (stakeholders) and the lifeworld knowledge of private individuals and households for use in the research process. In the course of these processes, the objectives of and frameworks for the actions of the various societal actors are acknowledged and subsequently incorporated when developing approaches to solutions. In addition, procedures and methods are tried out which could be used to make research findings available for societal assessment – for example, with regard to assessing the social, economic and ecological effects of strategies for action or to dealing with uncertain knowledge about future developments.

Social-Ecological Research thus exemplifies a type of research that aims to acquire transformation knowledge which can be used to achieve sustainability goals. Social-Ecological Research can contribute this knowledge base to a transdisciplinary climate research that is aimed at expanding societal options for protecting the climate by reducing emissions (mitigation) and for adapting to the effects of climate change in participatory ways that are not predefined. In this connection, it can in particular

- bring together climate research's scientific knowledge about the complex interactions in the climate system with our knowledge on technological, economic or behaviour-oriented options for protecting the climate and assess them in light of the options the various societal stakeholders have for action,
- shift feedback between social and natural systems to centre stage and develop suitable processes for dealing with uncertainties about the climate system's causal connections and their effects on biodiversity, water resources and the future course of societal developments,

- introduce sociological understanding of heterogeneous interests and of the social, cultural and institutional conditions necessary for societal development processes and adaptations in dealing with cumulated risks into the development of control and regulation approaches in climate and technology research and

- develop flexible strategies which can be used to strengthen the ability of societies and societal groups to adapt to the effects of climate change and which, at the same time, take aim at the causes of climate change.

Social-Ecological Research contributes to transdisciplinary climate research on two different levels. These are presented in greater detail in the following sections. The first section discusses Social-Ecological Research projects which have developed concrete strategies for climate protection and reducing greenhouse gas emissions. The second section uses selected problem areas to illustrate the transdisciplinary approach that Social-Ecological Research takes when developing effective strategies for sustainable solutions. The methods and instruments used by this approach can be put to productive use in the climate research field as well. This is followed by a short examination of the prospects of and potential offered by climate research that takes a social-ecological approach.

1. Social-Ecological Research's contribution to climate protection

1.1 Climate protection policy and energy supply

In all probability the climate protection efforts currently being undertaken at global and national level will not be enough to mitigate the effects of climate change to a sufficient degree. Climate-relevant emissions are generated in all sectors. Thus a broad range of measures that span numerous policy fields must be implemented if a significant reduction in greenhouse gas emissions is to be achieved. In this connection, many researchers in the social-ecological research field consider a transformation of the systems currently in place in sectors that generate particularly large amounts of emissions – such as the energy production sector – as indispensible for reversing the present trend.

The German government's integrated energy and climate programme is an important starting point for policies that will be able to meet the challenges of the future. However, the targeted reduction goals pose enormous challenges. In addition, past experience shows that special efforts are necessary to ensure adequate implementation. Examples of this include the arrangements used to date for combined heat and power generation (CHP), measures in the building energy field which have led to an inadequate share of buildings being modernised to improve their energy profile, and measures in the transport sector in general and the automotive sector in particular. The fact that the targets have been set too low in some cases can be viewed as one reason for this. Other reasons include deficient enforcement and penalties. In addition, the technical and economic aspects have not been anchored firmly enough in a broader social-ecological context.

From the standpoint of a social-ecological analysis, it can be said that the measures used to foster

CHP were i.a. not successful largely due to their having been limited to the problem-solving approach of traditional energy producers which stand in the way of a greater dissemination of efficient, decentralised systems. In the building field, the decision whether to modernise is influenced not only by (definitely important) financial incentives but also by a number of social, psychological and institutional factors. These aspects should be taken into account when developing political measures. The same applies to the transport field where a wealth of ‚technical' concepts (from the three-litre car to speed limits) goes hand-in-hand with a lack of implementation that sufficiently addresses institutional effects and societal contexts. Projects in the Social-Ecological Research field have for example shown how technology can be shaped and organised in ways that allow the participation of all stakeholders and how political measures can be developed that assimilate such societal and social-ecological factors.

For this reason, it is absolutely necessary that the social-ecological context and its requirements be taken into consideration when designing climate protection policy instruments and in particular concepts for far-reaching system transformations. Social-Ecological Research examines transformation processes of this type and formulates the conditions necessary for their sustainability. It must also be pointed out here that there may be conflicts between climate protection goals and the objectives integrated environmental protection, as currently demonstrated by the example of bioenergy use. This shows how urgently necessary it is to keep integrated ecological criteria in mind when designing climate protection measures.

These constraints can also be observed at the level of international climate policy. In the wake of the Kyoto Process, the international focus was on so-called flexible mechanisms. Issues that revolve around fairness, differences in the vulnerability of individual regions, countries and populations and targeted efforts to foster transformation processes did not play a role for a long time. These aspects – which have landed in part on the agendas of international negotiations and discussions – were taken up by Social-Ecological Research early on.

Social-Ecological Research that is funded by the Federal Ministry of Education and Research has conducted several projects in the energy and climate protection policy field. These projects expressly dealt with the analysis of transformation processes, the approaches used by climate policy to date, the social-ecological context and effects of climate policy instruments as well as the development of related scenarios. This work laid the foundation for conducting comprehensive assessments and analyses, identifying obstacles to and fundamental factors in success, and ultimately being able to develop, on the basis of this, specific recommendations for action to be taken by stakeholders and the political sector.

Global Governance and Climate Change

A multi-level analysis of the conditions, risks and opportunities involved in social-ecological transformation

The Global Governance and Climate Change project investigated a number of uncharted areas in climate policy that the political approaches taken to date have disregarded or that have been edged off the agenda up to now. These include issues of vulnerability and fairness, democracy and the legitimacy of the process and the decisions taken, the role of transnational stakeholders (such as the United Nations, Intergovernmental Panel on Climate Change, World Trade Organization) and the private sector, and the deficits of political instruments. Two objectives were pursued more closely: Firstly, data was collected on the interaction between local, national and international political processes using a cross-level approach.

Secondly, drawing on this, the research group pursued the aim of contributing to the analysis of the multi-level climate system and to the development of theories in the area of multi-level-governance. Findings from the empirical case studies of the project are outlined below.

The subject of adaptation to the effects of climate change – which did not play an important role in international climate policy for a long time – was examined in greater detail in two case studies (Nicaragua and Tanzania). The analysis of the adaptation strategies that have been formulated to date at international and national levels showed that they do not pay particular attention to communicating to society the effects of climate change – such as rights of access to existential goods (e.g. water) that have to be recast or unequal gender relations. The adaptation strategies examined during this project are strongly oriented to national economic preferences and much less to the vulnerabilities that are unequally distributed throughout society. On the other hand, it was observed that those countries that are disproportionately affected by climate change – many of which are among the world's poorest countries – have had little means to influence the climate policy negotiating process and the top-down approaches that have dominated to date

Women at a watering place in Tanzania:
Vulnerability to aridity and drought is first of all a gender-specific problem in those areas where, for example, women are traditionally responsible for their family's water supply.

meet with enormous difficulties in gaining acceptance in the regions affected.

The analysis of renewable energy policies firstly showed that they were primarily advanced – at first glance, quite remarkably – by individual pioneering states at national level, isolated from international energy and climate policies. However, a nuanced multi-level analysis of the example provided by Germany's policies for promoting renewable energies in the electricity sector revealed that there were a number of interactions at work in the multi-level political system which are fundamental to explaining the success of the Act on Granting Priority to Renewable Energy Sources (Renewable Energy Sources Act). Interactions that count as factors in this success include a number of sectoral and/or regional developments and stakeholders. By contrast, German funding policies had to contend with strong resistance from Brussels for a long time. Only through the massive intervention on the part of German actors in the political sector and stakeholders in the renewable energy industry could this resistance finally be broken. For several years now, the international level has been pursuing – also strongly influenced by German policies – its own specific political path for fostering renewable sources of energy. Interestingly, this path follows a course that is independent of and parallel to international climate policy.

TIPS

Transformation and Innovation in Power Systems

The Transformation and Innovation in Power Systems (TIPS) project gave centre stage to the role that innovation plays on the road to a climate-friendly electricity system. Electricity is the pacemaker of modern societies. However, the methods used to generate electricity are not climate-friendly. Using the examples provided by decentralised and centralised power generation structures, emissions trading, grid regulation and informative electricity bills, the TIPS research team examined the dynamics involved in climate-relevant innovation processes in the electricity system and the degree to which these processes can be steered. What counts here – for both the electricity system and the necessary innovations – is not just the technical infrastructure but also an integrated system comprised of institutions, values, and energy, financial and material flows that form the context for every single change.

Combined heat and power plants generate heat and electricity, are climate-friendly and are also suitable for use in single-family and multi-family homes.

