FROM MULTIPLE TO DISTRIBUTIVE COGNITION: THE CASE OF THE DRENTSCHE AA

NIELS RÖLING

Wageningen University, The Netherlands, n.roling@inter.nl.net

Introduction

In 1998, Jane Lubchenco[1], then President of the American Association for the Advancement of Science, raised an important question. Now that the cold war is over, does science still have a social contract? Why should society continue to finance science? Her answer was 'yes'. We are entering the age of the environment and now face the *eco-challenge* as the main human predicament. According to Lubchenco, the eco-challenge is caused by the fact that *humans have become a major force of nature*, comparable to the impact of a meteorite or the onset of a glacial period. We have transformed vast areas of the surface of the earth, use a large part of the world's fresh water resources, have caused the fifth largest extinction event in global history, have exhausted, or are on the verge of depleting, the oceans' fishery resources, etc. In other words, the eco-challenge is *an anthropogenic* phenomenon. It is not caused by forces outside us, but by ourselves. The eco-challenge is the system feedback to the combined impact of human activity on the 'fraying web of life'[2]. We have taken on the management of the planet but so far we have not made a very good job of it.

This raises the interesting question *how we can deal with ourselves*. As a scientist, Lubchenco sees the contribution of science mainly in telling people 'what is out there', so that humankind can take appropriate action. As a result of this position, Lubchenco takes great interest in science journalism. We have good reason to believe that telling people about the facts of life is a necessary but not sufficient strategy for change. Those concerned with the design of a sustainable future cannot escape moving beyond technology and economics, into the murky area of understanding human behaviour. In this paper, the focus will be especially on understanding conflict resolution, social learning, negotiated agreement and concerted action and other outcomes that emerge from interaction.

People need to make negotiated trade-offs among the policy goals of productivity, equity, sustainability and stability[3]. Typically these include trade-offs among:

- Food security (agricultural production, irrigation, soil and water conservation);
- Health promotion (access to sufficient clean drinking water, sanitation, water purification);
- Environmental stability (controlling pollution, toxification, floods, droughts);
- Ecological sustainability (maintaining bio-diversity, integrity of the web of life).

Achieving such trade-offs requires bringing together multiple, and increasingly inter-dependent, stakeholders (with their multiple perspectives and interests) to negotiate and agree on collective or concerted action with respect to the sustainable use of fresh water and other resources. The focus on such interactive solutions is emerging simultaneously in many

[1] Lubchenco, J. (1998). Entering the Century of the Environment: A New Social Contract for Science. *Science*. 279: 491-496, January 23, 1998.

[2] United Nations Development Programme, UNEP, World Bank and World Resources Institute (2000). World Resources 2000-2001. People and Ecosystems. The Fraying Web of Life. Washington (DC): World Resources Institute.

[3] Conway, G.R. (1994). Sustainability in agricultural development: trade-offs between productivity, stability and equitability. *Journal for Farming Systems Research-Extension* 4(2): 1-14.

different policy arenas. On an over-crowded planet, there simply is no other way. We must learn to look at desirable states, such as sustainable integrated water resources management, as the emergent property of human interaction. More especially, we must begin to develop the skills and insights required effectively to facilitate and govern interaction so that it yields desirable states.

1. Paradigms for Dealing with Interactive Process

A paradigm comprises epistemology, ontology and methodology[4]. Figure 1 uses an epistemological horizontal and an ontological vertical axis to illustrate different approaches for tackling natural resource management problems. The example is based on the management of the Spruce Budworm crisis in New Brunswick, Canada[5].

