

## 2 Towards Transdisciplinarity in Sustainability-Oriented Research for Development\*

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### Abstract

Transdisciplinarity has become an important aspect of research partnerships that aim to mitigate syndromes of global change. This research approach is necessary to identify and reflect on sustainability-oriented research for development, and to facilitate various stages of implementation of this form of research. The past 25 years of development cooperation have seen an evolution from disciplinary to participatory and transdisciplinary methodologies. More recently, the significance of transdisciplinarity has been acknowledged as a new form of learning and problem-solving involving cooperation among different partners in society and academia, in order to meet complex challenges of society. Transdisciplinarity has now been incorporated in many sustainability-oriented research frameworks. By taking the qualitative appraisal of syndrome contexts as a transdisciplinary starting point for sustainability-oriented research for development, the NCCR North-South has combined two conceptual frameworks – the syndrome concept and the transdisciplinary approach – in its overall definition of syndrome mitigation research. This concrete application of transdisciplinarity, combined with more conventional, disciplinary to interdisciplinary approaches in a chronological sequence, has received international recognition as an innovative and promising approach, and has aroused a great deal of interest.

\* This chapter is a modified version of a paper originally published in German (Hurni and Wiesmann, 2001).

## 2.1 From participatory to transdisciplinary research

In their search for solutions to concrete development problems, professional development organisations have, as a rule, been using participatory methods for more than two decades, as this approach has proved very effective. This means that local populations and decision-makers are involved in planning and implementing projects. Participatory approaches were also taken up at a correspondingly early stage in so-called action research, although with considerably greater hesitation than in development cooperation. These largely empirical approaches were given a theoretical basis only with the establishment of transdisciplinarity as a concept and approach. In essence, a transdisciplinary approach requires that phenomena under investigation be regarded from a perspective that (a) goes beyond specific disciplines and (b) is based on broad participation, characterised by systematic cooperation with those concerned.

Thus two issues need to be addressed in transdisciplinary research. First, do participatory research approaches adequately meet the requirements of transdisciplinarity, or do they need to be further elaborated? Of course this means identifying the limits of transdisciplinarity, and also defining how and where there is an additional need for interdisciplinary and disciplinary methods. Second, the past few years have shown that transdisciplinary research is not only a meaningful addition to individually pursued research in the context of development cooperation, but that it also expands the potential of traditional methods in all other areas of research.

In order to pursue the evolution of approaches from disciplinarity to transdisciplinarity, let us consider a concrete example from development cooperation (Fig. 1). In the highlands of Madagascar, there are many large gullies caused by erosion, known locally as *lavakas*. Intense rainfall during the monsoon causes heavy runoff in hill zones that have been deforested for centuries, especially when cyclones come from the east, ripping open gullies that can reach a depth of 100 m in the weathered tropical bedrock. The logical response of foresters specialising in development has been to argue for afforestation of catchments surrounding such gullies, as shown in Figure 1. However, a more precise analysis of the impact of rainfall and erosive processes conducted by geomorphologists showed that gullies advance towards the rear, encroaching upon afforested areas, and that the sheer size of the gullies qualifies them as catchments in their own right; these produce new runoff, leading to more erosion. In other words, afforestation cannot



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halt erosion. The original analysis was thus clearly enhanced by interdisciplinary collaboration between foresters and geomorphologists.

This perspective was further expanded by applying a participatory research approach: the local population, who has to live with the *lavakas*, was asked to help assess the problem. This process revealed that in most cases, farmers actually welcomed sandy sediment flows from the gullies as a highly beneficial source of mineral fertiliser for rice terraces downslope, whose yields constitute an important source of income. Hence, the search for solutions took quite a different shape when the research approach employed a transdisciplinary method from the outset.

While initial approaches were sectoral, i.e. disciplinary in nature and hence to some degree tailored to suit the curiosity of researchers, the need for a broader scientific approach rapidly became apparent in the concrete development context. In addition to natural science and technology aspects, economic and ultimately social dimensions were explored, raising the question

Fig. 1  
Example of  
huge *lavaka*  
erosion gul-  
lies in Mada-  
gascar, with  
afforested  
area above  
the gullies  
intended to  
protect the  
irrigated rice  
fields below  
them.

Photo:  
H. Hurni, 1987

of how different disciplines could best cooperate in a mutually supportive way in the search for solutions to the problem. Even more fundamental was the question whether solving the *lavaka* problem in all the areas where the phenomenon occurred is necessary to achieve sustainable development. What measures are best suited to optimise ecological, social and economic objectives? Which groups of actors need to be involved in order to achieve social goals?

