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Managing natural resources: A social learning perspective

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Abstract. This article presents a social learning perspective as a means to analyze and facilitate collective decision making and action in managed resource systems such as platforms. First, the social learning perspective is developed in terms of a normative and analytical framework. The normative framework entails three value principles, namely, systems thinking, experimentation, and communicative rationality. The analytical framework is built up around the following questions: who learns, what is learned, why it is learned, and how. Next, this perspective is used to analyze two managed resource systems: Fishery management in Lake Aheme, Benin and water resources management in Gelderland, The Netherlands. To assess platform performance in resource use negotiation, emerging lessons from the case studies are combined with propositions concerning membership of platforms, accessibility of platform meetings, skills and relations of platform members, realization of platforms, and third party facilitation of platform activities.

Key words: Adaptive resource management, Benin, Facilitation, Lake fisheries, Platforms, Social learning, The Netherlands, Water resources

Abbreviations: COHEGEN – Comité de Gestion de Ehen; WHP – Waterhuishoudingsplan (water resource management plan)

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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 that inevitably lead to destruction of a resource system. However, these analyses are challenged by numerous others that indicate that people are capable of coordinating decisions and actions to overcome such destructive patterns of resource use (Ostrom, 1990; Uphoff, 1992; Lee, 1993; Scoones and Thompson, 1994; Gunderson et al., 1995). Resource management practice indicates a great diversity of 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 action 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 an everlasting optimal equilibrium by achieving the appropriate institutional arrangement should not be drawn too 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* adaptation of management practices is required to ensure sustainable managed resource systems. The question is whether this ongoing adaptation can be facilitated, and how.

This article will focus on whether using a social learning perspective to analyze and catalyze collective decision making and action in managed resource systems can provide some answers to this question. First, theoretical notions of social learning are discussed in light of the above question. The transpiring framework structures the analysis of social learning in two managed resource systems: Fishery management in Lake Aheme, Benin, and water resources management in Gelderland, the Netherlands. Emerging lessons are combined with the discussion statements of the introductory article to critically assess the role and possibilities of collective decision making arrangements such as platforms (Röling, 1994; Röling and Wagemakers, 1998; Steins and Edwards, 1999).

2. A social learning perspective for natural resource management

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 that includes: Learning by individuals through observation or interaction with their social context; learning by social aggregates; learning pertaining to social issues; and learning that results in recognizable social entities such as collective decision making procedures, culture, etc. (Dept. of Communication and 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, much along the lines of the everlasting nature/nurture debate in philosophy and psychology. For example, early institutional economics mainly focuses on how environmental stimuli shape individual preferences and choices (cf. Hodgson, 1988; Veblen, 1899), while several psychological theories have highlighted inner processes such as individual drives, instincts and other motivational forces (cf. Freud in Hall, 1979; McDougall, 1906). 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. *Guiding principles for resource management*

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

Systems thinking aims to counter blind spots of reductionist analytical traditions (Von Bertalanffy in Katz and Kahn, 1978; Holling, 1978; Checkland, 1981; Maturana and Varela, 1984; Röling, 1992; Gunderson et al., 1995; Röling and Wagemakers, 1998). When attempting to solve a problem within a reductionist approach, one takes the problem apart like a machine and develops a solution from an understanding of the separate parts. However, many resource management problems emerge at a higher or different level of aggregation than the one that gives rise to them. For example, by dumping waste in rivers, upstream habitants affect the water quality of downstream habitants. Their actions also affect the aquatic and terrestrial life dependent on the river water. Reducing the upstream community's behavior to the decisions and actions of the individual inhabitants neglects the spillover effects of their behavior. These effects become visible when one takes different system levels such as the watershed into account. It can also be worthwhile to make visible checks and balances that exist among inhabitants at (other) system levels. These can be used to resolve issues for which, at first hand, no incentives to change behavior appeared to exist.

As our understanding of relationships in natural and human systems and their interplay is ridden with uncertainties, an *experimental approach* is called for (Holling, 1978, 1995; Lee, 1993). Treating types of resource use, policies, and management as experiments 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 learn-

ing by correcting errors, improving understanding, and changing plans and actions. An example of an experimental approach in the case of water resource management in Gelderland is the current introduction of more sustainable water systems in cities. Contrary to resource management that sets policy goals at the highest management level for the entire area under jurisdiction, policy formulation goes hand in hand with pilot studies at the local level. In this case, municipalities and neighborhoods are involved in experimenting with double water pipe systems (for high and low quality water), and more natural water collection and drainage possibilties, among others things. In this way resource management can be adapted to changing circumstances and new insights, as these are obtained along the way.

In order for experimental based 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 and alternatives explored. And, based upon subsequent shared understanding, decisions and actions can be adjusted if necessary. This does not mean that this process takes place without conflict. Practice has proven that communication can be a source of conflicts, but also that it can be a means to resolve them. The ideal of communicative rationality can be a guide in realizing an interaction in which all who feel the need are free and have equal chances to express their views, and that they do so in an understandable, legitimate, and truthful manner.

From a normative point of view, a social learning perspective thus provides an alternative for more traditional resource management perspectives that heavily rely upon reductionist, sectoral, and expert/scientist driven knowledge generation and management. 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 and Verlaan, 1995: 503). Moreover, the guiding principles pave the way for systematic and continuous probing, discussion and testing of insights and solutions (Lee, 1993). As such, a social learning perspective can be a guiding framework for realizing ongoing adaptation in managed resource systems.

2.2. *Towards an analytical framework*

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

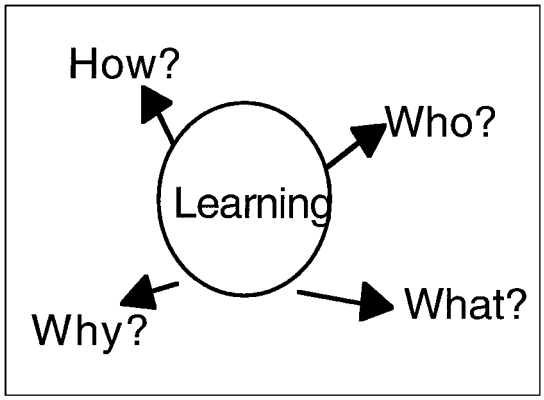


Figure 1. Learning about learning.

2.2.1. *Who learns?*

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

2.2.2. *What is learned?*

By identifying different action-reflection feedback loops, the learning loops of Argyris and Schön (1996) have provided a helpful model to distinguish different domains of the learning involved in resource management. *Single loop learning* takes place when outcomes of decision making and action are evaluated in terms of the way these contribute to realizing goals and expectations. 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 the case of groundwater management in Gelderland, analysis of the water system indicated that appropriation exceeded the determined capacity of the system. At first, attention turned to how groundwater appropriation could be reduced or made more efficient so that use would be within the capacity of the system. *Double loop learning* could be distinguished when feedback started to generate change in the set of assumptions on which practices had been based. Stakeholders proved unable to commit to measures to reduce groundwater appropriation practices because they found themselves

trapped in a finger-pointing and blaming deadlock. Provincial policy makers realized that in order to take action effectively to combat desiccation of the natural environment, the former strategy of "cause must pay" needed to be replaced. They proposed to envision a commonly desired and achievable end situation. This situation was then used to determine the weight of measures stakeholders could carry on their respective backs to realize this common goal. Subsequently, resource management practices have been changing (slowly). When learning is characterized by reflection and actions that address the conditions that structure interaction patterns in single and double loop learning, it is referred to as *triple loop learning*, i.e., learning to learn. In the case of water resource management in Gelderland, this has entailed changes in the process that structures the realization of water management plans, setting deadlines for implementation of measures as well as monitoring and evaluation of proposed actions.

2.2.3. *How is it learned?*

These different learning loops can occur through *direct experience, observation of other's experience*, and *modeling*, i.e., extracting common features from seemingly diverse responses and formulating rules of behavior that go beyond what has been experienced or observed. In the example above, learning of stakeholders came about through direct experience – by participating in the planning process. Other provinces have observed effects of this learning and taken it into account in their resource management policy making and implementation. Policy scientists, among others, have combined such experiences in participatory policy making and modeled how (social) learning can be facilitated (cf. Renn et al., 1995; Vermeulen et al., 1997).

2.2.4. *Why is it learned?*

The tendency exists to focus on *external triggers*, especially *crises*, as grounds for learning. Although certainly an important source, human cognitive capacities to represent outcomes symbolically allow for other triggers of learning. From prior experiences and the experiences of others, we are able to *anticipate consequences* of behavior in similar 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 *breakthroughs* 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.

2.3. *Towards a social learning praxeology*

As learning entities, we have the capacity of detecting and bringing about changes through various combinations of the above mentioned aspects of learning. Diversity of learning strengthens the adaptive capacity of managed resource systems, since this enlarges sensitivity to different types of change and the ability to come up with different strategies for taking action. However, our abilities, choices, or context might not always endorse diversity in learning patterns. In these cases, *asymmetric learning patterns* can emerge, i.e., a disposition for certain combinations of learning aspects.

A number of asymmetric learning patterns in terms of the four questions structuring the learning framework have been identified. For instance, when individuals are unable to influence their context through their behavior, learned helplessness can occur (Garben and Seligman, 1980). In such cases, individuals fall into a state in which all sense of being able to translate understanding into action disappears, even in contexts in which they did not lack this ability at an earlier time. Moreover, when looking at learning in terms of contextual entities (groups, organizations, communities, etc.), asymmetric learning patterns can develop when only certain types of individuals in a group learn. In terms of what is learned, individuals or groups can be "stuck" in a certain learning loop (Argyris and Schön, 1996). Successful single loop learning can mask the root of the problem that 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 modes of learning, individuals tend to have learning styles that 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 modes 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 in constituting these learning biases. Regarding the grounds for learning, we have developed a dangerous tendency to rely upon a crisis to trigger learning. 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.

Although a certain learning pattern might be more effective to cope with a particular issue, developing a disposition for a learning pattern can turn out to

be quite risky for human, and subsequently, natural domains. Asymmetric reliance on a learning pattern can lead to *development of blind spots for certain types of evolving conditions, a failure to grasp opportunities to bring about change,* and *accommodation* (keeping the situation as is) *rather than bringing about real change*. All these limit the adaptive capacity of the managed resource system. In the long term this can decrease a system's resilience to cope with evolving conditions, subsequently increasing the chance that a future change becomes an irreversible crisis.

2.3.1. *Fasolearn: Facilitating social learning*
Combining the analytical framework of social learning with the earlier mentioned guiding principles provides a basis for reflection and action 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 dysfunctional asymmetric learning patterns. Systems thinking, experimentation, and communicative rationality can then be used as guiding value principles to develop alternatives and bring about changes to counter these asymmetric patterns. For example, systems thinking can help to shift boundaries with regard to who is involved in the learning process by helping to make visible the scope and scale of resource management problems. Experimentation can help to develop diversity in the "who," "what," "how," and "why" of learning. In the next section, the feasibility of this social learning perspective will be explored through the analysis of collective decision making and action in two managed resource systems.

3. Social learning in managed resource systems

In this section, two managed resource systems are presented and analyzed, namely, the cases of fishery management in Lake Aheme, Benin, and water resources management in Gelderland, The Netherlands. Unfortunately it is beyond the scope of the article to do justice to the complexity of each of the two cases. Case presentations are limited to a brief overview of the resource system and its management history. More comprehensive studies can be found in the dissertations addressing these cases (Dangbégnon, 1998; Maarleveld, in prep.). Following the descriptions, three instances of collective decision making and action in each case are analyzed in terms of the social learning framework and value principles.

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

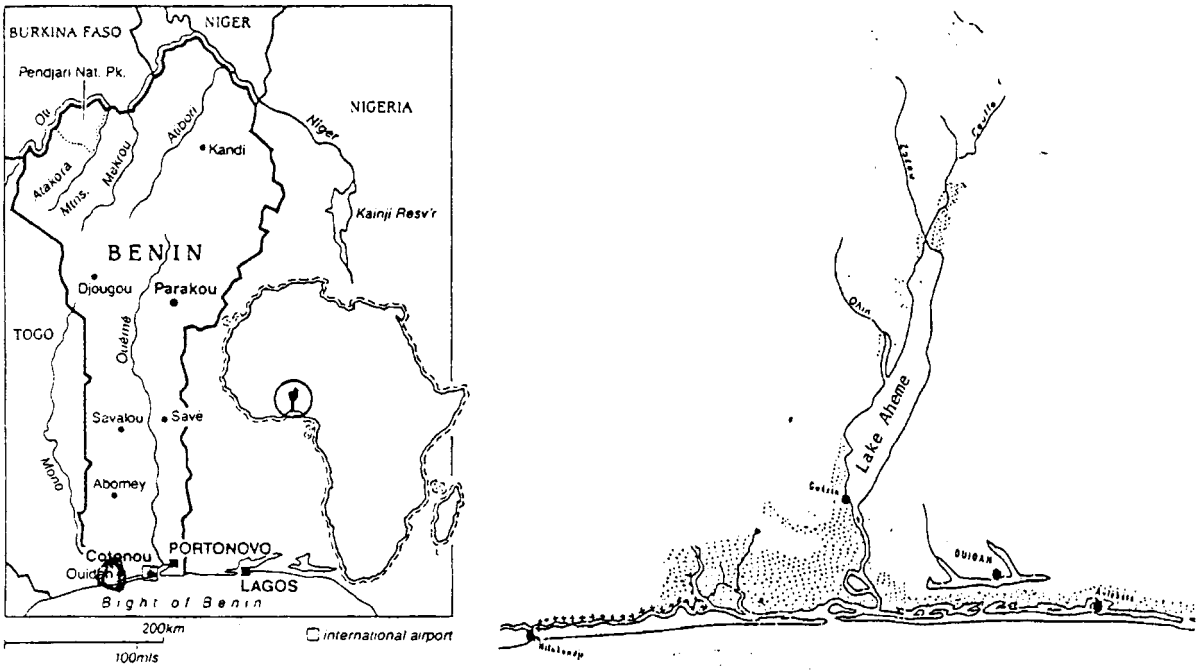
3.1.1. *The resource system*
Lake Aheme is located in the southern part of Benin, and is (partially) a natural frontier between the Atlantic and the Mono provinces. The lake is deeply embanked between a number of plateaus of *Terre de barre* (red soil): the plateaus of Comé and Bopa in the west, and of Allada in the east.

