TRANSDISCIPLINARITY AND NATURE CONSERVATION

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Abstract: Nature conservation is concerned with human-nature interface problems. It started as a movement that involved individuals from different scientific disciplines and other groups in society. Where is the nature conservation science today? What is its future? Researchers that work in nature conservation in Slovenia are mostly natural scientists, primarily biologists and foresters. More and more often, they are powerless to solve increasingly complex problems of nature conservation, because of their lack of social, economic, management, educational, communication and other skills. The aim here is to demonstrate the urgent need for trans-disciplinary approach in the conservation of nature, in order to mitigate this power imbalance. Trans-disciplinary approach is an extremely promising global movement that promotes a new approach to the creation of human knowledge. It includes dialogue among the natural sciences, social sciences and humanities as well as with civil society, where the problems of the world are lived out on a daily basis. By removing the walls between the disciplines and civil society, we enable new types of knowledge to emerge through complex and integrated, mutually learned insights. This embodied knowledge is created in the spaces between the disciplines and society (the fertile middle ground). There are four pillars (axioms) of the transdisciplinary methodology - multiple levels of Reality (ontology), the logic of the included middle, emergent complexity (epistemology), and integral value constellations (axiology). These axioms are explained in this paper as is the role each plays in reframing our conception of the conservation of nature. Transdisciplinarity can ensure that we attain an efficient and grounded future for nature conservation. As well, transdisciplinarity better ensures that Slovenian natural scientists regain their power to solve increasingly complex, nature-human interface problems.

Key words: nature conservation, transdisciplinarity, partnership

TRANSDISCIPLINARNOST IN OHRANJANJE NARAVE

Povzetek: Varstvo narave obravnava problematiko konfliktnih odnosov med človekom in naravo. Varstvo narave v Sloveniji se je v začelo kot gibanje v katerem so sodelovali posamezniki različnih znanstvenih disciplin in drugih skupin v civilni družbi. Kje je varstvo narave dandanes in kakšna je njegova prihodnost? Naravovarstveniki v Sloveniji so večinoma naravoslovci, predvsem biologi in gozdarji. Vse pogosteje so nemočni pri reševanju kompleksnih naravovarstvenih problemov varstva narave, ki potrebujejo družboslovna, ekonomska, upravljavska, izobraževalna, komunikacijska in druga znanja. Cilj prispevka je opozoriti na nujnost uvajanja transdisciplinarnosti pri ohranjanju narave, da bi s tem ublažili to neravnovesje moči. Trans-disciplinarnost je zelo obetavno globalno gibanje, ki spodbuja nov pristop k osvajanju znanja. Vključuje dialog med naravoslovjem, družboslovjem in humanistiko, kot tudi dialog s civilno družbo, kjer se problemi vsakodnevno živijo. Želi si podreti zidove med znanstvenimi disciplinami in civilno družbo z namenom odkrivati nove vrste znanja. Ta znanja nastajajo skozi kompleksne in integrirane vpoglede ter v procesu medsebojnega učenja. To poosebljeno znanje se ustvarja na relacijah med znanstvenimi disciplinami in družbo. Štirje stebri (aksiomi) transdisciplinarne metodologije - multiple ravni resničnosti (ontologija), logika vključene sredine, rastoča kompleksnost (epistemologija) in integralna konstelacije vrednot (aksiologija) – ter njihova vloga pri preoblikovanju konceptov varstva narave so podrobno predstavljeni. Transdisciplinarnost nam lahko pomaga zagotoviti učinkovito prihodnost na področju ohranjanje narave in pomaga naravovarstveni stroki v Sloveniji povrniti kompetence pri reševanju kompleksnih naravovarstvenih problemov.

Ključne besede: ohranjanje narave, transdisciplinarnost, sodelovanje

1. Introduction

Humans have been learning about the natural world and teaching each other what they learn since Palaeolithic artwork. This ability to learn about the natural world and apply what is learned has been a key factor in human dominance as a species (Hayes 2009). Nowadays, by common agreement, we are witnessing an extraordinary loss of species and their ecological settings. By extrapolating the present trends, global biodiversity is likely to be substantially undermined by the year 2100 (Sala et al. 2000). Pimm and Raven (2000) predict that approximately 18% of the species contained in the global "hot spots", within which some 30-50% of all species may exist (Myers et al. 2000), will be lost by 2050, even if all of those areas are fully protected. Soulé and Sanjayan (1998) contend that at least half of total land area in the hot spots should be protected, compared to only 6-8% that is protected today, if species variety is to be guaranteed. If this prediction is true, we have a long way to go, and more effort should be directed into nature conservation. Selby (2007: p. 260) states that "the view of human-nature relationship needs to shift from the doministic, instrumental and exploitative to embeddedness and intrinsic valuing, from a shallow ecological to a deep ecological paradigm." Aronson et al. (2006) and Selby

(2007) believe that it is time for a unified effort to holistically solve the problems at the interface of people and nature.

Nature conservation is concerned with human-nature interface problems. Human-wildlife conflict occurs when the needs and behaviour of wildlife impact negatively on the goals of humans or when the goals of humans negatively impact the needs of wildlife. This year we celebrate the 90th anniversary of the first conservational programme in Slovenia, named Spomenica (1920). It was submitted by the Department for the Protection of Nature and Natural Monuments on 20th of January 1920. Nature conservation started as a movement that involved individuals from different scientific disciplines and other groups in society. Among the initiators and writers of Spomenica were professors, teachers, museum workers, lawyers, notaries, engineers and financial advisors. In the introduction, they declared that nearly all cultural countries saw the need to preserve monuments. Based on this belief, they co-founded the natural parks for fauna and flora protection.

Where is nature conservation science today (90 years later) and what is its future? Berginc et al. (2007) write that nature conservation is an activity in which people strive to conserve valuable objects, both (a) parts of nature and (b) nature as a whole. They see it as a subject of environmental protection and sustainable use of natural resources. Dietz et al. (2003) state that, in the absence of effective governance institutions at the appropriate scale, natural resources and the environment are in danger from increasing human population, consumption, and deployment of advanced technologies for resource use, all of which have reached unprecedented levels. A different approach is needed.

2. Reframing the conception of nature conservation by trans-disciplinary methodology

2.1. Overview of nature conservation conceptions

Stoll-Kleemann and O'Riordan (2002) compare two overall approaches to the conservation of biodiversity: (a) the "ecology-first" approach (also known as "fortress conservation" or "fences and fines") and (b) the "people included" approach (also known as community-based conservation or the participatory approach). They note pros and cons of both approaches. Nature conservation was, in its beginnings, imposed from the top-down and was characterized by strong top-down management (Gbadegesin and Ayileka 2000). Both approaches continue to have their supporters today. Top-down advocates are convinced that "local community" welfare and development are in conflict with conservational goals (Brown 2002). One of the strong supporting reasons for the "fortress conservation" approach is that changes in the global economy and the penetration of Western ideas and materialistic values into every corner of the globe may give rise to potentially chaotic and destabilizing socioeconomic conditions at the level of local communities (Terborgh 1999).

Purely protectionist approaches to conservation are criticized in the international community (Inamdar et al. 1999). Failings of this top-down imposition of natural-resource policies and management have been well documented (Gbadegesin and Ayileka 2000). More inclusive, community-based approaches in conservation are, in part, a reaction to these failures, in a world in which social and economic factors are more and more seen as key to successful conservation (Ghimire and Pimbert 1997). The community-based approach looks to a direct cooperative relationship between the integrity of ecosystems and the sustainable livelihoods of local people (Salafsky and Wollenberg 2000, Stoll-Kleemann and O'Riordan 2002, Berkes 2004). The inclusion of local interests, in order to maintain sustainable management, is of fundamental significance for nature conservation (for more, see McNeely 1995, Pimbert and Pretty 1995, Borrini-Feyerabend 1996, Barton et al. 1997, Davey 1998, Haynes 1998, Venter and Breen 1998, Stoll-Kleemann and O'Riordan 2002, Berkes 2004, Carlsson and Berkes 2005, Wood et al. 2008, Don Carlson et al. 2009). There is a general agreement that it is unrealistic to consider humans separately from nature, especially in today's heavily human-dominated world (Kates at al. 2001, Gunderson and Holling 2002).

Stoll-Kleemann and O'Riordan (2002: p. 163-164) summarize three key reasons in favor of the participatory (community-based) approach:

1. *Democratic necessity.* Community-based management process realizes the importance of local participation and consultation and respects their citizenship credentials.
2. *Management legitimacy.* Effective and efficient management requires the understanding and the support of local people. Protected areas established authoritatively from above, without prior consent, may make them "closed territories" with few links to the external worlds (Batisse 1997), and with little chance for peaceful coexistence.
3. *Sharing knowledge and understanding* are vital for the success of protected areas. All actors have uniquely different perspectives as to what is a problem and what constitutes improvement. This uniqueness is also one of the important constraints, because targeted stakeholders often do not share a unified view and therefore do not always or readily see the need for peacefully linking multiple interests. Knowledge and understanding are socially constructed; therefore, there is no single "truth" or correct answer. What is taken to be "true" depends on the framework of knowledge and assumptions brought in by individuals and their social and occupational settings. It is essential to involve different actors and groups (Pretty and Pimbert 1995) to share knowledge and interests.

Barton et al. (1997) provide a list of constraints that should be taken into consideration while implementing participatory approaches. We believe two of their constraints are especially important. First, participatory processes require specific investments of time and other resources. Constant commitment over time is required and results may take a while to appear. This time factor may tax the patience of people involved or threaten the natural resources, if the conservational action is urgent. The second important constraint is that the participatory approach in nature conservation includes compromises in conservation objectives. This situation is often unacceptable among radical supporters of "ecology-first" conservation.

