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Social learning towards a more adaptive paradigm? Reducing flood risk in Kristianstad municipality, Sweden

Åse Johannessen [a,*], Thomas Hahn [b]

[a] Stockholm Environment Institute, Kräftriket 2b, SE-106 91 Stockholm, Sweden
[b] Stockholm Resilience Center, Stockholm University, SE-106 91 Stockholm, Sweden

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ABSTRACT

Social learning is often treated as an intervention, a designed process facilitated or even initiated by a third party. We investigated how a social learning process emerged spontaneously from inside Kristianstad, one of the most flood-prone municipalities in Sweden. Twenty key persons were interviewed over 8 years, many of them several times, to assess the process. A small action oriented group of technical professionals perceived the flood risk and were key drivers providing strategic innovative capacity. We identified the process attributes that fostered the learning, the knowledge generated and other learning outcomes adapting a model by Schusler et al. (2003). Despite some elements of double loop learning, this process was not able to change the prevailing stationary principle/paradigm, feeling safe behind the embankments and continuing building on low lying land. We argue that building resilience and adaptive capacity would require a mind shift to a paradigm of flood proofing/living with floods and preparing for the unexpected, acknowledging that water cannot be controlled at a certain level. We conclude that knowledge development is inhibited by the Swedish decentralisation approach and we call for a multilevel learning strategy including learning from international experience and emphasising more active coordination at the national level.

1. Introduction

Human settlements are often located in low-lying and flood prone environments, as closeness to water associates with livelihood, trade and navigational routes. Society has learnt how to capitalise on, adapt to and buffer against natural hydrological variability with different means e.g. dams, canals and dredging (L'vovich and White, 1990). However, this development has altered the hydrological flows and linked ecosystem dynamics (Lammersen et al., 2002; Brandt et al., 1988) sometimes resulting in removing natural buffers and increasing the likelihood for more extreme flood events (Lane et al., 2003). In Europe, flooding is becoming the most common natural disaster, including more frequent floods with more impact (IPCC, 2007; Barredo, 2007). This has many causes, such as population growth, urbanisation and other land-use change in exposed areas, higher exposed values, increased vulnerability of buildings, goods and infrastructure, failure of flood protection systems and changes in environmental conditions (Munich Re, 1999; Kundzewicz et al., 2005). In addition to natural variability, predictions of increased frequency and magnitude of extreme events due to climate change have triggered renewed considerations of risk in local planning. This includes increasing rainfall and frequencies of severe floods (White et al., 2001; Cubasch, 2001; Milly et al., 2002; IPCC, 2008). The city of Kristianstad has the greatest flood risk in Sweden, in terms of the most number of persons within the area of a worst case scenario (MSB, 2011). Due to a locally driven initiative to mitigate the flooding, Kristianstad has become a role model to other municipalities in Sweden. The present construction of 10 km embankments is the nation's most costly measures to meet the flood challenge in modern history. Its pioneering position underscores the importance of a critical assessment, as many other cities will be learning from the Kristianstad approach.

There are different approaches to flood mitigation. A combination of coping and adaptation is generally applied as a response to climate impacts (Kabat et al., 2002), in which coping mechanisms are the bundle of short-term responses to situations that threaten livelihood systems, and often taking the form of emergency responses in abnormal seasons or years (Berkes and Jolly, 2001:2). In the context of floods, coping includes for example closing the traffic on exposed roads and putting up temporary embankments, using resources which can be mobilised at short notice. Adaptive strategies, on the other hand, are the ways in which individuals, households and communities change their productive activities and modify local institutions to secure

* Corresponding author. Tel.: +46 (0)8 6747176.
E-mail addresses: ase.johannessen@sei-international.org, ase.johannessen@gmail.com (Å. Johannessen), thomas.hahn@stockholmresilience.su.se (T. Hahn).

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Table 1
A selection of different social learning approaches advocated in different contexts and their focus and aim. These approaches can be planned or self-organised.

Learning approach	Focus and aim	Example/reference
Deliberation in *comanagement*; a partnership between government agencies and local communities (planned and/or self-organised)	*Ecosystem focus*: fisheries, parks, protected areas, forests, wildlife, rangelands and water resources	Schusler et al. (2003) and Pinkerton (1989)
Participation by river basin stakeholders guided by river basin authority in public meetings, with media, authorities, NGOs etc. (planned and facilitated)	*River basin focus*: Collaboration and public participation under EU Water Framework Directive (WFD) for allocation and conflict management	HarmoniCOP, SLIM projects (Tippett et al., 2005; Mostert et al., 2007, Blackmore et al., 2007)
Learning alliance; a group formation with different stakeholders from authorities to communities etc. (planned and facilitated)	*Urban/rural focus*: Aimed at upscaling of different aspects of IWRM (focused on drinking water, sanitation and hygiene)	SWITCH (Butterworth & Morris, 2007); MUS (Van Koppen et al., 2009); Empowers (Moriarty et al., 2007)
Ecosystem approach including institutional design, e.g. committees, task groups etc.; (planned, coordinated)	*Ecosystem focus*: aimed at achieving integrated planning and/or management of multiple sectors in an ecosystem	Okavango Delta Management Plan, Botswana (Janssen, 2002; Pirot et al., 2000)

