

# **Social-Ecological Research: A New Approach towards Generating, Integrating and Transforming Knowledge for Sustainable Development**

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**1<sup>st</sup> European Network Conference for Sustainability in Practice, April 1-3, 2004, Berlin**

# Social-Ecological Research (SER)

At present: Social Ecological Research new research field rather than new science.

## Demarcating remarks on the US tradition of Social Ecology (SE):

- SE subsumes diverse topics: sociology of ant societies, sociology of cities, ecological anarchism...
- More recent trends: Notion of SE extended to evolutionism, complexity theory and 2<sup>nd</sup> order cybernetics.
- Academic SE tradition traces back to Chicago School of sociologists (Thomas, Park, Burgess), 1920ies.  
*“While the field of ecology focuses on the relationships between organisms and their environments, social ecology is concerned with the relations between human populations and their environment.”*

➡ **Focus of this talk: SER as conceived and practiced in Germany!**

## Origins of the research field in Germany:

- Non-state, non-university research institutes and various social movements ➡ 3<sup>rd</sup> research sector.
- Crystallisation from rather diffuse but dynamic research field with influences from various domains: applied ecology, political ecology, integrated environmental sciences and sustainability research.
- Common approach: Environmental problems are perceived as complex societal problems.

# BMBF SER Framework Programme

SER state-aided through dedicated framework program “Sozial-ökologische Forschung” by the German Federal Ministry of Education and Research (BMBF) since 2000.



Long-term project with three basic investment areas:

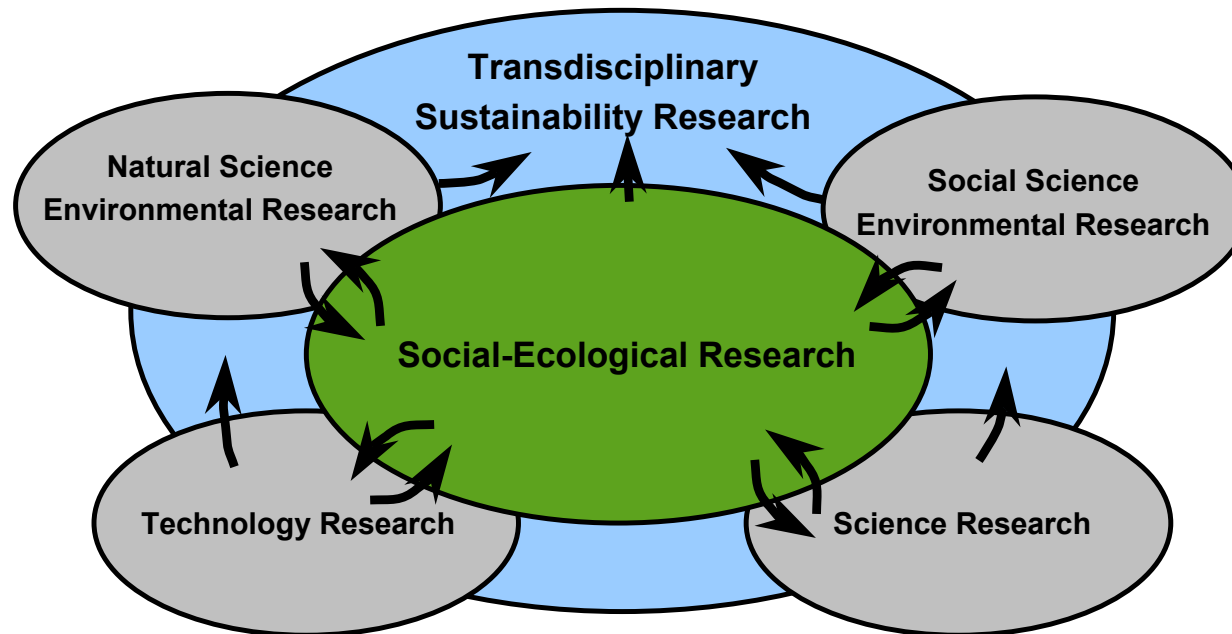
- Project Funding – Emphasis on research fostering SD.
- Infrastructure Funding – Strengthening independent research institutes.
- Personnel Funding – Promotion of interdisciplinary groups of young researchers.

Covered overarching problem dimensions:

- Social-ecological transformations and social innovation.  
*Investigation of nature-society relations to determine potentials for SD.*
- Social needs and material, energy and information flows.  
*Investigation of social-economic transformation processes under SD perspective.*

**Social Dimension: Strongly influenced by sustainability discourse, but...  
... distinct scientific problem: Cognitive, social, technical levels of integration!**

# SER & Transdisciplinary Sustainability Research



- SER integral part of sustainability research and as such conceived as: Problem oriented, actor oriented and transdisciplinary (“mode-2 like”).
- What is the dedicated task of SER under this perspective?

# SER and Knowledge for Sustainability

Level of Discourse	Discourse Activities	Forms of Knowledge
<b>Normative</b>	Definitions, criteria, indicators, objectives of sustainability. ➔ <i>Starting points:</i> Desirable future, understanding of sustainability, determination of non-sustainable states.	<b>Navigating Knowledge</b>
<b>Descriptive</b>	Non-sustainable states, processes of social-ecological transformations, dynamic nature-society interactions. ➔ <i>Starting points:</i> Analysis of nature-society interactions under action perspective, analysis of consequences and effects of activities.	<b>System Knowledge</b>
<b>Operative</b>	Strategies/Activities for specific sustainability problems. ➔ <i>Starting points:</i> 2nd order problem solutions, spatially and temporally specified.	<b>Transformation Knowledge</b>

SER discriminates explicitly between the three discourse levels and knowledge forms.

# SER: Characteristic Research Process

Specific research process is characterised by three levels:

- ➔ Generating
  - ➔ Integrating
  - ➔ Transforming
- } Knowledge

SER: Provides and develops specific methods on all levels, but...  
... integration of knowledge is hallmark of SER!

No schematic application of multi-, inter- or transdisciplinary concepts!  
➔ Problem specific hybrid cooperative forms.

Fundamental problems of integration in SER:

- Synthesis of knowledge across natural and social sciences  
*(incommensurable knowledge, data and theories; incompatible methods and practices; different problem perceptions; communication barriers).*
- Linkage of *theory and practice* or *knowledge and agency*  
*(involvement of non-scientific actors; integration of expert or lay knowledge; adjustment of diverging interests).*

# The Basic SER Research Approach

## Working definition of SER:

“Social Ecology is the science of the relationships between people and their natural and social environment. SER investigates the existing forms of these relationships and the possibilities of transforming them, by means of a comprehensive, disciplinary unbound perspective. The research objective is to generate knowledge for societal concepts of action in order to be able to ensure the future reproduction and development potential of society and its natural life stock.”

## ➔ Cognitive Core of Social Ecology:

- Research type: problem oriented, actor oriented and transdisciplinary.
- Research domain: Relationships between people and their natural and social environment.
- Research objective: Fostering sustainable development.

# The ISOE Specific Research Approach

## Innovative basic conceptual approaches to integration problems:

### ➔ **Societal Relations to Nature** (“Gesellschaftliche Naturverhältnisse”):

- Puts analysis of relations, i.e. patterns of connections into centre stage.
- Definition: Network of interfering connections and forms of behaviour between individuals, society and nature and emerging patterns therein.
  - ➔ Social, political, technical, cultural regulatory systems and dysfunctions of these systems can be analysed on the basis of a guiding scientific concept.

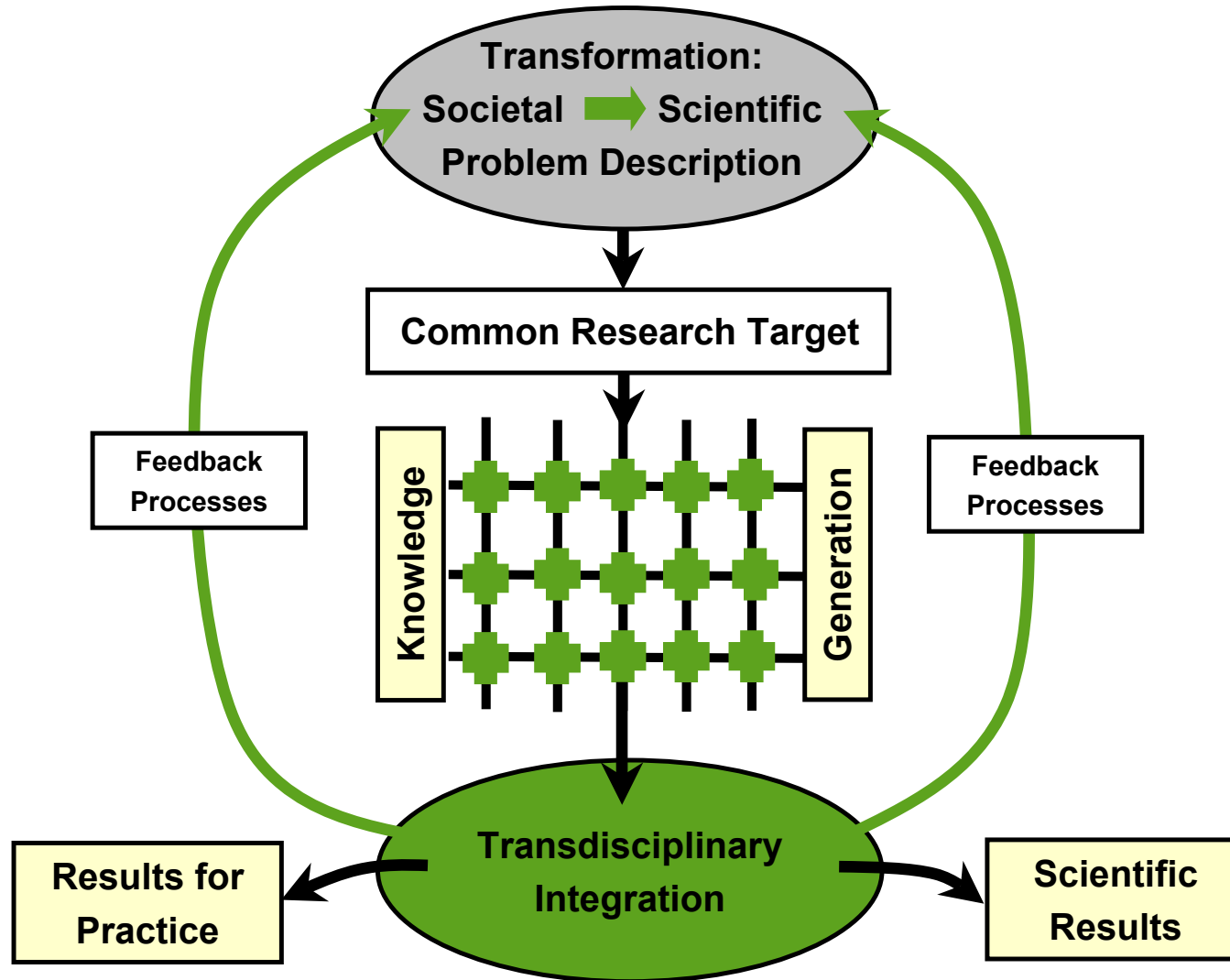
### ➔ **Problem specific research methods:**

- Interdisciplinary problem analysis – problem revision through theorisation.
- Systematic recourse to disciplinary methods – choice by connectivity cross-check.
- Recourse to impact assessment methods – Gender IA, Technological IA,...
- Use of quantitative and qualitative modelling – problem revision through formalisation.

### ➔ **Problem specific forms of organising the research process:**

- Systematic participation methods – key concepts: co-determination and liability.
- Conceptual quality assurance methods – cross-disciplinary “godparenthoods”.
- Institutionalised reflection processes – target agreements, feedbacks, process planning.

# Ideal Type of an ISOE Research Project



# Outlook: Modelling Social Ecological Systems

**Outstanding SER research question:**

**Can complex social-ecological systems be modelled?**

**Postulate: Social and ecological systems are strongly coupled.**

➔ Subsystems lose their autonomy. The Properties of the whole system are not solely determined by the properties of the isolated subsystems. Non-linear effects, feedback loops and emergent phenomena occur.

**Most recent research focus at ISOE:**

**Develop and establish formal modelling as a genuine SER instrument.**

**Modelling issues are addressed on three levels:**

1. Development of models that integrate natural and social processes along with their multiple interactions to study the fundamental dynamics that govern specific social-ecological systems.

} **Instrument  
of cognition**

2. Integration of knowledge across the natural and social sciences. Utilize the formal rigour of models to adapt common conceptual and linguistic frameworks.

} **Instrument  
of integration**

3. Integration of expert and lay knowledge through participation of decision makers and stakeholders in the model development process.

# Summary

**SER integral part of sustainability research but with distinct scientific problem.**

**SER explicitly addresses fundamental problems of knowledge integration:**

- Integration across the natural and social sciences,
- Linkage of theory and practice.

**SER research domain: Analysis of dynamic nature-society interactions.**

**SER research target: Practice solutions to foster Sustainable Development.**

**ISOE develops and applies basic conceptual integration approaches:**

- Theoretical concepts as premises for common problem descriptions,
- Problem specific research methods (e. g. mathematical modelling),
- Problem specific forms of organising the research process.

**➔ SER dynamic research field generating scientific and practice knowledge for SD.**

# ISOE Practice Example: Mobility Research

## Mobility research is highly transdisciplinary:

- *Municipal activities*: Transport planning, spatial planning, environmental planning;
- *Disciplinary sciences*: Engineering, geography economics, sociology, ecology...

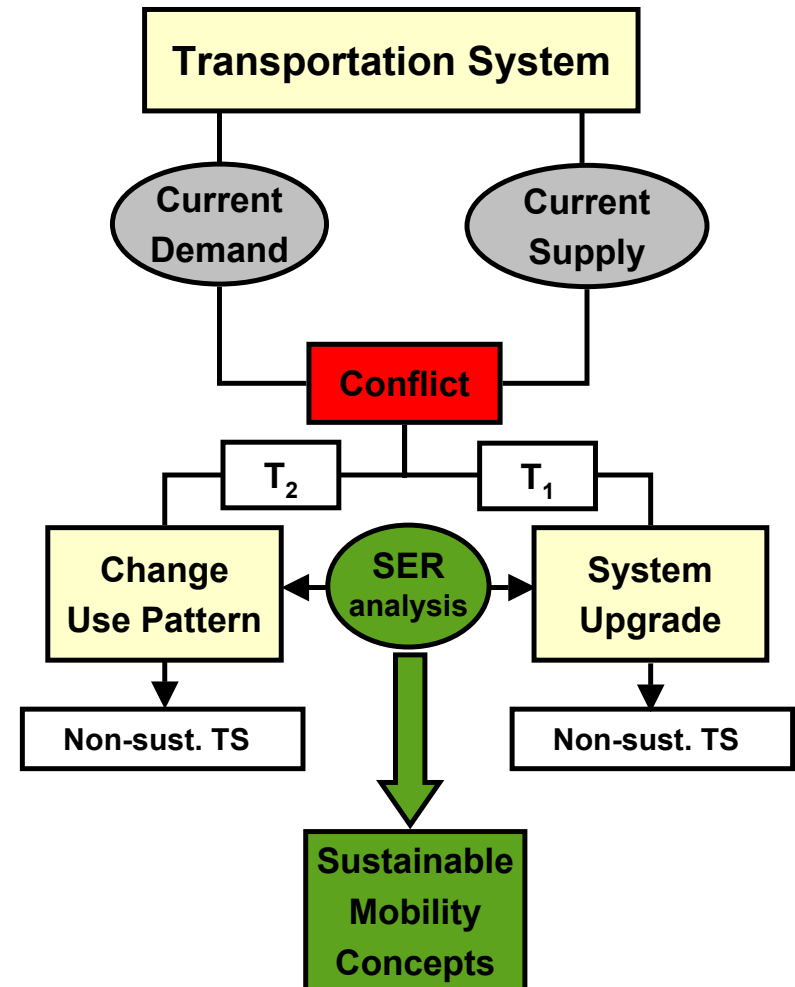
➔ **Challenging integration task!**

## Basic research assumption:

Sustainable mobility concepts have to be demand side oriented!

## Basic SER research approach:

Analysis of connectivity patterns between people, society and nature emerging from oscillations of supply side oriented solutions to appeals for the change of use patterns.



# ISOE Practice Example: Mobility Research

**Basic requirement to successfully cope with the integration problem:  
Shared theoretical framework “Multidimensional Mobility Concept” (MMC).**

Differentiation between “mobility” as basic societal relation to nature “locomotion/flexibility” and “transport” as technical aggregation of transport processes in physical space.

## **Dimensions of mobility:**

- Spatial mobility → Time, distances
  - Socio-spatial mobility → Needs, options
  - Socio-cultural mobility → Meanings, differences
- Mobility**

**MMC enables the transformation of a societal, political and disciplinary problem description into a specific, scientific and interdisciplinary problem formulation.**

MMC is functional equivalent for disciplinary integration by means of a guiding discipline.

## **Transdisciplinary integration of research results on two levels:**

- Integrated, practical proposals for transformations of the transportation systems.
- Check of hypotheses and identification of emerging new scientific research problems.

**➡ MMC basis for a variety of mobility research projects within and outside ISOE.**