With 24 km in length, the lake's surface is 78 km^2 during low levels of the water and 100 km^2 when the flood plain is inundated. In the northern part, where the Couffo River enters, the lake is on average 2.10 meters deep, while the southern part is shallower, down to 0.30 meter during the low water level periods. Lake Aheme is connected to the sea by the Aho channel, a complex, 10 km long, waterway that joins the lagoon of Grand-Popo, a crossing point where other rivers flow into the Atlantic ocean. During the dry season, water flows from the sea through the Aho canal and increases the salinity of the southern part of the lake. This occurs quite often in March. When the rainy season starts, the Couffo River flows abundantly into the lake and decreases its salinity.

A number of fish species spend their entire life cycle in the lake, while others spend part of their life 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, and breeding ponds for the fish. Once the mangroves were destroyed, fish population declined (Pliya, 1980).

3.1.2. *Dynamics in the managed resource system*
People around the lake live off the fish catches. 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. A myth explains how the first ruler of the lake region introduced Xha. Xha is a practice used in the southern part of the lake and in the Aho canal to harvest fish by placing a barrier in the water enabling its owner to catch shrimp and fish species migrating from the sea. In pre-colonial times (before 1894) the right to practice Xha was entitled to the king and his direct family. This entitlement provided the ruler with a means of support for the kingdom.

During the colonial period (1894–1960), population around the lake mounted and demands for fish and market opportunities rose beyond subsistence level. Locally, the right to practice Xha was extended to relatives of the ruling family, while at the national level the state was declared to have control of water and forest resources. However, the state took its time in defining new institutions to manage these resources.



Map 1. Benin (left, Crystal 1996) and Lake Aheme (right).

During this time, the lake was overfished, not only due to an increase of Xha, but also because increase of other fishing practices destroyed the lake's mangroves. After scientists had established that the lake was in a degraded state, professionals of the National Fishery Service introduced the practice of "Akaja" in order to restore fish populations (see Table 1A). This practice, observed by Service officials in another Beninese lake, consists of building small mangrove-like constructions in the lake, which provide breeding grounds for the fish. These fish can then be harvested to benefit the community. At first, Akaja was not at all accepted by the community, but once it proved extremely successful in generating fish and income, those who had no entitlements to use Xha quickly adopted it. Yet it was not adopted in the way intended by the Service. As there were no social and institutional supports to carry the practice collectively, it was taken up individually.

In the years following independence (1960), businessmen from outside the fishing community, attracted by the potential earnings, provided financial means for local fishermen to practice Akaja. As a result, the lake filled with "Akaja mangroves." This led to fierce competition among Akaja fishermen, at times resulting in stabbing and deaths. Fish populations declined once again. In addition, wood, used to build the Akaja, became scarce around the lake. As changes in and around the lake affected everyone's fishing possibilities, conflicts also arose with members of the old, at this time somewhat dispersed, ruling family, who had been expanding the use of Xha. With the hope to solve the lake's degradation problems, Xha fishermen took initiative to create a platform to recreate the pre-colonial lake governance structure (see Table 1A). Representatives and priests of villages around the lake were invited to form a committee (COGEHEN – Comité de Gestion de Ehen) to manage the lake. However, Akaja fishermen were excluded from this committee. As a result, decisions were somewhat biased in favor of Xha fishermen and efforts to implement monitoring and sanctioning measures failed. Furthermore, Akaja fishermen created their own organization and conflicts further intensified.

In 1992, finding a solution for the lake was made a priority at the national level. Analysis made clear that all parties involved agreed upon the problem: the lake is impoverished. However, Akaja fishermen blamed Xha fishermen and vice versa. Other marginal fishermen groups blamed both those practicing Akaja and those practicing Xha. When all parties met in a general assembly meeting, the majority decided that all parties had to give in on certain things in the adaptation of Lake Aheme's management practices. In other words, both Akaja and Xha had to be reduced. But when it came to actual implementation of this decision, stakeholders did not keep to their end of the bargain. Especially Xha fishermen resisted quitting a practice they felt was a legacy of their ancestors.

The first government in the period of democratization came up with the idea of a "*journée de reflexion*" to stimulate collective reflection and problem solving (see Table 1A). The Fishery Service was given

Table 1A. Three examples of (collective) decision making and action in fishery management in Lake Aheme, Benin.

Occurrence	Who?	What?	How?	Why?
Introduction of Akaja, 1956	Professionals of Service de Pêche (National Fishery Service) Scientists	– Degradation of mangroves and lake – Need to maintain productive capacity of fisheries	– Sampling and technical – Observation of Akaja-like practice by fishermen in the lake	– Crisis, depletion of the lake and suffering of stakeholders
Establishment of committee to combat lake degradation, 1990	Xha fishermen, village representatives, priests	– Restoring local patterns of lake use – Establishment of Cogehen	– Past experience with lake governance structure	– Crisis, competitive arenas around few lake resources
Breaking impasses, "*journée de réflection*", Lake Aheme, 1992	National and regional government organizations National Fishery Service Akaja and Xha fishermen, other Lake stakeholders (priests, women organization, etc.)	– Defining new institutions for lake – New organization for governance of lake which involves representatives at level of ministries – Ban of Akaja and Xha practices	– 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 the lake	–Crisis, conflicts and wars became serious. – Difficulty of stakeholders to agree among themselves

responsibility for the organization of this meeting. In addition to representatives of local stakeholders, such as different fishermen groups, religious groups, and women's organization, government officials of all levels including high political authorities with the power to intervene from above were present. Once again, the conclusion was that all parties needed to contribute to changing the lake's degraded state. In the end it was decided that Akaja and Xha should be banned. However, as alternatives to maintain livelihoods were not developed and follow-up management institutions did not involve direct stakeholders, the efforts at collective decision making and action have once again proven fragile.

3.2. *Brief overview of water management in Gelderland, The Netherlands*

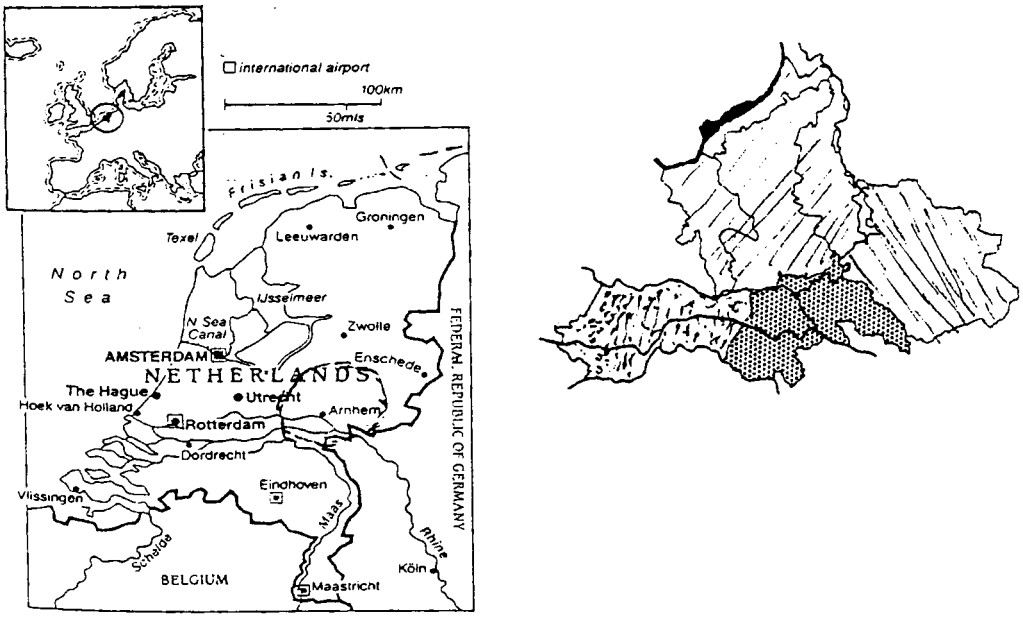
3.2.1. *The resource system (WHP, 1996)*

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 terms of water resources, three areas can be distinguished: Veluwe, Achterhoek, and Rivierengebied. The Veluwe is characterized by a sandy plateau dominated by a large nucleus of dry land vegetation at higher elevation with 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.

The Achterhoek is characterized by surface water systems that mostly flow east/south-east to west/north-west 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 that 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 the Achterhoek, groundwater from the Veluwe surfaces.

As the name suggest (probably even for those who do not speak Dutch), 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



Map 2. The Netherlands (left, Crystal 1996) and province of Gelderland (right, WHP 1966).

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

3.2.2. *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. Surface and groundwater are also used for irrigation and livestock watering. In a large part of the province, drainage is necessary to make and keep lands productive for agriculture.

Since the Second World War, the number of water users and uses has multiplied steadily. This has meant greater appropriation of groundwater and increase in drainage interventions for agricultural and infrastructure projects. Extensive land consolidation in the 1950s and increasing industrialization and urbanization have left their marks on the landscape and water resources of the province. These human interventions have led to decreasing groundwater tables. In addition, industrialization and use of pesticides and fertilizers have threatened water quality. In order to cope with these different and growing demands on water resources and their consequences, provincial governments were obligated by national government to develop water management plans for the area under their jurisdiction. These plans must be in line with the general policy prescribed at the national level and take into account statutory obligations for stakeholder consultation and appeals. Otherwise content and process of plan are left up to the different provinces.

In Gelderland, the first water resource management plan (WHP I, 1991, see Table 1B) was preceded by an in depth technical analysis of the water resources in the province. This research was carried out by civil servants of the provincial water management department and produced innovative modeling of water flows and guiding principle of integrated water management. The strongly developed research background of the civil servants responsible for the WHP I is revealed in its extensive descriptions of the watersystem in the province, organization and instruments of water management, and emerging bottlenecks. In the end of the plan, policy measures are suggested, but little attention is paid to their implementability and measurability. And although waterboards were explicitly consulted during the planning process and appeal trajectories were adhered to, the plan was mostly an internal affair involving the water management experts of the provincial government.

The consequences of the lack of involvement of stakeholders were taken into account when it became time to make the second plan (National Water Management Law obliges provinces to make a plan every four years.) Evaluation of the first plan showed that it had proven little inspiration for stakeholders to implement the suggested policy measures. This was a reason for the responsible provincial civil servants to choose a different approach to make the WHP II (see Table 1B). Being somewhat more experienced in the "planning business," their aim was to involve more stakeholders

Table 1B. Three examples of (collective) decision making and action in water resources management in Gelderland, The Netherlands.

Occurrence	Who?	What?	How?	Why?
Water Management Plan I, Gelderland, NL, early 1990s	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 1990s	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 – Experiences with Plan I – Problems in water management
Desiccation Covenant, Gelderland, NL, late 1990s	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 + 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

in the process of agenda setting and decision making regarding the issues to be addressed and measures to be taken. In a number of workshops, not only provincial water management policy makers and water board representatives, but also representatives of farmer's organizations, environmental groups, estate owner organizations, chamber of commerce, municipalities, drinking water companies, and political parties, among others, were involved in setting the agenda. A core group further developed this agenda and workshop discussions into a draft plan. The draft was regularly discussed with stakeholders and colleagues from other policy sectors. In order to free responsible civil servants from their double role as managers of and stakeholders in the planning process, an external facilitator specializing in process management was hired to chair meetings with stakeholding parties. All in all, the participatory approach has led to a plan that puts greater emphasis on actual implementation of policy measures, responsibilities of different stakeholders, deadlines, monitoring, and evaluation. The hope is that greater involvement in the planning process will lead to greater commitment to translate the plan into action.

Experience with developing WHP II was extended to the development of an action plan to combat desiccation of a number of natural areas in the province (see Table 1B). Again, national policy obligated the province to develop an action plan. The point of departure was to get committed involvement of parties whose behavior has brought about the current desiccation problems. After some rounds of futile finger pointing related to past behavior of stakeholders, it was proposed to take a commonly desired future state as the starting point for negotiating who would contribute what to combating desiccation. Stakeholders came up with an end situation that was not in line with national

policy. However, this breach was counterbalanced by commitment of stakeholders to change behavior. The commitment to the collectively decided goals and measures was formally laid down in a covenant signed by all stakeholders.

3.3. *A social learning analysis of collective decision making and action in the cases*

Although the cases concern quite different combinations of natural and human systems, a social learning perspective discloses a number of comparable (asymmetric) learning patterns underlying the dynamics of the two managed resource systems. For each case Tables 1A and 1B highlight three moments of collective decision making and action in terms of who was involved, the nature of these adaptations, how they came about and why adaptation of management practices occurred.

Table 2 presents these instances of collective decision making and action in terms of the learning aspects introduced in the social learning analytical framework.

When viewing the resource problem at the (eco)system level, both the introduction of Akaja and the establishment of the lake management committee in the Benin case and the development of the WHP I in Gelderland indicate an asymmetry in terms of the entities that are involved in decision making and action to adapt management practices. The learning pattern of the Akaja introduction is furthermore characterized by single loop learning. In their desire to restore the lake's fish production capacity, officials of the Fish Service introduced a new practice observed in another Beninese lake: Akaja. As fishermen themselves were not involved in the choice of this practice and its introduction, there were no possibilities to experiment with this practice and embed it in local management institutions. And although successful in restoring fish catches, long term consequences of the practice and its interplay with other fishing practices in Lake Aheme were neglected. Moreover, there was no space for experimentation. The fishing practice was introduced as the only alternative for the entire lake.