The unwillingness to share power, already noted, is another constraint. In any case, empowerment operates on many social dimensions, and may not be achieved by economic measures alone (see Agrawal and Gibson 1999; Cleaver 1999). Last but not least, Songorwa (1999) identifies three further constraints: the lack of trust toward the implementing agencies, the failure to underwrite donor grants for people unable to raise their own funds, and unreliable income flows. These all combine to create a feeling of noncredibility, leading to unwillingness to cooperate.

In the previous text, we pointed out some positive and negative aspects of the participatory approach and also its necessity in the conservation of nature. The aim here is to demonstrate the urgent need for transdisciplinarity in the conservation of nature. Stoll-Kleemann and O'Riordan (2002) suggest that we shift "from participation to partnership". They highlight the importance of prolonged and committed partnerships, reliable funding, strong leadership and comprehensive awareness rising. Berkes (2004) stresses the importance of an interdisciplinary approach in community-based conservation, an approach that may contribute to the development of fuller understandings of social-ecological interactions. He recognizes that several "bridging" conservational fields have emerged in the last decades to bridge some gaps between social and ecological systems (for example, conservational psychology, conservational biology, and conservational education).

Conservationists in Slovenia are mostly natural scientists, primarily biologists and foresters. In practice, more and more often, they are powerless to solve increasingly complex problems of nature conservation, because of their lack of social, economic, management, educational, communication and other skills. We can name two recent examples: the establishment of Natural Park Snežnik using the "top-down" approach, which was unsuccessful; and the process of adopting a new *Act on Triglav National Park*, with many disagreements and deep anger from NGOs. Encouragingly, nature conservation theory and practice in Slovenia is moving towards the "people included" (participatory) approach to conservation, which requires understandings of the social context, a long-term communication and cooperation with local communities, political lobbying, and servicing of economic and wider community interests. In the following text, we intend to expand on Stoll-Kleemann and O'Riordan (2002) and Berkes' (2004) ideas and justify the importance of a transdisciplinary methodology for people- included and community-based approaches to nature conservation.

2.2. Trans-disciplinary methodology

Complex problems, such us human-nature (social-ecological) conflicts, demand complex, emergent thinking in the form of transdisciplinarity. Transdisciplinarity is an extremely promising global movement that promotes a new approach to the creation of human knowledge (McGregor 2009b). In order to understand it, we will first explain the interdisciplinary approach. In the interdisciplinarity approach two or more *disciplines* temporary work together and build bridges among disciplines in order to solve problems. There is no connection with actors from civil society. Furthermore, interdisciplinarity brings disciplines together (either in person or theoretically) but with no commitment to change the boundaries and relations between them. As already mentioned, Berkes (2004) recognizes that new conservational fields are emerging, which are trying to bridge some gaps between social and ecological systems. We are trying to extend this phenomenon by introducing the trans-disciplinary methodology so that the boundaries can come down between the academy and civil society.

Transdisciplinarity is a new knowledge about what is at once in between, across and beyond different and individual disciplines and civil society (Nicolescu 2006). Trans means zigzagging back and forth, moving across, going beyond the existing boundaries. It includes dialogue among the natural sciences, social sciences and humanities as well as with civil society, where the problems of the world are lived out on a daily basis. The intent of taking down the walls between the disciplines and civil society is to enable new types of knowledge to emerge through complex and integrated, mutually learned insights. This embodied knowledge is created in the spaces between the disciplines and society (McGregor 2009b). This knowledge is created via a new methodology that complements the conventional, classic scientific methodology. As with any methodology, there has to be agreement about fundamental axioms, laws and principles related to: (a) ontology (what counts as reality), (b) logic (what counts as inference and rigorous argument), (c) epistemology (what counts as knowledge), and axiology (the role of values and the researcher in the creation of complex, emergent knowledge) (McGregor 2009a).

Below, we explain the four pillars (axioms) of the transdisciplinary methodology - multiple levels of Reality (ontology), the logic of the included middle, emergent complexity (epistemology) (Nicolescu 2002) and integral

value constellations (axiology) (Cicovacki 2004, 2009; Mcgregor, 2009a,b) (Figure 1), and the role each plays in reframing our conception of the conservation of nature.

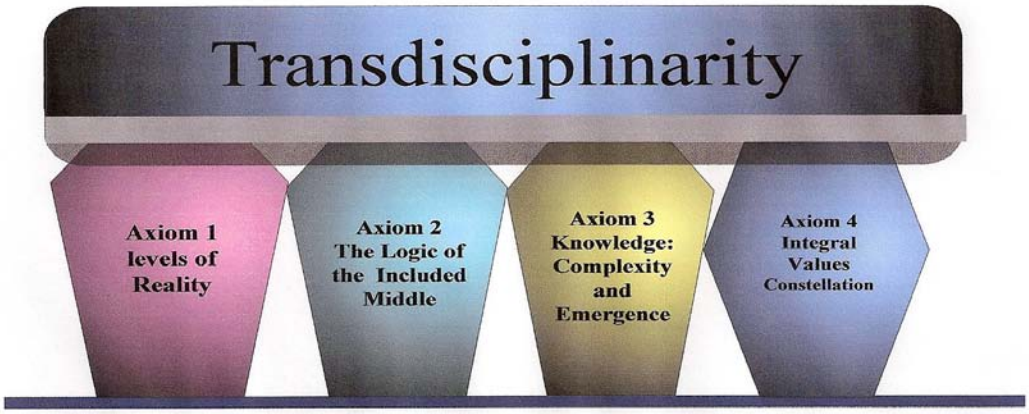

Figure 1: Four Pillars (Axioms) of Transdisciplinary Methodology

2.2.1. Axiom 1- Ontology: Multiple Levels of Reality

Kates at al. (2001) argue that many environmental problems, including those related to conservation, do not lend themselves to analysis by the conventional, rational approach of defining the problem, collecting data, analyzing data, and making decision based on the results. They explain that, because targets keep shifting and the issues often must be redefined, there is too much uncertainty. A major challenge in the science of the last few decades is the recognition that nature is complex (Levin 1999). We are in the time when science ecology and the field of applied ecology are in a shift from reductionism to a system view of the world, a shift to include humans in the ecosystem, and a shift from an expert-based approach to a participatory conservation and management approach (Levin 1999, Bradshaw and Bekoff 2001, Ludwig 2001).

Traditional natural science approaches, whose influence on nature conservation theory and practice in Slovenia is the strongest, are predicated on the empirical notions of fragmentation, separation, dualities and universal laws that apply to everything and everyone (no concern for context). Transdisciplinary methodology presents a different approach than reductionistic methodology. Korfiatis (2005) maintains that the reductionist methodology characterizes the common scientific approach, i.e. seeking explanations in simple cause–effect relationships between the parts of a system and not in complex systemic functions. For reductionism, complex wholes have no existence, but they can be reduced to their parts. As a result, reductionism tends to fragmentize its research subjects into isolated parts instead of treating nature as a whole autonomous integrated unit. Selby (2007) believes that we need a more radical tilt away from atomistic/reductionist thinking to holistic ways of mediating and interpreting reality. A transdisciplinary approach enables people to look at knowledge from different levels and different prospectives. This approach reinforces the importance of the participatory approach to nature conservation. As Stoll-Kleemann and O'Riordan (2002) explain in their discussion of the "participatory" approach, all actors have uniquely different perspectives as to what is a problem and what constitutes improvement. What is taken to be "true" depends on the framework of knowledge and assumptions brought in by individuals and their social and occupational settings. Berkes (2004: p.623) asserts that "a multiplicity of scales prevents there being one 'correct' perspective in a complex system."

Transdisciplinary methodology assumes there are multiple layers of reality that interact with each other (McGregor 2009b). We need to respect complex and dynamic relationships between (a) the political, social, historical and individual levels (called *Transdisciplinary subject*, the internal world of humans) and (b) the environmental, economic, individual and cosmic/planetary levels (called *Transdisciplinary objects*, the external world). The internal transdisciplinary subject involves a flow of consciousness across different levels of perceptions of the world. The external transdisciplinary object involves the flow of information across different levels of reality. When consciousness and information meet and share, a moment of breakthrough happen (an *aha* moment) – transdisciplinary theory calls this the zone of non-resistance. (c) Transdisciplinary methodology employs the concept of *The Hidden Third.* This is the place where people's experiences, interpretations, descriptions, representations, images, and formulas meet. Three levels of reality exist in this zone: culture, religion, intuition, and spirituality (McGregor).

The important outcome of this discussion is the recognition that there are many levels of truth that must be integrated. Pretty and Plimbert (1995) maintain that it is essential to seek multiple perspectives on any "problem assessment" by ensuring the involvement of different actors and groups. The result is unity, which better reflects the complexity of human issues in the conservation of nature. The first axiom, ontology, highlights

the importance of opening up borders to ensure cooperation among scientific disciplines and fields within the academic world and between the academe and civil societies. This boundary crossing is necessary because, individually, people cannot satisfactorily respond to the complex challenges posed by nature conservation if they continue to problem solve from the perspective of one level of reality (e.g., only politics or only economics or just biology).