livelihoods for the long-term (Berkes and Jolly, 2001:2). This can build resilience, which entails: (a) buffer capacity or robustness and (b) the capacity for learning, self-organisation and adaptation (Folke, 2006:259). For flood prone urban areas this translates for example into (a) building permanent embankments or adapting land use (b) social learning, collaboration in social networks and adapting strategies including city planning.

The predominant and traditional approach to meet flood risks is based in the 'foundational' water management paradigm which bases its assumptions on the 'stationary principle' i.e. that natural systems fluctuate within a fixed range of variability (Milly et al., 2008). Water managers who follow this paradigm work according to design rules and management criteria, based on monitoring and analysis of hydrological data (Veraart and Bakker, 2009) favouring structural adaptation measures such as embankments to be able to cope with a certain water level. A rediscovered approach of 'climate proofing' uses a combination of infrastructural and institutional measures in order to adapt (Veraart and Bakker, 2009). This includes new planning paradigms such as 'living with floods' ('flood proofing') and robust solutions acknowledging that physical structures like embankments etc. cannot give total protection and that people and their homes may get exposed to the full forces of floods from time to time (Hendriks and Buntsma, 2009; Defra, 2006). It also acknowledges the need to reduce risk of exposure e.g. adapting land use and provide for buffer zones. Strategies part of the adaptive paradigm allow for smaller disturbances, rather than shutting them out, where the system instead learns how to absorb them and build resilience (Walker et al., 2004).

To apply these strategies, adaptive capacity is required, which is the ability to adjust to climate variability and extremes, e.g. to take advantage of opportunities, or to cope with the consequences (IPCC, 2001). *Social learning* is recommended as a way to boost adaptive capacity in a deliberate and systemic fashion (Kolb, 1984; Kim, 2004; Groot et al., 2002; Walker et al., 2004). Such social learning achieves "a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks" (Reed et al., 2010). Kristianstad's initiative, which displays a capacity for action and implementation, and ability of actively meeting challenges of flood risk in times of climate change, is therefore highly interesting in this context, and the questions arise: are there evidence of social learning and if so, how this was achieved? Did it improve the adaptability? In other places, this has been achieved by variables such as facilitation, institutional frameworks and policies, stakeholders and stake-holding processes, and ecological constraints (Steyaert and Jiggins, 2007). Social learning is key to adaptive management (Röling and Wagemakers, 1998) through developing institutions and capacities for sustainability (Pahl-Wostl et al., 2008). However, the outcome from social learning does not always have to be sustainable, or sustainability can be achieved without social learning (Reed et al., 2010). To distinguish between different outcomes, or rather, levels of intensity of learning, the concept of single, double and triple loop learning is often used. Single loop learning is the improvement of already established actions; double loop learning means a change in the frame of initial reference and guiding assumptions (such as system boundaries); and triple loop learning means a transformation of the frame of reference and of the whole regime (Hargrove, 2002).

There are no blueprints for a social learning process but lessons learnt are being promoted and documented through various approaches; see Table 1 for a selection. We are interested in a type of social learning which is 'stable', enabling long-term build up of capacities, action and behavioural change; a rather unexplored area of research (Gerger Swartling et al., 2011). We are also interested in such social learning which is ongoing in the professional day-to-day deliberations "on the job" arguably in stable contexts. This is in contrast to social learning efforts which only last for the time during active facilitation or participation (Bull et al., 2008) and sometimes requires additional institutional structures. The Kristianstad case is part of such self-organised and spontaneous processes that take place in the absence of any planned participatory process (Pinkerton, 1989), organized within conventional structures and networks.

If stable long term social learning is aimed for, we need to know what environments trigger and enable such processes. Enabling environments for learning are often characterised by trust, collective meaning and sense making and 'ownership' with respect to both the learning process as well as the solutions/outcomes (Wals et al., 2009). But that information is not sufficient to recreate a process. One critique to the social learning concept in natural resource management has been the general approach, concealing a great diversity, without distinguishing the specific mechanisms at work, and lack of empirical evidence which makes it difficult to recreate such processes in practice (Reed et al., 2010; Schusler et al., 2003). To reduce ambiguity and develop the concept of social learning for natural resources management Muro and Jeffrey (2008) suggest more empirical research. This study aims to contribute to that effort.

1.1. Purpose

The purpose of this empirical case study is to shed light on social learning related to flood mitigation that is useful for action to build resilience and adaptive capacity. We investigate the following questions: