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**td-net for Transdisciplinary Research,
a project of the swiss-academies**

Bibliography Transdisciplinarity

User Information

The database Bibliography Transdisciplinarity comprises important literature in the field of trans-disciplinary research. Its aim is to foster a broad basis of knowledge within the community of trans-disciplinary research and research on transdisciplinarity.

The dynamic tool addresses persons directly involved in the planning, realisation and evaluation of transdisciplinary research projects, as well as other interested parties.

Users of the Bibliography Transdisciplinarity are asked to contribute suggestions for literature to be added, additional keywords, new topics or commentaries on the entered documents (email to: bibliography@transdisciplinarity.ch).

Website: <http://www.transdisciplinarity.ch/e/Bibliography>

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Criteria for the Selection of Documents

1. The selected documents should contribute to transdisciplinarity in the domains (categories) *Fields of Application, Involved Disciplines, Transdisciplinary Approaches, Metatheoretical Perspectives, Context of Application, Topics of Importance in Transdisciplinarity or Tools*.
2. Abstract articles, comprehensive books and outstanding or innovative research articles should be selected. Not completeness, but a specific selection of important documents is aimed at.
3. The documents can be written in German, English or French. They are commented in the original language.

Definition of Transdisciplinarity the way it is understood in this Bibliography

Transdisciplinarity is concerned with the crossing of boundaries in the production of knowledge. Disciplinary boundaries can be crossed in the same way that the boundaries between theoretical and practical knowledge are crossed. Concrete aims, the delimitation and standardisation of basic assumptions, approaches, forms of justification and social networks can change considerably in the course of the research process. The form of complexity reduction, the way uncertainty and nescience are dealt with and the common structure of knowledge systematisation are subject to repeated discussion. The practices of transdisciplinary research have developed in different contexts and, within these contexts, different types of transdisciplinary research have emerged with different research goals. One type of transdisciplinary research aims to achieve the scientific systematisation of methodologies and knowledge in transdisciplinary research. Another concerns the increasingly close collaboration between third-level institutions and industry/the private sector. A third type involves addressee-oriented research which would like to improve the action competencies of actors in practice, whereby the role of experts as advisors and intellectual pioneers is being increasingly questioned and replaced with a concept of mutual learning. Within these fields of transdisciplinary research, theoretical and methodological aspects, which overlap in part and differ in part are important.

Categories and Keywords of the Bibliography

In this chapter the seven categories and their assigned keywords are listed and explained. Several categories and within the single categories several keywords can be selected.

Category «Fields of Application»

With a focus on new, cross-disciplinary defined research fields such as conservation or risk research, this category allows the access to thematic fields.

- Agriculture
- Biosphere
- Chemicals
- Climate
- Communication, Language, Journalism
- Cryosphere
- Development and Co-operation Research
- Economy
- Education
- Electromagnetic Radiation
- Energy
- Environment
- Ethics
- Gender Studies
- Genetic Engineering
- Human Perception and Behaviour
- Human Ressources
- Labour, Labour Market
- Law
- Lithosphere
- Medicine, Human and Public Health
- Nanotechnology
- Natural Ressources
- Nature Conservation
- Noise
- Nutrition
- Politics
- Population
- Profession and Qualifications
- Radiation
- Recreation, Sports, Tourism
- Risk
- Science, Culture, Art, Religion
- Soil
- Sustainable Development
- Technology Development and Transfer
- Toxicology
- Traffic
- Urbanism and Spatial Planning
- Waste
- Water
- Welfare and Social Practic

Category «Involved Disciplines»

This category allows the assignment of transdisciplinary projects to the different disciplines involved.

A. Social Sciences¹.

- Administration and Management Sciences
- Anthropology
- Communication and Journalism
- Criminology
- Demography
- Economics
- Education
- Ethnology and Folklore
- History
- Human and Cultural Geography
- Law
- Political Sciences
- Psychological and Social Linguistics
- Psychology
- Science of Art
- Social and Economic History
- Social Policy
- Social Psychiatry
- Social Psychology
- Sociology
- Urbanism and Spatial Planning

¹ Source: SIDOS (Swiss Information and Data Archive Service for the Social Sciences)

B. Humanities²

- Ethics, Practical Philosophy
- Religious Sciences, Theology
- Theoretical Philosophy

C. Mathematics, Natural Sciences and Engineering³

- Agricultural Engineering
- Astronomy, Astrophysics and Spatial Sciences
- Chemical Engineering
- Chemistry
- Civil Engineering
- Earth Sciences
- Electrical Engineering
- Fluid Dynamics
- Forest Engineering
- Geomorphology
- Hydrology, Limnology, Glaciology
- Information Sciences
- Material Sciences
- Mathematics
- Mechanical Engineering
- Meteorology + Atmospheric Sciences
- Microelectronics, Optoelectronics
- Oceanography
- Pedology
- Physics

D. Biology and Medicine⁴

- Basic Medical Sciences
- Biology
- Clinical Medicine
- Experimental Medicine
- Preventive Medicine (Epidemiology/ Early Diagnosis/ Prevention)
- Social Medicine

Category «Transdisciplinary Approache»

This category covers concepts that structure the research topics of transdisciplinary research projects.