2.2.2. Axiom 2 - Logic: The Included Middle

Often, people from different disciplines and civil society agencies cannot talk to each other; consequently, there can be no integration or generation of new knowledge (MacCleave 2006). To address this constraint, transdisciplinary methodology tenders Axiom 2, the Logic of the Include Middle (Nicolescu 2006). This logic holds that there *is* a middle ground, if people accept that different actors have different perceptions of things. The first condition, therefore, is that the individual be able to perceive the dimension of the first axiom (i.e., multiple realities). Inclusive logic then enables people to imagine that the space between things (especially between academic disciplines or between the academic world and civil society) is alive, dynamic, in flux, moving and perpetually changing. This logic completely alters the balance of power in the adoption of conservational decisions. A view from a specific scientific field (e.g. conservational biology) must take a back seat to trans-disciplinary and integral views on the problem of nature conservation.

It is in this fertile middle space that transdisciplinarity manifests itself and generates new transdisciplinary intelligence and knowledge (see next section on Axiom 3). When people use the logic of the included middle (by making a space for contradictions and discontinuities in realities) to move through the different levels of reality, they generate a *permanent possibility* for the evolution of knowledge. Theories at any given level of reality become transitory theories, which are open to change when confronted with contradictions from other, even new, levels of reality (McGregor 2009a, b).

For example, the Uckermark Lakes Nature Park administration visualizes itself as an agency that services local interests. This service extends beyond conservation management to include advice and financial support for farm and other enterprise schemes (Stoll-Kleemann and O'Riordan 2002). Nowadays, local people are often increasingly confronted by the relentless rules of global market economics. This situation means that land use and agriculture are not always determined in their own interests, forcing local people to give top priority to survival rather than biodiversity (van Schaik and Kramer 1997). This conundrum brings us to management legitimacy. Effective and efficient management requires the understanding and the support of local people; otherwise, in the long term, coexistence is threatened.

In his book, *Compass and Gyroscope*, Lee (1995) writes that environmentalism has flourished in liberal (free) societies as a way to challenge tyrannical regimes. This freedom spawns environmental conflicts that are complex and often lack a definite answer. In theory, people in governments, elected by voters, decide matters. In practice the power of people in governments is limited; therefore, negotiations remain an essential means of resolving conflicts. Recently, the Ministry of Environment and Spatial Planning in Slovenia requested non-governmental organizations, which are concerned with nature conservation, to comment on the draft *Act on Triglav National Park* (TNP). Non-governmental organizations had different understandings of the proposed document. They ranged from those who completely rejected the proposed Act, to those who sought to cooperate with the proposers to help them improve the Act. As suggested by the Ministry, the NGOs submitted comments, but they did not receive any responses from the Ministry or any explanations as to why their comments were not included in the Act. Without any further consultation, the Ministry sent the Act to the National Assembly. These Ministry actions strengthened the opposition to the Act and probably opposition to the "excluded middle" and polarized supporters and opponents of the Act. Stoll-Kleemann (2001) and Stoll-Kleemann and O'Riordan (2002) explain that this form of communication (arrogance, unwillingness to cooperate) leads to a sense of alienation and misunderstanding among those whose interests are likely to be affected by controversial decisions.

This situation can serve as a basis for new learning. The trans-disciplinary methodology would be extremely valuable for resolving these conflicts. The second axiom, logic, is concerned with the habits of the mind that are acceptable for inference and reasoning. The logic of the included middle would have created a space for dialogue and knowledge generation between the people in government and the people in the NGOs. There would have been an attempt to reconcile different logics for the sake of ecological integrity. The transdisciplinary approach places participation into a position of partnership. The partnership of local communities is not an unusual phenomenon in nature conservation management (Berkes 2004), but this cannot happen if we continue to engage with the logic of the excluded middle where everything is separate, disconnected and alienated.

2.2.3. Axiom 3 – Epistemology: Knowledge complexity and emergence

Cicovacki (2004) points out that all traditional theories of truth are one-sided and inadequate. It is not that they completely miss the nature of truth; rather, they capture only a few relevant aspects and disregard all others. Transdisciplinarity tries to understand the complex problems of the world (the big issues with global

implications) rather than the problems inside specific disciplines. The assumption is that everything is interconnected and interrelated in the world and far from being consistent and predictable. Everything is "complexus" - woven into a web, where you are focused on the relationships (links) between things instead at things that are linked. The knowledge *is alive* because the problems the knowledge addresses are alive, emerging from the life world (McGregor 2009b). When we accept the world and everything in it as dynamic, evolving and always in-formation, our knowledge, explanations and definitions gain nonpermanent status. To deal with such complex systems, working partnerships should be built between managers and resource users (Berkes 2004). He believes a cross-scale approach is necessary, one that addresses governance and communities, involving both horizontal linkages (across space – different networks) and vertical linkages (across levels of organization – from local to global level).