Thus, when choosing the methods to be used, the TIPS project drew on selected approaches from the economics, sociology and political sciences, environmental energy system analysis and modelling which were incorporated into the interdisciplinary discussion. The analysis of decentralised heating plants that generate electricity (fuel cells, small Otto engines, Stirling engines) shows that such plants could constitute a small but important component in a sustainable electricity system. However, in densely populated areas, district heating systems are the better alternative in ecological and economic terms. In addition, very small combined heat and power generation (CHP) units of this type compete with solar-thermal hot water supply systems and building insulation which are even more climate-friendly ways to reduce heating needs. Mini combined heat and power plants that are environmentally more advantageous and fuelled by renewable sources of energy could gain in importance in the future. Steps must be taken to further develop and refine the Stirling and other internal combustion engines in order to increase the use of such CHP units. The assistance measures recently launched by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety to supplement the (relatively modest) feed-in tariff through financial incentives such as low-interest loans and investment grants are helpful. The cost and effort for users could also be reduced substantially by providing better information and introducing standardised administrative processes (such as standardised rules for connecting to and feeding into the grid, and streamlined processes for applying for tax breaks and other financial assistance).

The vision of ‚clean' coal-fired power plants leads to another development path. In modern coal-fired power plants it will be possible to capture and store the carbon dioxide that is generated during combustion (carbon capture and storage, CCS). The downside here is additional energy input and resource consumption plus the fact that only large, centralised power plants will be able to do this cost-effectively. An environmental impact assessment and an analysis of research and political processes in connection with the role CSS will play in sustainable climate protection strategies bring up other critical aspects. A wealth of technical and geological issues – including the risk of carbon dioxide escaping and the geological risks inherent in the storage of carbon dioxide – must be clarified before CCS can be transformed into a viable option for the future.

Any responsible strategy for the future must take into account the uncertainties involved in decisions on innovation. It is important to examine potential options without precluding others in the process. A climate-friendly electricity system will ultimately consist of a suitable mix of different technologies, together with innovations that are generated by society, institutions or consumers.

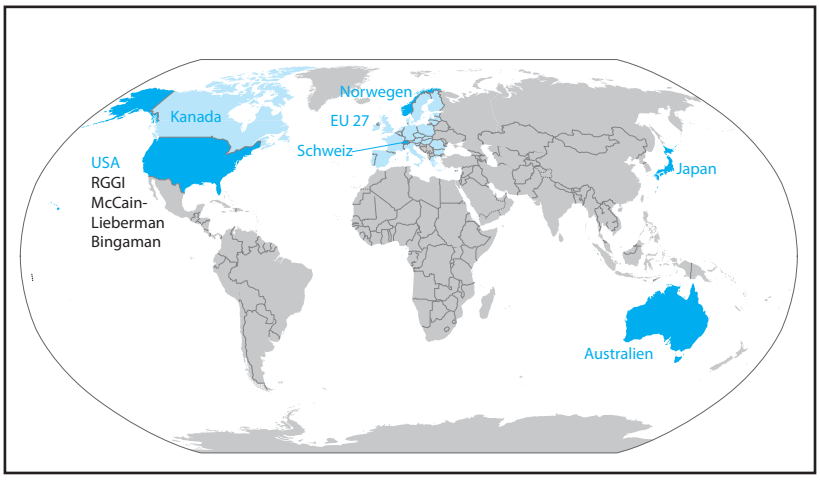
JET-SET

The introduction of emissions trading systems as a social-ecological transformation process

The development of a globally linked emissions market is currently seen as a promising way to implement cost-effective climate protection measures. As a consequence, the almost simultaneous emergence of national emissions trading systems – such as in the European Union, Japan and the USA – is directing attention to the possible knock-on effects of linking these emerging markets, and therefore to a possible extension of business-related emissions trading to other important industrialised countries.

One of the aims of the JET-SET project was to assess from a variety of angles the knock-on effects of this type of linkage on the basis of different policy scenarios. An economic analysis conducted by the Centre for European Economic Research (ZEW) shows for example that connecting emerging emissions trading systems with one another would have the same structural weaknesses as the current EU trading system has. Although international linking processes tend to lower the cost involved in reducing emissions, this effect will be very small. The reason: As a result of moderate goals and generous certificate allocation, the brunt of the economic burden arising from emission avoidance would have to be shouldered by the sectors (government sector, consumer sector, transport sector, trade and industry, services) at much higher savings costs which are not covered by emissions trading.

By contrast, the project demonstrates at institutional level that an international linking of differently organised emissions trading systems is possible in principle. However differences in the way the individual national systems are designed increase the transaction costs and have the potential to threaten the integrity of EU emissions trading. For example, while many systems recognise the reductions generated by reforestation projects the EU emissions trading system excludes them per se. The Canadian and Australian systems that are currently being developed also set price limits on emissions certificates which would additionally function as price ceilings in a future linked system – on a relatively low baseline.



Many countries already have an emissions trading system. What benefits would linking them bring?

And lastly, an analysis conducted from the standpoint of ecological fairness points to the ambivalent role played by the Clean Development Mechanism (CDM). When for example industrialised countries can deploy this mechanism without restriction in developing and newly industrialised countries as an economical avoidance option, this results in a per capita reduction in emissions in those countries but slows down the reduction in per capita emissions in the industrialised countries. A reduction in industrialised countries is however equally necessary from a climate policy point of view.

This project puts into perspective the predominantly positive assessments and hopes expressed in the political debate which have been associated with the linking of developing emissions trading systems. Establishing clear goals for the reduction of greenhouse gases in industrialised countries, ensuring the direct comparability of certificates by harmonising existing systems and, most importantly, the accelerated implementation of climate protection measures on location (domestic action) are also key prerequisites for efficiently and effectively linking emissions trading systems. Only under such conditions could the linking of different systems make a vital contribution to the progressive development of the international climate regime.

1.2 Integrated concepts for action to foster climate-friendly consumption

The Transport and Food fields have, alongside energy production and the building sector, a particularly strong impact on the climate. In these fields, a number of projects analysed areas of societal activity in which climate protection has made only slow progress to date. The integrated analysis of interlinked areas of activity (such as Food-Health-Environment) revealed common problems, solutions and thematic alliances and was therefore a valuable resource in the development of recommendations for action. This transdisciplinary analysis enabled a more profound and comprehensive grasp of the obstacles that stand in the way of climate and environmental protection. Using this information, it was possible to develop promising recommendations for solutions.

Sociological lifestyle analyses played a special role here. These analyses were coupled with the scientific findings from technology analyses, life-cycle assessments and eco-efficiency analyses. The second essential element here was the inclusion of consumers' day-to-day experience and information on how they organise their daily lives. The combination of these two social-ecological analysis elements provided an excellent basis for developing promising options for action that are suited to everyday life. The following section outlines two projects in which climate protection and overall environmental and health protection were dealt with in an integrated manner.

Ernährungswende – Turning food habits around

Strategies for social-ecological transformations in the area of Environment-Food-Health

Obesity, BSE, acrylamide: Food has become a standing problem for German society. The Environment-Food-Health complex is a field for action that entails fundamental human needs. Approaches used to date to organise and shape this complex to be more sustainable and years of issuing recommendations on healthy diets have had little effect, despite the fact that society has been experiencing growing problems in this connection for some time now. This study shows that a new approach needs to be taken not only by the scientific analyses but also in the recommendations for action that are subsequently developed on their basis. The political framework, public communication on nutrition and on developments in food production, processing and trade, and day-to-day nutrition at home and out of the home – such as school food – were examined.

The Food field's impact on the climate was determined in detail – starting with agricultural production and food processing and extending to freight transports, shopping trips and transportation to restaurants all the way to storage and preparation and the use of rooms for eating purposes. An examination of climate-relevant emissions shows that more than half of them are the result of energy consumption to heat rooms, store food and prepare meals. Food production, including freight transport, accounts for a further 45 per cent and trips to go shopping or to eat outside the home are responsible for nearly three per cent. In addition to the contribution the Food field makes to Germany's greenhouse gas emissions, the analyses also examined the contribution made by the most important foods (for example: beef – 13.3 CO^2 equivalents per kilo, fresh vegetables – an average of 0.15 CO^2 equivalents per kilo). It was shown that greenhouse gases could be greatly reduced by eating a healthier, reduced-meat diet and could be reduced even further through the cultivation and use of organic foods. The project conducted a CO^2 analysis for a total of seven different nutrition styles.

This analysis also put an end to common myths: For example, it disproved that all convenience products (prepared dishes) require much more energy to produce than products that are prepared fresh at home, and that food packaging or long-distance transports constitute a large share of the environment pollution generated in the Food field. It is true that in the case of some products, food transports do account for a large portion of the climate-relevant emissions (particularly when the transport is by plane). However, freight transports represent only about three per cent of the greenhouse gas emissions generated by the entire Food field.