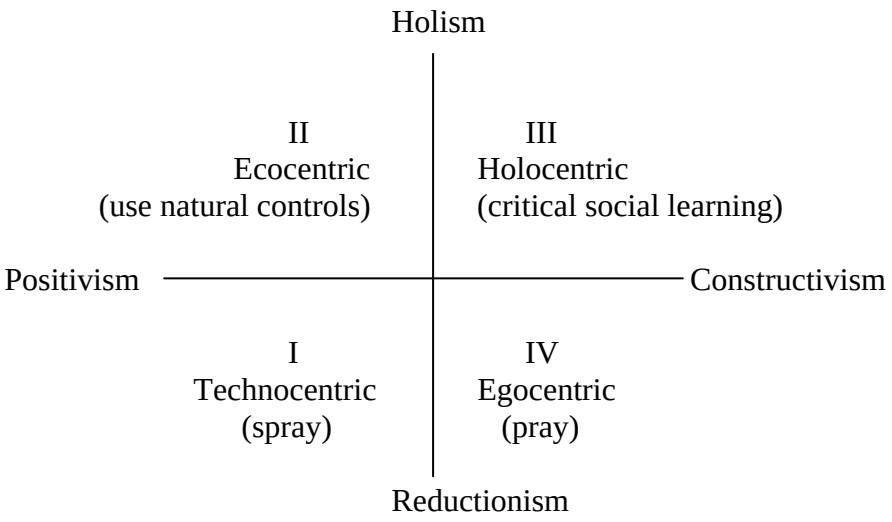

Figure 1: The Miller/Bawden Quadrants
(Based on Miller 1985 and '87, and Bawden 2000)

Miller used the figure to characterise the paradigms favoured by his colleagues involved in the battle against the Spruce Budworm. Quadrant 1 leads to approaches based on a reductionist and positivist perspective. People who give meaning to the world based on that perspective recommended spraying. Quadrant 2 represents a positivist but also holistic, i.e., a hard systems, perspective. Colleagues with that perspective focused on natural controls and the management of the eco-system as a whole. A few colleagues had developed a Quadrant 3 perspective (i.e., holistic and constructivist, soft system thinking). They focused on the problem as the outcome of human activity and on critical learning (with some reason: the Spruce Budworm became a pest as a result of the human decision to plant enormous tracks of land with one species). Quadrant 4 remains somewhat of an enigma, Miller mentions 'praying' as the appropriate response in this quadrant[6].

[4] Guba, E.G. and Y.S. Lincoln (1994). Fourth Generation Evaluation. London: Sage Publications.

[5] Miller, A. (1983). The Influence of Personal Biases on Environmental Problem-Solving. *Journal of Environmental Management*, 17: 133-142. Miller, A. (1985). Technological Thinking: Its Impact on Environmental Management. *Journal of Environmental Management* 9 (3): 179-190

[6] The intriguing quadrant 4 readily leads to speculation. In his ' Gateway to the Global Garden: Beta/Gamma Science for Dealing with Ecological Rationality'. (Guelph (Ontario): University of Guelph, Eighth Annual Hopper Lecture, October 24, 2000. (www.uoguelph.ca/cip)), Röling suggests that spirituality might appropriately be placed in quadrant 4.

Studies of effective social change show that the perspectives typical for each of the first three quadrants were involved. Successful change required fundamental and applied research based on the perspective of Quadrant 1, but it also design of hard systems that work (Quadrant 2) and soft systems that people want, know and can handle (Quadrant 3). A typical example is the study of Tekelenburg[7] in Bolovia. The study deals with a development project among poor Quecha speaking Indians in the High Andes who cultivate mountain slopes which are largely degraded. The project eventually designed a farming system using Cactus Pear to produce fruit and re-vegetate the barren slopes, cladodes for cattle, and cochineal, a red parasitic scale insect that brings a high revenue for its natural dye or pigment. The whole hard system design is quite complex. If the cattle eat too many leaves, there is not enough for the Cochineal. If one allows too many Cochineal, the Cactus dies off. But such a system also has cultural dimensions, assumes labour availability and profitability as perceived by the people who must run it. Furthermore, people must understand and be able to manage the system. In all, developing this system required fundamental and applied research, design of a hard system that works, and of a soft system that local people consider that desirable and manageable.

2. Three Ways of Being Effective

Table 1 provides a slightly different take on the same issue. It illustrates three ways of being effective and some defining attributes of each. Most of us are thoroughly familiar with instrumental and economic thinking, but not with 'interactive thinking'.

Table 1: Three ways of being effective

	Instrumental Thinking	Economic Thinking	Interactive Thinking
Predicament	Lack of control over causal factors	Competition, scarcity	Humans major force of nature, anthropogenic destruction of our habitat, lack of control over ourselves
Dynamics	Causation. Self-organisation	Rational choice, struggle for survival, market forces	Interdependence, learning, reasons, reciprocity, trust, tendency toward coherence and correspondence
Objective	Control nature for human purposes	Win, gain advantage, optimise utility	Negotiated agreement, concerted action
Knowledge Base	Science	Economics	Cognitive Theory
Effect based on	Technology	Strategy	Conflict resolution, agreement, learning
Policy focus	Engineering, hard systems design	Fiscal policy, market stimulation	Interactive policy making, social process design, foster dialogue, process facilitation

One can argue that societal problems require all three ways of being effective. But I want to draw attention especially to type 3 because it is the most unfamiliar. Although the explicit and deliberate embrace of technology (type 1) and economics (type 2) is a recent historical phenomenon in industrial societies, by now most of their inhabitants can engage in informed discourse about types 1 and 2. My argument is that this myopic focus on types 1 and 2 has led

[7] Tekelenburg, Tonnie (2001). Wageningen: University, Published Doctoral Dissertation defended on November 23, 2001

to second-generation problems that increasingly require type 3. We are facing a new context: the greatest threat to our survival is our own behaviour. Therefore we need to develop shared ability for discourse and reflection with respect to type 3. Cognition promises to provide a theoretical framework that can be widely shared.

3. Cognition

The study of human cognition has long been dominated by neuro-psychologists and analysts of formal logical systems who use the metaphor of the computer to study the working of the individual human brain, whether embodied or not[8]. Increasingly, however, cognition is becoming the field of study of philosophers, biologists, ecologists, anthropologists, multi agent system modellers, and others[9]. Cognition is emerging as an over-arching and integrating concept that captures the core of what makes living organisms, and including people and organisations, different from other combinations of matter and energy.
In his 'Philosophy of Social Science', Rosenberg[10] provides what he calls 'a perhaps oversimplified statement that seems to lie behind our ordinary explanations of human action', or folk psychology (32):

> If any agent, *x*, wants *d*, and *x* believes that *a* is a means to attain *d* under the circumstances, then *x* does *a*.

In social science, 'our aim is to fill in a 'hermeneutic circle' of beliefs, desires and actions, in which coherence among the three variables is the criterion for explanatory adequacy' (40). In other words, *we are not interested in causes but in reasons*. Our explanations are based on understanding how people make sense of the world, on how they socially construct it.
The biologists Maturana and Varela go much further[11]. Says Capra[12]: 'In the emerging theory of living systems, mind is not a thing, but a process. It is cognition, the process of knowing, and it is identified with the process of life itself. This is the essence of the Santiago theory of cognition, proposed by Humberto Maturana and Francisco Varela' (257).
Their starting point was perception, e.g., a frog looking at a fly. The image of the fly cannot be projected on the central nervous system of the frog. In fact, the physical processes that govern the image of the fly (light waves) are totally different from the neurological processes that determine the image created in the central nervous system of the frog. One could say that the central nervous system is informationally closed. There is no way that the fly can be "objectively" projected. But the presence of a fly can trigger change in the central nervous system of the frog. The frog 'does not bring forth *the* fly, but *a* fly'. The active construction of reality is not a human prerogative but a quality of all living organisms.

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[8] Clark, A. (1997) Being There: Putting Brain, Body and World Together Again. Cambridge (Mass.): The MIT Press. ISBN 0 262 03240 6

[9] Some interesting books in this respect: Gilbert, Nigel and Klaus Troitzsch (1999). Simulation for the Social Scientist. Buckingham: Open University Press. ISBN 0 335 19744 2 (pbk); Gigerenzer, G. and P.M. Todd (1999). Fast and Frugal Heuristics: The Adaptive Toolbox. Chapter 1 in: Gigerenzer, G., P. M. Todd, and the ABC Research Group. Simple Heuristics that Make us Smart. New York and Oxford: Oxford University Press, pp. 3-34. ; Holling, C.S. (1995). What Barriers? What Bridges? Chapter 1 in: Gunderson, L.H., C.S. Holling and S.S. Light (Eds.). Barriers and Bridges to the Renewal of Ecosystems and Institutions. New York: Colombia Press: 3-37. Hood, Christopher (1998). The Art of the State. Culture, Rhetoric, and Public Management. Oxford: Clarendon Press; Hutchins, E. (1995, fourth printing 2000). Cognition in the Wild. Cambridge (Mass.): The MIT Press.

[10] Rosenberg, A. (1988). Philosophy of Social Science. Boulder: Westview Press

[11] Maturana, H.R. and F.J. Varela (1987, and revised edition 1992). The Tree of Knowledge, the biological roots of human understanding. Boston (Mass.): Shambala Publications.

[12] Capra, F. (1996). The Web of Life. A New Synthesis of Mind and Matter. London: Harper Collins Publishers (Flamingo)

But, say Maturana and Varela, the frog does not bring forth *any* fly (as pure relativists would have us believe). It brings forth a fly the frog can catch and eat. Organisms and their environment are *structurally coupled*. They maintain this coupling through co-evolution and learning. This leads Maturana and Varela to their startling and powerful definition of *knowledge as effective action in the domain of existence*. The cognitive system, then, is a *duality* of the perceiving organism and its environment: "The new concept of cognition, according to the Santiago theory, is much broader than that of thinking. It involves perception, emotion, and action - the entire process of life" (170). These elements are reminiscent of the desires, beliefs, actions and circumstances mentioned by Rosenberg (see above). In fact, they come back in various names and with slightly different configurations in the work of many biologists, system thinkers, learning theorists and social scientists. I have settled for Figure 2 as best way to capture the essential elements of cognition.

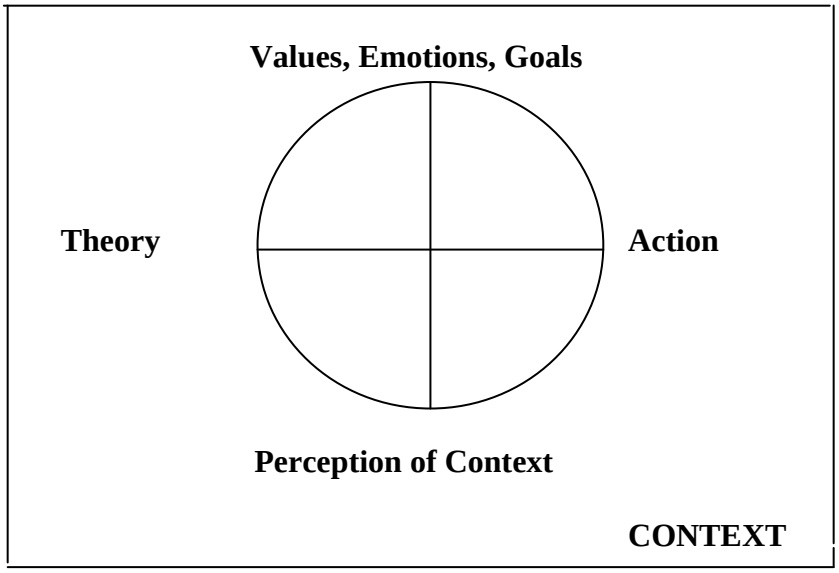

Figure 2: The Elements of Cognition
(adapted from Kolb[13], Maturana and Varela and Bawden[14].

We observe that cognition includes
(1) An organism or *agent* that can perceive the environment or context, has beliefs or theories about it, has emotions that provide criteria for judgement about it, and can take action in it; and
(2) The *context*: the environment or domain of existence with which the agent is structurally coupled.

We could further have distinguished
(3) An *ecosystem*, i.e., a space in which multiple agents interact and mutually adapt.

The organism in its context is comparable to the distinction that Damasio[15] makes between 'inside' and 'outside'. The 'inside' represents the adaptation of the internal environment of the organism, oriented to survival when the 'outside' environment or context changes. The value of the conscious cognitive process is that it helps the organism deal with external changes that were not 'foreseen' in the original programming. Thus the organism can adapt

[13] Kolb, D. (1984). Experiential Learning: Experience as a source of learning and development. New Jersey: Prentice Hall.
[14] See for Maturana and Varela as well as for Bawden previous footnotes
[15] Damasio, A. (2000). The Feeling of What Happens. Body and Emotion in the Making of Consciousness. London: William Heinemann.

and survive in conditions that it would not be able to handle on the basis of the automatic responses that have been hard-wired into it.
Gigerenzer et al[16] have contributed two fundamental *drivers* of the cognitive process:

- *Coherence* (or cognitive consistency)
- *Correspondence* (or structural coupling between agent and domain of existence).

On the one hand, cognition fundamentally assumes a tendency towards coherence among values/emotions, perception, theories and action. But, on the other, it equally requires a tendency towards correspondence between these four elements, and the context. Where Rosenberg (above) only spoke of coherence among beliefs, desires and actions, the new cognitive theory emphasises coherence *and* correspondence. The tendencies toward, and the dilemmas between, coherence and correspondence provide dynamism to cognitive theory, much as gravity does to dynamics. The dilemma between coherence and correspondence in cognitive systems is the key to the study of innovation. But failure to achieve coherence and correspondence typically leads to various pathologies[17].
A typical example of the dilemma between coherence and correspondence is the work of Thomas Kuhn[18] on Scientific Revolutions. A dominant paradigm or 'normal science' is a coherent body of knowledge. It fends off evidence that is inconsistent with it. But after some time, it cannot resist this evidence any longer, the coherent body of knowledge collapses, and a new paradigm emerges that better corresponds with the context.

4. Collective, Distributive and Multiple Cognition

For the purposes of this paper, I am especially interested in collective, distributed and multiple cognition. *Collective* cognition emphasises *shared* attributes, i.e., shared myths or theories, shared values, and collective action, e.g., households all engage in waste paper recycling. *Distributed* cognition emphasises different but complementary contributions that allow concerted action, e.g., the operation on the market by a commercial company or the navigation of a battleship[19]. *Multiple* cognition emphasises the existence, in one situation, of totally different cognitive agents with multiple perspectives. They tend to maintain mutual isolation. But when they become inter-dependent with respect to the use of a resource, they engage in conflict, work at cross-purposes, or engage in disjoint action. However, multiple perspectives can grow into a joint rich picture, can meet on platforms for negotiation (about which more later), and negotiate collective action.
In this way, *multiple cognition can grow into collective or distributed cognition*. We are, of course, quite used to thinking of cognition beyond the individual brain. We speak of learning organisations, cultural traditions, life worlds and so forth, to describe phenomena which can only be explained by looking at organisations, groups or other collectives as cognitive agents. What is of interest in such situations is how values, theories, perceptions *become* shared or complementary, and lead to collective or concerted action. It is one of the main tasks of leaders, managers and administrators to work on these processes. They provide myths, reward desirable behaviours, stimulate group speak and group think, set up company magazines that ensure widely shared perceptions of the environment, facilitate company-wide dialogues, set

[16] Gigerenzer, G. and P.M. Todd (1999). Fast and Frugal Heuristics: The Adaptive Toolbox. Chapter 1 in: Gigerenzer, G., P. M. Todd, and the ABC Research Group. Simple Heuristics that Make us Smart. New York and Oxford: Oxford University Press, pp. 3-34.
[17] See e.g., Merton, R. (1957). Social Theory and Social Structure. Glencoe: Free Press and Van Haaften, E.H., F. van de Vijver, J. Leenaars and P. Driessen (1998). Human and Biophysical Carrying Capacity in a Degrading Environment: The Case of the Fulani in the Sahel. *The Land*, 2 (1): 39-51.
[18] Kuhn, T.S. (1970). The Structure of Scientific Revolutions. 2nd Ed. Chicago: University of Chicago Press.
[19] Hutchins, E. (1995, fourth printing 2000). Cognition in the Wild. Cambridge (Mass.): The MIT Press.

standards for dealing with the context[20], etc. In such organisational or collective settings, the tendencies towards coherence and correspondence become very interesting social phenomena, including not only power, social pressure, imitation, congruence, convergence, and so forth, but also deviance, social dilemmas, innovation, mutation, evolution and revolution.

Our interest in natural resource management means that we are inherently interested in *multiple* cognition. That is, we are interested in situations in which different ethnicities, organisations, groups, networks, and other stakeholders in a resource, each presumably representing a more or less coherent cognitive agent, become inter-dependent with respect to achieving correspondence. They have to learn to act as a more or less single cognitive agent, capable of collective or concerted action. The interest is in how such multiple cognitive agents can be facilitated in the direction of collective or distributed cognition by affecting the interplay between processes of coherence and correspondence.

Given the increasingly common experience that resource dilemmas cannot be resolved (only) by technology and market forces, there is a tendency to set up platforms, forums, dialogues, and other interactive devises that are expected to negotiate sustainable outcomes[21]. Industrial societies are largely organised and institutionalised to deal with production and economic issues. Interactive devices are relevant especially when natural resource problems, such as run-off, erosion, depletion of ground water, begin to manifest themselves, but no human decision making capacity exists at the hard system level at which problems are perceived to be solvable (e.g., water catchments, wetlands, deltas, aquifers, oceans). In such situations, platforms are deliberately created to provide the soft system to complement the hard system.

But the assumptions underlying the faith in interactive emergence can be quite naive. Deliberation among reasonable people, especially if guided by skilled administrators, facilitators and managers, will, it is assumed, lead to agreement and desirable joint action. This is very much in line with Habermas'[22] idea of communicative rationality (as opposed to instrumental and strategic rationality) which can occur in perfect communication situations. Relying on platforms to resolve resource dilemmas definitely has a wishful element. Platforms seem the only way out therefore they must work. In actual fact, platforms often do not lead to the desired outcome. The compromises reached turn out to be unsustainable in the long run, powerful interests impose 'solutions', and so on and so forth. This is especially the case when outsiders intervene in local situations[23]. That is why it is important to develop theory about platforms and their facilitation that can be widely shared. Understanding the processes involved is one way to ensure an acceptable outcome.

