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**Sustainable Coastal Zone Management
from a Transdisciplinary Human Ecology
Perspective**

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Themes:

- (1) A policy framework - Integrated Management of Coastal Zones (ICZM) in Europe
- (2) An example of interdisciplinary research - the Swedish programme "Sustainable Coastal Zone Management"
- (3) The problem - from interdisciplinarity to transdisciplinarity in resource management
- (4) Tentative conclusions – what can transdisciplinarity approaches contribute to integrated resource management?

Resource management problems in European coastal areas:

- (1) The *resource system*: progressing degradation of marine and coastal ecosystems and reduction of living resources (especially fish).
- (2) The social complexity of *resource use* results from the parallel existence of different appropriation processes, property systems, multiple resource use and resource management systems – with manifold conflicts between users.

Management problem "incoherent knowledge"

- (3) Knowledge from different scientific disciplines or stakeholders is often incompatible and not sufficient knowledge is available. Knowledge required for problem solution and resource management includes knowledge about the state of ecosystems, the state of social systems, rules for resource use, and property rights and the factual behaviour of resource users.

Management problem "incoherent rules"

- (4) Rules and regulations from different political systems (international law and contracts, regulations from the European Union or from the states) and relicts from older traditional local resource use systems include different and sometimes contradicting criteria and priorities for resource management. Not all stakeholders are interested to cooperate for the purpose of achieving coherent regulation and management systems.

1. ICZM in Europe

- European Demonstration Programme for Integrated Coastal Zone management (ICZM) was initiated in 1996.
- Thirty five demonstration projects have been carried out until 1999, together with accompanying research.
- “Integration” of resource management meant: horizontal and vertical integration of policies, territorial integration, consistent integration of goals and programmes for sustainable development and resource management over time.
- No rigorous scientific and methodological evaluation of the projects, only a series of pragmatic conclusions with regard to the organization of ICZM-processes at different policy levels – local, national, EU (Burbridge 1999).

Recommendation of the European Parliament and the Council of 30 May 2002 concerning the implementation of Integrated Coastal Zone Management in Europe

(2002/43/EC):

- Principles to be followed by EU-members in ICZM:
- (a) a broad thematic and geographic perspective
- (b) a long-term perspective
- (c) adaptive management (understood as a gradual process to adjust as problems and knowledge develop)
- (d) local specificity and great diversity of the European coasts (requiring specific solutions and flexible measures)
- (e) working with natural processes and respecting the carrying capacity of ecosystems
- (f) involving all parties concerned
- (g) involving relevant administrative bodies at national, regional and local levels
- (h) use of combination of instruments to facilitate coherence between policies and between planning and management

2. Swedish Research Programme “Sustainable Coastal Zone Management”

(SUCOZOMA):

- SUCOZOMA covered mainly archipelago coasts in Western and Eastern Sweden.
- Interdisciplinary research programme: ecology, fishery science, economics, law science, human ecology
- Primarily water based resources (coastal fishery and water quality management), less land based resources.
- Whether this scope of interdisciplinarity and problems is sufficient to deal with the problems found is still (after SUCOZOMA) a matter of discussion.
- Managerial problem: every step from land-based planning and management to include coastal water areas is both methodologically and practically difficult.

(1) Motives & interests of resource users and owners at the coast:

- Resource users differentiate between local owners and users and non local owners and users. Most local stakeholders, whatever their professional role and economic interests, argue for more local or community-based resource control and management of resources. The cluster of motives includes:
 - - a positive view of local traditions bound to the social system (local community), the ecosystem (archipelago), local livelihood strategies (household fishery, subsistence, small scale local fishery and production);
 - - negatively valued components as the dominance of monetary or economic interest in resource use bound to external markets and external consumers.

Local owners:

- Management of natural resources that includes private ownership (of land and coastal waters) needs practical engagement by the owners to use their resource to keep the resource and the ecosystem productive in the long run.
- Such engagement is often available with local owners who are living in the local community and are committed to the community and the local traditions of resource management.
- To maintain the local engagement of owners and to support similar behavior of non-local or absent owners is a core problem of sustainable resource management. Participation of different stakeholders in local management systems may be an option.

(2) Changing conflicts:

- In Swedish coastal management: conflicts about access, use and distribution of natural resources between professional groups of resource users (different groups of fishermen, mussel cultivators, and others) are gradually being superseded by conflicts between new resource user groups using resources for consumptive purposes (seasonal residents, national and international tourists and tourism enterprises, recreational and sport fishermen).
- The changes in conflict patterns during the past decades follow from the changes of economic structures towards a "third sector economy" with a decrease of primary production and industry and an increase of service, leisure time and private consumption.
- The arena where these changes can be seen best is municipal planning that has to deal with the clashing interests of traditional and new users of resources at the coast.

(3) Conflict management:

- Conflict solution is possible in many different forms, formal and informal, direct and indirect. At present the informal approaches of conflict mitigation and direct negotiation between stakeholders and local approaches are not yet practised in Swedish coastal management, but to such approaches attention was directed with SUCOZOMA. There is still a predominance of top-down regulation and conflict management through governmental, formal and legal institutions.
- Conflict management is not only a therapy for single conflicts, but follows the idea of knowledge transfer in transdisciplinary frameworks. Such knowledge transfer includes (a) collective learning of several scientific, political and administrative actors from case studies; (b) methodologically controlled processes of scientific advice; (c) direct co-operation between scientists and resource users for the purpose of knowledge production (participatory research).

3. From Inter- to Transdisciplinarity in Resource Management

- No sharp boundaries between inter- and transdisciplinarity:
- Transdisciplinarity - variant of interdisciplinary cooperation, going beyond intra-scientific cooperation and knowledge integration.
- SUCOZOMA: no transdisciplinary epistemology and methodology, although the objectives of the programme, its cooperation with stakeholders, and the approaches to transfer of knowledge in innovative and experimental resource management at local levels can be seen as similar to transdisciplinarity, also:
- combined stakeholder and conflict analysis with four main steps:
- (1) to map the stakeholders and their interests, (2) to analyse the conflicts and the problems to which they are linked, (3) to develop methods for conflict mitigation and cooperation of stakeholders, (4) to integrate these components in systems for the management of natural resources that are implemented in cooperation and with participation of stakeholders.

Approaching transdisciplinarity:

- The presently emerging epistemological paradigm of “transdisciplinarity” evolves from various forms of applied research. Ideas such as
 - - problem and context-oriented research,
 - - new views of the roles of researchers,
 - - broader notions of actors or stakeholders that provide knowledge, and
 - - a preference for use of local knowledge from stakeholders in decision-making can be found under transdisciplinarity, where the changing roles and contexts of research in late twentieth century are discussed.
- Researchers and research institutions appear no longer as privileged producers of knowledge but as stakeholders with specific interests (resulting from their institutional dependence, the competitive production and offer of knowledge from different disciplines and fields of research).

Discussion of transdisciplinarity:

- (1) Epistemology of transdisciplinary knowledge integration:
- Rules for integration of data and research results from special fields, projects, management areas.
- Guiding questions: Who is allowed to use which knowledge for which purposes in a resource management system? Definition power, access to knowledge, entitlement to produce knowledge, negotiations between different groups of scientists and other stakeholders are important questions here – taken for granted that knowledge use means exercising power.
- New formal research methods are less required than
 - - methods for cooperation in knowledge production when scientists and non-scientists are involved
 - - and methods for the synthesis of knowledge.

Discussion of transdisciplinarity:

- (2) Managerial implications of transdisciplinarity: The questions of “Who defines the problems and delivers adequate knowledge?” are changing in resource management practice into that of “Who owns the problems and has to manage them? “. The rights, roles and obligations of stakeholders with regard to the knowledge they produce, own or use need to be specified (for scientific knowledge, intra-institutional and local knowledge).
- (3) Successful cooperation between scientists, resource managers and resource users (social capital for resource management):
- Social capital (social networks and linkages between resource users) can only be created through trust, when local networks are strengthened, and the chances for cooperation in resource management are improved.
- The practice of science mandated by large governmental institutions with strong decision making power in resource management has created distrust in science among local resource users.