In addition to conducting analyses of environmental and climate relevance which provided primarily orientational knowledge, this project focused especially on how recommendations for action could be developed in the Food field which – in contrast to other recommendations made to date – would have a real chance of being implemented: The customary recommendations developed to date for behaviour changes run counter not only to people's conceptions, wishes and daily routines but also to financial and time resources (for example, the recommendation to cook for oneself and eat at home rather than use convenience products and out-of-home meals). As a result, they have little chance of being widely implemented in daily life. When identifying starting points for effecting a change in food habits, it is essential to ascertain key consumer needs and reduce or eliminate possible obstacles to a change in diets that arise because these needs are not being met. The examination of

Germans' daily diets shows that the central desire most consumers have in day-to-day life is the wish for simplification and less complexity which cannot simply be dismissed as laziness. In light of this, approaches for action were developed on the basis of the preceding empirical study. These approaches were tailored to the needs of different ‚nutrition styles' and targeted nutrition that is more environmentally-friendly and conducive to good health. In addition to fostering the greening of food production, it is particularly necessary that food policy and communication be geared more to prevention and sustainability and that the assumption of responsibility among the various stakeholders in the Environment-Food-Health complex be redefined. Bringing about a turnaround in food and nutrition will necessitate strengthening the competence and skills of stakeholders along the entire value-added chain (producers, food industry and trade) all the way to the end consumer as well as in institutional contexts such as schools and enterprises. It will also require injecting sustainability qualities into food products and developing structures that foster sustainable food and nutrition. A series of workshops were conducted with stakeholders from the nutrition, consumer counselling, food policy, food industry and health care spheres to disseminate these guidelines. Concrete approaches for action and actor alliances for the actual implementation of the guidelines were also identified as part of this stakeholder process.

The course that will have to be taken at institutional level to ensure sustainable food and nutrition was illustrated using the example of school food. Criteria and recommendations for shaping sustainable day-to-day nutrition and diets at school were developed and issued in the „Appetite for school – Guidelines for changing diets in everyday school life" guide. These recommendations provide actors in the school field decision-making guidance that taps into and supports the implementation of the objectives of the National Action Plan on the Prevention of Unhealthy Eating, a Lack of Exercise, Overweight, and Related Diseases (NAP) of the Federal Ministry of Food, Agriculture and Consumer Protection and the Federal Ministry of Health.

MOBILANZ

Ways to reduce the energy consumption and material flows of different types of mobility through the use of target group-specific mobility services

It will take more than just technological innovations in the Transport field – such as fostering propulsion systems that are less damaging to the climate – to reach the goal of reducing carbon dioxide emissions by 80 per cent by the year 2050. Such innovations will have to be augmented by changes in behaviour on the part of all individuals, such as in their choice of means of transport or holiday destinations. In this connection, the MOBILANZ junior research group that is funded by the Federal Ministry of Education and Research analysed existing potential for reducing mobility-related climate-change gases through the use of mobility services in the public and private sectors. Mobility services are offerings that help persuade and make it easier for the respective group of persons to give climate protection greater consideration when choosing their means of transport. These include luggage transport services for people travelling by rail, car-sharing and bicycle rental services in city centres.

Based on a survey of 1,991 persons in three major German cities, a climate scorecard was drawn up for each respondent. According to this information, adults who live in German cities generated an average of 1,851 kilograms of greenhouse gases in 2003 through their use of motorised modes of transport. The project ascertained the extent to which five different mobility-based target groups (mobility types) could reduce the greenhouse gas emissions that are generated as a result of their use of various public or automobile-based mobility services. These figures were then projected in corresponding scenarios. Based on the above-mentioned 1,851 kg of transport-related greenhouse gases, a total of 78 kg per person could be saved each year in an optimistic scenario and 25 kg per person and year in a pessimistic scenario. This translates into a potential reduction of 4.2 per cent and 1.3 per cent respectively.

Given that mobility services contribute in varying degrees to reducing greenhouse gas emissions, a prioritised list of climate protection measures was developed for transport operators and transport policy. Long-distance transportation that uses more environmentally-friendly modes of transport offers the greatest potential for reducing greenhouse gas emissions. Fostering long-distance rail transport – by offering luggage transport service, for example – is recommended as the most important measure for avoiding car travel, particularly in connection with (short) holiday travel. It was calculated that this area offers the greatest potential for reducing greenhouse gases (21.6 kg per person). In the case of short holidays and recreational activities, improving access to information regarding public transportation options and ensuring that it is easy to understand offers potential for similarly large reductions in emissions (20.3 kg per person).

Realising these aims can however only be expected when corresponding target group-specific information is provided and mobility services are communicated in ways that are geared to the attitude profiles of the five mobility types identified by the project.

2. Approaches to social-ecological climate research

2.1 Sustainable consumption

Nearly all statements on preventive climate protection (mitigation) point out that changes in behaviour – along with the development of innovative technologies and materials – are indispensible to achieving targeted climate protection goals. On the other hand however, it can be observed that precisely when it comes to environmental and climate protection the gap between awareness and behaviour is enormous. This has been repeatedly documented in scientific studies. However, there is a lack of knowledge about how this gap can be closed. Seen from a social-ecological standpoint, it is not enough to simply develop new, energy-efficient technologies. To be successful, it is crucial that such technologies be adapted to and incorporated into lifeworld, economic and political contexts.
There is however a second reason why more attention should be paid to the potential offered by changes in behaviour: Even if we manage to comply with the ‚two-degree guardrail', adaptation strategies will become extremely important with regard to the water supply, food security, health and coastline protection. Far-reaching changes in lifestyles and consumption patterns will be necessary not only in industrialised societies but in newly industrialising and developing countries as well.

Calculated on the basis of not just final energy consumption but also the supply of energy and the production of the individual products, consumers can directly influence approximately two-thirds of their greenhouse gas emissions through their buying decisions. Energy consumption in private households has however increased in recent years, particularly in the area of electricity consumption. This increase has more than offset any efficiency gains achieved in products and services. In its various projects, Social-Ecological Research has set itself the task of identifying and analysing the underlying obstacles that stand in the way of translating knowledge into action. Social-Ecological Research generates orientational knowledge and know-how that can be used by different groups of stakeholders and can help strengthen consumer competence. The practical knowledge that is needed for handling problems in the lived world is integrated and transformation knowledge is developed by incorporating relevant stakeholders (consumers, manufacturers, trade).

Various transdisciplinary approaches were developed in the course of several social-ecological projects. Using these approaches it was possible to examine the climate relevance of various lifestyles in terms of feelings of recognition, ethical conduct and happiness that they motivate or hinder. This made it possible to draw conclusions regarding how future climate strategies could be more effective than past strategies in activating existing potential for changes in emotional or ethical behaviour.

PROSA

Development and International Harmonisation of the Product Sustainability Assessment (PROSA) Method and the EcoTopTen– Innovation for Sustainable Consumption project

The PROSA – Development and International Harmonisation of the Product Sustainability Assessment (PROSA) Method project developed the world's first method for examining product development and marketing together with consumer behaviour on an integrated basis. The individual tools used by the PROSA method include life-cycle assessments, life-cycle costing and lifestyle analyses plus two newly developed tools: social reporting and benefits analysis. The PROSA method has already been used in various projects and collaborative activities with enterprises. It was also used in the EcoTopTen product campaign to work up the ten most important product fields from an energy and climate standpoint, develop options for climate-friendly consumption and disseminate them with the help of a consumer campaign.

There is a downright ‚efficiency lag' in building modernisation, in the marketing of energy-relevant household appliances and in motor vehicles (automobiles) which active consumers could easily eliminate. Consumer research shows however that there are three fundamental obstacles here. Most consumers are extremely prejudiced against ‚eco products' from the technical field („poor quality", „too expensive") and, when making buying decisions, ignore the high operating costs of products that use energy. These prejudices are largely the upshot of experience gathered with the first generation of eco products in the 1980s. Although such prejudices are entirely unfounded today (see www.ecotopten.de), they have been passed on over the years and therefore continue to influence consumer attitudes and buying decisions. Examples of the substantial potential for reducing emissions offered by energy-efficient brand products with comparable or lower life-cycle costs include low-consumption cars (30 to 40 per cent less CO2 compared to the respective market leader, depending on the size of the vehicle), condensing gas boilers (approximately 33 per cent less than oil heating systems), tumble dryers with a Class A rating (some 50 per cent less than regular Class C dryers), green electricity (approximately 77 per cent less than conventional electricity), low-energy bulbs (approximately 80 per cent less than

regular light bulbs) and wood pellet heating systems (some 90 per cent less than oil heating systems).

Using the PROSA method and lifestyle analyses, the EcoTopTen project formulated requirements for modern, energy-efficient, high-quality products whose overall costs are comparable to those of conventional products. It also worked out product developments and marketing concepts for manufacturers and trade. The EcoTopTen product campaign has been used for four years now to inform consumers, using, for example, up-to-date market surveys that it produces. Today, EcoTopTen is supported by numerous manufacturers and major business enterprises. The market surveys show that an average household could reduce its greenhouse gas emissions by 30 to 40 per cent using energy-efficient products that are already available on the market and, in the process, save € 2,000 to € 3,000 a year compared to other similar households!