5. The 'National Landscape De Drentsche Aa' (DRA)

The Dutch Forestry Service (FS) is tasked, on behalf of the nation, to preserve agreed-upon rare plant communities. Since the Government has shifted to an output financing system, the FS is rewarded on the basis of norm payments for the surface of target vegetation types it has realised. These rare vegetations are largely *short* vegetations, i.e., not trees, but plant communities composed of orchids, sedges, etc. The FS is Holland's largest nature conservation organisation in terms of the area of land it manages.

[20] E.g., Busch, L. (2000). The Moral Economy of Grades and Standards. Journal of Rural Studies, 16: 273-283

[21] e.g., Röling, N. (1994). Platforms for decision making about eco-systems. Chapter 31 of L.O. Fresco et al (Eds), *Future of the Land: Mobilising and Integrating Knowledge for Land Use Options*. Chicester: John Wiley and Sons, Ltd, pp 386-393.

[22] Habermas, J. (1984). The Theory of Communicative Action. Vol. 1: Reason and the Rationalisation of Society. Boston: Beacon Press. Habermas, J. (1987). The Theory of Communicative Action. Vol. 2: Lifeworld and System. A Critique of Functionalist Reason. Boston: Beacon Press.

[23] E.g., Upreti, B. (2001). Conflict Management in Natural Resources. A Study of Land, Water and Forest Conflicts in Nepal. Wageningen University: published doctoral dissertation.

My job was to assess the institutional and administrative conditions for realising and sustaining the rare vegetation types in the DRA area. Looking at that aspect was no luxury. The FS owns the wet water meadows along the brooks and small rivers in the DRA. It does not own the lands on the plateau's that are the infiltration areas for the rainwater that eventually feeds the small streams and the springs that well up in the water meadows. The water from these springs often has percolated deeply and has acquired a high lime content on which many of the rarer plants depend.

In the sixties, when the first lands for the nature reserve were acquired, the understanding of the larger hydrological system was underdeveloped. Most conservationists in the FS are now deeply aware of the extent to which *others* control the essential conditions for the rare vegetations. Given the water that wells up in the springs that feed the water meadows and the brooks often predates the period when farmers started intensively using fertilisers and pesticides, many fear that a time bomb is underway which will eventually destroy the rare vegetations. Hence the requirement to examine the institutional and administrative conditions for sustaining the incredible bio-diversity that centuries of nutrient removal from the water meadows by earlier generations of small farmers has created.

This situation makes the DRA an interesting case. Not only are the narrow margins which most of the rare vegetations need to survive is dependent on other actors than the FS that is rewarded for maintaining them, the farmers on the plateau's also need access to the land owned by the FS (the largest landowner in the area). Given that they are not likely to make it in a competitive world market for agricultural commodities, they need a chance to co-manage the natural beauty of the DRA and to get paid for it.

Other stakeholders, such as the one million tourists that visit the area every year and their caterers also require access to the land and maintenance of its beauty. They want to see cows and other farm activity, but are equally interested in the rare vegetations. Meanwhile the provincial Drinking Water Company is pumping water deep underground, disturbing the natural hydrological system and allowing alien water to infiltrate the water meadows. Other actors include the inhabitants (many of them recent 'imports') of the picturesque villages that dot the plateau's. They are organised in an interest group with a vocal representative. The Water Authority 'Hunze and Aa' is officially charged with the responsibility for water quantity and quality management.

In all, the various actors are largely inter-dependent for realising their objectives and for achieving the incentives society provides. This holds especially for the two largest landowners, the FS and the farmers. The Dutch Government rewards FS for maintaining vegetations that require a high water table and impoverished soils, while the EU pays farmers US$500 per hectare for a type of agriculture that requires fertilising and draining the land.

Over the years, various attempts have been made to manage the land from an integrated perspective. The DRA is one of the last small river systems in the Northern German Plains that is still relatively intact (i.e., not canalised, drained, levelled, etc.). The area has been zoned partly according to the 'Relatienota' which provided funds for identifying some areas as nature areas that could be purchased from farmers for nature conservation, while other areas were zoned as 'management areas'. The owners of those areas can get paid for various voluntary regimes of nature conservation (e.g., late mowing). Later on, the area was declared a 'Ruimtelijke Ordening en Milieu' (ROM) and 'Valuable Cultural Landscape' (WCL) area which allowed the Provincial Government to apply various bits of legislation and funding.

At present, the area (i.e., not the whole hydrological system but an arbitrary part of it) has been zoned as a 'National Landscape', which allows it to be managed as an integral whole. This management is the responsibility of an Implementation Committee (IC), which is a discussion forum and has no statutory powers of its own. But managing an area as a Landscape does create some access to additional resources. Members of the IC are all the

main stakeholders in the area or their representatives. Each stakeholder represents his or her own interests. Yet the area can only survive if they eventually agree to move ahead collectively.

5.1. Statutory Powers

The IC was created because the area needed some form of integrated administration and management that did not exist. Hence the emergence of different forms of project structures, such as ROM, WCL and now the 'National Landscape' to provide such a capacity. The various players all enter the platform process with a baggage of rules, regulations, incentives, reward structures, and acquired power that makes compromise difficult. A typical example is the FS itself whose mission gives it very limited flexibility in the negotiation with farmers. The official creation of the IC leaves the platform deliberately without formal powers. That is, the existing formal powers, such as the (elected) Provincial Council and the Provincial Administration, the (elected) Water Authority Board, the (elected) Chairman of the Northern Farmers' and Truck Growers' Association, and so forth, all retain their own powers. In addition, some also elected representatives of interest groups, as well as formal directors of governmental agencies or parastatals (e.g., the Director of the FS in the Province) are present. The implications of this toothless form of management for the ability of the platform to move into a more sustainable direction are presently unknown. In the Netherlands, experience shows that such situations can lead to compromises that, in the end, only postpone the day of reckoning.

Related is the issue how various instruments of Government, such as subsidies, regulatory frameworks, etc., are applied through platform structures. Obviously, it is expected that upon negotiated decision by the IC, regular government agencies such as the Province would deploy the instruments available to them. This raises the issue of the legitimacy and accountability of platforms in the structure of government. They are not elected, yet they can be expected to generate tremendous pressure on elected bodies to conform to negotiated outcomes.

5.2. Representation

The representativeness of platforms is also an issue. In the DRA area the one million tourists are not really represented. On the platform there is a representative of the 'entrepreneurs in the recreational sector', i.e., the people with holiday bungalows, campings and restaurants. There is also an voluntary association of local community councils that focuses on creating and maintaining recreational facilities and infra-structure (paths, parking places, indicators, boards, picnic tables, etc.), but the tourists are not represented. There is no clear segmentation of tourists into categories and the nature of what they desire, for example. The assumption is that they want to walk 'in nature', but they might well want swimming pools or amusement parks.

Another category that is under-represented are the 'imports' who have bought the farm houses of the farmers who have given up. They are often very rich, exert an enormous pressure on land use through their hobby farms, and yet are totally unorganised, hardly represented, and uncontrollable. One voluntary association of 'Small Villages in Drenthe' represents them to some extent, but its chairman uses his membership in the IC to pressurise the IC to pay attention to cultural history of the area (as opposed to only the rare plants, as promoted by FS). He is very influential, but has no clear vision of the implications for the design of the Landscape.

I did speak to virtually everybody on the Implementation Committee and some of its Working Groups, but I am not sure whether I really managed to speak to everybody with interests in the area. For example, I did not speak to hunters, fishermen, bird watchers, priests and pastors (they might have become extinct), doctors, psychiatrists, teachers, nor to anyone in the Provincial administration.
One of the important findings was the alienation of representatives in the IC from their constituencies. A very good example was the Director of the FS who represents it in the IC. He is under tremendous pressure from his IC colleagues to compromise with the farmers. This means acceptance of (some) manuring, while FS emphasises the need for *de*-manuring (i.e., removing nutrients). In fact, it spends millions on removing the topsoil in its reserves. In the end, the FS Director was pressured to say that 'some manuring' should be discussible. For this brave deed he was applauded by his fellow IC members. But within the FS, the remark caused tremendous controversy. A social scientist can have an important influence simply by pointing out that such conflicts are to be expected and should not lead to personal conflicts but to ways in which to handle the built-in contradiction.

