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Trust-building, Knowledge Generation and Organizational Innovations: The Role of a Bridging Organization for Adaptive Comanagement of a Wetland Landscape around Kristianstad, Sweden

Thomas Hahn · Per Olsson · Carl Folke · Kristin Johansson

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Abstract The literature on ecosystem management and assessment is increasingly focusing on social capacity to enhance ecosystem resilience. Organizational flexibility, participatory approaches to learning, and knowledge generation for responding adequately to environmental change have been highlighted but not critically assessed. The small, flexible municipal organization, Ecomuseum Kristianstads Vattenrike (EKV) in southern Sweden, has identified win-win situations and gained broad support and legitimacy for ecosystem management among a diversity of actors in the region. Navigating the existing legal-political framework, EKV has built a loose social network of local stewards and key persons from organizations at municipal and higher societal levels. As a 'bridging organization', EKV has created arenas for trust-building, knowledge generation, collaborative learning, preference formation, and conflicts solving among actors in relation to specific environmental issues. *Ad hoc* projects are developed as issues arise by mobilizing individuals from the social network. Our results suggest that the EKV approach to adaptive comanagement has enhanced the social capacity to respond to unpredictable change and developed a trajectory towards resilience of a desirable social-ecological system.

Key words Social-ecological systems · resilience · adaptive comanagement · collaborative learning · organizational innovation · ecosystem management.

Introduction

Social and economic development relies on the support of dynamic and functioning ecosystems generating valuable goods and services (http://www.maweb.org). Resilience—

T. Hahn (✉) · C. Folke
Centre for Transdisciplinary Environmental Research (CTM),
Stockholm University, SE-106 91 Stockholm, Sweden
e-mail: hahn@ctm.su.se

P. Olsson · C. Folke · K. Johansson
Department of Systems Ecology, Stockholm University, SE-106 91 Stockholm, Sweden

the capacity to buffer, adapt to and shape change—has emerged as a crucial concept in the search for understanding complex ecosystem dynamics (Holling, 1973). Sustaining and enhancing ecosystem resilience is a function of successful ecosystem management and this in turn rests on the social capacity to understand and respond to environmental feedback over time as well as space (Berkes and Folke, 1998).[1]

We focus on the dynamic interplay of ecological and social systems, which we term social-ecological systems (Berkes *et al.*, 2003; Folke *et al.*, 2002; Gunderson and Holling, 2002). Our concern is *resilience in social–ecological systems*, which is determined by ecological dynamics as well as the social capacity to respond to and shape ecosystem change in a fashion that sustains and enhances the ecological preconditions for human societies. The question is how to sustain or develop a desired social-ecological trajectory (Carpenter *et al.*, 2001) in the face of change and uncertainty (Folke *et al.*, 2003). This has been referred to as adaptive governance of ecosystems or social-ecological systems (Dietz *et al.*, 2003; Eckerberg and Joas, 2004; Folke *et al.*, 2005; Ostrom, 2005).

Advocating an adaptive ecosystem approach, Boyle *et al.*(2001) suggest a triad of activities, where *governance* is the process of resolving tradeoffs and providing a vision and direction for sustainability, *management* is the operationalization of this vision, and *monitoring* provides feedback and synthesizes the observations to a narrative of how the situation has emerged and might unfold in the future. In a recent review (Folke *et al.*, 2005) we concluded that successful adaptive approaches for ecosystem management under uncertainty involve (Fig. 1):

1) *building knowledge and understanding of resource and ecosystem dynamics*; detecting and responding to environmental feedback in ways that enhances resilience requires knowledge of ecosystem processes and functions. Hence, managers need to mobilize all sources of understanding to reduce ecological illiteracy. This involves linking people and steward organizations with different knowledge systems (Gadgil *et al.*, 1993; Olsson and Folke, 2001).
2) *feeding ecological knowledge into adaptive management practices*; successful management is characterized by continuous testing, monitoring, and adaptive responses acknowledging the inherent uncertainty in complex systems. Management plans are adapted to new understanding of uncertainty rather than striving for optimization based on past records (Berkes *et al.*, 2003). Forming a learning environment that accepts continuous testing and changes requires leadership within management organizations (Danter *et al.*, 2000).
3) *supporting flexible institutions and multilevel governance systems*; The sharing of management power and responsibility may involve multiple, often polycentric, cross-level institutional and organizational linkages among user-groups or communities, government agencies, and nongovernmental organizations, i.e., neither centralization nor decentralization (Ostrom, 1998). This collaboration and adaptive governance draws on visions and narratives from the social memory of past ecological crises and responses and requires enabling legislation and social incentives for collaboration (Malayang *et al.*, 2005; Pretty, 2003). Social networks are instrumental for mobilizing social memory, generating social capital as well as legal, political, and financial support to ecosystem management initiatives.

[1] Pollution abatement of course also impacts on ecosystems but here we focus on the direct impacts through natural resource management.

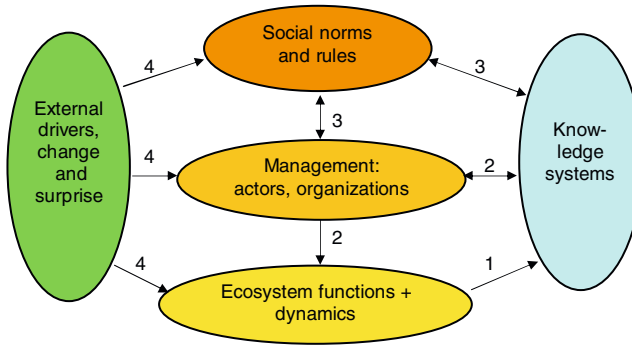

Fig. 1 A conceptual model of the dynamics facing a linked social-ecological system (SES). A SES consists of an ecosystem, the management of this ecosystem by actors and organizations, and the formal (rules) and informal (social norms and conventions) institutions underlying this management. The capacity of ecosystems to generate valuable ecosystem services depends on ecological dynamics as well as the organizational and institutional capacity to manage this dynamics.

4) *dealing with external drivers, change and surprise*; it is not sufficient for a well-functioning multilevel governance system to be in tune with the dynamics of the ecosystems under management (referred to as the "internal resilience" by Folke *et al.*, 2004, p. 567). It also needs to develop capacity for dealing with changes in climate, disease outbreaks, hurricanes, global market demands, subsidies, and governmental policies (Dietz *et al.*, 2003). The challenge for the social-ecological system is to accept uncertainty, be prepared for change and surprise, and enhance the adaptive capacity to deal with disturbance (Berkes *et al.*, 2003). Nonresilient social-ecological systems are vulnerable to external change while a resilient system may even make use of disturbances as opportunities to transform into more desired states (Walker *et al.*, 2004).

In this paper we focus on the second and the third issue of ecosystem management, i.e., the links between organizations, institutions, and knowledge systems (Fig. 1), which has received relatively little attention (Berkes and Folke, 1998; Berkes *et al.*, 2003; Dale *et al.*, 2000; Imperial, 1999). The case study for our analysis is the ecosystem management system in Kristianstads Vattenrike (KV), which was established in 1989. This case has been chosen because it appears to be an example of successful collaboration for ecosystem and landscape management and illuminates many theoretical concerns of adaptive governance, adaptive comanagement, and resilience in social-ecological system. The social response is a result of self-organization at the local level but it involves interaction between organizations and institutions at municipal, county, national, and international levels.

The aim of this study is to understand the social processes and strategies that contribute to resilience. We want to assess whether 'adaptive comanagement' is applied at KV. We are particularly interested in the organizational structure of adaptive comanagement, the role of leadership and key persons, how knowledge, meaning, and visions are generated and communicated, how learning and collaboration are carried out at KV, and how local actors have managed to "navigate" among national and international institutions and organizations for legal, political, and financial support.

The first section examines the flexible organizational structure of Ecomuseum Kristianstads Vattenrike (EKV) and its surrounding social networks. In the next section,

we examine the horizontal collaboration, i.e., how EKV is coordinating and engaging local actors and local steward associations in the knowledge generation and ecosystem management process. We then examine vertical collaboration in multilayered institutions, how EKV navigates the larger environment by connecting to formal institutions to safeguard achievements from informal collaboration. These sections are both descriptive and analytical. Important findings are analyzed in the subsequent section followed by conclusions.

Methods and Definitions

To understand the institutional and organizational dynamics of the adaptive comanagement process in KV we have chosen two projects from about 20 for closer examination; the Flooded Meadow Project and the Crane Project. Together with the Vramsån Creek Project, analyzed in Schultz *et al.* (2004), these projects involve a diverse set of collaborators operating at different levels. We have used qualitative methods including semistructured in-depth interviews (Bernard, 1994; Kvale, 1996) with key informants of KV. An extensive review of other information sources was also conducted to complement the interviews.

Our approach is historical rather than structural (McAllister, 2002), analyzing the dynamics underlying the ecosystem management of KV. Variables like trust building, social capital, strategic collaboration in *ad hoc* projects/networks, knowledge generation, sense-making, identification of win-win situations, preference formation, conflict resolution, etc., were only to a limited extent preconceived from theory and hypotheses. Instead, they largely emerged from the in-depth interviews. We then analyzed the material within the theoretical framework of adaptive comanagement and resilience in social-ecological systems without trying to isolate independent variables and single causes for complex events (Gaddis, 2002).

The study was conducted over a two-year period 2002–2003. The three core staff of EKV were interviewed on several occasions throughout this period, using a tape recorder or taking notes. Telephone interviews were also conducted for supplementation, clarification, or verification of data. The goal was to capture the interviewees' experiences regarding the strategies for ecosystem management in KV, including how they deal with change and uncertainty. Three landowners/farmers at three different sites were interviewed several times using a tape recorder. These key informants, who are involved in one or both of the projects chosen for this study, were identified by other farmers and the EKV staff. They were asked to describe how the projects have evolved and evaluate the collaboration with EKV.

Results from the in-depth interviews have been triangulated with other sources of information such as project proposals, progress reports, municipal protocols, inventories, maps, correspondence, Internet sites, and newspaper clippings. Shorter interviews have also been conducted with other actors in the area including an official from a municipality administration with responsibility for the environmental issues of KV, as well as farmers and other persons representing local steward associations. Informal meetings with these and key persons at the national level have provided us with opportunities to air controversies and triangulate the in-depth interviews.

We define the legal framework and other official rules with formal sanctions as the formal institutions (or institutional arrangements) of a society, while conventions and social norms of behavior are defined as informal institutions (Bromley, 1989; North, 1990). Organizations also provide structure but are regarded as the actors or "players" rather than the rules.

Multilayered or polycentric institutional arrangements are nested sets of institutions that involve local as well as higher levels of society, allowing a balance between decentralized and centralized control. Due to their overlapping functions, polycentric institutions enhance the diversity of response options (Ostrom, 1998). This provides an "institutionally rich environment [that] improves the prospects of resolving complex problems. It can encourage innovation and experimentation by allowing individuals and organizations to explore different ideas about solving problems" (Imperial, 1999).

Interaction between institutions at different organizational levels may be benign or malign depending on the degree of congruence and collaboration (Young, 2002). Benign interactions enable *adaptive comanagement* where "adaptive management" stands for learning from deliberate experimentation (Gunderson and Holling, 2002) and "comanagement" is collaboration among local actors as well as with higher level organizations and institutions (Pinkerton, 1989). Adaptive comanagement is a way to operationalize adaptive governance (Olsson *et al.*, 2004a). We believe a focus on adaptive comanagement will illuminate many issues addressed by the literature on the ecosystem approach (Boyle *et al.*, 2001) and ecosystem management (Dale *et al.*, 2000).

In the two projects of this study we assess the dynamics of social responses, at various organizational levels, to ecosystem change to find out whether adaptive co-management exists and if so, how it works. If data reveal that local steward associations self-organize, experiment with new management practices, learn, generate and store ecological knowledge, collaborate, and manage to get support for this from authorities at different levels, then we interpret the process as adaptive comanagement (Olsson *et al.*, 2004a).

The Case Study: Kristianstads Vattenrike (KV)

Kristianstads Vattenrike[2] is the name of the lower Helgeå River catchment, southern Sweden, that stretches 35 km from upstream forests, through agricultural land, wetlands, and the City of Kristianstad to the Hanö Bay, a coastal area on the Baltic Sea (Fig. 2). The whole Helgeå River catchment is 4,775 km^2. The lower part of the catchment including the coastal area (1,110 km^2) belongs to the Municipality of Kristianstad and this area is referred to as Kristianstads Vattenrike (KV). The core of KV (80 km^2) is listed by the Ramsar Convention on Wetlands and contains flooded meadows as well as two shallow lakes. The agriculture of KV is among the most productive in Sweden. The wetland areas are located within walking distance from the center of the City of Kristianstad with about 28,000 inhabitants. There are 75,000 inhabitants in the whole municipality and this translates to a density of 56 persons per square kilometer.[3]

The most characteristic feature of KV is that large parts of the wetland area are flooded meadows that are used for pastures (1100 ha) and hay harvesting (500 ha) (Ovesson, 2003). Due to an annual average water fluctuation of 1.4 m at Kristianstad, these meadows are flooded in fall and early spring and can thus be used for agriculture only in summer. The lower demarcation of the flooded meadows is the summer brink of the Helgeå water system and the upper demarcation is where permanent agricultural is possible (Fig. 3). Most of the

[2] In The Millennium Ecosystem Assessment context this case is sometimes referred to as *Kristianstad Wetlands* (http://www.maweb.org/en/subglobal.overview.aspx). Kristianstads Vattenrike roughly translates as "The Kristianstad Water Realm," but *rike* also means riches; the double meaning of the name both defines the catchment area and reflects its rich natural values.

[3] The area of the Municipality of Kristianstad is 1,346 km^2, most of which is a part of the drainage basin of Helgeå River.

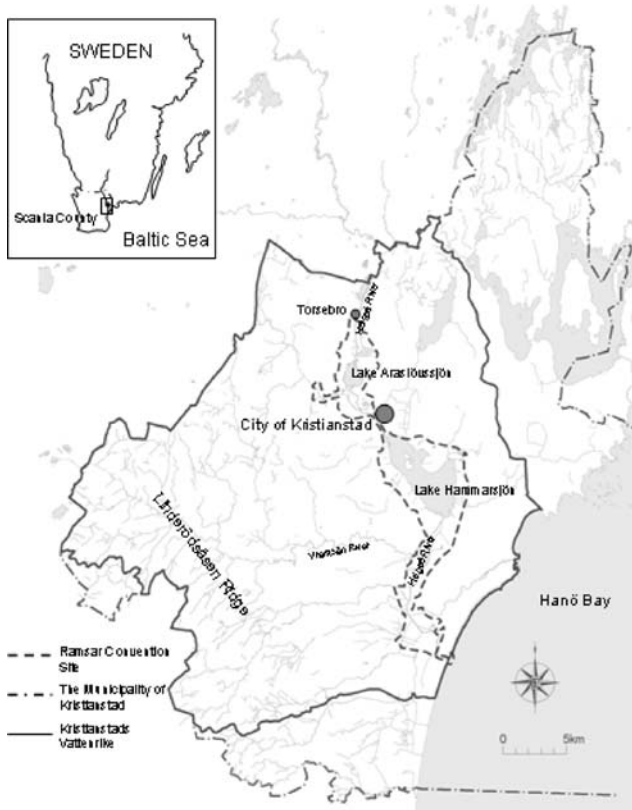

Fig. 2 The lower Helgeå River catchment, showing the Ramsar Convention Site, Kristianstads Vattenrike, and the Municipality of Kristianstad (from Olsson *et al.*, 2004b).

flooded areas in between have been used for agricultural purposes for centuries and have unique cultural-historical values (Cronert, 2001). Other important habitats include large beech forests, wet forests, willow bushes, and sandy grasslands with unique flora and fauna. In June 2005, KV became the first UNESCO Man and the Biosphere (MAB) Reserve in Sweden fulfilling the Sevilla requirements of 1995.

A Flexible and Adaptive Organization

In 1989, a small group of concerned inhabitants convinced the municipal executive board of Kristianstad to establish Kristianstads Vattenrike (KV) as an area of interest for ecosystem management and employ a director (we call him SEM here) of the office Ecomuseum Kristianstads Vattenrike (EKV). SEM himself played a key role in this transformation and is still the director of EKV (Olsson *et al.*, 2004b). Other key persons include HC, who works half-time for the technical municipality administration and half-time for the County Administration Board (CAB) and is responsible for issues concerning nature conservation and nature reserves, and KM, one of the founders of the Nature School and information secretary at the Man and Biosphere (MAB) Candidate Office that was established to make preparations for KV to become a MAB Reserve.