GELENA

Societal learning and sustainability – Analysis, practical testing and theory-supported reflexion of participative learning processes in science and in organisation and product development as illustrated by the example of climate protection

The GELENA research project examined societal learning processes involved in the development of climate-friendly products. Working together with enterprises and consumers, the project developed methods for including potential users in the product development process and for testing on a simplified basis the impact future products could have on the climate. The INNOCOPE (INNOvation through Consumer Oriented Product dEvelopment) process enables the direct, equal participation of company representatives and consumers which in turn makes it possible to incorporate user needs into the production of products that spare the environment and conserve resources.

The INNOCOPE process consists of three workshops that build on one another. Product ideas are developed in the first workshop and are then evaluated, given concrete shape and refined in subsequent meetings. Between workshops, the participating company takes the results of the work done to date and develops initial ideas for implementing them (sketches, models, even prototypes). By the end of the workshops, it will have produced a marketable product design. The decision whether to actually realise the product lies with the company. In practice, the process can take up to 12 months from start to finish. INNOCOPE should be organised in such a way that the same persons participate in all three workshops: First of all, this consistency allows longer-term learning processes to be set into motion. Secondly, it boosts the group‘s capacity for work (as a result of group-dynamic effects) and leads to high-quality results. Participating firms should identify suitable products prior to the start of the process. The product to be developed together with consumers should not be too complex (as in the case of a car). It should be possible to actually use it (examples here include a vacuum cleaner, pram or bicycle) and the time to market should not exceed 12 to 18 months. The process and the moderators should take the product‘s contribution to sustainable development and climate protection expressly into account right from the start. Regardless of the product chosen, it would be wise to include persons from the research and development, environment and sustainability, marketing and sales fields as well as the management in the process. Only in this way can the participating company ensure cross-disciplinary product development that does justice to the holistic character of product development that is geared to ensuring sustainability. It is recommended that 20 to a maximum of 30 consumers be invited to participate in the process, firstly to obtain a productive group size and secondly to obtain complex, multi-faceted feedback. The group can be put together in a variety of ways. For example, with an eye to the potential target group or to obtaining a high level of heterogeneity or homogeneousness in socio-demographic attributes (sex, education level, etc.) or product-specific attributes (such as experience with similar products) or to general characteristics (such as environmentally-conscious behaviour).

This process was tested in the development of an environmentally-friendly means of transport (see photo). It turns out that participating consumers also began contemplating making changes in other areas of their daily lives as a result of their involvement in the workshops. Thus the workshops additionally helped activate the participants and increase their competence in connection with consumption that is more climate-friendly.

The Pedelec was developed in collaboration with consumers. Its step-through frame makes it attractive to all age groups.

2.2 Problem-specific control and regulation (governance)

Social-Ecological Research is concerned not only with conducting scientific analyses. It also wants to incorporate societal action that is aimed at social-ecological transformation processes. Governance is therefore of central importance in the description of Social-Ecological Research's objectives and issues. The implementation of effective climate protection measures will necessitate changes in the underlying conditions at many levels of social organisation. Enterprises and civil society actors – non-governmental organisations – are increasingly coming onto the stage in this connection, giving a voice to interests and concerns that are not represented in established structures. For this reason, governance research also enquires at a very fundamental level into how existing power structures could be influenced or changed and how a consensus could be negotiated between the public and private institutions involved.

In the case of climate change, sustainable development requires conceiving and testing new forms of societal co-operation and debate. When doing so, the various levels (from global all the way to local), stakeholders (government, enterprises, science and actors from civil society), control structures (hierarchy, market, negotiations) and fields for action are also to be taken into account. Governance structures for ensuring sustainable development must enable individual and societal learning processes and open up planning and development options. This is particularly so in light of the sustainability concept's postulate of intra- and inter-generational fairness

This is bound up with special requirements for governance structures for supporting social-ecological transformation processes. The following correlations must be noted in connection with the application and relevance of governance research and approaches for social-ecological climate research. Firstly, it must be assumed that climate change is a complex, multi-faceted problem with long-term

political, economic, social, cultural and ecological dimensions (problem complexity). Secondly, as a field of activity, climate policy is not the exclusive domain of government. In actual fact, many actors from the private sector, including their lobbies, are highly involved in climate policy, whereas other interest groups and parties concerned should perhaps be more involved (pluralisation of the stakeholder landscape). Thirdly, climate policy has long been more than just a matter of national policy. It is increasingly shaped at international level (the EU and international climate negotiations). This in turn leads to deficits in its implementation and integration down to the local level. Formulating and analysing climate policy must therefore take into account the complex, reciprocal processes that take place on various international, regional, national and local levels (globalisation, multi-level political system). Fourthly, analyses and implementation of climate policies must take into consideration the diverse interactions between policy fields such as environmental, transport, trade and development policies (interdependence between individual fields of policy).

Governance and Sustainability

New approaches and networks for social-ecological governance

The Governance and Sustainability project examined how recent governance concepts that are the focus of scientific discussion can be applied to various issues and policy fields and put to use in the actual implementation of sustainable development. Background: With the rise of the conflicting trends toward globalisation and regionalisation, existing societal regulation systems are under growing pressure to take action. In this connection, the regulatory mechanisms that governments have traditionally used are proving to be increasingly less suited for dealing adequately with today's challenges, conflicts and problems and their interactions. At the same time, the responsibility for and forms of governance are shifting within the multi-level political system: For example, as a result of economic globalisation, the governance attributes of the marketplace and enterprises are becoming increasingly important. One consequence of this is the dwindling reach of the means to exert political and administrative influence on the development of societies and natural resources. This can be observed on all political and geographical levels. Parallel to this, the global level (the WTO and international environmental agreements such as the Kyoto Protocol) and the local/regional level are seeing an increase in their societal status.

One of the project's areas of focus was the assessment of the changing role of enterprises and their social responsibility, particularly of multinational companies which have gained considerable importance in terms of (power) politics in recent years. As part of the analysis of the relationship between corporate governance and sustainability, the project elaborated possibilities for, limits to and demands on corporate social responsibility (CSR) concepts which increasingly shape the national and international discussion regarding external demands placed on corporate responsibility. This concept leaves the content of corporate social responsibility largely undefined. This vagueness has implications for CSR's suitability as a management or governance instrument and currently concerns in particular

- criteria for economic responsibility vis-à-vis society as a whole which the individual enterprise can easily use and implement and
- culturally sensitive criteria for a socially sustainable organisation of supplier relationships along the value-added chain.

Processes for specifically defining corporate responsibility have to be set up as participative discussions at the interface between the respective enterprise and its stakeholders and are therefore highly situation-dependent. These discussion, negotiating and learning processes make it possible for decision-makers, operatives, interested parties and individuals who are affected by corporate activities to develop a shared understanding for the direction of their production and consumption behaviour and to assess this behaviour's contribution toward achieving the overriding objective of sustainability. Thus, stakeholder processes have the potential for injecting greater consistency into the direction of corporate decisions.

For this to happen, the conditions necessary for such new types of co-operation must be established by expanding transparency requirements for example or by fostering the activities of ‚weaker' societal actors such as consumer or environmental protection associations so that they can act independently and effectively when collaborating with economic actors. The project developed fundamental terminology and concepts for use in the application of governance at regional level. It also developed and applied relevant elements (participation and institutions) of regional governance architecture in concrete areas of activity (ecosystem management, integrated management of river basins). Looking at the example of product-policy governance and at the subject of corporate responsibility, it was established that in regard to the stakeholder-orientation of governance concepts it is important to differentiate between the parties responsible and the parties affected and to concomitantly develop and organise political processes and instruments accordingly. This is more complicated than it sounds because the parties responsible generally include not only the producers but also the consumers. For this reason combinations of measures that include both the supply and the demand side in social-ecological transformation processes are increasingly considered promising. ‚Product panels' which have been introduced in Denmark are one innovative example for a more recent governance instrument. In this case, the political sector, businesses and other stakeholders work together in a participative process to develop a shared problem perception of the ‚social-ecological relevance' of a particular product group and come to an agreement on the action that must be taken. Product panels lead to increased interaction between the market and the respective environmental authorities. As a result, environmental authorities receive information and insights into the effects of environmental protection policy measures. Including providers in the process additionally increases understanding and support. Furthermore, trade and industry receive early insight into future political activities and can develop long-term strategies on this basis of this information.

Integrated Micro Utility Systems

Dynamics, sustainability and shaping of transformation processes in network and grid-based utility systems

The transformation processes currently in progress in the electricity, natural gas, water and telecommunications sectors were the focus of the Integrated Micro Utility Systems project. The far-reaching changes that are presently taking place in these sectors open up opportunities for planning and developing these processes with a view to sustainable management. At the same time however, the transformation of utility systems also bears potential risks for the objectives of sustainability.