5.3. Perspectives
I found it useful to try to define the perspectives of the different sets of actors, i.e., their espoused theories or theories in use. The FS staff was generally imbued with a hard hydro-ecosystem perspective, i.e., they were not after a given rare plant but after plant communities, and their actions seemed generally directed by an overwhelming awareness of the entire hydrological catchment as a system. However, the FS found it difficult to maintain and defend this perspective against those who tried to label them as only representing the 'nature sector', i.e., one voice among many.
The farmers' perspective could be seen as oriented totally on maintaining the conditions, also in future, under which they can make sufficient income to maintain farming operations in the open market and as 'free entrepreneurs'. They are, of course, not free entrepreneurs but get about $500 per ha to farm the way they are farming. However, they aware that this subsidy is only going to decrease, alternative sources of income have not been developed, and the pressure to sell the farm against the very attractive land prices going at the moment is high. A number of observers feel that the future of farming is very uncertain. Yet farmers are seen as an essential element in the landscape.
A third very interesting perspective that I had not expected to find is that of the administrators. They are paid to move the IC in a direction of agreement and compromise. In other words, social learning and concerted action are the concrete outcomes for which the administrators are rewarded. They apply their skills of networking, exerting social pressure, etc., to move the various stakeholders in the IC. They apply sayings such as 'under pressure everything become fluid' and other espoused theories that guide their actions. The Chairman of the IC has been specially appointed as an independent chairman. His background is to have amalgamated a large number of small water authorities into one huge one. Another top administrator is the Chairman of the Farmers' Union who speaks of managing farmers as managing 'a wheelbarrow full of frogs'. In the past 20 years he has managed to create the large Northern Farmers' Union out of the large number of Catholic, Protestant, Liberal and local unions that used to exist. A third administrator of this ilk is the Provincial Council member, a lady with tremendous networking and management skills. These people are professionals in creating platforms and in making things happen on them. In a way, they are not interested in substantive issues.

5.4. Policies

In a country such as the Netherlands, the number of policies that are operative in a situation such as the DRA is overwhelming. Community councils, provinces, ministries and the central government all have, in the course of years, developed rules, regulations, frameworks, definitions, laws, etc. which are often not even consistent with each other. In a densely populated country such as the Netherlands, they affect spatial planning, land use, water management, zoning, etc.
An example is the 'Area Vision with Respect to Nature, Forest and Landscape DRA' of December 1995. This 'vision' is a sectoral government paper that elaborates provincial policies with respect to nature, forest and landscape in concrete proposals at a regional scale. Such visions are concrete agreements that acquire the status of policy for a certain period. In this case, the 'vision' contains detailed maps zoning the area into uses. It specifies details such as the reintroduction of the badger in area x, or the measures needed to maintain the population of marsh grasshoppers in area y. In the Netherlands, 'everything of value is vulnerable' and requires explicit effort.
A second important bit of policy is the boundary setting of the DRA area by the Provincial Council. Such boundary setting is an extremely political issue, especially because policies with respect to the National Landscape will be operative within the boundaries. An earlier plan to create a National Park was shot down, also by the farmers, because they saw it as a major threat to their survival (their response to such ideas has always been 'we can look after nature'). The boundaries of the DRA National Landscape reflect compromise rather than that they reflect the hard hydrological system.

The Provincial Environmental Plan (POP) zones the provincial area into zones, such as:
Zone VI: Forest with recreation, wood production and Nature, so multi-functional forest.
Zone V: Nature. No agricultural functions.
Zone IV: Nature and Farming Interwoven. Focus on integration, with attention an a-biotically valuable areas, archaeology, etc.

In other words, the area is not considered as an integral system', but zoned on the basis of negotiation into distinct areas within which certain types of policy are operative. This reflects the typical tendency to draw maps and fill in areas with different colours (functions).

Conclusion

The DRA case represents a laboratory in which multiple cognitive agents who agree that they need to collaborate to each achieve their own goals, meet on a platform on which coherence and correspondence are deliberately pursued. These efforts include deliberate and contested attempts to vision a shared future. The different perspectives held by the stakeholders represent different theories, and the stakeholders are aware that a joint narrative is a powerful weapon in making one's interests prevail. Meanwhile, the standards and criteria by which to measure the results of the joint action are still under negotiation. Do these focus on the existence of rare plant communities? Or does it focus on the recreation of a nostalgic landscape with black and white cows? (That would be a-historic in the first place, given that the original 'Drentsche cow' which had evolved over 4000 years to adapt to lack of iodine in the local diet and became extinct around 1930, was not black and white)?

In other words, cognitive theory seems useful to make sense of complex interactive processes that emerge now that we try to deal with the eco-challenge. But case studies such as the DRA also suggest important areas where the theory is still underdeveloped.