

Joint Problem Identification and Structuring in Environmental Research

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Mutual learning among researchers and practitioners should already begin when real-world problems are identified and structured for research, in order to make the results practically useful. How do projects manage this challenge?

It is often stated that a joint identification and structuring of problems including all actors involved in the issue at the beginning of a transdisciplinary project is crucial for bridging gaps between research, policymaking and practice because it facilitates mutual learning about the meaning that actors give to an issue. How can projects in environmental research manage this challenge (Förster et al. 2001)? Here we compare experiences from three different projects: a project dealing with the effectiveness of soil and water conservation, a study on decision processes in repository site selection for nuclear waste, and the development of the *Swiss Research Agenda Alpine Convention*. The comparison focuses on three aspects:

1. Starting point: What triggered awareness of the issue, who took the initiative

and which incentives made a transdisciplinary project attractive for both scientists and other actors?

2. Participants: Who are the participants, what are their roles, and how do they collaborate?

3. Scientific objectives: Which knowledge gaps and research questions have been identified?

Each project is briefly presented in general and then described with regard to these three aspects. Finally, we compare the three projects.

Project 1: On- and Off-site Effectiveness of Soil and Water Conservation in Switzerland – Steps Towards the Integration of Farmers', Experts' and Scientific Knowledge

In the last decades, research into soil erosion has focused on the influence of soil protection measures on erosion and soil fertility in agricultural areas (on-site). However, only little is known about social and economic consequences of soil erosion for water bodies, buildings and roads (off-site) and about obstacles to the implementation of protection measures. The project focuses on an evaluation of off-site erosion and soil conservation and on opportunities for learning processes about erosion and soil conservation including ecological, economical and social aspects (www.erosion.ch). The approach “by farmers for farmers” makes it possible to integrate local knowledge, shows the distribution of this knowledge, and elucidates why soil-conserving



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practices have not been adopted more broadly by farmers.

Starting Point

External stimulation for the project proposal was a COST funding programme. Personal motivation for the project came from the long-term experience of the responsible scientist at Agroscope Reckenholz-Tänikon in soil conservation research and his knowledge about obstacles to the implementation of soil conservation measures. Knowing the complexity of the problem and the large efforts required for empirical studies, he was looking for broad scientific and institutional support and for funding opportunities. He found interested project partners in the Centre for Environment and Development (CDE, University of Bern) and at Management of Knowledge for the Environment (Zurich).

Participants

Using existing personal relationships, the research partners were able to bring together a broad range of interested actors already for the formulation of the problem, even before the proposal was submitted. Also the further identification and structuring of the problem took place in a participatory way and with a broad consensus, because additional actors stating their own interests and objectives were involved from the very beginning. For the CDE, although part of a university institute, “theoretical” knowledge to be published in high-ranked scientific journals was not a primary objective.

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When the proposal was accepted, funding for two dissertations became available, and the contents and methods of the dissertation projects were largely defined. Additional questions that were identified later in the course of the project (which was to some extent stimulated by additional project partners [insurance companies]) can be pursued in master theses. This organisational setting and the willingness to include new perspectives on the problem under study leads to a continuous improvement of the problem structuring that was considered as a positive experience by the project partners. The scientists in the project share the attitude that experience and knowledge of all actors involved should be included if this contributes to the problem solving process.

Scientific Objectives

There is a consensus that knowledge about the on-site problem is sufficient but that knowledge is missing (or, if existing, not sufficiently accessible) with respect to:

- restrictions for the implementation of proposed soil-conservation measures, as well as
- the off-site problem.

Scientists and institutional actors agree on the definition of the problem and the overall objective of the project: Soil erosion is to be reduced and this has to be achieved with consideration of the various factors to which actors in Swiss agriculture are exposed.

Project 2: *Transdisciplinary Study on Decision Processes in Repository Site Selection for Nuclear Waste*

The project aims at principles for organising decision processes in repository site selection for nuclear waste in a way that is acceptable for all stakeholders. The project studies the *acceptability of the decision processes* and *not* the acceptability of proposed sites with the case of the Wellenberg, a small mountain located in the Canton Nidwalden (www.uns.ethz.ch/translab/cs_actual). The Wellenberg had been pre-selected as an appropriate repository site in 1986 by the National Cooperative for the Disposal of Radioactive Waste (Nagra) but

was finally rejected by the population of the Canton Nidwalden in two referenda (1995/2002). The project departs from a reconstruction of the decision processes at the Wellenberg. On this basis, aspects of the decision processes that are regarded as most important are systematically varied (option analysis). Alternative options of the decision process are assessed by different stakeholder groups in order to reveal preferences and apprehensions, and to derive orientations.

Starting Point

Triggers for the project were

- the awareness that the organisation of the decision processes is of utmost importance in repository site selection for nuclear waste, but not much knowledge is available in this area (Flüeler 2002), as well as
- indications that decision processes at the Wellenberg were seriously flawed (Rütter and Partner 2006).

By funding studies and supporting the public discourse, the Swiss Federal Office of Energy (Bundesamt für Energie, BFE) was a key player in the triggering process. The project was initiated by a research team from the Natural and Social Science Interface (NSSI, ETH Zurich). Incentives were provided by an existing research cooperation between the researchers and Swissnuclear, the association of the nuclear power companies. Moreover, the research team is responsible for an internally funded annual project course integrating teaching, research and application (“transdisciplinary case study”) that provides a setting for the project.

Participants

The research team is responsible for the project management. The process started from a series of 25 interviews with stakeholders from Nidwalden. The interviews unfolded an interest among the stakeholders in revisiting and learning from the past Wellenberg decision processes – albeit the majority is satisfied with the result of the referenda. The research team analysed the statements gathered and structured the problem by identifying priority issues.

The Cantonal Government of Nidwalden rejected the offer to collaborate in the study due to political apprehensions caused by the highly emotionally loaded issue and a possible re-consideration of the Wellenberg for future site selection. However, an “advisory board” of about 25 stakeholders from Nidwalden – most of them key actors in the previous decision processes that led to the referenda – collaborated with the research team to structure the problem.

Scientific Objectives

Because of the triggers mentioned above, the research team investigates the decision processes underlying the Wellenberg case.

The project aims to generate transformation-oriented target knowledge about the *decision processes* (preferences about feasible options). Values and needs of the population in Nidwalden and in other re-

The Matterhorn is one of the most famous and attracting mountains in the Alps.



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gions and municipalities in Switzerland that might get involved into repository site selection are at stake.

Project 3: Research Agenda Alpine Convention

The *Alpine Convention* is a framework agreement between Austria, France, Germany, Italy, Switzerland, Liechtenstein, Slovenia, Monaco and the EU on protection and sustainable development of the Alpine region (www.alpenkonvention.org). In their *multi-annual work programme (MAP)* the bodies of the *Alpine Convention* define key issues, joint activities and priorities for the years 2005 to 2010. The aim of the project is – based on the *MAP*'s priorities – to develop a research agenda for the Alpine region that stimulates scientists to take up *MAP*'s topics and to provide results that help to achieve *MAP*'s goals (Hoffmann-Riem and Scheurer 2006).

Starting Point

The *Alpine Convention* addresses protection and sustainable development of the alpine region at the international political level. The implementation of the *Convention* is promoted, reported and assessed by its permanent committee of high officials. The International Scientific Committee on Research in the Alps (ISCAR), located at the Swiss Academy of Sciences (SCNAT) in Bern, is one of the approved observers of the permanent committee. ISCAR's office manager, who also runs the scientific committee on Swiss alpine studies, initiated the project. SCNAT's internal pool for early detection and science-society dialogue provided funding.

Participants

ISCAR's office involved td-net – the Swiss Academies' forum for transdisciplinary research – to jointly manage the project. In order to translate *MAP*'s priorities into state-of-the-art research questions, two workshops were held, first bringing together the Swiss and then also the international scientific community on research in the Alps. ISCAR's and td-net's offices organised the workshops, selected and invited experts, and prepared documents and tasks for the working groups. The researchers ac-

complished the translation into research questions. Two examples illustrate this: One of *MAP*'s priorities is to “study the repercussion of different tourist concepts in international and inner-alpine competition as it undergoes change”. In the research agenda this lead to “evaluation of competitiveness of existing and new tourist models in the context of globalisation”. The challenge of such a project is seen in linking models of tourist development with models of climatic or demographic change or globalisation trends. Another example of *MAP*'s key issues is “tourism and culture in the Alps”, taken up by the research agenda as “relationship between culture and tourism”, arguing that traditional as well as tourist cultures have already been studied in detail, but very few is known about their interactions.

Scientific Objectives

The project proposes a sequential processing of different forms of knowledge. The *Alpine Convention* is a political statement about development priorities (target knowledge). The researchers use this starting point to identify up-to-date research questions within the proposed priorities. Ideally they would come up with questions concerning “transformation knowledge” that stimulate social adaptation (in problem solving) during the research process. In the present project, however, the research questions often focus on systems knowledge, with a view on transformation by naming the stakeholders addressed and the social relevance of the issue. Further feedback from the political system or involvement of further stakeholders may change this focus on systems knowledge.

Comparison

Starting Point

There is no specific responsibility for the initial awareness leading to transdisciplinary research. Scientists, public agencies or politicians may become aware of an issue. However, in all cases scientists initiated the projects. They work at applied research institutions or institutions for the science-society interface. The private sector and funds for applied research or for the science-society dialogue provide financial support.

Participants

Participants have various tasks such as networking to involve experts, preparing and organising meetings for discussion, writing summaries and proposals on problems for research, selecting staff to do the research, involving experts for advice during research, and writing proposals for funding. In projects 1 and 2, scientists and other actors jointly address most of the tasks. In project 3, by contrast, politicians and researchers divide labour sequentially. Project 1 involves all actors with a stake in the uncontested issue by building on existing networks. Project 2, however, dealing with a highly controversial issue, does not involve all parties.

Scientific Objectives

All three projects aim at target and/or transformation knowledge: transformation knowledge (obstacles and supporting factors for soil conservation measures) based on consensual targets (reduction of soil erosion) in project 1; transformation-oriented target knowledge (preferences about feasible options to conduct decision processes in repository site selection) in project 2; in project 3, there is only a weak orientation towards transformation (“social relevance”), the focus is on systems knowledge based on consensual targets (*Alpine Convention* as a political statement about priorities).

Our comparison of three projects indicates that there is a tendency to focus research questions on systems knowledge if non-scientific actors (government, the public etc.) do not participate in the problem identification and structuring process.

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