This process of fluctuations, changes and disturbances requires people to accept this uncertainty and seek for solutions. Not everyone is able or willing to accept uncertainty. We mentioned that one of the very important constraints of the participatory conservational approach is the unwillingness to share power. Stoll-Kleemann and O'Riordan (2002) note: "There is often a lack of training to help all parties appreciate their need to be shareholders rather than stakeholders. Training is not a matter of a few days of workshops. It is essentially a function of culture change, a shift in outlook, and a willingness seriously to understand the views and aspirations of others. Indeed, we go further. Training ought to create a fundamentally intuitive empathy between the manager and the managed. Such empathy can only come through case experience and a genuine willingness to reach out and admit to past mistakes" (p.174).

The term co-management, or sharing the management power and responsibility, tries to capture the complexity of interactions. The term represents a linkage of multiple parties, involving horizontal and vertical dimensions (Berkes 2004, Carlsson and Berkes 2005). Trans-disciplinarity is all about sharing power in the relationships between people (institutions) that are linked. Sharing knowledge and understanding are vital for the success of protected areas (Stoll-Kleemann and O'Riordan 2002). The trans-disciplinary methodology puts participation into a position of partnership where all stakeholders, irrespective of their social or scientific backgrounds, face a common problem in a joint process of sharing knowledge from which a new knowledge and ideas can be born. The process of exchanging knowledge and producing new knowledge is more important than to stubbornly insist on one's position and reject the views of others. By observing others in the group, people learn about the demands and difficulties of a task; they learn different, effective strategies and they produce joint creative results that take into account multiple levels of reality and the logic of the included middle. McGregor (2009a) refers to this as *embodied knowledge*.

2.2.4. Axiom 4 – Axiology: Integral Values Constellation

The fourth axiom deals with axiology – the role of values and the researcher/agent in the knowledge creation process. Traditional Newtonian science holds that research should be value neutral; that is, there is no place for values in objective science. Some scholars of transdisciplinarity, especially Cicovacki (2004, 2009) and McGregor (2009a, b), are developing the idea that values are an integral part of solving complex, emergent problems. McGregor coined the term *integral value constellations*, explaining that, by its very nature, transdisciplinary dialogue will witness the inescapable value loading of every inference, every opinion, every line of conversation – these all face a potential clash of values, ethics and morals.

We have to acknowledge the role of values in transdisciplinary work because, in our current society, defined mainly by unlimited greed over natural resources, change can happen only if we change our view of the human-nature relationship, which is value laden. David Selby's (2007) preposition to shift from the doministic, instrumental and exploitative worldview to embeddedness and intrinsic *valuing* sounds very radical and illusory. But, we must agree with his statement that thinking about the values and principles of deep ecology would help us think differently about the human-nature relationship and rid us of some of our anthropocentrism, and at least create a space in debates and dialogues for the bio-spherical egalitarian position. Selby also is convinced that everyone has to understand and come to terms with the fact that we are threatening our own existence. As climate change happens, we cannot afford the self-indulgence of being other than holistic and systemic. In the introductory chapter of the Manifesto "*Tomorrow May Be Too Late*", Nicolescu (2002) voices a concern about the direction in which our fragmented sciences and our whole disoriented civilization is going. We must see ourselves as implicated in the world, not simply isolated, self-maximizing individuals (Orr 2001). We cannot do that if we do not appreciate that transdisciplinary work is very politicized, hence value laden.

Integral values constellation (Axiom 4) is of a great importance for successfully implementing the transdisciplinary methodology into nature conservation theory and practice. The complexity and trans-disciplinary aspects of human-nature conflicts require partnerships and knowledge of experts from different scientific disciplines and civil societies. Granted, their different world views and value orientations may cause a conflict and these conflicts can result in power struggles. McGregor (2009b) explains that, in a trans-disciplinary methodology, capacity to solve complex problems is generated through relationships. Relationships are predicated on the generation and allocation of power, which is *energy*. Because power is energy, it needs to

grow. Without relationships, there can be no power. Whether or not the power generated when people work together to solve complex and emergent problems is negative or positive depends upon the nature of the relationship. Furthermore, with power comes responsibility. Embracing this responsibility will be a challenge unless the constellation of values at play is respected and managed.

3. Conclusion: from stakeholders to stake-sharers

It is obvious that nature conservation is a complex cultural problem intimating that more shared patterns of partnership governance are needed. Despite the obvious constraints that should be considered while adopting a "bottom-up" ("people-included") participatory approach, we believe that, in most cases (urgent conservational actions are an exception), trans-disciplinarity should be practiced. A transdisciplinary methodology helps everyone involved in a "bottom-up" conservational approach feel as if they are *stakesharers* rather than stakeholders. Most everyone is familiar with the term stakeholder, referring to someone who can affect, or can be affected, by others' decisions. To have a stake in something means people share or have an involvement in it. We coined the term *stake-sharer* to reflect the idea that, within transdisciplinary work, people share ideas, solutions, threats and opportunities as they try to stake out their collective response to nature-human interface problems. All the while, they are balancing different logics, values, ways of knowing, and are functioning on many different levels of reality (political, economic, social, ecological, spiritual, cultural et cetera). And, everyone has a stake in the outcome – everyone's interests are affected.