These questions made it clear that disciplinary and interdisciplinary methods were no longer sufficient when it came to establishing or defining values and norms. Collaborative research made it necessary to give more emphasis to social dimensions. Just as development cooperation was increasingly using participatory methods, research approaches began to match local knowledge with scientific knowledge beginning in the mid-1980s, with the aim of generating new knowledge in dialogue with local decision-makers. The process of compiling, combining and developing concepts has done much to shape the work of research partnerships in recent years, and is increasingly determining research approaches. The NCCR North-South (see Chapter 1) has benefited greatly from this challenge.

## **2.2 The significance of transdisciplinarity in sustainability-oriented research for development**

Previous reflections on research in concrete development contexts, as well as the example of the *lavakas* in Madagascar, allow us to propose an initial description of transdisciplinarity as a concept associated with a requirement for the topical, methodological and social openness of research processes. This requirement arises from the demand that research contribute to the understanding, and particularly to the solution of concrete and complex development problems.

However, it is difficult to provide a further precise description of transdisciplinarity beyond this general requirement for openness. One reason is that the concept has positive social and research-related connotations, and its meaning is thus exaggerated. Moreover, it is difficult to make the concept more concrete and operational, owing to the variety of positions and definitions associated with transdisciplinarity that have arisen, not least of all as a result of the positive value it has in social terms.

Three basic positions have influenced discussions of transdisciplinarity (see Häberli et al., 2001). First is the idea that transdisciplinarity builds a bridge between the natural and technical sciences on the one hand, and the social sciences and humanities on the other. This position was developed in the late 1970s in answer to the exaggerated use of the term “interdisciplinarity”, and emphasises the need to overcome paradigmatic and methodological contradictions. A second position, established somewhat later, addresses the demand that research must be explicitly concerned with social and political processes. This position puts less emphasis on bridges between the sciences than on links between science and society. The third position combines the first two and calls for research processes that adopt a broad interdisciplinary approach and interact with the societies concerned in addressing complex problems.

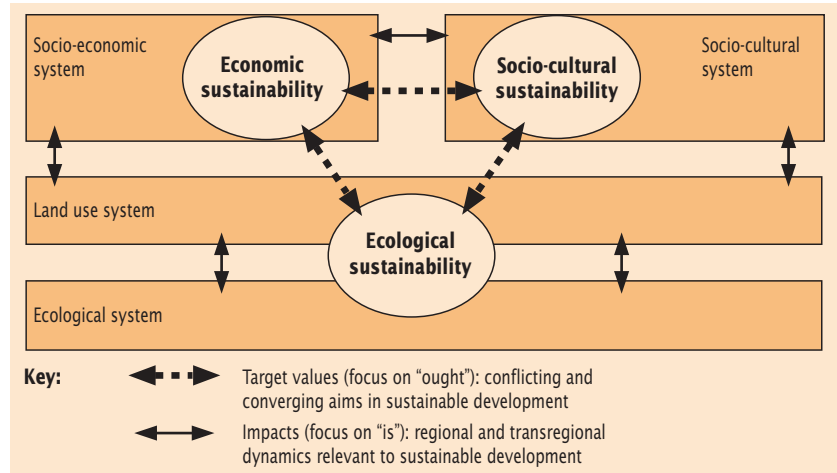
Against the background of these diverse positions, and taking account of the perspective of research for development (or development research), we propose a pragmatic approach. The aim of this approach is oriented research that will make concrete contributions to sustainable development. Although the term “sustainable development” (WCED, 1987; see Box in Chapter 1, p. 14) is quite vague and broadly applied, certain fundamental requirements for its application to development research can nonetheless be deduced.

Figure 2 on page 36 summarises the concept of sustainable development, which can be described in terms of economic, socio-cultural and ecological values. These dimensions form a so-called “magic triangle” that defines how inter- and intra-generational equity is to be achieved. Sustainable development is thus primarily a normative concept used to negotiate and establish values and aims in processes of development. But in addition to a focus on values (on what “ought to be”), the concept also has a focus on impacts (on what “is”). According to this, concrete values on scales of values in the magic triangle depend on the dynamics of the man-environment system.

Several conclusions can be drawn from this brief description:

- (a) As sustainable development is primarily a normative concept, there is a question of who establishes the relevant norms and anticipates future norms where necessary. As it turns out, the answer to this question always leads to a specific social context. In other words, sustainable development can only be meaningfully understood and negotiated in a particular social context.