Single loop learning was also the point of departure in the establishment of the Lake Aheme management committee in Benin and the development of the WHP I in Gelderland. During these adaptations, stakeholders became aware of the need for double loop learning. However, the disposition for direct experience as learning mode proved too limited to fulfill this need. Triggers of learning (crisis and the anticipated consequence) did not allow diversification in learning patterns. As a result, adaptations are merely accommodations rather than real change. In terms of the guiding value principles it becomes clear that an experimental approach and communicative rationality require particular attention to be paid to the management of time and space in decision making and action.

In the Lake Aheme case, double and triple loop learning remain elusive. Although stakeholders from different system levels are involved in the "*journée de reflexion*," intensifying conflicts and resource degradation strongly influence the learning pattern. The depleted resource, deadlocks, and, at times deadly, violence make finding alternatives to current practices extremely difficult. In addition, the social turmoil of the independence years proves slippery ground to anchor new management practices and institutions. As in the case of the WHP I in Gelderland, space needs to be created in order to diversify learning patterns. Only then can different practices and means for livelihoods be developed and tried.

When occurring in a less pressured situation, collective single, double, and triple learning can transpire more successfully. The experience with the development of the WHP II and the Desiccation Covenant in Gelderland indicate a delicate balance of push and pull forces. Some pressure is needed in order to create an environment in which choices must be made, but space must exist to call things into question, even things that appear to be fixed, such as national level regulations. These instances also make clear that involving different parties at the resource system level requires careful process management so that different learning patterns can evolve. The choice of who learns at what loop level becomes an important issue, since it has consequences for possibilities of learning individuals to influence their context. In case of WHP II, some of the participants who were invited to question water management practices in terms of single loop or single and double loop learning felt that the inability to address third loop learning problems limited their ability to contribute effectively to single and double loop learning issues.

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

A social learning analysis of the two cases provides a number of useful insights for discussing and assessing the performance of platforms in dealing with the dynamics of managed resource systems. The above analyses appear to confirm that platforms (as they appear in various forms of group or ecosystem entities undertaking collective decision-making and action) can be a viable means to adapt management practices.

Table 2. A social learning analysis of the cases.

Occurrence	Who learns?	What is learned?	How?	Why?
Introduction of Akaja, Lake Aheme, 1956	– Individual entities – Group entity	– Single loop	– Direct experience – Observation of the experience of others	– Crisis
Establishment of committee to combat lake degradation, 1990	– Individual entities – Group entities	– Single loop – Double loop	– Direct experience – Observation of the experience of others	– Crisis
Breaking impasses, "*journée de réflection*", Lake Aheme, 1992	– Individual entities – Group entities – Ecosystem entity	– Single loop – Double loop – Triple loop	– Direct experience – Observation of the experience of others	– Crisis, conflict (war)
Water Management Plan I, Gelderland, NL, early 1990s	– Individual entities – Group entity	– Single loop – Double loop	– Direct experience	– Anticipated consequences
Water Management Plan II, Gelderland, NL, late 1990s	– Individual entities – Group entities – Ecosystem entity	– Single loop – Double loop – Triple loop	– Direct experience – Observation of the experience of others	– Crisis – Anticipated consequences
Desiccation Covenant, Gelderland, NL, late 1990s	– Individual entities – Group entities – Ecosystem entity	– Single loop – Double loop – Triple loop	– Direct experience – Observation of the experience of others – Modeling	– Crisis – Anticipated consequences

Where no platform exists (as in the first highlighted instance in each case), resource managers are unsuccessful in coping with the resource problems at hand. The cases also show that platforms are certainly no guarantee for ongoing adaptations. Learning patterns that underlie decision making and action in a platform can be asymmetric in ways that limit the adaptive capacity of a managed resource system.

The discussion statements of the introductory article to this special issue (Steins and Edwards, 1999) address a number of issues that, when taken into account in the design of platforms, could improve a platforms performance in adapting management practices and facilitate social learning. These issues are the membership of platforms; the accessibility of platform meetings; the skills and relations of platform members; level of organization of platform members; and, third party facilitation of platform activities. These issues will structure the discussion of the lessons learned when taking a social learning perspective.

