Collaborative decision making in sustainable flood risk management: A socio-technical approach and tools for participatory governance

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ARTICLE INFO

ABSTRACT

Currently a change of paradigm from flood protection towards flood risk management (FRM) is taking place, which calls for participatory governance. The paper's main aim is to describe how social learning and collaborative decision making can be realised as part of participatory governance and how they can be supported by socio-technical approaches and instruments. We describe the socio-technical approach of collaborative modelling (CM), and features of the web-based tools for supporting social learning and collaborative decision making, which were developed and tested in a case study on FRM in Northern Germany. The underlying framework of CM is described and the different phases with regard to stakeholder interaction are illustrated. The CM tools are described and reflected against a set of six criteria for cognitive learning in social learning processes. We illustrate how they can support learning about: (a) the status of the problem; (b) possible solutions and the accompanying consequences; (c) other peoples' and groups' interests and values; (d) one's own personal interests; (e) methods, tools, and strategies for better communication; and (f) practicing, using and applying holistic and integrative thinking.

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1. Introduction

We are currently facing a discourse on governance structures and processes, as well as a discussion on changing approaches to the management of natural hazards. One crucial issue involved in this is floods and how to manage flood risks. It is apparent that a paradigm shift is taking place in Europe in the way flood issues and flood risk governance are dealt with. This is characterised by a movement away from flood protection towards flood risk management (FRM). Water Governance is understood here, as defined by Lautze et al. (2011), as "the process and institutions through which decisions are made related to water". One reason for this shift is the increase in flood events and related flood damage in recent decades (IPCC, 2014; Schwarz et al., 2008; EEA, 2009; MunichRe, 2014). A significant consequence of this paradigm shift is the adoption of the EU Floods Directive (FD) (European Union, 2007), which demands flood risk assessment, flood risk management plans and the involvement of interested

parties in the implementation process as a new approach to dealing with FRM.

Evers and Nyberg (2013) developed a synopsis of water- and flood relevant EU framework directives which they analysed with respect to political, legal, management, physical, sustainability, and other dimensions. It was shown that in flood risk, and thus in the EU Floods Directive, ecological, social and economic aspects play crucial roles and are interrelated as shown in Fig. 1. The character of floods is highly dependent on ecological parameters and floods strongly influence the ecological functions of rivers. These aspects have to be considered and stakeholders from different sectors need to be involved. The economic aspect is obvious when it comes to damage caused by flood events, whether this affects private households, government institutions, public infrastructure or economic activities. The social aspects involve, inter alia, personal or societal vulnerability, potential losses, and even fatalities. Thus, the relevance of participation of stakeholders and the public seems to be considerably high and higher than for many other environmental issues and related directives or legal requirements.

Therefore, transparency and communication play a crucial role in FRM, since it depends greatly on social factors such as awareness, preparedness, and capacity for coping with a flood
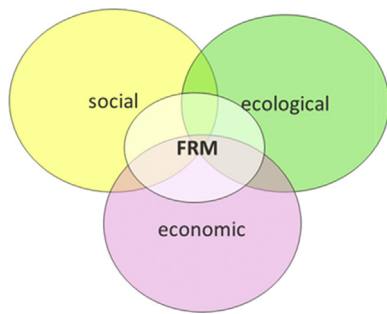
Fig. 1. Sustainability aspects of flood risk management.
Adapted from Evers and Nyberg (2013).

event. Furthermore, it is expected that citizens who are potentially affected by floods will become involved in various measures and actions. The current change of paradigm implies a shift to individualisation of risk and social vulnerability, and therefore shifting from a top-down to a participatory governance approach is essential. In this respect, participation processes and capacity building can be considered an important prerequisite for FRM.

The increasing importance of participation in environmental management can generally be traced back to the potential it presents for dealing with complexity and conflict, as well as its potential to initiate social learning processes and develop capacity through awareness raising (cf. APFM, 2006).

Moreover, understanding the conflicting claims and views of stakeholders through more transparent stakeholder participation may increase trust among stakeholders themselves (Richards et al., 2004). Furthermore, participation allows the inclusion of local knowledge and different values, interests and perspectives in planning and management processes. This, on the other hand, fosters the acceptance of – and identification with – proposed measures by the participating stakeholders (Gooch and Huitema, 2008).

Similar to other areas of environmental management, FRM, as a complex and potentially conflict-ridden process, has been argued to require stakeholder involvement and participatory approaches for its successful and sustainable implementation (Hisschemöller et al., 2001; Abbott, 2007; Steinführer et al., 2008; Pasche et al., 2009; Watson et al., 2009; Pitt, 2008; Dawson et al., 2011; Webler et al., 1995; White et al., 2010; Vojinovic and Abbott, 2012).

This issue is also reflected in the UN guidelines on sustainable flood prevention (UNECE, 2000) which state:

"*Cooperation is necessary within each riparian country as well as between riparian countries and is most effective if it involves the public.*" UNECE (2000, Par 21, Box 1) and furthermore:

"*Access to information and public participation in decision-making concerning flood prevention and protection is needed . . . to improve the quality and the implementation of the decisions, to contribute to public awareness, to give the public the opportunity to express its concerns and to enable public authorities to take due account of such concerns.*" (UNECE, 2000, Par. 33, Box2). Another position is that it is necessary to assist local communities to make "informed decisions" because there are numerous biases and cognitive shortcuts that can be invoked by individuals as they try to quantify the costs and benefits for themselves (Watson et al., 2009; UNECE, 2000).

The FD came into force in 2007 and requires participation during various stages (Newig et al., 2014). The latter authors conducted an early investigation of how participation is actually implemented by the respective authorities and found that (so far) participatory approaches have not been applied on a large scale in European states, in contrast to the scale of activities undertaken to implement the EU Water Framework Directive. This is interesting

to note against the background of the critical nature of the flood risk issue, as illustrated above, and reveals a gap between the (normative) statements of official papers and legal requirements and the reality in practice.

However, it should be recognised that participatory approaches are not always a possible or even justified means of dealing with FRM problems. Researchers have emphasised the difficulties in relations between participation and expertise, as well as cultural, political, economic and technical or physical conditions that may challenge the contribution of participation to the decision-making processes involved (see, for example Ahrens and Rudolph (2006) or Messner et al. (2006), and the references cited therein). Several studies have also shown that many participatory approaches fail to result in more informed and effective policies (Edelenbos and Klijn, 2006; Behagel and Turnout, 2011). Hurlbert and Gupta (2015) point out that the literature often romanticises participation without examining the cases in which it is challenging and/or implemented using inappropriate mechanisms, or in which it is more appropriate for policy making to be dealt with technocratically and for policies to be created or implemented by expert bureaucrats.

Hurlbert and Gupta (2015) identified flood preparation projects as a policy problem with high agreement on a scientific level but high disagreement on values and norms. Thus, they conclude, that a high level of participation for reaching consensus and so-called self-management may be necessary for success and to allow for social learning processes in FRM.

As described above, and illustrated in Fig. 1, FRM is a very complex issue with clear interfaces between social, economic and ecological aspects, where various actors with diverse backgrounds and knowledge have a stake and should be involved in management questions and decision making. This requires mutual exchange and learning processes in different societal and administrative settings, which we can call social learning processes. Social learning is a popular term and approach referring to many different kinds of learning processes in different contexts where uncertainty and change are problematic (Pahl-Wostl et al., 2007). Social learning can be described as a concept where individuals and organisations learn from and about each other through exchange, dialogue or even conflict (Smith and MacGregor, 1992). Schusler et al. (2003) concluded that the term has a multitude of meanings but they nevertheless defined it, based on a number of sources, as learning that occurs when people engage one another, sharing diverse perspectives and experiences to develop a common framework of understanding and basis for joint action. Reed et al. (2010) proposed the following definition: "a change in understanding that goes beyond the individual to become situated within social units or communities of practice through social interactions between actors within social networks". It is regarded as a promising approach for collective decision making in societal challenges characterised by complexity, uncertainty and multiple social perspectives (e.g. Schusler et al., 2003; Kilvington, 2007; Mostert et al., 2007). Many authors see social learning as a key factor for awareness raising, capacity development and increased resilience, especially of local stakeholders and authorities (e.g. Pasche et al., 2009; Pitt, 2008; Watson et al., 2009; Evers et al., 2009; Pahl-Wostl et al., 2007).

Webler et al. (1995) identified a set of aspects or elements for social learning with which to generate a structure for its definition and evaluation. They distinguish elements for evaluating cognitive enhancement of learning and elements related to moral development (enabling individuals to make decisions for the good of all). Here we will focus on cognitive learning: (a) Learning about the status of the problem (information and knowledge); (b) Learning about possible solutions and the accompanying consequences (cause–effect relations, predictions); (c) Learning about other