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Content:

1 Introduction

In many natural resource systems, people find themselves to be increasingly interdependent as the number of resource users and types of uses multiply. Analyses which make use of the prisoner's dilemma, tragedy of the commons and logic of collective action effectively illustrate how certain types of interdependence can trap us in resource use patterns which inevitably lead to destruction of a resource system. However, these analyses are challenged by numerous others which indicate that people are capable of coordinating decisions and actions to overcome such destructive patterns of resource use (Ostrom 1990 among others). Resource management practice indicates a great diversity in ways in which individual choices and action are coordinated *to balance* needs and interests of users with the capacity of the resource system. Coordinated decision making arrangements and actions vary from quite simple rules of thumb, for example, restricting fishing in spawning seasons, to complex social-economic arrangements such as the Balinese water management (Lansing 1991).

Nonetheless, the conclusion that sustainable resource management is simply a question of reaching everlasting optimal equilibria by getting the right institutional arrangement should not be drawn to hastily. This would neglect the dynamic nature of managing natural resources. After all, human use changes resource systems; resource systems themselves entail change processes; and, human needs and interests regarding resource systems change. From the interplay of these changes new, often unforeseen interdependencies of actors and (collective) consequences of decisions and actions can emerge. Consequently, *continuous* adaptations of existing management practices are required to ensure sustainably managed resource systems.

Figure 1: Dynamics in managed resource systems

INSERT FIGURE 1 HERE

The question is whether this ongoing adaptation in managed resource systems can be facilitated, and how.

This paper will focus on whether using a social learning perspective to analyze and adapt coordinated decision making and action in managed resource systems provides some answers to this question. First, theoretical notions of social learning will be discussed in light of the above question. The transpiring framework structures the analysis of social learning in two managed resource systems in Benin and the Netherlands: Fishery management in the Lake Aheme and water resources management in Gelderland. Emerging issues will be discussed and used to critically assess the role and possibilities of arrangements to coordinate decision making and actions such as platforms (Röling 1994, Röling & Wagemakers 1998, Steins & Edwards 1998) to cope with evolving conditions in resource management.

2 A social learning perspective: Guiding principles and praxeology for reflection and action

As notions of social learning, and for that matter of learning in general, have proliferated (for example, in development practice, policy analysis, management studies), the concept has come to comprise a collection of phenomena which includes learning by individuals through observation or interaction with their social context, learning by social aggregates, learning pertaining to social issues, and learning which results in recognizable social entities such as collective decision making procedures, culture, etc. (Dept. of Communication & Innovation Studies, 1997). Although these phenomena differ from each other, they share the interplay of individual and situational factors in generating human behavior.

This feature makes a social learning perspective interesting for natural resource management. Many other perspectives have a tendency to focus on either individual agency or structural incentives as determinants of human behavior (cf. the eternal nature/nurture debate in philosophy and psychology). For example, (neo-)classical economics and some strands of institutional economics focus on how environmental stimuli shape individual preferences and choices, while a number of psychological theories only has an eye for inner processes such as individual drives, instincts and other motivational forces. Neither of these explanations of human behavior proves satisfactory. Behavior is certainly influenced by the environment, but people also play a role in creating this environment.

2.1 Social learning: Guiding principles for resource management

In terms of a normative framework for resource management, a social learning perspective aims to convey a manner in which people learn and need to learn how to gain insight into, predict, and control the way their actions affect the natural world to ensure a sustainable future (Lee, 1993; Röling & Wagemakers 1998). *Systems thinking*, *experimentation*, and *communicative rationality* are essential guiding principles of this framework.

-Systems thinking counters blind spots of reductionist problem solving traditions (Holling 1978, Checkland 1981; Maturana & Varela 1984; Röling 1992; Gunderson et al 1995, Röling & Wagemakers 1998). Many resource management problems emerge in a different domain than the one that gives rise to these problems. For example, by dumping waste in rivers, upstream habitants affect the water quality of downstream habitants. Moreover, their actions also affect the aquatic and terrestrial life dependent on the river water. By looking at consequences of decisions and actions in terms of these different levels of aggregation, systems thinking aids to increase visibility of interdependent relations between and within natural and human domains.

-As our understanding of relationships in natural and human systems and their interplay is ridden with uncertainties, an experimental attitude is called for (Holling 1986, 1995; Lee 1993). Treating types of resource use, policies, and management as experimental creates room for systematic learning from experience and change. An experimental approach to resource management is explicit about expectations when designing management strategies and evaluation methods, collects information to check assumptions with practice, and translates comparison into learning: Correct errors, improve understanding and change plans and actions. In this way resource management can be adapted to changing circumstances and new insights as these are obtained along the way.

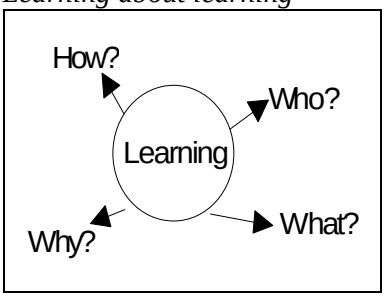
-In order for such learning to take place scientists, users, planners, and managers, etc. need to interact continuously (Lee 1993, Van Woerkum 1997). In a social learning perspective, communicative rationality (Habermas 1984) is the guiding principle for such interaction. Through dialogue and deliberation, problems and questions are identified, alternatives explored, and, based upon subsequent shared understanding, decisions and actions can be adjusted when necessary. This does not mean that this process takes place without conflict. Practice has proven communication a source of conflicts, but also our means to resolve them.

In conclusion, from a normative point of view a social learning perspective provides an alternative for more traditional resource management perspectives which heavily rely upon reductionist, sectoral and expert/scientist driven knowledge generation. It prescribes "collective and collaborative learning that links biophysical to the social, cultural and political spheres, the local to the global arena, and action to reflection and research" (Finger & Verlaan 1995, 503). As such, a social learning perspective can be a guiding framework for realizing ongoing adaptation in managed resource systems.

2.2 Social learning: A praxeology for resource management

The question remains how such learning can facilitate continual adaptation of resource management practices. This requires a combination of action and reflection. In order to be able to take action which generates continually modified understanding of evolving conditions, and accordingly, adaptations in managed resource systems, we need to understand the learning process itself. Four simple questions will guide our understanding of learning: *Who learns?; What is learned?; How is learned?; and Why is learned?*

Learning about learning



-*Who?*

In general, the individual is identified as the basic learning entity. As mentioned, learning is determined by individual cognitive abilities as well as the physical and social context. When actions as a result of learning affect that context, it is possible to distinguish learning entities in terms of these contexts such as groups, organizations, communities, platforms, watersheds, regions, etc. (cf. Senge 1990, Florida 1995).

-*What?*

By identifying different action-reflection feedback loops, the learning loops of Argyris and Schön (1996) prove a helpful model to distinguish different types of learning involved in understanding, predicting, and managing human-natural system relationships. S*ingle loop learning* takes place when outcomes of decision making and action are evaluated in terms of the way these contribute to achieving the goals set. A mismatch between expectations and performance is resolved by improving present practices so that future performance is within the range of existing norms and values. For example, in case of groundwater management in Gelderland, analysis of the water system indicated that appropriation exceeded the determined capacity of that system. In first instance, attention turned to how groundwater appropriation could be more efficient or cut back so that use would be within the capacity of system. *Double loop learning* could be distinguished when feedback started to generate change in the set of assumptions on which practices had been based. In Gelderland, stakeholders realized that in order to effectively take action to combat desiccation of nature due to dropping groundwater

levels, the former strategy of "causer must pay" needed to be replaced as it trapped stakeholders in a finger-pointing and blaming deadlock. Instead, stakeholders envisioned a commonly desired end situation, and, accordingly, agreed upon who would contribute what to realizing this common goal. Subsequently, resource management practices have been changing. The process of double loop learning has triggered *triple loop learning*, i.e., learning to learn. This learning is characterized by reflection and actions which address the conditions which structure interaction patterns in single and double loop learning. In case of water resource management in Gelderland, this has entailed changes in the process which structures the realization of water management plans.

-*How?*
These types of learning can occur through *direct experience*, *observation of other's experience*, and *modeling*, i.e. extraction of common features from seemingly diverse responses and formulate rules of behavior that go beyond what has been experienced or observed. In the example above, the participants' learning came about through direct experience- by participating in the covenant making process. Other provinces have observed this learning and taken it into account in their resource management policy making and implementation. Policy scientists, among others, have been busy combining this experience with others in participatory policy making and modeling how (social) learning can be facilitated (cf. Renn et al 1995; Vermeulen et al 1997).

-*Why?*
The tendency exists to focus on *external triggers*, especially *crises*, as reasons for learning. Although certainly an important source, human cognitive capacities to represent outcomes symbolically allows for other triggers of learning. From prior and other's experiences we are able to *anticipate consequences* of behavior in certain situations. These potential consequences can become motivators that influence our behavior (Bandura 1971). Our capacities for both insight and foresight also enable us to generate *break throughs* as a source of learning. These are active attempts to reflect on actions in new or unexpected situations through the creation of protected learning environments in which participants are free to experiment. Outcomes of such encounters can trigger learning in other entities.

Social learning in practice: The danger of learning asymmetries
As learning entities we have the capacity of detecting and bringing about changes through various combinations of the abovementioned aspects of learning. Diversity of learning will facilitate continual adaptation of resource management practices as this enlarges sensitivity to different types of change, and come up with different strategies to take action. However, our abilities, choices or context might not always endorse a diversity of learning. In these cases *learning asymmetries* can emerge, i.e., characteristics of learning entities which reduce their adaptiveness.

For instance, when individuals are unable to influence their context through their behavior, learned helplessness can occur (Garben & Seligman 1980). In these instances, individuals fall into a state in which all sense of being able to bring about change disappears, even in contexts in which earlier they were able to exert influence. Moreover, when looking at learning in terms of contextual entities (groups, organizations, communities, etc.), asymmetries can develop when only certain types of individuals in the aggregate learn. Learning entities can also be "stuck" in a certain learning loop (Argyris & Schön 1996). Successful single loop learning can mask the root of the problem a learning entity faces. As discrepancies between performance and expectations are adjusted, the possible problematic nature of the expectations remains unquestioned. Analysis addressing the how

of learning indicates that although individuals have a capacity for all three forms of learning, individuals tend to have learning styles which have a bias for certain forms (Kolb 1984). This bias can be the result of individual cognitive abilities, but is often a consequence of situational incentives. For example, the history of agricultural extension indicates how types of learning have been ascribed to certain groups (Groot 1997). Experiential learning has been attributed to farmers and modeling to agricultural scientists. Uniformly designed extension and training programs have aided to create these learning biases. The tendency to rely upon a crisis to trigger learning has proven a dangerous one (De Geus 1997). Certainly crisis is a strong force to convince people of the need for change. However, once in a crisis, options and time for change become scarce.

Learning asymmetries can turn out to be quite dangerous for human, and subsequently, natural domains. As a result learning of asymmetries, entities can *fail to grasp opportunities to bring about change, develop blind spots for certain types of change,* and *fall into the trap of accommodation* (keeping the situation as is) *rather than bringing about real change.* All these limit the adaptive capacity of the learning entity. In the long term this decreases a system's resilience to cope with changes, increasing the chance that a future change becomes an irreversible crisis.

Combining the analytical framework of social learning with the earlier mentioned guiding principles provides a basis for action aiming to realize ongoing adaptations in managed resource systems. The analytical framework can be used to understand the learning processes that occur (or have occurred) and to identify possible learning asymmetries. Systems thinking, experimentation, and communicative rationality can then be used as guiding principles to develop alternatives and bring about changes to counter these asymmetries in order to develop adaptive capacity of the learning entity in question. For example, systems thinking can help to shift boundaries of learning entities in relation to the scope and scale of resource management problems. Experimentation can aid to develop diversity in the "who, what, how, and why" of learning, etc… In the next section, the feasibility of this social learning perspective will be explored through the analysis of (coordinated) decision making and action in two managed resource systems.

3 Social learning in managed resource systems

The managed resource systems analyzed are the cases of fishery management in the Lake Aheme, Benin and water resources management in Gelderland, Netherlands. Although quite different combinations of human and natural systems, the social learning perspective should allow for some generalizations that cross the boundaries of these specific cases. First, case presentations will be limited to a brief overview of the resource system in question, and a number of examples of coordinated decisions and actions for each case. (More comprehensive studies can be found in the dissertations addressing these cases (Dangbegnon in prep; Maarleveld in prep)). Following, the adaptations in decision making and action will be analyzed in terms of the social learning analytical framework. Past and future adaptations will be discussed in terms of the social learning perspective's epistemological foundations. In the last section emerging issues will be further discussed in light of assessing the role and possibilities of platforms as a means to deal with dynamics of managed resource systems.

3.1 Brief overview of fishery management in the Lake Aheme, Benin

The resource system

Lake Aheme is located in the southern part of Benin, and is (partially) a natural frontier between the Atlantic and the Mono provinces. The lake is deeply embanked between a number of plateaus of *Terre de barre* (red soil): the plateaus of Comé and Bopa in the West, and of Allada in the East. In the northern part, the lake receives the Couffo River. With 24 km in length, the lake's surface is 78 km^2 during low levels of the water and 100 km^2 during periods of inundation of the flood plain. The northern part is deep (2.10 meters) while the southern part is not as deep, down to 0.30 meter during the low water level periods. Lake Aheme is connected to the sea by the Aho channel, a 10 km long complex which joins the lagoon of Grand-Popo, a crossing point with other rivers flowing to the Atlantic ocean. During the dry season the water flows from the sea through the Aho canal and causes increased salinity of the southern part of the lake. This phenomenon very often happens in March. When the rainy season starts, the Couffo River flows abundantly in the lake and decreases the salinity.

Some fish species spend their entire life cycle in the lake, others spend part of their life cycle in the sea. During the time when mangroves were abundant at the edges of the lake, fish populations thrived. The mangroves provided shelter, refuge, shade, food, breeding ponds for the fish. Once the mangroves were destroyed, fish population went down (Pliya 1980).

Dynamics in the managed resource system

People around the lake live off the fish. The Pedah people are the dominant ethnic group on the western and southeastern side of the lake. The Aïzo people dominate the eastern part of the lake. During the colonial period the practice of Akaja was introduced to restore the abundance of fish in the lake. This practice consisted of building small mangrove-like constructions in the lake which provide breeding grounds for the fish. The practice proved extremely successful, both in terms of increased fish populations as well as income generated. As a result, the lake filled with "Akaja mangroves". This led to divisions among Akaja stakeholders. It also led to conflicts with the members of the Zounon family who are entitled to make use of Xha, a practice to harvest fish in the Aho canal. The changes in the lake affected everyone's fishing possibilities, both in the lake and the canal. After attempts to bring about change (paralleled with independence of the country), the conflict between Akaja users and Xha owners intensified. Both fish populations decreased and implementation of management institutions failed. In 1992, finding a solution for the lake was made a priority at the national level. Table 1A gives an overview of three moments of (coordinated) decision making and action in terms of who was involved, what became visible, how this came to light and why adaptation of management practices was triggered.

Table 1A: (Coordinated) decision making and action in managed resource systems: Fishery management in Lake Aheme, Benin

Occurrence	*Who?*	*What?*	*How?*	*Why?*
Introduction of Akaja, Lake Aheme, RB, From 1956	Professionals of Service des Pêche (National Fishery Service)	- Effects of degradation of mangroves on lake - Lake as ecosystem	- Sampling and technical analysis	- Crisis, depletion of the lake and suffering of stakeholders
Akaja users and Xha users resource conflict, Lake Aheme, RB, 1980's	Individual and groups of Akaja users and of Xha users	-'rethinking' Akaja practice - Changing local institutions which legitimized Xha's use of the lake	- Learning from own experience (fish catches) - Observations of others' practice	- Crisis, competitive arenas around few lake resources
Breaking impasses, Lake Aheme, RB, 1990's	Individual and groups of Akaja users and of Xha users, national and regional government organizations, "Lake system"	- Defining new institutions for lake - New organization for governance of lake which involves representatives at level of ministries - Adaptation of fishing practices to conflict situation of lake (Akaja and Xha practices were banned)	- Meeting ('journée de réflection') - Collective appreciation and analysis of lake situation - Evaluation of previous actions - Collective decision making among different coalitions of stakeholders who exploit Lake	- Crisis, conflicts and wars became serious - Difficulty of stakeholders to agree among themselves

3.2 Brief overview of water management in Gelderland, Netherlands

The resource system (WHP 1996)

The province of Gelderland is located in the eastern part of the Netherlands, bordering Germany. Covering 5143 km^2, it is the largest province of the country. In case of water resources, three areas can be distinguished: Veluwe, Achterhoek, and Rivierengebied. Veluwe is characterized by a sandy plateau dominated by a large nucleus of dry land vegetation at higher elevation and wetland and aquatic vegetation at the lower edges. The high parts of the Veluwe form a large infiltration area with very deep groundwater which stays in the region relatively long. At the edges this groundwater percolates in brooks and springs.

Achterhoek is characterized by surface water systems which mostly flow east/southeast-west/northwest and begin in Germany. The deeper groundwater also flows in this direction, but predominantly originates in the region itself. The shallow clay layer of the East-Netherlands plateau in the east of Achterhoek only accommodates shallow groundwater which is subject to rapid drainage. In this region, watercourses naturally run dry in summer. In the rest of the region sand deposits produce local percolation and infiltration systems. Infiltrated rainwater percolates both at the edges of these systems as well as in areas further away. At the western side of Achterhoek, groundwater from Veluwe surfaces.

As the name suggest, Rivierengebied is characterized by a number of large rivers and their forelands. Both flooding and droughts occur easily. Via sandstrokes in the subsoil,

percolation water from the large rivers surfaces in the area, and in some locations, groundwater from Veluwe and Achterhoek. A part of this region's watershed lies in Germany.

Dynamics in the managed resource system
Water plays a role in a number of domains. Besides the fact that water is an essential factor in the natural system and landscape, rivers and canals are used for transport. Groundwater is a source for drinking water and industrial production purposes, and plays a role in agriculture. Water is used for irrigation and livestock watering. And, drainage is necessary to make lands productive.

The past forty years, the number of users and uses have multiplied steadily. This has meant greater appropriation of groundwater and increase in drainage interventions for agricultural and infrastructure projects. Together these have led to decreasing groundwater tables. In addition, water quality has been threatened by industrialization and use of pesticides and fertilizers. All in all, the pressure on water resources has greatly increased. This has triggered some of the adaptations of resource management practices. Who took part in these adaptations of management practices, the outcomes, how these were realized, and why these adaptations were undertaken are presented in table 1B for three different instances.

Table 1B: (Coordinated) decision making and action in managed resource systems: Water resources management in Gelderland, Netherlands

Occurrence	*Who?*	*What?*	*How?*	*Why?*
Water Management Plan I, Gelderland, NL, early 1990's	Policy makers, Water Management Department Gl.	- Improved understanding of provincial water system - Provincial strategy for water management - Planning	- Technical analysis	- (Anticipated) statutory obligation to make plan in national water management law
Water Management Plan II, Gelderland, NL, late 1990's	Provincial policy makers, stakeholders in provincial water management, politicians	- Insight into dynamics of planning-action-monitoring-evaluation - Shared understanding of problem issues - New coalitions among water stakeholders - Adapted provincial strategy for water management	- External evaluation of Plan I - Collective appreciation and problem analysis - Collective strategy formulation	- Statutory obligation to make plan in national water management law - Experiences with Plan I - Problems in water management
Desiccation Covenant, Gelderland, NL, late 1990's	Provincial policy makers, stakeholders in provincial water management	- Improved understanding of groundwater dynamics in relation to nature and human use of water - Shared understanding of problem issues - Insight into the relation between responsibilities and action - Strategy to combat desiccation and its effects - New coalitions among water stakeholders	- Discussion of plan of approach - Collective appreciation and problem analysis - Envisioning a strategy of where to go and how - Collective signing of covenant	- Consequences of desiccation in certain regions - Expected problems of desiccation - Obligation charged in national policy to take action at provincial level

3.3 A social learning analysis of the cases

The analytical framework makes visible learning patterns underlying the dynamics in the two managed resource systems. Accordingly, table 2 shows who learns, what is learned, how and why for three different instances of (coordinated) decision making and action.

Table 2: A social learning analysis of the cases

Occurrence	*Who learns?*	*What is learned?*	*How?*	*Why?*
Introduction of Akaja, Lake Aheme, RB, from 1956	- individual entities - group entity	- single loop - double loop	- direct experience	- crisis
Akaja users and Xha people resource conflict, Lake Aheme, RB, 1980's	- individual entities - group entities	- double loop - single loop	- direct experience - observation of other's experience	- crisis
Breaking impasses, Lake Aheme, RB, 1990's	- individual entities - group entities - ecosystem entity	- triple loop - double loop - single loop	- direct experience - observation of other's experience - modeling	- crisis, conflict (war)
Water Management Plan I, Gelderland, NL, early 1990's	- individual entities - group entity	- double loop - single loop	- modeling	- anticipated consequences
Water Management Plan II, Gelderland, NL, late 1990's	- individual entities - group entities - ecosystem entity	- triple loop - double loop - single loop	- direct experience - observation of other's experience	- crisis - anticipated consequences
Desiccation Covenant, Gelderland, NL, late 1990's	- individual entities - group entities - ecosystem entity	- triple loop - double loop - single loop	- direct experience - observation of other's experience - modeling	- crisis - anticipated consequences

Individually the different examples illustrate the occurrence of a number of learning asymmetries. Both the introduction of Akaja in the Lake Aheme and the first water management plan in Gelderland indicate how the learning entity is limited to a particular group of individuals involved in managing the resources. In case of the lake, the active actors are the professionals of the National Fishery Service, and in Gelderland, the provincial water policy makers. What and how is being learned also shows asymmetries. In both learning is restricted to single and some double loop learning. In the Lake Aheme this learning occurs through direct experience, while in Gelderland, modeling is the key learning style. As a consequence of these asymmetries, insight gained about the resource at the system level did not spread throughout the congruent human domain. Moreover, stakeholders who were not involved in developing this new understanding of the situation, were rather resistant to participate in attempts to change management practices.

The other instances of coordinated decision making and action show somewhat greater diversity in learning. In the Lake Aheme case however, crisis remains the main trigger for change. On the one hand, this increases awareness of the urgency to adapt management practices- even up to the national level in the 1990's. On the other hand, a depleted resource, deadlocks, and even violence made finding different options extremely difficult. They also added to the social turmoil of the independence years which proved slippery ground to anchor new management practices and institutions. Clearly, before any experimentation with policy,

management and resource use could take place, shared appreciation of past, current and future situations among all lake stakeholders needed to be developed.

The last example of the Lake Aheme case and the last two of the Gelderland case illustrate how this process of shared reflection and action can be undertaken. The three examples indicate how taking time to develop shared understanding of a problem situation through interaction of individuals involved in using and managing the resource pays off when deciding upon strategies and taking action. In order to create opportunities for dialogue and deliberation, reflection and action groups (whether one calls them platforms, arenas, fora's, working groups, etc.) in which both content and process of resource management could be addressed by participants were set up. The ecosystem entity was the basis for inviting individuals to participate in these platforms. In the realization of Water Management Plan II, this meant that not only provincial water management policy makers and water board representatives were involved, but also representatives of farmer's organizations, environmental groups, estate owner organizations, chamber of commerce, municipalities, drinking water companies, political parties, among others. In this way, it was attempted to link individual and group entities to the problem context domain. By enabling diverse group of individuals to interact, some space was created for different types of learning styles and triggers of learning. Practices were also questioned at the three learning loop levels, although choices in the design of the plan making process limited what levels were questioned in certain groups. As a consequence, some individuals participated in the process, but felt to lack influence on it. When attempting to break the resource management impasse in the Lake Aheme case in the 1990's, it became clear that those groups who were not as organized and had little influence on ensuring the Akaja-Xha users power balance also had less influence in reshaping management practices. All in all, although these instances are very much in line with the guiding principles of a social learning perspective, they clearly are not free from learning asymmetries. Future adaptations will have to address these asymmetries.

Historically each case confirms the interplay of individual and contextual (both natural and human) factors in determining human behavior. In all instances, changes at the aggregate level can be deduced to individual learning. At the same time, the successive series of (coordinated) decision making and action in these cases indicate how the manner in which problems have been framed in one instance shape the space for future learning. For example, in case of fishery management in Lake Aheme, a study of the consequences of the introduction Akaja leads the framing of the problem at the lake level. This opens the way for an approach which involves local stakeholders in reshaping management practices. In this setting, the problem of scarcity becomes more dominant, resulting in local conflict and deadlocks. One way these types of conflict can be resolved is by involving parties which overarch local needs and interests, in the Lake Aheme case: Representatives at the national level. In the Gelderland case a similar relation between problem framing and learning can be observed.

Together the two cases show that learning is not a linear process with a clear endpoint. Learning to manage changes in resource management involves proverbial movements in reflection and action such as three steps forward, two backward and reinvention of the wheel. Nonetheless, turning to social learning is a feasible means to facilitate ongoing adaptations in resource management as learning itself, however composite, is a natural occurring process, providing many anchor points to bring about change.

4 Facilitating social learning (Fasolearn): Critical issues in terms of platform designs

All in all, the social learning perspective appears to be a useful framework to analyze and influence dynamics in (coordinated) decision making and action managed resource systems. One means to bring about change has been the design and implementation of platforms. The above analysis confirms that platforms can be a viable means to bring about changes in terms of social learning. However, platforms do not warrant adaptations in managed resource systems. The learning that occurs in a platform can be asymmetric in ways that inhibit any changes to take place.

In light of the panel discussion paper statements (Steins & Edwards 1998; see also Appendix 1 of this paper) and the above analysis, the following issues will be discussed: membership of platforms; accessibility of platform meetings; skills and relations of platform members; realization of platforms; and, third party facilitation of platform activities.

Membership of platforms (c.f. discussion statement1)

- The social learning perspective prescribes that the system level of the resource problem should be the guiding principle for determining the boundaries of the platform. This means that not only resource users themselves are eligible to participate in platforms, but also those who are affected by its use. The cases indicate an ecosystem entity proves a sensitive scale for seeing signals of change. They also indicate that it can take some time to figure out what the boundaries of this entity in terms of the natural and human system. As definition of the system has consequences for who participates in the platform, some attention should paid to who takes part in the definition process. Moreover, as resource systems and human interests and use of these systems change over time, platform boundaries will have to change over time as well.

Accessibility of platforms (c.f. discussion statement 2)

- Clearly, platform meetings must be accessible to members in terms of time and place of their occurrence as well as constitution and operation of meetings. In terms of a social learning perspective this means that individual members must be able to influence both content and process of platform meetings. Accordingly, the platform set-up needs to accommodate a diversity of learning loops, styles, and triggers.

Organization and skill of platform member stakeholders (c.f. discussion statement 3)

- As the number of stakeholders in a managed resource system quite often exceeds what is feasible to come together to negotiate resource use and management, the choice can be made to invite representatives of the various stakeholding groups. This is not without consequences. First of all, it presumes some level of organization on the side of the stakeholding group. Second, it presupposes that the interests and needs within a group are homogenous. Third, it assumes that the representatives have the necessary skills to negotiate on behalf of their constituents. Practice proves that these assumptions need to questioned as differences exists. And, these differences have consequences for the way in which participants are able to influence decision making and action in the platform, possibly resulting in learning asymmetries.

Evolution of platforms (c.f. discussion statement 4)

- For platforms to succeed in bringing about adaptations in managed resource systems they will need to be linked to existing institutional arrangements and initiatives for adaptations. Experience in the Lake Aheme case shows that newly designed platforms have no chance when not embedded in existing management organization. Moreover, focusing on a new organization of resource use

negotiation is no guarantee that a resource management problem or conflict will go way. Important is to look for initiatives attempting to tackle the problems themselves and build platforms from there.

Third party facilitation of platform activities (c.f. discussion statement 5)
- The cases indicate that third party facilitation in coordinated decision making and action arrangements such as platforms can be very effective. Often, the party who has taken initiative in setting up the platform also has a stake in the management of the resource, making impartial coordination of activities of the platform difficult. Inviting an outside party to take up this role can counter this duality. However, it does not necessarily ensure balanced development of adaptations in resource management practices. Who hires and/or pays for the facilitation, knowledge of the problem situation, and learning biases of the facilitator, among others, can make this outside party less impartial than it appears to be.

Returning to our question whether ongoing adaptation in managed resource systems can be facilitated, and how, the following can be concluded. Yes, ongoing adaptation in managed resource systems can be facilitated. By making visible learning limitations and potentials emerging from the interaction of resources, stakeholders, and institutions (whether in the form of platforms or otherwise), a social learning analysis provides a means of identifying starting points for future adaptations. Moreover, guiding principles of systems thinking, experimentation, and communicative rationality provide direction in the manner in which to facilitate adaptation of management practices. Recognising aggregated effects of interdependent decisions and actions, and allowing different stakeholders in the managed resource system to voice concerns and contribute to resolving problems, have proven to promote ongoing adaptation in face of evolving conditions.

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Appendix 1: Discussion statements Panel 'Multiple-Use CPRs, Collective Action and Platforms for Resource Use Negotiation', "Crossing Boundaries" 7th Conference of the International Association for the Study of Common Property, Vancouver, Canada, June 10-14, 1998 (Steins, Nathalie & Victoria Edwards 1998: 16).

Based on the empirical evidence of local platforms and the issues emerging from it, five discussion statements regarding the role of local platforms can be put forward. These statements will provide the basis for the discussion in the panel 'Multiple-use CPRs, collective action and platforms for resource use negotiation' at the 7th International Common Property Conference in Vancouver (July 1998).

Discussion statement 1:

Platforms for resource use negotiation in multiple-use CPRs must consist of representatives of the different user groups (i.e. individual user groups need to appoint a representative who negotiates on their behalf in the platform).

Discussion statement 2:

Platforms must be physically (i.e. place and timing) and culturally (i.e. constitution and operation of meetings) accessible to representatives of all user groups.

Discussion statement 3:

Platform performance depends on the level of organisation of individual user groups within the platform, the relations between the various user groups and the strengths and skills of the representatives of the individual user groups.

Discussion statement 4:

New platforms for resource use negotiation in complex, multiple-use CPRs must not be built on existing platforms for single-use resource management.

Discussion statement 5:

Platforms must be facilitated by a third party to co-ordinate multiple user groups, to ensure continuity and to reduce or absorb the transaction costs of forming and operating the platform.