We should consider nature conservation as a co-evolution of conservational objectives and the objectives of the local community, indeed the human family. Conservation agencies should adopt the mantle of economic, human and social development, either by extension or through cooperation with other experts (Stoll-Kleemann and O'Riordan 2002). Often, conservational efforts do not succeed, primarily because actors want to achieve too much in too short a time. As a result, conservational initiatives can be frozen for a long time due to peoples' deprecation. Transdisciplinarity respects and anticipates this temporary state, recognizing it as a necessary stage in the eventual emergence of new things from amidst chaos (which is considered to be order emerging, just with no predictability). A trans-disciplinary approach envisions people working together with a deep respect for the convergence of different logics, value constellations and emergent ways of knowing, unfolding along multiple levels of reality.

In conclusion, transdisciplinarity is far more than a method or a guideline for conducting and collecting knowledge (Cicovacki 2004). It is a methodology in its own right, with its own ontology, axiology, epistemology and logic. Approaching complex nature-human interface problems from this perspective better ensures that we attain an efficient, effective and grounded future of human existence on the planet (due to human efficacy, making a difference together). Transdisciplinarity better ensures that government, academic and NGO agents, who are concerned with nature conservation, are able to regain and/or share their power to solve increasingly complex, nature-human interface problems.

References

Agrawal A., Gibson C.C. 1999. Enchantment and disentchantment: The role of community in natural resource conservation. World Dev. 27(4):629-649.

Aronson J., Milton S.J., Blignaut J.N. Clewell A.F. 2006. Nature conservation as if people mattered. Restoration Ecology, 14: 260-263.

Barton T., Borrini-Feyerabend G., de Sherbinin A., Warren P. 1997. Our people, our resources. IUCN, Gland, Switzerland and Cambridge, UK.

Batisse M. 1997. Biosphere reserves: A challenge for biodiversity conservation and regional planning. Environment 39:7-33.

Berginc M., Kremesec-Javšenak J., Vidic J. 2007. Sistem varstva narave v Sloveniji. Ministrstvo za okolje in proctor, Ljubljana, Slovenia.

Berkes F. Colding J., Folke C. (eds). 2003. Navigating social-ecological systems: building resilience for complexity and change. Cambridge university Press, Cambridge, United Kingdom..

Berkes F. 2004. Rethinking Community-based Conservation. Conservation Biology, 18(3): 621-630.

Borrini-Feyerabend G. 1996. Collaborative on management of protected areas: Tailoring the approach to the context. IUCN, Gland, Switzerland and Cambridge, United Kingdom.

Brown K. 2002. Beyond consensus and empowerment: Sustainability in linking conservation and development. Geographical Journal, 168: 6-17.

Bradshaw Berkof 2001 Ecology and social responsibility: the re-embodiment of science. Trends in Ecol. & Evol.. 16: 460-

Carlsson L., Berkes F. 2005. Co-management: concepts and methodological implications. Journal of Environmental Management, 75: 65–76.

Cleaver F. 1999. Paradoxes of participation: Questioning participatory approaches to development. J. Int. Dev. 11(4):597-612.

Cicovacki P. 2004. Transdisciplinarity as an interactive method: A critical reflection on the three pillars of transdisciplinarity. *TRANS: Internet Journal for Cultural Sciences, 15*(1), Retrieved January 20, 2010 from http://www.inst.at/trans/15Nr/01_6/cicovacki15.htm

Cicovacki, P. 2009. Transdisciplinarity as an interactive method. *Integral Leadership Review, 9*(5), Retrieved February 17, 2010 from http://www.integralleadershipreview.com/archives/2009-10/2009-10-06-article-cicovaki.php