Action Research

Action research is an approach in social science research that combines investigation and transformation of social problems within the research process and enables social groups to participate in democratic decision procedures. By experiments in real settings, action, research and learning of all participants are recursively combined as a triangle to develop at the same time valid knowledge and the competences of the social groups to solve the problems.

Adaptive Management

Adaptive management was developed in the USA in the 1970s. The aim of Adaptive Management is to manage natural resources on the basis of a trial and error approach. It involves close collaboration between research and practice. Institutional innovations, transparency with regard to uncertainty and participation are key aspects of this approach.

² Source: Swiss National Science Foundation (slightly modified)

³ Source: Swiss National Science Foundation (slightly modified)

⁴ Source: Swiss National Science Foundation (slightly modified)

Assessment of Chemicals

The assessment of chemicals approach integrates scientific and ethical criteria for the assessment of the distribution of chemicals in the environment. It aims to combine scientific criteria and the precautionary principle. The scientific analysis is based on the two criteria of persistence (i.e. life span of a chemical) and spatial reach.

Case Study Approaches

Case study approaches focus on the analysis of cases for various epistemic goals and are used in a broad field of research.

ETH-NSSI Case Study Method

The NSSI case study method was developed by the group Environmental Sciences: Natural and Social Science Interface (NSSI) at the Swiss Federal Institute of Technology (ETH Zurich) for a transdisciplinary undergraduate course. The NSSI case study encompasses teaching, research and application. Each case study team's activity starts with a comprehensive understanding of the case and its set of problems. The case protagonists are „systems experts of another kind“: Their co-operation with students and lecturers not only concerns the definition of problems but the elaboration of orientations as well. The goal is to achieve a „mutual learning„ process. Both sides stand to gain equally from this dialogue.

Ecological Economics

Ecological economics was developed during the 1970s in the USA with the aim of integrating ecology and economics. The metaphor of a co-evolution of ecological and economic systems lies at the centre of this approach. In contrast to comparable approaches such as human ecology, ecological economics is rooted directly in classical macroeconomics. Ecological services of ecosystems is a key term in ecological economics.

Green Hydropower

As part of its Green Hydropower project, the Swiss Federal Institute for Environmental Science and Technology (EAWAG) developed a label for eco- friendly electricity. In this project, an interdisciplinary team of scientists from the social, natural and economic sciences are working with experts from outside academia.

History of Materials

The keyword “History of Materials” covers approaches which analyse the historical development of the social integration of materials using both historical and scientific methods.

Human Ecology

Human ecology is grounded in geography and aims to develop an integrative perspective on man-environment relationships. This is often done by combining concepts from evolution and system theory.

Industrial Ecology

Industrial ecology focuses on the sustainable conversion of industrial systems. Material-flow analysis and life-cycle assessment are important methods used as part of this approach.

Integrated Assessment

Integrated assessment is a broad research field that focuses on the integrative assessment of the social, economic and ecological consequences of environmental change. An important part of integrated assessment is the combined assessment of the impacts of climate change. Complex computer simulation models are an important instrument used in integrated assessment.

Livelihood Approach

Livelihood approaches deal with the capabilities, assets and activities required for a means of living.

Man and Biosphere (MAB), UNESCO

MAB is a research program that was initiated by UNESCO and aims at establishing an integrative understanding of coupled ecological and social systems on a regional scale. A MAB project on the Alps and tourism was carried out in Switzerland in the 1980s.

Need Field Approach

The need field approach was developed as part of the Swiss Priority Program Environment (SPP Environment). Its basic assumption is that research questions focused on sustainability must be derived from real-life problems. A reduction of the complexity is achieved by applying an approach derived from human action theory. Human actions in a need field, e.g. nutrition, provide the focus for the framing of the problem. The objective of the project was to identify strategies for sustainable nutrition in Switzerland. The heuristic approach “options and restrictions” was developed for this purpose.

Political Ecology

Political ecology deals with the complex relationships between socio-political systems and ecological problems.

Real-World Experiments

In real-world experiments, controlled interventions are carried out under natural (real) conditions and their effects on the dynamics of investigated systems are observed in a process of recursive design.

Social Ecology

Based on the metaphors of metabolism, colonialisation and cultural evolution, an interdisciplinary group of social and natural scientists at the Department of Social Ecology at the Institute for Interdisciplinary Studies of Austrian Universities (IFF) is developing a transdisciplinary understanding of the relationship between nature and society.

Socio-Ecological Research

This transdisciplinary approach to sustainability was initiated by the Institute for Socio-Ecological Research (SOE) in Frankfurt and aims to establish a systematic linkage of knowledge concerning systems, goals and implementation strategies and deals with associated methodical problems.

Sustainability Indicators

Sustainability indicators serve in the operationalisation of the sustainability concept. The three pillars of sustainability: society, economy and ecology necessitate an interdisciplinary approach.

Syndrom Approach

The syndrome approach was developed by the German Advisory Council on Global Change (WBGU). The approach aims to identify recurring local patterns of global change which are known as syndromes. These global syndromes represent patterns of anthropogenic degradation of the environment. The understanding of the functional interrelations between the identified syndromes provide the basis for the development of problem solving strategies.

SYNOIKOS

The SYNOIKOS project is a collaborative project being implemented by the Institutes of Architecture and Urban Design and Resource and Waste Management at the ETH in Zurich. The aim of the project is to create

scenarios for the sustainable conversion of a Swiss urban region. The method aims to establish a link between scientific material-flow analyses and urban design.

Systems Analysis and Modelling

Systems analysis and modelling cover the analysis of systemic relationships as well as their mathematical description in models. Their aim is to describe complex phenomena by changing values of variables.

Earth Systems Analysis

The Earth Systems Analysis approach was developed by the Potsdam Institute of Climate Impact Research (PIK). Its aim is to attain a better understanding of coupled natural and societal systems. The synthesis of the results is based on mathematical models and metaphors drawn from cybernetics.

Technology Assessment

Technology Assessment (TA) attempts to provide policymakers with a rational basis for their decisions. TA proceeds in an interdisciplinary way: ideally, social, economic, technical, legal, ecological etc. aspects are dealt with together. From a methodological point of view, there is TA that focuses on expert knowledge and there are participatory forms that integrate interest groups, decision-makers and lay people directly in the TA process. Modern, “constructive” TA studies attempt to get involved at a very early stage of the development of a new technology and to shape its very development.

Category «Metatheoretical Perspectives»

This category provides references to theoretical and empirical work on transdisciplinarity, and constellations and developments that require transdisciplinary research. Documents on the different definitions of transdisciplinarity can also be found under this category.

Boundary Concepts

The keyword “Boundary Concepts” covers concepts that deal with the areas between traditional disciplines. The approach questions the boundaries defined by traditional disciplines and their concepts and provides the starting point for new concepts such as cyborgs, seamless webs and actor networks.

Concepts of Transdisciplinarity

The keyword “Transdisciplinarity Concept” includes documents that deal with different definitions of transdisciplinarity.

Metaphor

The keyword “Metaphor” covers documents that deal with the use of terms and concepts in a different context. This process gives rise to a transfer of meaning by comparison.

Philosophy of Science

The keyword “Philosophy of Science” refers to philosophical texts with a transdisciplinary relevance.

Science & Technology Studies

The keyword “Science & Technology Studies” covers documents from the field of science and technology studies with a transdisciplinary relevance. Unlike philosophical texts, these documents contain empirical work or theoretical texts that refer to empirical research.

Category «Context of Application»

This category includes constellations of collaborations between academic research and non-academic partners.

Non-Academic Institutions

Non-academic institutions of knowledge production are non-academic institutions that foster or carry out transdisciplinary research.

Science - Industry/Private Sector

The collaboration between science and industry or the private sector is focused on the development and production of products and services.

Science - Policy

The collaboration between science and politics is focused on policy consultancy and on the influences of political processes on the sciences.

Science - Public

The collaboration between science and the public is focused on cultural and social debates about sciences and its consequences.

Transcultural Collaborations

Transcultural collaborations refers to the specific features of the knowledge transfer between different cultures, to the extent that scientific knowledge is part of it.

Category «Topics of Importance in Transdisciplinarity»

This category includes important aspects that are crucial in the context of transdisciplinarity. They include participation, interdisciplinarity, dealing with complexity and uncertainty as well as new forms of scientific explanation.

Collaboration Natural + Social Sciences

The keyword “Collaboration between Natural and Social Sciences” refers to questions relating the collaboration between the social and the natural sciences (including the humanities and engineering sciences).

Collaboration beyond Disciplines

The keyword “Collaboration beyond Disciplines” deals with the problems involved in the collaboration between different scientific disciplines.

Complexity

The keyword “Complexity” deals with forms of complexity and ways of dealing with complexity in transdisciplinary projects.

Explaining + Understanding

The keyword “Explaining and Understanding” refers to different approaches used to explain and understand human action and social processes to the extent that they are also important in transdisciplinary research.

Incommensurability

The keyword “Incommensurability” deals with the problems surrounding the incommensurability of knowledge and values. Incommensurability stands for different forms of knowledge or values that can not be translated into one and another, compared or made to relate easily.

Moral Values + Norms

The keyword „Moral Values and Norms“ refers to research on moral and normative aspects of target and transformation knowledge in transdisciplinary research.

Mutual Learning

The keyword “Mutual Learning” refers to processes of mutual knowledge and value exchange and learning between different disciplines and between research and practice.

Participation

The keyword “Participation” stands for the participation of partners outside of academic institutions in a research process. This keyword covers also documents which deal with local knowledge.

Problem Orientation

The keyword “Problem Orientation” refers to the focus in transdisciplinary research on concrete problems from the real world and the formulation of problem-solving strategies.

Process Character

The keyword “Process Character” refers to the paramount importance of learning and mediation processes in transdisciplinary projects. Process character also means that the different phases of a research project do not unfold in a linear sequence, instead they may be modified during the research process in an iterative and recursive manner based on the experience gained.

Reflexivity

The keyword “Reflexivity” refers to the importance of reflection on the implicit research assumptions and status of the persons involved in a project – scientists and other participants – and on the research in the project context.

Systems Knowledge + Target Knowledge + Transformation Knowledge

The keyword „Systems Knowledge, Target Knowledge and Transformation Knowledge“ refers to research addressing the analysis of complex processes and developments in nature, economy and society (systems knowledge) in relation to studies on related values and norms (target knowledge) and on possibilities of how to approach these aims (transformation knowledge).

Uncertainty

The keyword “Uncertainty” deals with forms of uncertainty and with ways of dealing with uncertainty and nescience in transdisciplinary projects.

Valuation

The keyword “Valuation” refers to questions of the assessment and the valuation of alternative options of actions (including products and technologies). Due to the fact that transdisciplinary projects deal with real life problems and with problem solving strategies these projects are often confronted with questions of valuation and with a close intertwinedness of knowledge and values.

Category «Tools»

This category deals with tools and methods which may be helpful in the context of transdisciplinarity.

Case Study Tools

The keyword “Case Study Tools” refers to concepts and methods referring to the investigation of cases.

Education Tools

The keyword “Education Tools” refers to the concepts and methods used in transdisciplinary education.

Evaluation Tools

The keyword “Evaluation Tools” refers to concepts and methods for the evaluation of transdisciplinary projects.

Generalization of Knowledge Tools

The keyword “Generalisation of Knowledge” refers to methods that aim to examine the transfer and generalisation of knowledge from a specific context.

Institutional Tools

The keyword “Institutional Tools” refers to institutional innovations that foster transdisciplinary research and collaborations.

Knowledge Management Tools

The keyword “Knowledge Management Tools” refers to concepts and methods that aim to co-ordinate and integrate knowledge among experts.

Participation Tools

The keyword “Participation Tools” refers to concepts and methods for participatory processes.

Problem Framing Tools

The keyword “Problem Framing Tools” refers to concepts and methods for the formulation and framing of problems and research questions independently of individual disciplines.

Project Management Tools

The keyword “Project Management Tools” refers to concepts and methods for the organization and management of transdisciplinary projects.

Science Policy Tools

The keyword “Science Policy Tools” refers to concepts and measures from science policy that aim to foster transdisciplinary research.

Synthesis Tools

The keyword “Synthesis Tools” refers to concepts and methods for the synthesis of knowledge in transdisciplinary projects.

Systems Analysis Tools

The keyword “System Analysis Tools” refers to concepts and methods for the analysis of systemic relationships.

Uncertainty Tools

The keyword “Uncertainty Tools” refers to concepts and methods that aim at dealing with uncertainty.

Valuation Tools

The keyword “Valuation Tools” refers to concepts and methods for the valuation and assessment of alternative actions (including products and technologies) in transdisciplinary projects.