Fig. 2  
Focus on values  
and concrete  
impacts in the  
magic triangle of  
sustainable  
development.  
Source:  
Wiesmann, 1998



(b) As scales of values are an integral part of the dynamics of an economic, social and ecological system, there is a basic inherent potential for conflict in the aims of sustainable development. In other words, sustainable development is preconditioned upon evaluation of the dynamics in man-environment systems, and negotiation of conflicting aims.

Consideration of these points makes it possible to deduce concrete requirements for sustainability-oriented research with a focus on development:

- Development research requires a context-specific approach that simultaneously allows the possibility of global referencing.
- Development research must begin with explicitly negotiated scales of values relevant to development. This means that issues must be determined as the result of interaction with the societies concerned.
- The potential for conflict in the magic triangle requires development research to include and link together perspectives and approaches from the natural and social sciences, as well as from the humanities.
- The search for solutions to problems in development research must take place in close collaboration with the actors and social groups concerned, thereby allowing the use of knowledge and capacity outside the realm of science.

These four requirements give transdisciplinarity a concrete, pragmatic meaning: transdisciplinary development research is interdisciplinary, context-specific and participatory, both with respect to problem identification as well as in the search for and implementation of research-based solutions to development problems.

### **2.3 The syndrome approach as a starting point for transdisciplinary development research**

The above considerations allow to suggest that transdisciplinarity in development research is not an empty political phrase but a necessity. Consequently, there is a need to confront the question of how to integrate transdisciplinarity in development research. This requires focusing on the level at which the conceptual principles of research are established, as well as the level at which specific research procedures are organised and executed. Some ways of answering this question are explored in the NCCR North-South (see Chapter 1). The framework of the programme is rooted in the “syndrome concept” (*Syndromkonzept*) originally developed by the German Advisory Council on Global Change (WBGU, 1997), and further refined by the NCCR North-South. The syndrome concept was originally built on several basic assumptions: it postulates that certain core problems of non-sustainable development occur in specific spatial and social contexts. These problems occur in particular combinations, and similar combinations of core problems are found in different contexts. A typical “cluster” of core problems is accordingly designated as a “syndrome of global change”.

Table 1 on page 39 illustrates how these basic assumptions are specifically integrated into the research approach defined by the NCCR North-South. Studies are now being undertaken in three important syndrome contexts – urban and peri-urban, semi-arid, and highland-lowland – to determine whether core problems of non-sustainable development have amalgamated into one or more clusters, and whether approaches can be developed to mitigate the resulting syndromes.

A syndrome approach of this sort offers a meaningful conceptual framework for the transdisciplinary process required in development research concerned with sustainability. The following principles, among others, are crucial to this approach:

- The selection and description of essentially normative core problems of non-sustainable development in specific contexts are the entry point for syndrome-oriented research for development. This requires explicit interaction between science and society with respect to these core problems, at the beginning of the research process. In other words, this interaction makes the normative basis of the research process explicit and thus open to critical examination and negotiation.
- The basic assumption of the syndrome approach – that core problems can occur in several local situations in comparable combinations – offers a way out of the ideographic trap of sustainability, according to which each case is unique and that therefore no generalisation is possible. As illustrated in Figure 2, sustainable development can only be meaningfully defined and addressed in specific contexts and situations. The syndrome concept gives this particularised approach a general frame of reference in global terms.
- The assumption that a cluster of core problems can be typified is supported by the hypothesis that comparable causes, dynamics and processes underlie a syndrome that occurs in different contexts. This makes it possible to establish a problem-oriented definition of a system, as well as a meaningful ordering of research questions, during the process of development research. Thus the syndrome approach can help find a way out of the systemic trap of sustainability, according to which everything is interconnected.
- The potential of the syndrome approach for reduction and structuring of complex interconnections opens perspectives for the mitigation of syndromes. First, it is possible to identify meaningful sectoral or multi-sectoral approaches to problem-solving for complex problems. Secondly, appropriate structures of communication and negotiation can be developed with different categories of actors and other social groups concerned.

The arguments presented here underscore the fact that the syndrome approach provides an answer to the requirements cited above for transdisciplinary, sustainability-oriented research for development. It combines a context-specific approach and a global frame of reference based on negotiable scales of values, links natural science perspectives and approaches with perspectives and approaches in the social sciences and the humanities, and facilitates participatory problem-solving.