This project consisted of three phases: During the first phase, the current dynamics in the utility sectors were analysed and scenarios for the future were developed. The project worked out four alternative scenarios on the basis of a detailed analysis of the current change processes in the four sectors under examination. These alternative scenarios covered a broad range of conceivable societal, technical and ecological developments. The structured descriptions of the four scenarios provided the basis for all the subsequent steps taken in this project. Based on this, the project interviewed actors regarding their ideas about sustainability in the utility sector, identified the future opportunities, problems and areas of conflict that the individual scenarios offered and assessed them with the help of suitable sustainability indicators.

During the third phase, strategies for action were developed for three selected fields of innovation. The project additionally examined as examples the development of fuel cells, smart buildings and network/grid regulation. Based on an analysis of the dynamics in these three fields of innovation and their incorporation into the utilities environment, microscenarios were developed and analysed for each of the fields of innovation as alternative visions of the future. During the last stage of the project, these microscenarios were discussed with a group of actors from the respective field of innovation and strategies were formulated for ways to shape and organise future development in these fields to be sustainable and for the entire network and grid-based utility system.

This project generated not only concrete insights into sustainable ways to organise utility structures. It also produced an innovative method for developing societal learning processes. This method builds on the concept of ‚technological transitions' and is called ‚sustainability foresight'. It was successfully tested with the help of a total of 100 different representatives from utilities, the science community, technology providers, the political sector and societal groups.

netWORKS

Social-ecological regulation of network and grid-based infrastructure systems as illustrated by the example of water

Agreements on climate protection goals are usually reached at national or international level. However, they are primarily implemented at local level in municipalities. In the process they are faced with numerous climate-relevant interactions between the various areas of activity and must therefore develop strategies for adapted solutions. For example, tried and tested planning rules in the urban water management sector are challenged when water availability and demand patterns change in the wake of increasing aridity or increased precipitation and the range of variation grows.

The netWORKS project developed a social-ecological transformation management system to support adaptation processes and facilitate strategic decisions. This system was designed to help municipalities convert existing infrastructures into systems solutions that are more adaptable, more flexible and consequently more sustainable. The project developed a guide that also provides the basis for case-based consultancy services. This guide is meant to put local decision-makers in a position to recognise and assess at an early stage the effects that infrastructure decisions will have. Special features of this approach include a process for an interdepartmental impact analysis of various alternative actions and an assessment process which is no longer geared solely to the classical sustainability rules of social, ecological and economic compatibility but also incorporates the guiding principles of integration, adaptability and functionality. In addition to this, instruments and processes are used that make it possible to identify and conduct the adaptation measures that become necessary not only in the decision-making process but also in the implementation of decisions. Examples here include indicator-based monitoring, participatory processes and knowledge management methods. For this reason, the decision-making process should be comprehensive and should integrate not only the political sector and administration but also the civil society. This is supported by participatory stakeholder processes that link several levels. Since the netWORKS approach is fundamentally transferable, the possible contributions that other areas of action can make toward achieving climate protection goals also play an important role here. For example, the close links between the energy system and urban water management system can be examined and the effects of energy policy decisions can be negotiated on a transparent basis.

A city that for example is considering whether it should organise its sewage disposal operations – which have been fully-owned by the municipality to date – as a public-private partnership in the future and sign an operating agreement with a private partner could use this approach to assess the potential, restrictions and even unintended negative effects connected with such a decision. This makes it possible to determine whether it can be expected that necessary investments would actually be effected as a result of bringing in private capital and whether energy consumption could be minimised and gaps in material cycles be closed in collaboration with this partner. Particularly for cities with declining populations, it would probably also be interesting to learn whether the private partner has sufficient expertise in dealing with shrinking networks and alternative, semi-centralised technologies. Based on the policy consultation services which are an element of the netWORKS approach it is clear that, for example, one-dimensional privatisation decisions are too narrow and that crucial decisions that set the course for the future can only be made when urban development and infrastructure planning are included in the process.

2.3 Climate dynamics as a systemic risk

The current climate discourse is seeing an increasing focus on the term ‚adaptation'. This discourse is also forging a societal problem description which involves not only the risks of the anticipated change processes but also the opportunities that various regions and social groups will have for development. At the same time, unexpected effects that global climate policies could possibly have on security, poverty and equal chances for development are also drawing increasing attention. For the research community, this complex societal issue means having to integrate different types and stocks of knowledge with the aim of reaching a profound understanding of the consequences that climate change will have for regional social-ecological systems. The corresponding descriptions of these problems provide the subject of transdisciplinary, social-ecological climate research: the development of sustainable strategies for adapting to climate change and ways to deal with its effects.

A fundamental challenge arises when developing such strategies: Increasing the ability of social-ecological systems to adapt and shape requires a comprehensive understanding of their resilience vis-à-vis two complementary risk dynamics. This concerns on the one hand the effects of singular events such as extreme weather events or malfunctions in socio-technical sub-systems such as the water or energy system. Of particular significance is the fact that these are usually complex, highly interconnected systems in which the failure of one component in the system could trigger a cascade with incalculable consequences for preserving the entire system and maintaining its ability to function. On the other hand, it is precisely the intentional adaptation processes that could have unintended side effects which threaten fundamental system functions. For example, strategies for adapting agriculture to local climate changes could lead on a long-term basis to edging out native animal and plant species that are important for the ecosystem. With its work to formulate strategies for dealing with this type of ‚systemic risk', Social-Ecological Research is currently developing concepts which could help meet this challenge.

The term ‚systemic risks' originally came from the financial and insurance sectors. It was a key phrase in the Emerging Risks in the 21st Century: An Agenda for Action project. Systemic risks have the potential

Systemic risks have cross-border effects whose impact is hard to foresee.

to seriously and perhaps irreversibly damage systems that are of central importance to society, such as the health care, transport, electricity and energy systems and, not least of all, ecosystems. Fundamental features of systemic risks include complexity, extreme uncertainty and ambiguity arising from wide differences in the various societal actors' interpretation of specific dangers. Current social-ecological research projects are progressively developing this understanding of systemic risks – in connection with diverse issues such as the cultivation of genetically modified crop plants, overweight and obesity in different population groups and today's ubiquitous information and communications technologies.

The complementary approach taken by systemic risk analysis focuses on the ‚normal operating mode' of systems. The reason: The processes that run when a system fulfils its function can also lead to systematic, cumulative damage. In this context, identifying properties and interactions that could produce undesired side effects during normal operation takes centre stage in the face of a suspected security threat or as part of a preventive system check. In other words: The aim here is to detect unintended transformation processes that could threaten the continued existence of entire social-ecological systems. This approach is presently being worked out in another social-ecological research project involving the problem of pharmaceutical residues in drinking water.

Current social-ecological risk research uses the term ‚systemic risk' generically as a synonym for a type of risk that established risk management concepts are unable to handle. There are three overriding reasons for this:

- It is not possible to determine with great accuracy the likelihood of a systemic risk actually happening or the extent of the damages that such an event would cause because systemic risks arise from processes in complex systems;
- Systemic risk analyses exceed the capabilities of quantitative risk calculations. As a consequence, taking qualitative scientific and extra-scientific knowledge into account is becoming increasingly important. However, methods for integrating this knowledge have largely been lacking to date.
- Coping with systemic risks requires the involvement of a large number of actors, not only vertically across many institutional levels but also horizontally across various segments of society.

For this reason, a concrete governance problem arises in the area of conflict between the existing knowledge problem and the need to form heterogeneous actor communities. This problem can be illustrated using the following questions:

- How applicable and suitable is the precautionary principle as a legal principle in general and as a principle of environmental law in particular?
- Given an uncertain knowledge base, how can a level of protection for a given legally protected good be defined and (scientific) criteria be determined for when this level of protection has been violated?
- What possibilities do consultation procedures offer, what are their limits and how can they be institutionalised if need be?
- How should the relationship between top-down and bottom-up approaches in risk governance be assessed and to what extent is a high degree of consensus in the perception of a problem and in objectives a fundamental requirement for joint action?
- Given the uncertain knowledge base, how can the different actor and target groups be motivated to practise risk management?

Drawing on existing concepts such as adaptive governance and reflexive governance, social-ecological risk research is conducting five transdisciplinary research projects against the backdrop of different thematic fields to develop approaches for dealing with this specific governance problem. In addition, internet-based methods of visualising risk conflicts are being developed that enable societal actors to cope with the above-mentioned knowledge problem on a structured, reflexive basis. The findings that are already available and those that are to come can be put to use in social-ecological climate research. The reason: Developing regional, actor-specific and sector-specific strategies and solutions for adapting to the effects of climate change requires innovative governance concepts.