Davey A.G. 1998. National system planning for protected areas. IUCN, Gland, Switzerland, and Cambridge, UK:
Dietz T., Ostrom E., Stern P.C. 2003. The struggle to govern the commons. Science 302: 1907-1912.
Gbadegesin A., Ayileka O. 2000. Avoiding the mistakes of the past: Towards a community oriented management strategy for the proposed National Park in Abuja-Nigeria. L and Use Policy 17: 89-100.
Hayes M.A. 2009. Into the Field: Naturalistic Education and the Future of Conservation. Conservation Biology, 23 (5): 1075-1079.
Haynes J.S. 1998. Involving communities in managing protected areas: Contrasting approaches in Nepal and Britain. Parks 8(1): 54-61.
Inamdar A., de Jode H., Lindsa K., Cobb S. 1999. Capitalizing on nature: protected a reamanagement. Science, 283: 1856-1857.
Kates R.W., William C. Clark,* Robert Corell, J. Michael Hall, Carlo C. Jaeger, Ian Lowe, James J. McCarthy, Hans Joachim Schellnhuber, Bert Bolin, Nancy M. Dickson, Sylvie Faucheux, Gilberto C. Gallopin, Arnulf Grübler, Brian Huntley, Jill Jäger, Narpat S. Jodha, Roger E. Kasperson, Akin Mabogunje, Pamela Matson, Harold Mooney, Berrien Moore III, Timothy O'Riordan, Uno Svedin.
Korfiatis K.J. 2005. Environmental education and the science of ecology: exploration of an uneasy relationship. Environmental Education Research 11(2): 235-248.
Lee K.N. 1995. Compass and Gyroscope: Integrating Science and Politics for the Environment. Island Press, Washington, DC, USA.
Levin S.A. 1999. Fragile dominion: complexity and the commons. Perseus, New York.
MacCleave A. (2006). Incommensurability in cross-disciplinary research: A call for cultural negotiation. *International Journal of Qualitative Methods, 5*(2), retrieved March 16, 2009 from http://www.ualberta.ca/~iiqm/backissues/5_2/HTML/maccleave.htm
McGregor S.L.T. 2009a. Integral leadership's potential to position poverty within transdisciplinarity. Integral Leadership Review, 9(2), http://www.integralleadershipreview.com
McGregor S.L.T. 2009b. Transdisciplinary Consumer Citizenship Education. In: Klein A and Thoresen V.W. (eds.) Making a difference: putting consumer citizenship into action. Consumer Citizenship: Promoting New Responses, 5, pp. 168-186, Hedmark University College, Hamar, Norway.
McNeely J. A. 1995. Expanding partnerships in conservation. Island Press, Washington, DC, USA.
Nicolescu B. 2006. *International congresses on transdisciplinarity* [Interview given by Basarab Nicolescu to Professor Augusta Thereza de Alvarenga of the Faculty of Public Health, University of São Paulo, Brazil]. Message posted August 12, 2008 to http://www.groups.yahoo.com/group/
Nicolescu B. 2002. *Manifesto of transdisciplinarity* [Trans. K-C.Voss]. NY: SUNY.
Orr D.W. 2001. Foreward. In: Sterling S. Sustainable education. Devon, Green Books Ltd.
Pimbert M.P., Pretty J.N. 1995. Parks, people and professionals. Putting participation into protected area management. Geneva, Switzerland: United Nations Research Institute for Social Development.
Pimm S.L., Raven P. 2000. Extinction by numbers. Nature 403: 843-845.
Pretty J.N., Pimbert M.P. 1995. Beyond conservation ideology and the wilderness myth. Nat. Resources Forum 19: 5-14.
Sala O.E., Chapin III F.S., Armesto J.J., Berlow E., Bloomeld J., Dirzo R., Huber-Sanwald E., Huenneke L.F., Jackson R.B., Kinzig A., Leemans R., Lodge D.M., Mooney H.A., Oesterheld M., LeRoy N. 2000. Global biodiversity scenarios for the year 2100. Science 287: 1770-1774.
Salafsky N., Wollenberg E. 2000. Linking livelihoods and conservation: A conceptual framework and scale for assessing the integration of human needs and biodiversity. World Dev. 28(8): 1431-1438.
Selby D. 2007. As the heating happens: Education for Sustainable Development or Education for Sustainable Contraction? International Journal of Innovation and Sustainable Development, 2 (3/4): 249-267.
Songorwa A.N. 1999. Community based wildlife management (CWM) in Tanzania: Are the communities interested? World Dev. 27(12): 2061-2079.
Soulé M.E., Sanjayan M.A. 1998. Conservation targets: Do they help? Science 279: 2060-2061.
Spomenica, ki jo je predložil odsek za varstvo prirode in prirodnih spomenikov 20. januarja 1920. pokrajinski vladi za Slovenijo v Ljubljani. Odsek za varstvo prirode in prirodnih spomenikov, Ljubljana.
Stoll-Kleemann S. 2001. Opposition to the designation of protected areas in Germany. J. Environ. Plan. Manage, 44(1):111-130.
Stoll-Kleemann S., O'Riordan T. 2002. From Participation to Partnership in Biodiversity Protection: Experience from Germany and South Africa. *Society and Natural Resources*, 15: 161-177.
Terborgh, J. 1999. *Requiem for nature*. Island Press, New York, USA.
van Schaik C., Kramer R. 1997. Towards a new protection paradigm. In *Last stand: Protected areas and the defence of tropical biodiversity*, ed. R. Kramer, C. van Schaik, J. Johnson, 212-230, New York: Oxford University Press.
Venter A.K., Breen C.M. 1998. Partnership forum framework: Participative framework for protected area outreach. Environ. Manag. 22: 803-815.