4.1. *Membership of platforms (discussion statement 1)*

The social learning perspective prescribes that the resource system level should be taken into account when determining who should participate in 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. Only in these cases, will a platform be sensitive to the consequences of its resource management practices and develop means to adapt to evolving conditions. Introduction of Akaja, the establishment of the COGEHEN, and the development of the WHP I indicate how failure to involve stakeholders at a resource system level leads to failing adaptations of management practices. The other cases indicate that involving stakeholders at this level proves quite a challenge. The boundaries of the resource system are not always readily visible. Not all stakeholding parties are able to voice their interests (for example fish and water do not talk, stakeholders can be badly organized (see statement 3)). In addition, boundaries of natural and human systems can inter-

twine in complex manners, and sometimes prove to be insurmountable barriers. As definition of the system has consequences for who participates in the collective decision making and actions of the platform, some attention needs to be paid to who takes part in this definition process. The fact that resource systems and human interests and the use of these systems change over time means that platform boundaries will have to change over time as well.

4.2. *Accessibility of platforms (discussion statement 2)*

Clearly, a platform must be accessible to its members in terms of the time and place of their occurrence as well as in terms of the constitution and operation of meetings. From a social learning perspective, this entails striving to realize the ideal of communicative rationality. The cases confirm that this is no easy matter. Stakeholders have a tendency to participate in platforms in order to influence collective decision making and action to the advantage of their specific interests. Getting them to pursue a goal that benefits all, but might appear to cost them personally, requires great skill and creativity in the constitution and operation of meetings. The cases indicate that meetings that focus on commonly desired future states and that discuss adaptations of resource management practices from this point can lead to successful platform performance.

4.3. *Organization and skill of platform member stakeholders (discussion statement 3)*

As the number of stakeholders in a managed resource system quite often exceeds what is feasible to bring together to negotiate resource use and management, the choice is often made to invite representatives of the various stakeholding groups. This is not without consequences. First of all, it presumes some level of organization of the stakeholding group. However, in the case of Lake Aheme, marginal fishermen are not as organized as Akaja and Xha fishermen are. As a result they have little influence on reshaping management practices. Moreover, unorganized stakeholders are often overlooked when inviting stakeholders to join platforms. Second, it presupposes that the interests and needs within a stakeholder group are homogenous. This is often not the case. In Gelderland, divisions within umbrella organizations of farmers, municipalities, landowners, and other stakeholder groups make clear that the interest of a group of stakeholders is highly dependent on the person representing it. And, third, it assumes that the representatives have the necessary skills to negotiate on behalf of their constituents. Again, great differences exist.

4.4. *Evolution of platforms (discussion statement 4)*

The cases illustrate that successful collective decision making and action in platforms is linked to existing institutional arrangements and initiatives for adaptations. The experience with the introduction of Akaja in Lake Aheme shows how imported adaptations without institutional embedding can backfire. Moreover, focusing on a new organization of resource use negotiation is no guarantee that a resource management problem or conflict will be resolved. The introduction of provincial water management plans as a means for collective decision making to adapt water management practices indicates that in the first round (WHP I), the making of the plan itself took so much time and effort that there was little space left to actually deal with the resource management problems at hand. Once more experience in planning was gained, attention could return to management issues. For this reason, it can be more effective to start with initiatives that attempt to tackle the problems themselves and build platforms from there, rather than start with the design of platforms.

4.5. *Third party facilitation of platform activities (discussion statement 5)*

The cases indicate that third party facilitation in coordinated decision making and action arrangements such as platforms can be very effective. Experiences with the WHP II shows how the party who has taken initiative in setting up the platform can have 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 double role. However, it does not necessarily ensure balanced development of adaptations in resource management practices. Among others, who hires and/or pays for the facilitation, knowledge of the problem situation, and learning biases of the facilitator, can make this outside party less impartial than it appears to be. Attention also needs to be paid to the skills and experience of the facilitator, since these are an influence on the social learning processes facilitated (Groot and Maarleveld, 1998)

5. Conclusion

Returning to our question whether ongoing adaptation in managed resource systems can be facilitated, and how, the following can be concluded. A social learning perspective can identify levers to facilitate ongoing adaptation in managed resource systems. By making visible learning limitations and potentials emerging from the interaction of resources, stakeholders, and institutions (whether in the form of plat-

forms 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. Recognizing aggregated effects of interdependent decisions and actions, experimenting with pilot studies, and allowing different stakeholders in the managed resource system to voice concerns and contribute to resolving problems have proven to promote ongoing adaptation.

Together, the two case analyses 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, since learning itself, however composite, is a natural occurring process, providing many anchor points to bring about change.

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 are a consequence of individual learning. At the same time, the successive series of collective 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 of Akaja frames the problem at the lake level. This opens the way for an approach that 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 that 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.

The highlighted instances of collective decision making and action in each case point to a role for platforms in resource use negotiation. They also indicate that platforms themselves are no guarantee for sustainable resource management. Careful attention must be paid to learning patterns that underlie platform performance. Overall, the case analyses and discussion statements point out how some bottlenecks can be overcome through the facilitation of learning processes and platform design.

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