Prospects and potential

Climate change and the challenges involved in coping with its effects present societies with social-ecological problems that typically exhibit complex interactions at a number of geographical and spatial levels and whose long-term effects are unclearly known today. Dealing with these problems often necessitates making decisions on the basis of incomplete, uncertain or disputed knowledge. Due to its interdisciplinary and transdisciplinary approach to research, Social-Ecological Research can make important contributions to the development of solutions for dealing with climate change and its effects. This is illustrated by the examples presented in the first part of this brochure. They show how concrete strategies for climate protection activities and for reducing greenhouse gases were developed in the course of Socio-Ecological Research projects. In the area of climate protection policy and energy supply, these projects examined not only how innovation processes could be shaped and organised on a long-term basis in favour of the climate-friendly production of electricity, but also the interaction between international climate protection policy and developments at national and local level and their consequences for other areas of society.

The development of concepts for integrated action that fosters climate-friendly consumption placed its focus on opportunities that the individual consumer has for taking action and laid the foundation for integrating a corresponding point of view into climate research. Integrated concepts for action were developed as examples for the Food and Mobility fields. These concepts use as their starting point everyday demands for action and the different needs and possibilities for action of various consumer groups. Projects being conducted under the From Knowledge to Action. New Paths towards Sustainable Consumption funding programme of the Federal Ministry of Education and Research are developing other approaches for action that will foster more climate-friendly consumption in the Construction and Housing and the Energy Consumption in Private Households fields.

In addition to these concrete contributions, the examples presented in the second section of this brochure illustrate the potential that Social-Ecological Research offers for generating new developments in the area of Sustainable Consumption, Governance and Innovation which can also be put to productive use in social-ecological climate research activities.

In view of this, the focus of transdisciplinary, social-ecological climate research can be more clearly outlined, namely, the development of sustainable strategies to protect the climate and increase society‘s ability to adapt to climate change and to deal with the effects of climate change. With this focus, Social-Ecological Research addresses a key challenge facing society today: The opportunities and risks that climate change brings are usually not equally distributed in either regional or societal terms. There are also geographical, sectoral and social differences in the causes of climate change and in its impact. For this reason, the assessment of the risks and development opportunities that will arise for various regions and social groups as a result of change processes is becoming just as controversial as the development of suitable compensation mechanisms. Unexpected effects that global climate policies could potentially have on security, poverty and equal chances for development constitute another focus. This social problem demands that research come to a more profound understanding of the interaction between climate change and other societal dynamics (globalisation, social change,

ageing and migration as consequences of demographic change, etc.) and the consequences climate change has for regional social-ecological systems.

With this research focus, transdisciplinary, social-ecological climate research also gives centre stage to the problem of knowledge integration: Being able to deal adequately with complex climate problems requires linking quantitative knowledge from scientific climate research with qualitative knowledge about societal and cultural correlations and including the lifeworld knowledge of stakeholders and affected societal actors in the assessment of stocks of knowledge and approaches to action. Using its interdisciplinary and transdisciplinary approach, Social-Ecological Research has tested methods and concepts for integrating knowledge that can be used when dealing with climate problems.

Examples of possible areas for further-reaching attention and priority topics in transdisciplinary social-ecological climate research include:

- One possible priority topic is the question of how the ability of utilities and disposal systems to adapt can be preserved and improved in the wake of major climate change. Transformation knowledge must be established for new types of situations in which decisions have to be made under uncertain conditions, knowledge that – depending on the utility system – could increase the system's ability to adapt and at the same time counter climate change. In order to achieve this, it will be necessary to develop a scientifically-backed understanding of ecological and social dynamics that are specific to the particular region and of their interaction in utility systems in order to identify corridors for possible developments and to determine various options for action. Given the central role that municipalities play in the provision of public services, the municipal level is of vital importance in the transformation of network and grid-based utility systems.

  For this reason, when developing approaches to solutions, it is vital to understand not only region-specific and context-specific connections between the climate system and other areas (food, energy, biodiversity, urban living environments) but also the options for and restrictions on action on the part of the stakeholders and actor groups involved.

- Another priority area is the often underestimated importance of day-to-day actions – not only in their ability to aggravate existing problems but also with an eye to their contribution to possible solutions for climate problems: Social-Ecological Research makes an essential contribution to integrating the behaviour dimension and the perspective of the actors involved into the systemic approaches taken by scientific climate research. One example for this is the question of how daily routines that have an impact on the climate can be broken and which motivations, incentives and circumstances could help replace existing day-to-day routines with more climate-friendly alternatives.

- A further field of study is the connection between technological innovation and the development of new use and consumption patterns. Studying how society incorporates technologies into daily life reveals options for how technological innovation can be designed and organised so that they enable the development of routine activities that have a mitigating impact on the climate and strengthen consumer skills for handling resources efficiently.

- Climate protection policies can place a particular burden on population groups that suffer from poverty and political marginalisation and can thus increase the risk of their social exclusion. In order

to counter this type of undesired social side effects, Social-Ecological Research can support the development of effective compensatory mechanisms and develop starting points for action to strengthen actor groups which are, for example, particularly affected by rising energy costs. It can point out how existing climate policy instruments could be supplemented or progressively developed in order to support the strengthening of skills and expertise necessary for climate-friendly action and to establish incentives and leeway for micro-investments to increase energy efficiency.

- Environmental measuring methods can, together with statistical methods, geographical information system (GIS) modelling and social empirical studies, can contribute to quantitatively describing, explaining and forecasting the effects that anthropogenic substances or substances that are redistributed through human activities have on our natural basis for life and thus provide fundamental information for climate impact research and climate protection. Society must – with an eye to recognised societal objectives such as the protection of the Earth's climate – assess this information on a normative basis so that these insights lead to knowledge that is of relevance to action. This will require the establishment of interfaces which enable a societal assessment of scientific findings.
  Social-Ecological Research becomes even more relevant for climate research and climate protection in this connection because it has a broad range of tested procedures and methods which can be used to develop orientational and transformation knowledge for dealing with climate problems

One problem arising in connection with climate change was and is that the concomitant long-term strategies for climate protection and adaptation must compete with short-term political and economic success scales. This gives rise to the challenge of integrating into current market mechanisms new procedures for enhancing the value of using resources in ways that preserve the climate on a long-term basis. This applies not only to resources such as water, soil and energy, but also to biodiversity as a fundamental prerequisite for stable ecosystems. In this connection, the relationship between climate protection and resource conservation exhibits conflicting aims. This will require a nuanced analysis of synergies and counterposed effects as, for example, the subject of biofuels with their critically discussed impact on biodiversity and food production shows.

Only a balanced consideration of societal and ecological issues leads to strategies for action that can draw a consensus. This poses a particular challenge when designing and assessing new market mechanisms that are aimed at sustainability. Striking a balance between social justice and the enhancement of economic value is particularly important, especially in view of the different societal structures and economic and natural conditions around the world.

Website of the Social-Ecological Research funding programme:
www.sozial-oekologische-forschung.org

Climate-relevant projects conducted under the Social-Ecological Research funding programme

Reference projects

Section 1.1

Global Governance and Climate Change – A multi-level analysis of the conditions, risks and opportunities involved in social-ecological transformation
Point of contact: Dr Achim Brunnengräber, Free University of Berlin (www.globalgovernance.de)

Further reading:

Brunnengräber, A. (2008): Global Climate Governance. Eine Mehrebenenanalyse der politischen Ökonomie des Klimas, Munich: oekom-Verlag (Postdoctoral thesis, in preparation)

Brunnengräber, A., Dietz, K., Hirschl, B., Walk, H., Weber, M. (2008): Das Klima neu denken. Eine sozial-ökologische Perspektive auf die lokale, nationale und internationale Klimapolitik, Münster: Westfälisches Dampfboot

Hirschl, B. (2008): Erneuerbare Energien-Politik. Eine Multi-Level Policy-Analyse mit Fokus auf den deutschen Strommarkt, Wiesbaden: VS-Verlag

Walk, H. (2008): Partizipative Governance: Beteiligungsformen und Beteiligungsrechte im Mehrebenensystem der Klimapolitik, Wiesbaden: VS-Verlag

Brunnengräber, A., Walk, H. (2007): Multi-Level-Governance. Umwelt-, Klima- und Sozialpolitik in einer interdependenten Welt, Schriften zur Governance-Forschung, Volume 9, Baden-Baden: Nomos-Verlag

TIPS – Transformation and Innovation in Power Systems.
Point of contact: Dr Barbara Praetorius, Deutsches Institut für Wirtschaftsforschung (DIW Berlin) (www.tips-project.de)

Further reading:

Fischer, C. (Ed., 2008): Strom sparen im Haushalt. Trends, Einsparpotenziale und neue Instrumente für eine nachhaltige Energiewirtschaft, Munich: oekom-Verlag

Fischer, C., Praetorius, B. (2008): Carbon Capture and Storage: Settling the German Coal vs. Climate Dispute? In: International Journal of Environmental Technology and Management, Special Issue on Energy Innovation, Volume 9