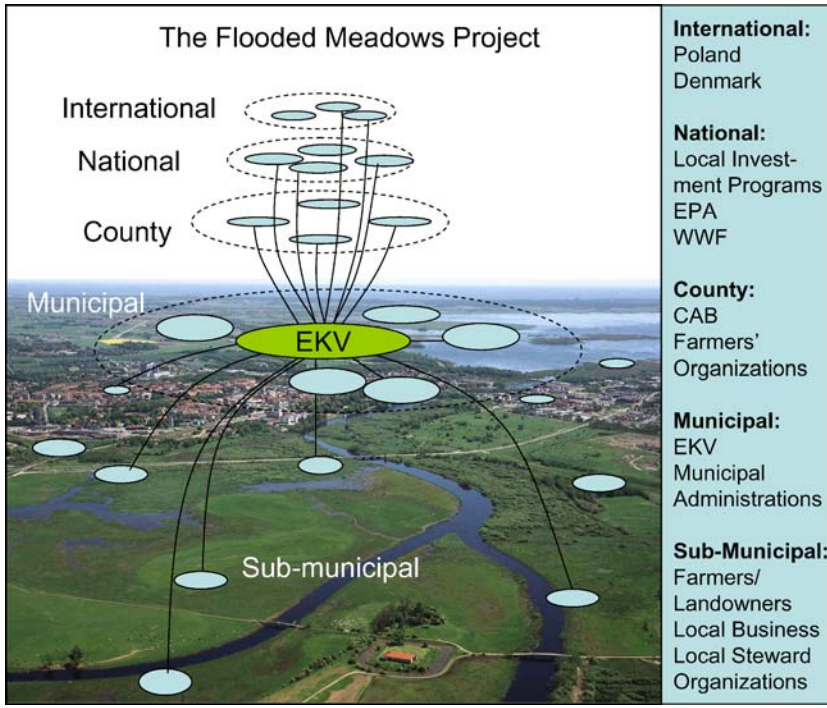

Fig. 3 The urban part of Kristianstads Vattenrike (KV) in summer, showing the wetlands, the two branches of Helgeå River running from Lake Araslövsjön to Lake Hammarsjön in the forefront, and the Hanö Bay of the Baltic Sea in the background (Photo Patrik Olofsson). The social network of the Flooded Meadows Project has benefited from experiences of wetland management in Poland and Denmark. Each node includes one or several key persons, often employed by or members of an organization. Ecomuseum Kristianstads Vattenrike (EKV) is the central node of the network. The cross-level collaboration has started as informal contacts by EKV and has sometimes become formalized by contracts and joint ventures (Modified by Lisen Schultz after Magnusson, 2002[4]).

Unlike ordinary municipal administrations, EKV has no legal authority to make or enforce rules. To get access to larger resources *within* the municipality, EKV presents various ecosystem management projects as "profitable", in terms of fulfilling nonmonetary goals, for the municipal administrations concerned with education, environmental protection, and development. As SEM puts it: "You must present your idea so they see why it's worthwhile to cooperate. Win–win situations are necessary." The same strategy applies for EKVs *external* contacts with the CAB, the EPA, Region Scania and other authorities as well as organizations like the WWF. The ability to attract financial resources from various sources to concrete projects has been characteristic for EKV since the beginning (Olsson *et al.*, 2004b).

The purpose of EKV is to preserve the ecological values and cultural heritage connected to water, recreate values that have been lost, and use the natural resources for economic purposes in a way that sustains the values.[5] The major role of EKV is to coordinate

[4] http://www.vattenriket.kristianstad.se/presentation/natverk.htm Magnusson in turn developed his figure after meetings with the authors.

[5] Background info of KV in English is provided by EKV at http://www.vattenriket.kristianstad.se/eng/index.shtml

activities related to the water resources. EKV is the agent that determines which outdoor museum sites and which projects belong to and are undertaken in the name of KV. Since 1989 EKV has defined five sections of collaboration within KV:[6]

1. Nature conservation,
2. Environmental protection,
3. Ecotourism and recreation,
4. Education and the Nature School, and
5. Cultural heritage management.

At present, EKV has around 20 projects running, engaging some 200 persons. Over the years a social network of actors has developed in relation to the management of KV. It includes individuals representing local steward associations (Schultz *et al.*, 2004) and authorities and organizations at higher levels of society.[7] EKV is the central node of this network. From a loose social network collaborative *ad hoc* projects are formed as issue arise. As a consequence each of these projects consists of a subnetwork and is coordinated, but not necessarily administered, by EKV. The oldest project and also the largest in terms of number of participants and budget, is the Flooded Meadows Project; its structure is illustrated in Fig. 3.

The projects often start as initiatives from the EKV staff, such as the protection and restoration of flooded meadows, the nature school, the stork project, and compiling a list of all birds that have been observed in KV.[8] Several small nature conservation inventories have been initiated and/or conducted by EKV or other stakeholders within KV—the bird-watching association, the nature conservation association, and a fishing association. External scientists are often hired to make such inventories.

Some project ideas have to wait for the right moment to be implemented, e.g., "The Riverboat for tourists," an idea SEM that materialized a few years later when an entrepreneur with suitable skills and interests turned up, and is the harvest machine for wetlands that was constructed when the state provided an opportunity for farmers to apply for investment grants. In this case EKV assisted a farmer to write an application, hence "navigating" formal institutions (Table I).

A fixed structure with regular meetings for all these projects would require a large administration. EKV has deliberately chosen a flexible project organization to take advantage of and respond to sudden changes. As SEM puts it: "There is no optimal organization, it has to continuously adapt and be flexible. A nucleus of reliable staff is essential, and the competence they lack is borrowed from the actors involved in each specific project." Hence, the EKV operates as a dynamic organization (Westley, 1995) that uses social networks to build a broad support for integrated ecosystem management.

The flexibility of EKV has resulted in a lot of activities at a small cost to the municipality, 1.8 MSEK (200,000 Euro) per year. This covers the costs for the office and other technical costs as well as the salaries for the director and two other persons who work with the practical issues concerning maintenance and development of the outdoor museum[9] and administration. Most of the physical outdoor museum, with trails, footbridges, and

[6] http://www.vattenriket.kristianstad.se/folder/vattenriket.pdf (Swedish, English, and German)

[7] See Table I in Olsson *et al.*, 2004b.

[8] http://www.vattenriket.kristianstad.se/birds/excel/krvr_birds.pdf

[9] This physical manifestation of Kristianstads Vattenrike is, confusingly, also called "the Ecomuseum." It consists of 13 visit sites with information, of which four are more elaborated outdoor museums with exhibitions.

Table I Processes and Strategies Used by EKV for Local Collaboration

Trust-building for identification of common interests
Generating, mobilizing, and communicating ecological knowledge
Inspiring preference formation
Creating meaning by "elevating" the issues to identify win-win projects
Arena for conflict resolution
Assisting farmers and tourist entrepreneurs in navigating formal institutions

exhibitions, was built during the economic recession at the beginning of the 1990s by government programs. The outdoor museum has made the recreational value of the wetland ecosystems accessible to the local inhabitants and provides experience-and-learning sites with extensive monitoring of biodiversity and ecosystem conditions and functioning.

Collaborative Learning with Local Stakeholders

In western societies, public participation and collaborative learning is increasingly being employed for sustainable community development (Berkes, 2002; Hoff, 1998; Ljung, 2001; Röling and Wagemakers, 1998; Wondolleck and Yaffee, 2000). People from the wider social network around EKV are mobilized in different collaborative learning projects. The connections between individuals and organizations at different levels are coordinated and facilitated by EKV. The *horizontal* collaboration takes place at the municipal and submunicipal levels (Fig. 3). Important characteristics of this collaboration are summarized in Table I.

Collaboration with Selected Key Persons

HC, who is in charge of the nature conservation section of EKV, describes the working methodology in three steps:

- Assessment of which lands have the highest conservation and other values.
- Personal contacts with landowners or tenants on these lands to identify common interests and discuss win–win projects.
- Further contacts within the municipality and at higher organizational levels to gather and develop knowledge as well as attract funding and support of the project.

SEM is very careful about the selection of individuals who are invited to participate in a project: "We don't invite negative persons in the beginning of the process; increased knowledge and enthusiasm among the positive persons take care of them later. Sooner or later we have to face the negative farmers but often they approve when they see how it works and that their neighbors are content." SEM does not recommend inviting a lot of strangers to an unconditional meeting: "That is the worst thing you can do. Having talked to so many people out in the district we realize what bombs might be dropped if we were to bring everybody together for a large meeting. I mean, you don't gather people if you don't think anything positive will come out of the meeting."

When initiating collaboration with farmers and fishing associations with private property rights, EKV must make attractive proposals (win-win) to influence management. On public (state or municipal) land and water there are often several stakeholders claiming management authority or at least use rights—conservationists, developers or exploiters,

and boating associations. Sometimes these conflicts can be resolved through consensus, which is the EKV approach, but sometimes it becomes an issue for The Consultancy Group for Nature Conservation, in which EKV and with a dozen other interest groups meet to advise the municipal executive board on land use plans. This consultancy group is the only "political" or collective-choice forum that EKV participates in and as part of this forum they do not, and cannot, select who participates, as they do in their "private" projects. We describe two projects involving substantial horizontal collaboration.

The Flooded Meadows Project

The Flooded Meadows Project involves managing ecosystem services like water regulation, nutrient filtering, bird habitats, and a cultural landscape dependent on grazing cattle before the 1989 inventories. The uniqueness of the flooded meadows of Kristianstad was not appreciated (Olsson *et al.*, 2004b). The project consists of several subprojects, each embracing one or several landowners or tenants. Restoration includes clearing bushes and reeds and then fencing the meadows for cattle. The project depends heavily on restoration and grazing subsidies from the EU's Common Agricultural Policy. The landowners we interviewed appreciate flooded meadows and the contact with water. Landowner A told us: "Today we can see the lake. When I was a child we could only see the reed, my father did not dare to harvest near the water given the technology he had. At the time of my grandfather they harvested by hand with a scythe and today we are harvesting the water brink again but with the new machine. Apart from the aesthetic values we gain fodder or grazing land. Besides, the number of birds and other animals has increased."

In 1989 EKV chose to focus on six areas for restoration. One of these flooded meadows became a pilot case when Landowner B showed interest. EKV encourages the local media to report on all successful projects and several landowners outside the original six areas have approached EKV for collaboration. Hence, the social network for flooded meadows has self-organized and new actors have entered. EKV has mobilized funds from the municipality, the CAB, the EPA, and the WWF to respond to opportunities provided by these landowners. Together with the strong focus on monitoring and learning described by Olsson *et al.* (2004b) these are good indications of adaptive comanagement.

These subprojects have faced various conflicts. For example, farmers were asked to pay back annual EU grants for any year if an unusually high water level made the management plan difficult or impossible to implement. The present EU program is more flexible, according to HC. Another source of conflict has been that the EU grants require that no chemical fertilizers or pesticides are used on flooded meadows. Landowner B told us that "some farmers think the meadows don't provide enough fodder without fertilizers. But EKV supports this prohibition [of fertilizers]. This is the only conflict with EKV that I've heard about."

The Crane Project

KV has 150,000 visitors each year including hundreds of school classes, other local inhabitants, researchers, and ecotourists from outside the region. Cranes are very popular birds and there are increasing numbers of bird-watchers visiting the area. There have always been cranes in KV but since 1997 their number has increased. The farmers who were most affected by cranes feeding on their crop were unhappy although severe damage may be compensated by the CAB.

The first meeting on this issue took place on October 8, 1997, between the bird-watchers association and EKV. It was decided to contact ornithologists and farmers from Hornborgarsjön, the most famous Swedish bird-watching lake, to learn from their experience on how to minimize damage. The Crane Group was initiated at a meeting on December 1, 1997, where experiences from Hornborgarsjön were presented and strategies for Kristianstad discussed. Three local farmers participated, including the chairman of the local division of the Federation of Swedish Farmers (LRF), together with three representatives from the bird-watchers association as well as SEM and HC at EKV.

The Crane Project is a spin-off from the Flooded Meadows Project, partly drawing on the same social network. Information of this emerging potential for conflict between bird-watchers and farmers reached HC at an early stage through his ordinary contacts with farmers. HC and SEM had personal talks with individual farmers to avoid stereotypes and "elevate the discussion" prior to the first meeting (Table I). Not all affected farmers were invited to the initial meetings. By making an early response, a conflict escalation was forestalled. According to SEM: "Had we not acted and gathered this first meeting, the farmers' organization would probably have developed their own policy and strategy only looking at their own interests."

Landowner B, who has been involved in the Flooded Meadows Project since the beginning, got involved in The Crane Project as well in 1998. In Sweden, crane hunting is prohibited and according to Landowner B, he and other farmers "used to drive around on our fields trying to chase them away to other lands. EKV contacted some of us to find a solution that considers several interests."

In 1998 The Crane Group decided to monitor the behavior of the cranes and develop a response strategy. A coordinating farmer spread cereals, donated by the farmers' organization (LRF) or paid for by the CAB, to attract the cranes. However, the cranes did not respond to that. Since then they have tried to follow the cranes by feeding them with cereals as soon as they have landed. This trial-and-error process of learning resembles adaptive management.

> [The coordinating farmer] consults the landowner/tenant before he spreads cereals. But if the next group of cranes has chosen other fields, it's not easy to steer them. We knew how they have solved this around Hornborgarsjön. They [also] feed cranes to prevent damage on other arable lands. A farmer from Hornborgarsjön came down to share his experiences. But we learn mostly from our own experiences, if something doesn't work one year we try something else next year. We learn together but we still have a lot to learn. (Landowner B)

In October 2002, The Crane Group made a study trip to northern Germany (Stralsund) to take part of their experiences in handling large concentrations of cranes. The CAB provided funding for the trip (Magnusson and Magntorn, 2002). However, this should not be interpreted as a formalization of The Crane Group, Landowner B explained:

> If the problems of cranes disappear then The Crane Group will also vanish. We don't have any board, we just meet. When the problems with geese emerged the other year, some farmers thought The Crane Group should look after the geese as well. But HC argued that they [those affected by geese] should make a new group because nobody in The Crane Group is paid, we are all volunteers.

Farmers gain self-esteem from participating in these projects. As Landowner A puts it: "We have started arranging bird-watching events on our land. It feels good because we

farmers have not generally a good reputation—'farmers always complain although they live on subsidies and produce the wrong stuff'—but the involvement in KV is only positive. They [EKV] lift us to the sky. We have an interest in nature and we can make money on it! It's fun, I think everybody agrees."

The Crane Project is an example of the importance of early response. A conflict escalation would probably have stifled learning and eroded trust. The feedbacks and responses between ecological and social systems were tightened thanks to the crane group. These examples of experimentation, learning, and collaboration are also good indications of adaptive comanagement.

Building Trust

To assess the trust building that EKV has invested in we asked the farmers their opinions about collaboration. Landowner A: "Previously I was almost afraid of authorities, it felt so bureaucratic somehow. But now thanks to this project I have learned a lot and I have a completely different view now it's more like we all sit in the same boat. We've had an open communication where everybody's opinion has the same value." This is in line with Westley (1995) who argues that ad hoc networks are more egalitarian since the participants need not represent their respective organization. HC notes: "They [the farmers] tell us a lot about previous conflicts on conservation issues. I feel this dialogue is one of the biggest differences compared to the time before KV."

The non-legal status of EKV is appreciated by Landowner C, who is involved in The Flooded Meadows Project: "The first time I met SEM he told me that their method is to talk to people, try to identify common interests and start projects in common. I have great confidence in both of them, they belong to the municipality authority but I think everybody feels they work differently." Landowner C is skeptical about the merits of nature reserves, favored by EKV, since these would transfer management rights to the CAB. HC discusses with farmers the vulnerability of voluntary commitment; "One day you die or need to sell your land and who comes next? The good efforts of farmers, who have put their hearts and souls in the land can be sustained with nature reserves." HC also points out that the subsidies from the EU are on a five-year basis. "If public support schemes are eroded financially the last land that will be abandoned [for conservation purposes] would be the nature reserves." Landowner C responded: "HC is a very good person and as long as he is at the CAB I'm not worried. But who comes after him? Imagine if that is an arrogant person? National authorities are crowded by idiots who think it's their job to boss people around! EKV has succeeded because they listen to the landowners instead of forcing us with rules and legislation. I think everybody agrees with the aim of KV, there is no conflict about this. They have built trust. However, they must be careful not to lose it."

Vertical Collaboration: Navigating the Larger Environment

As a municipal organization, EKV operates at the landscape level within the municipality's borders. Municipalities in Sweden have a more executive role compared to County Administrative Boards (CABs), and are involved in the practical work of land management as they are generally large landowners. From EKV's point of view there are three reasons to collaborate with authorities and nongovernmental organizations (NGOs) above the municipal level. The first is to get the institutional (legal and moral) support for protection of the most valuable land, to safeguard achievements of local collaboration or, as SEM puts

it, to "create a friction" in the system in case a local key politician or civil servant is be replaced by a person who is less interested in ecosystem management. The second is to get financial support for various projects. Last, vertical links enable scientific and experiential knowledge from other wetland areas and Biosphere Reserves, to be incorporated with the more "fine-grained" local ecological knowledge to make comprehensive inventories and management plans (Olsson *et al.*, 2004b).

As for horizontal collaboration, vertical collaboration is founded on personal contacts ("key persons"). Through these efforts, various EKV projects have received fundings from the CAB, the Local Investment Program (a national employment program), the EPA, the WWF, and various companies with interests in the local area (Table II). And nature reserves have, thanks to collaboration with the EPA and the CAB, increased from a 182 ha in 1989 to over 3,500 ha in 2004.

Since 2001, EKV's collaboration with global institutions has expanded dramatically, especially with UNESCO. A draft of the application to become a MAB Reserve was submitted in March 2004 for review within Sweden (Magnusson *et al.*, 2004). KV has also been approved as a Sub-Global Assessment within the Millennium Ecosystem Assessment[10] global program and is currently collaborating with scientists under the umbrella of the Resilience Alliance (http://www.resalliance.org) to make comparative studies of local cases across the world.

Analysis of the EKV Approach

In our analysis of the governance system of the wetland landscape of Kristianstad we have searched for the social processes and strategies that promote and sustain ecosystem management. Our findings suggest that the EKV approach to collaboration, within a social network of dynamic interactions horizontally and vertically, includes the following key characteristics:

- A flexible 'bridging organization' and 'adhocracy'[11]
- Leadership through trust-building and conflict resolution
- Generating and communicating ecological knowledge
- Collaboration and value formation conditional on fixed objectives
- The interplay between formal and informal institutions

A Flexible 'Bridging Organization' and 'Adhocracy'

Transformation towards ecosystem-based management is probably impossible without a corresponding organizational change (Danter *et al.*, 2000). When analyzing EKV's organizational *function* we observed a lot of 'bridging' between local stakeholders and between actors at several organizational levels. Westley (1995) used the term 'bridging organization' for interorganizational collaboration. Based on our results from KV, we see

[10] Information on Kristianstads Vattenrike/Kristianstad Wetlands can be found at http://www.maweb.org/en/subglobal.overview.aspx

[11] The term "ad-hocracy" (Toffler, 1970) describes an innovative and collaborative organization "that is able to fuse experts drawn from different disciplines into smoothly functioning *ad hoc* project teams avoid all the trappings of bureaucratic structure, notably sharp divisions of labor. Coordination can no longer be planned but must come through interaction. The structure of the Adhocracy must be flexible, self-renewing, organic" (Mintzberg, 1979: 432–33).

Table II Formal Institutions Linked up to by EKV

Formal institutions	Level of institution
Man and the Biosphere Reserves (MAB)[a]	Global (UNESCO)
Restoration grants	Regional (EU)[b]
Environmental subsidies	Regional (EU)[b]
Local Investment Grants	National (Government)
Prohibition of embankment	District (CAB)
Nature Reserves	District (CAB)

[a] MAB is indeed a non-statutory institution but due to the enormous political and moral support it enjoys it works *de facto* as a formal institution.

[b] These are administrated by the national EPA.

key persons as the unit for collaboration and suggest that a bridging organization provides an arena for trust-building, vertical and horizontal collaboration, learning, sense-making, identification of common interests, and conflict resolution. As an integral part of adaptive governance of social–ecological systems, bridging organizations reduce transaction costs of collaboration and value formation and provide social incentives for participating in projects. Unlike economic incentives, social incentives may have a lasting effect on behavior even after the project ends (Pretty, 2003). The initiative to a bridging organization may be bottom-up (like EKV), top–down, or from research institutes/NGOs (Malayang *et al.*, 2005).

EKV's organizational *structure* looks like an adhocracy, i.e., a project-driven organization (Mintzberg, 1979). In the management literature, the work life of managers was described as a rational process of planning, controlling, and coordinating until the 1970s (Westley, 2002, p. 334). Since then a number of writers have highlighted the role of uncertainty, surprise, contextual dynamics, and complexity in managerial decision-making (e.g., Westley, 2002, p. 334). This is related to the Organic School of Knowledge Management (Barth, 2000; Malhotra, 1999). For instance, "self-organizing adhocracies" have been suggested as solutions to the professional compartmentalization of bureaucracies (Desveaux *et al.*, 1994).

EKV is a municipal organization and reports directly to the municipal executive board. Contrary to ordinary municipal administrations, there is no law regulating EKV and it has no power to enforce rules. This gives EKV an unusually free mandate but it is also a source of vulnerability. As SEM puts it, "there is no ceiling and no floor when it comes to what to do; if we don't flap our wings we'll sink. We exist only as long as people within the municipality like our work." Since the start 1989 there have been several proposals to subordinate EKV to an ordinary municipal administration. This would reduce the present flexibility and has been resisted by the director SEM: "then we would have an additional layer or filter [the head of this administration] to pass in all our contacts with other municipal administrations and our external collaborators."

Leadership through Trust-building and Conflict Resolution

'Adhocracies' require flexibility in leadership. Hoff (1998) concludes that, for local case studies, key persons are more important for networking and collaboration than organizational structure. The EKV experiences also suggest that it is more important to support constructive self-organizing processes that generate knowledge about how to

respond to environmental feedback than to promote a blue-print of an "optimal" organizational structure. Leadership attributes or functions of "actor groups" important for self-organization are discussed in Folke *et al.* (2005).

Our results indicate that farmers and landowners perceive the collaboration with EKV as separate from the sanctioning role of the municipal administrations, and thus as not posing any threat to them. Besides resulting in extraordinary organizational flexibility, this appears to have facilitated communication, trust-building and conflict resolution. As Gunderson (1999) notes, learning and innovation appears to thrive in informal settings. Persons are mobilized into various project teams from the loose social network of local stewards and other key persons representing authorities and organizations at municipal and higher levels of society. These project teams have no formal responsibilities; accountability resides in the participators and their affiliations and this highlights the role of trust-building. As Kettl (2000) argues, the challenge for public administration is to keep the democratic accountability of hierarchical authority while adapting it to more effective network-based approaches. The project teams of KV only meet when an issue is pressing and action is needed. This type of organization allows the very few staff at EKV to initiate and be involved in a multitude of social interactions for dealing with ecosystem dynamics. EKV's space for informal maneuvering would decrease if it created more problems and conflicts than it solved for its collaborators.

Generating and Communicating Ecological Knowledge

The organizational entrepreneurs at EKV have been sensitive to the knowledge, social norms, and sentiments among farmers and other stakeholders in the course of scientific inventories and other projects. This sensitivity has resulted in a multitude of small projects that have created a macro effect in the ecological and social dimensions. In 2002, EKV received the Conservation Award from the Swedish Species Information Centre (ArtDatabanken) for its "systematic work on integrating the values of the wetlands into the ordinary operations of the municipality."[12]

Extraordinary values for recreation and ecotourism have been realized thanks to the enhanced accessibility provided by the outdoor museum. Social results include a growing interest for sustaining ecosystem services, reinforced legitimatization for ecosystem management and hence constructive conflict resolution on issues of embankments and nature reserves. Put together, a transformation seems to have taken place in which the municipality has adopted the ecosystem approach and started a trajectory of building resilience of a desired social ecological system (Olsson *et al.*, 2004b).

Interactions in the social network generate ecological knowledge and provide memory for ecosystem management. Memory of crises is the collective experience and accumulated understanding of environmental change and human responses to such changes. Memory resides in individuals, organizations, formal and informal institutions, and in local and scientific knowledge systems (Berkes and Folke, 1992; McIntosh *et al.*, 2000). Drawing on this memory, EKV creates meaning by combining and incorporating the skills and knowledge of researchers and a variety of local and non-local stewards who for a long time have been observing and interacting with the ecosystems of KV. EKV also maintains the memory of the broader social network by continuously communicating success and progress of projects—personally, to local media, in various reports, and on their homepage.

[12] http://www-internt.slu.se/nyheter/readmore.cfm?479

Collaboration and Value Formation Conditional on Fixed Objectives

The way EKV collaborates horizontally with other stakeholders is very different from conventional ideals of public participation.[13] The horizontal and vertical network around EKV is better characterized as a policy community, i.e., a diverse network of public and private organizations associated with the formation and implementation of policy around a common interest in a given resource area (Shannon, 1998). Through EKV, the Municipality of Kristianstad is involved in partnerships with farmers, small enterprises, and local steward organizations. People who approve of EKV's objectives and approaches to ecosystem management are welcome to participate in various projects. The mandate from the municipal executive board is to facilitate collaboration conditional on the fixed objective: enhance ecosystem values. Hence the direction of collaboration is clear, which probably explains its success. The mandate is *not* to empower the community to formulate a diverse set of strategies for community-based natural resource management and development. There are other forums for such *unconditional* participation, e.g., Agenda 21, which were very popular in Swedish municipalities in the mid-1990s.

SEM is aware that a minor mistake, e.g., concerning nature reserves as mentioned by Landowner C, may erode the goodwill of KV and that it would take a lot of effort to repair. Therefore he strives to orchestrate the whole process. The EKV approach to collaboration and its long-term visions have been amazingly stable during the 15 years of existence; for instance, the idea to make KV a MAB Reserve was part of to the original plan. This illustrates how a firm vision and direction can effectively be combined with flexible project organization.

The results from local inventories are used in the dialogue and collaboration processes with stakeholders concerning conservation issues. The explicit strategy is to make others interested in the *substantive issues* (conservation ecology, cultural heritage, ecotourism). Our results suggest that the communication of ecological knowledge and insights have contributed to trust-building, changing values (preference formation), and facilitated conflict resolution (Table I). Asking for winners and losers in the short run assumes fixed preferences and allows only for a *conflict management* and negotiation approach (Dukes, 1996, p. 115). Adams *et al.*(2003) suggest that conflicts are addressed at a deeper level of "world-views," i.e., perceptions and assumptions on the relationships between nature, humans, and society. Win–win projects are often possible only after such perceptions have been reconsidered. SEM's ambition is to change people's attitudes to ecosystem management: "When the farmers start asking questions about bird populations etc., then I know the trust-building process has started."

From our qualitative study we cannot conclude whether social norms and attitudes have changed at the individual level. But as McCay (2002) notes, individual rationality and attitudes are embedded or 'situated' in a social context. And this context has been transformed by EKV. One purpose of trust-building at the individual level is to avoid positioning of viewpoints. If that happens, EKV's strategy does not work since it depends on voluntary participation. In our interviews, SEM has emphasized his ambition to "elevate" the discussion within each stakeholder group and create meaning at the collective level by integrating ecosystem management with community development (Table I).

[13] The ideals include broad participation and empowerment of disadvantageous groups (Pretty, 1995). In practice, public participation often reinforces existing power structures (Agrawal and Gibson 1999, Brown 2003).

To initiate collaboration around more controversial issues would require political leadership of a kind we do not see much of today.[14] The first incremental steps in this direction may be knowledge generation and value formation. EKV has no legal mandate to force anybody but offers an arena for *directed* collaborative learning with the explicit goal of identifying shared values and common interests consistent to its vision and hence transforming the mental models towards ecosystem management.

The Interplay between Formal and Informal Institutions

The informality of EKV makes it vulnerable. McCay (2002) argues that 'emerging institutions' should include not only rules but also norms and perceptions of the environment. The latter can change human behavior and create a macro effect without involving the social–political process of changing formal rules. For local social–ecological systems, like KV, the legal framework is exogenous. The institutional arrangements including property rights set the framework for local voluntary collaboration (Hahn, 2000) and successful collaboration often requires a legal polycentric arrangement that enables institutional and financial support from various sources (Olsson *et al.*, 2004a). Nature reserves are one way of formalizing achievements from voluntary collaboration and make the ecosystem services more resilient to threats like declining interest by landowners and other stewards or policy change. Another way for EKV to build resilience in social–ecological systems is to influence physical planning for land use, which is an important tool for Swedish municipalities. Land use plans may prohibit further embankments of wetlands and point out some areas for future nature reserves, thus providing a prelegal direction for future development (Table II).

According to SEM, laws and plans concerning nature reserves as well as international classifications are important for continuity, to formalize achievements from informal collaboration as described earlier. They are also important as authoritative support against critics who believe that EKV has "made up" the values of KV. However, SEM does not rely on these when seeking collaboration: "These laws support our arguments but norms are not set by law. We never use the law to convince other partners, it doesn't create a positive atmosphere."

To collaborate horizontally requires personal competence in communication and conflict resolution, as well as knowing the local context, including social norms. Navigating the larger environment requires other competencies, e.g., interpreting scientific knowledge and experiential knowledge from other sites, understanding the legal-political arrangements, and attracting financial resources (Olsson *et al.*, 2004b). We found that EKV has managed both the local and non-local contexts and succeeded in linking formal and informal institutions.

Conclusions

By being sensitive to the concerns of farmers and other collaborators, EKV has established a constructive communication focused on the substantive values generated by the

[14] This was the main message from the Millennium Ecosystem Assessment (MA): "The challenge of reversing the degradation of ecosystems while meeting increasing demands for their services can be partially met under some scenarios that the MA considered, but these involve significant changes in policies, institutions, and practices that are not currently under way" http://www.maweb.org Statement of the Board, p. 10.

ecosystems. These values have emerged through inventories, based on scientific and local ecological knowledge, and engagement of farmers and other stakeholders in a *directed* collaborative learning and problem-solving process. A firm vision that provides a direction for the collaboration has coexisted with a flexible organization. We conclude that knowledge generation and trust-building are the central components of the EKV approach to collaboration. These have increased the local legitimacy for ecosystem management and facilitated the identification and creation of win–win situations and conflict resolution.

Through EKV the Municipality of Kristianstad is able to collaborate with other stakeholders within and outside the municipality on nature conservation and related issues. EKV represents the municipality but has no legal mandate or enforcement status, relying on voluntary participation. This is certainly a nontraditional role for a local government organization. If learning thrives in trustful informal settings, like the loose network around EKV, then it may be a good strategy to separate the collaborative role of governance from the enforcement role. Collaboration based on voluntary participation requires communication skills but support from formal institutions is needed to reduce vulnerability. In this sense, ecosystem management appears to require a fine interplay of formal and informal institutions.

The ecological knowledge generation and dynamic governance of Kristianstads Vattenrike illustrate the importance of organizations like EKV that bridge local actors with other levels of governance to generate legal, political, and financial support. Such bridging organizations may also filter external threats and redirect them into opportunities. Their role in resilience and sustainability needs to be further investigated.

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Personal communication

HC, Coordinator of the nature conservation section of KV. Employed by Kristianstad Municipality (50%) and the County Administration Board (50%). Hans.Cronert@kristianstad.se
KM, Information secretary at the Man and Biosphere (MAB) Candidate Office. Karin.Magntorn@kristianstad.se
SEM, Director of EKV since the beginning 1989. Sven-Erik.Magnusson@kristianstad.se
Landowners A, B, and C