Table 1

Scientific realms	Syndrome contexts			Core problems of non-sustainable development and syndrome contexts as postulated in the programme proposal of the NCCR North-South, to be revised in the regional workshops (cf. Table 1 in Chapter 3, p. 51, and Chapter 13, p. 383 ff).
	Urban and peri-urban	Semi-arid	Highland-lowland	
Political & institutional	1. Contradictory policies and institutional barriers 2. Hindering power structures 3. Poor local empowerment/governance			
Socio-cultural & economic	4. Social and ethnic tensions and conflicts 5. Limited innovative capacities 6. High social and economic disparities 7. Problems of market integration			
Population & livelihood	8. Poverty and insecurity of livelihoods 9. Health problems and infectious diseases 10. Population pressure and migration			
Infrastructure	11. Poor environmental services & infrastructure 12. Poor environmental sanitation 13. Problems of access to natural resources			
Bio-physical & ecological	14. Decreasing availability of freshwater 15. Increasing land degradation 16. Loss of biodiversity 17. Risks of natural hazards and climate change 18. Overuse of renewable sources of energy			

Source: NCCR North-South, 2000

## 2.4 Concrete transdisciplinary research in the NCCR North-South

The research framework of the NCCR North-South, which provides a concretisation of transdisciplinarity in sustainability-oriented research for development, has attracted international interest. While transdisciplinarity is one of the basic principles used to deal with the concerns of different groups affected by syndromes, the alternating use of transdisciplinary, interdisciplinary and disciplinary forms of research is crucial in terms of specific implementation.

Fig. 3  
Emphasis of  
methods during  
the course of  
research involving  
specific discipli-  
nary and trans-  
disciplinary  
approaches.  
Source: NCCR  
North-South, 2000

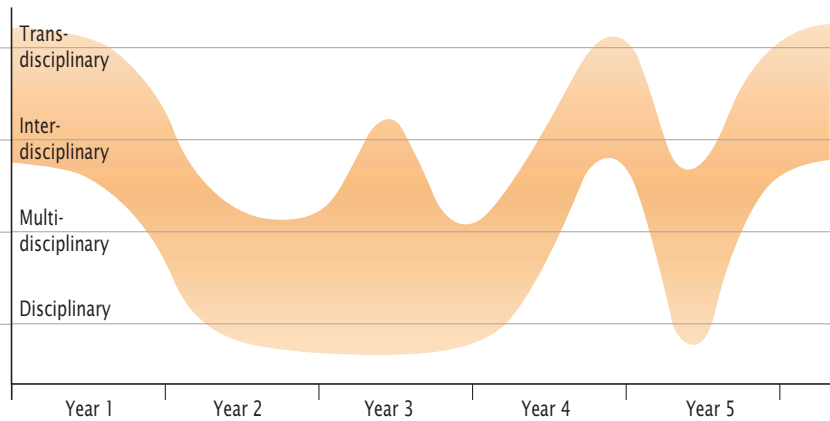


Figure 3 provides an overview of how the different types of research cooperation are being used in a chronological order. As already mentioned in Chapter 1, in the regional workshops of the “Syndrome Pre-Synthesis Project” (SPSP), an inter- and transdisciplinary methodology was used to prepare regional research partnerships. These activities allowed to realise the first step of the NCCR North-South programme (Year 1 in Fig. 3; see also Chapter 3). Following these regional SPSP workshops, research themes were identified by each region, syndrome context and scientific realm as a first activity of the NCCR North-South programme, based on which PhD and post-doc theses were defined, evaluated by the programme’s Board of Directors, and endorsed (Year 2). Currently (i.e. 1 July 2003), the NCCR North-South is at the beginning of Year 3, with a majority of activities consisting of disciplinary studies conducted by individual researchers. In addition, as

intended in Figure 3, an interdisciplinary symposium was held in June 2003 in Switzerland, focusing on “Complexity and generality in development-oriented research”. The general themes discussed in relation to the NCCR North-South programme were: (a) “Concepts, approaches and complexity”, (b) “Syndromes, mitigation and generality” and (c) “Transdisciplinarity and sustainable development”. In Year 4, an attempt will be made to feed individual research results back into a transdisciplinary process involving all researchers and selected stakeholders in regional conferences. Year 5, finally, will focus again on in-depth studies related to refining objectives derived from the transdisciplinary process of Years 1 and 4, in order to define the second programme cycle (Phase II) of the NCCR North-South.

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