Praetorius, B., Bauknecht, D., Cames, M., Fischer, C., Pehnt, M.;,Schumacher, K., Voß, J.-P. (2008): Innovation for Sustainable Electricity Systems. Exploring the Dynamics of Energy Transitions. Heidelberg, Berlin: Physica

Praetorius, B., Sauter, R., Watson, J. (2008): On the dynamics of Microgeneration Diffusion in the UK and Germany. In: Foxon, T., Köhler, J., Oughton, C. (Eds): Innovation for a Low Carbon Economy. Economic, institutional and management approaches. Edward Elgar

Pehnt, M., Cames, M., Fischer, C., Praetorius, B., Schneider, L., Schumacher, K., Voß, J.-P. (Eds., 2006): Micro Cogeneration. Towards Decentralized Energy Systems. Heidelberg, Berlin: Springer-Verlag

JET-SET – The introduction of emissions trading systems as a social-ecological transformation process
Point of contact: Dr Ralf Schüle, Wuppertal Institut für Klima, Umwelt, Energie GmbH (www.wupperinst.org/de/projekte/fg2/)

Further reading:

Anger, N., Brouns, B., Onigkeit, J. (2008): Linking the EU Emissions Trading Scheme under Alternative Climate Policy Stringencies: An Economic Impact Assessment. Accepted for Mitigation and Adaptation Strategies for Global Change, Special Issue. Forthcoming.

Onigkeit, J., Anger, N., Brouns, B. (2008): Fairness aspects of linking the European Emissions Trading Scheme under a long-term stabilization scenario for CO_2 concentrations. Accepted for Mitigation and Adaptation Strategies for Global Change, Special Issue. Forthcoming.

Schüle, R., Sterk, W., Duckat, R. (2008): Die weltweite Verknüpfung von Emissionshandelssystemen als klimapolitische Option? In: Schüle, R. (Ed.): Grenzenlos Handeln? Munich: oekom-Verlag

Schüle, R. (2008): Linking Domestic Emissions Trading Schemes as Parallel Track - State of Research and Introduction into a new research field. In: Schüle, R. (Ed.) „Linking Domestic Emissions Schemes". Accepted for Mitigation and Adaptation Strategies for Global Change, Special Issue. Forthcoming

Sterk, W., Schüle, R. (2008): Ready to link up? Institutional Conditions of Linking Domestic Emissions Trading Schemes. Accepted for Mitigation and Adaptation Strategies for Global Change, Special Issue. Forthcoming

Anger, N. (2006): Emission Trading Beyond Europe: Linking Schemes in a Post-Kyoto World, ZEW Discussion Paper No. 06-058, Mannheim

Section 1.2

Ernährungswende – Strategies for social-ecological transformations in the area of Environmental-Food-Health

Point of contact: Dr Ulrike Eberle, Öko-Institut e.V.; Dr Doris Hayn, Institut für sozial-ökologische Forschung (ISOE), (www.ernaehrungswende.de)

Further reading:

Hayn, D. (2007): Alltagsgestaltung der Konsumentinnen und Konsumenten - Ausgangspunkt einer Ernährungswende. In: Nölting, B., Schäfer, M. (Ed.): Vom Acker auf den Teller. Impulse der Agrar- und Ernährungsforschung für eine nachhaltige Entwicklung. Ergebnisse Sozial-ökologischer Forschung 8., Munich: oekom-Verlag

Öko-Institut e.V., Institut für sozial-ökologische Forschung (ISOE), (Ed.) (2007): Ernährungswende. Eine Herausforderung für Politik, Unternehmen und Gesellschaft, Freiburg/Frankfurt am Main

Eberle, U., Hayn, D., Rehaag, R., Simshäuser, U. (Ed.) (2006): Ernährungswende. Eine Herausforderung für Politik, Unternehmen und Gesellschaft, Munich: oekom-Verlag

Simshäuser, U. (2005): Appetit auf Schule - Leitlinien einer Ernährungswende im Schulalltag, IÖW, Berlin
Hayn, D., Empacher C. (Ed.) (2004): Ernährung anders gestalten, Munich: oekom-Verlag

MOBILANZ – Ways to reduce the energy consumption and material flows of different types of mobility through the use of target group-specific mobility services

Point of contact: Dr Marcel Hunecke, Ruhr-Universität Bochum (http://eco.psy.ruhr-uni-bochum.de/mobilanz/)

Further reading:

Hunecke, M., Haustein, S., Grischkat, S. Böhler, S. (2007): Psychological, sociodemographic, and infrastructural factors as determinants of ecological impact caused by mobility behavior. Journal of Environmental Psychology

Hunecke, M., Haustein, S. (2007): Einstellungsbasierte Mobilitätstypen: Eine integrierte Anwendung von multivariaten und inhaltsanalytischen Methoden der empirischen Sozialforschung zur Identifikation von Zielgruppen für eine nachhaltige Mobilität. Umweltpsychologie

Haustein, S., Hunecke, M. (2007): Reduced Use of Environmentally Friendly Modes of Transportation Caused by Perceived Mobility Necessities: An Extension of the Theory of Planned Behavior, Journal of Applied Social Psychology, Oxford: Blackwell Publishing

Section 2.1

PROSA – Development and international harmonisation of the product sustainability assessment (PROSA) method

Point of contact: Dr Rainer Grießhammer, Öko-Institut e.V. (www.prosa.org)

EcoTopTen – Innovation for sustainable consumption

Point of contact: Kathrin Graulich, Öko-Institut e.V. (www.ecotopten.de)

Further reading:

Manhart, A., Grießhammer, R. (2006): Soziale Auswirkungen der Produktion von Notebooks
Beitrag zur Entwicklung einer Produktnachhaltigkeitsanalyse (PROSA)

Grießhammer R. (2004): PROSA – Klartext zur sozialen und gesellschaftlichen Dimension von Produkten, UmweltWirtschaftsForum

GELENA – Societal learning and sustainability – Analysis, practical testing and theory- supported reflexion of participative learning processes in science and in organisation and product development as illustrated by the example of climate protection
Point of contact: Professor Dr Bernd Siebenhüner, Carl von Ossietzky University Oldenburg (www.gelena.net)

Further reading:

Arnold, M., Siebenhüner, B., Hoffmann, E. (2007): INNOCOPE – ein partizipatives Produktentwicklungsverfahren. Konzept, Erprobung und Reflexion, in: Hoffmann, E., Siebenhüner, B., Beschorner, T., Arnold, M., Behrens, T., Barth, V., Vogelpohl, K.: Gesellschaftliches Lernen und Nachhaltigkeit, Marburg

Hoffmann, E., Siebenhüner, B., Beschorner, T., Arnold, M., Behrens, T., Barth, V., Vogelpohl, K. (2007): Gesellschaftiches Lernen und Nachhaltigkeit, Marburg: Metropolis-Verlag

Siebenhüner, B., Arnold, M., Hoffmann, E., Behrens, T., Heerwart, S., Beschorner, T. (2007): Organisationales Lernen und Nachhaltigkeit - Prozesse, Auswirkungen und Einflussfaktoren in sechs Unternehmensfallstudien, Marburg: Metropolis-Verlag

Section 2.2

Governance and Sustainability – New approaches and networks for social-ecological governance
Point of contact: Thomas Korbun, Institut für ökologische Wirtschaftsforschung (IÖW) GmbH (www.ioew.de/governance)

Further reading:

Dehnhardt, A., Petschow, U. (2008): Sustainability in River Basins. A Question of Governance. Munich: oekom-Verlag

Nischwitz, G. (2007): Regional Governance. Stimulus for Regional Sustainable Development. Munich: oekom-Verlag

Scheer, D. (2006): Governance und Nachhaltigkeit. Sondierung und Analyse beispielhafter sozial-ökologischer Steuerungsmuster. With the collaboration of Ankele, M., Petschow, U. and Frieder R., Schriftenreihe des IÖW 183/06, Berlin

Scheer, D., Frieder R. (2006): Governance of Integrated Product Policy. In Search of sustainable Production and Consumption. Sheffield: Greenleaf Publishing

Petschow, U., Rosenau, J., von Weizsäcker, E.-U. (2005): Governance and Sustainability - New Challenges for States, Companies and Civil Society. Sheffield: Greenleaf Publishing

Integrated micro utility systems – Decentralised cross-sector and service-oriented energy, water and telecommunications utilities
Point of contact: Christoph Timpe, Öko-Institut e.V. (www.mikrosysteme.org)

Further reading:

Konrad, K., Truffer, B., Voss, J.P. (2008): Multi-regime Dynamics in the Analysis of Sectoral Transformation Potentials. Evidence from German utility sectors. Journal of Cleaner Production. 16

Markard, J., Truffer, B. (2008): Actor-oriented analysis of innovation systems: exploring micro-meso level linkages in the case of stationary fuel cells. Technology Analysis & Strategic Management