4. Transdisciplinarity for local resource management:

- In the last analysis: transdisciplinarity in resource management is a framework for methods and mechanisms for successful and cooperation between stakeholders (scientists included) to build local resource management systems.
- Components of such transdisciplinary approaches for the sustainable management of coastal resources can be formulated from the research and experience of SUCOZOMA as well as from broad comparative research about local resource governance by Ostrom et al.

SWOT-analysis: transdisciplinarity

- Strengths:
- + problem oriented (covering all resource use problems resulting from the interaction of social and ecological systems)
- + practice-related (practice in formal management programmes, local management, behaviour of different resource user groups)
- + based on experience, empirical knowledge, learning (chances of continuous improvement)
- + supports integration and synthesis of knowledge available (with the synthesis of already available knowledge many problems can be dealt with: not always is new research required)
- + creates opportunities for cooperation (between science, policy and resource users)
- Weaknesses:
- - still a diffuse concept with different and contradicting aims and forms
- - no clear and coherent set of methodologies
- - bad methodological compromises (quick, cheap and dirty methods; deficits of information and data rarely transformed into a methodology of "optimal ignorance")
- - intensive (in terms of time, work, persons)
- - limited generalisation (context-bound results)
- - lack of scientists trained for inter-/transdisciplinary work

SWOT-analysis: transdisciplinarity

- Opportunities:
 - + inclusive (include the whole knowledge cycle: generation/research, dissemination/training, transfer/application, monitoring/application)
 - + includes evaluative and normative components of knowledge use
 - + supports the integration of different knowledge forms (scientific, technical and local knowledge)
 - + supports innovation (in social, economic, ecological terms)
 - + can be linked with ... as sustainability science and sustainable development
 - + research can (but needs not to) become more democratically organised/participatory and transparent (less dependent from single and specialised expertise)
- Threats:
 - - lack of theoretical concepts and frameworks
 - - epistemic barriers of interdisciplinary cooperation (between natural and social scientists)
 - - lower quality of research (in terms of methodological standards, ...)
 - - unclear conditions for cooperation between disciplines, between science and policy, science and practice
 - - insufficient support from governmental institutions, resource managers/practitioners (still prevailing attitude to let science do the work of knowledge production alone)

Components of transdisciplinary resource management systems:

- Transdisciplinary cooperation can help – and has helped in SUCOZOMA – to transfer the comparative research about preconditions for local sustainable resource governance (Ostrom et al) into conceptual models guiding future practice of resource management by way of experimenting, adaptive planning and management, co-management and giving priority to locally managed and controlled resource use.
- Such transfer is a long-term strategy for policy and institutional reform, development and learning, in several management cycles over several decades. Core components of a transdisciplinary strategy of sustainable resource management are
 - (1) a long-term perspective of resource management (that transcends time horizon of the presently available planning and management methods),
 - (2) a local governance perspective (coherent with national and international management systems),
 - (3) a knowledge use perspective,
 - (4) a method perspective.

Transdisciplinarity: renewal of local resource governance

- Criteria for sustainable resource management include
 - - socially robust systems with the components of participation, knowledge integration, and
 - - maintaining biological and cultural diversity through pluricentric adaptive systems.
- To make coastal resource management systems more sustainable requires a change from
 - - "top-down"-approaches based on the regulatory dominance of large-scale bureaucratic and governmental or governmentally-dependent international institutions (finally resulting in ideas of the global management of ecosystems through global institutions) to
 - - local governance where complex national and global systems of management appear as secondary components, built through the networking of local management systems (trial to maintain the specificity and diversity of local social and ecosystems in a global mosaic of resource management).

Concluding reflection:

- How can resource management systems be built (and linked) across different levels of hierarchy and scales in time and space?
- SUCOZOMA case studies do not suffice to formulate further arguments - also the concepts of complex adaptive systems and adaptive management systems are still rather vague.
- SUCOZOMA research supports the assumption: the core of sustainable coastal zone management lies in the formulation of platforms for knowledge production, exchange, dissemination and application with several actor groups - resource user groups, local associations, scientists/researchers, politicians and public administrators.
- Beyond the "hard factors" (ownership rights and legal management rules), the "soft factors" of values, attitudes, interests, aspirations of stakeholders need to become part of the development process.
- With the rebuilding of formal institutions and the strengthening of soft institutions sustainable coastal management becomes possible - in continued reform and development processes of several decades.