Voß, J.-P. (2008): Nebenwirkungen und Nachhaltigkeit: Reflexive Gestaltungsansätze zum Umgang mit sozial-ökologischen Ko-Evolutionsprozessen, in Lange, H. (Ed.), Nachhaltigkeit als radikaler Wandel: Die Quadratur des Kreises? Wiesbaden: VS Verlag

Voß, J.-P., Bauknecht, D. (2007): Der Einfluss von Technik auf Governance-Innovationen: Regulierung zur gemeinsamen Netznutzung in Infrastruktursystemen, in Dolata, U., Werle, R. (Ed.),

Gesellschaft und die Macht der Technik. Sozioökonomischer und institutioneller Wandel durch Technisierung. Frankfurt a. M., New York: Campus

Voss, J.-P., Konrad, K.,Truffer, B. (2006): Sustainability Foresight. Reflexive governance in the transformation of utility systems, in: Voß, J.-P., Bauknecht, D., Kemp, R. (Eds.): Reflexive governance for sustainable development, Cheltenham: Edward Elgar

Truffer, B., Voss, J.-P., Konrad, K. (forthcoming), Mapping Expectations for System Transformations. Lessons for Sustainability Foresight in German Utility Sectors. Technological Forecasting and Social Change

netWORKS – Social-ecological regulation of network and grid-based infrastructure systems as illustrated by the example of water

Point of contact: Dr Thomas Kluge, Institut für sozial-ökologische Forschung (ISOE) and Jens Libbe, Deutsches Institut für Urbanistik (Difu) (www.networks-group.de)

Further reading:

Moss, T., Naumann, M., Wissen, M. (2008): Infrastrukturnetze und Raumentwicklung - Zwischen Universalisierung und Differenzierung, Ergebnisse Sozial-ökologischer Forschung, Volume 10, Munich: oekom-Verlag

Kluge, Th., Libbe, J. (2006): Transformation netzgebundener Infrastruktur. Strategien für Kommunen am Beispiel Wasser. DIFU-Beiträge zur Stadtforschung, Volume 45, Berlin

Kluge, Th., Schramm, E. (2005): Zwischen Kommune, Versorgungsunternehmen und Kundschaft. Herausbildung und Transformation der industriegesellschaftlichen Wasserinfrastruktur. In: Loske, R., Schaeffer, R., (Ed.): Die Zukunft der Infrastrukturen. Intelligente Netzwerke für eine nachhaltige Entwicklung. Ökologie und Wirtschaftsforschung, Volume 7. Marburg: Metropolis-Verlag

The netWORKS Papers series has also published background reports and in-depth analyses. Individual issues can be downloaded free of charge at: www.networks-group.de/veroeffentlichungen

Further current projects

Social-Ecological Risk Research

GeneRisk – Ecological, legal and economic analyses of the co-existence of agriculture with and without genetically modified plants
Point of contact: Dr Gunther Schmidt, Professor Dr Winfried Schröder, Lehrstuhl für Landschaftsökologie, University of Vechta (www.sozial-oekologische-forschung.org/de/692.php)

Collaborative assessment and communication of systemic risks of ubiquitous information and communications technologies
Point of contact: Dr H.-Peter Neitzke, Institut für sozial-ökologische Forschung und Bildung gGmbH (Ecolog) (www.aaccrisk.de)

start – Strategies for dealing with active pharmaceutical substances in drinking water
Point of contact: Dr Florian Keil, Institut für sozial-ökologische Forschung (ISOE) (www.start-project.de)

Overweight and obesity in children, youths and young adults as a systemic risk
Point of contact: Professor Dr Ortwin Renn, University of Stuttgart, International Center for Cultural and Technological Studies (IZKT) (www.zirn-info.de)

Visualisation of risk-related controversies – Developing and testing internet-based argumentation maps
Point of contact: Dr Cordula Kropp, Münchner Projektgruppe für Sozialforschung (MPS) (www.risk-cartography.org)

Projects on sustainable consumption

Reducing electricity consumption in private households: Impact analysis and transfer strategies for good practice
Point of contact: Professor Dr Doris Fuchs, University of Münster (www.sozial-oekologische-forschung.org/de/1291.php)

From consumer to prosumer - Potential for sustainable consumption through the changes in consumer control in the internet economy
Point of contact: Dipl.-Pol., -Biol. Siegfried Behrendt, IZT-Institut für Zukunftsstudien und Technologiebewertung gGmbH (www.sozial-oekologische-forschung.org/de/1292.php)

intelliekon – Sustainable energy consumption by regular rate customers through the use of intelligent meter, communication and rate systems
Point of contact: Dr Sebastian Gölz, Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (FhG) (www.intelliekon.de)

Energy-efficient modernisation of the housing stock of single and two-family homes – Activating and strenghtening of homeowner competence
Point of contact: Dr Bernd Hirschl, Institut für ökologische Wirtschaftsforschung (IÖW) GmbH, Dr Immanuel Stieß, Institut für sozial-ökologische Forschung (ISOE) GmbH (www.enef-haus.de)

Education institutions‘ contribution to fostering sustainable consumption among youths and adults
Point of contact: Professor Dr Gerd Michelsen, Leuphana University of Lüneburg (www.konsum-kultur.de)

Consuming energy sustainably – Consuming sustainable energy. Heat energy in the context of social predictors, economic conditions and ecological awareness
Point of contact: Professor Dr Ortwin Renn, University of Stuttgart (www.nachhaltigerkonsum.com)

Life events as windows of opportunity for change towards sustainable consumption patterns
Point of contact: Professor Dr Dr Martina Schäfer, Technical University of Berlin (www.lifeevents.de)

Social, ecological and economic dimensions of sustainable energy consumption in residiental buildings – Interim financing phase
Point of contact: Dr Klaus Rennings, Zentrum für Europäische Wirtschaftsforschung GmbH (ZEW) Mannheim (www.sozial-oekologische-forschung.org/de/1298.php)

Fostering sustainable consumption by integrating users into sustainability innovation
Point of contact: Professor Dr Frank-Martin Belz, Technical University of Munich (www.nanu-projekt.de)

Changing sustainability-relevant routines within social contexts: Developing an intervention instrument to foster energy-efficient user behaviour in organisations
Point of contact: PD Dr. Ellen Matthies, Ruhr-Universität Bochum (www.sozial-oekologische-forschung.org/de/1300.php)

Interdisciplinary junior researcher groups (preliminary phase)

Transformation knowledge for gender-appropriate and sustainable use of biological diversity
Point of contact: Dr Martina Padmanabhan, Humboldt University of Berlin

The politics of shaping nature. rural development and green genetic engineering between criticism and vision
Point of contact: Tanja Mölders, Daniela Gottschlich, Leuphana University of Lüneburg

Climate change and regional development - Adaptation strategies used in urban and regional planning in conurbations in coastal zones as illustrated by the example of the Baltic area
Point of contact: Dr Sonja Deppisch, HafenCity University of Hamburg

Protection of aquatic biodiversity and sustainable fishery management as illustrated by the example of the social-ecological issue of fish stocks in the angle fishing field
Point of contact: Jun. Professor Dr Robert Arlinghaus, Forschungsverbund Berlin - Leibniz-Institut für Gewässerökologie und Binnenfischerei

Biofuel as aocial fuel for sustainable development?
Point of contact: Kirsten Selbmann, Potsdam-Institut für Klimafolgenforschung e.V. (PIK)

EE Regions: The social ecology of self-sufficiency – Conditions for success and the diffusion of concepts for using renewable sources of energy to meet all energy needs of municipalities and regions – Focal area: bioenergy
Point of contact: Dr Chantal Ruppert, University of Freiburg (www.ee-regionen.de)

FAIR FUELS? - A social-ecological multi-level analysis of the possibilities of and limits on international biofuel use
Point of contact: Dr. Bernd Hirschl, Institut für ökologische Wirtschaftsforschung (IÖW)

Establishment of markets for indirect ecosystem services as illustrated by the example of CO^2 management in European cultivated landscapes
Point of contact: Dr Tobias Plieninger, Berlin-Brandenburgische Akademie der Wissenschaften

Chameleon - Adaption to climate change in enterprises in the public utilities sector – Analysis and development of company and political options for action
Point of contact: Jun. Professor Dr Klaus Eisenack, University of Oldenburg

Civil society's importance and potential for innovation in the remuneration of ecological and cultural-landscape services (CIVILand)
Point of contact: Dr Bettina Matzdorf, Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF) e.V.

GETIDOS – Getting things done sustainably. Theory, empiricism and potential of social entrepreneurship for sustainable development
Point of contact: Dr. Rafael Ziegler, Ernst-Moritz-Arndt-Universität Greifswald (www.getidos.net)

POLITICAL INNOVATIONS - New forms of politics for sustainability policy regimes and social-ecological transformation: Analysis of the innovation dynamics of ‚tradable certificates' and ‚participative discourse'
Point of contact: Dr Jan-Peter Voß, Technical University of Berlin

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