



# The Sustainable Procedure Framework for Disaster Risk Management: Illustrated by the Case of the EU Floods Directive in Sweden

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Published online: 27 June 2016

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**Abstract** How can the concrete meaning of the ambiguous and theoretical concept of sustainable development (SD) be defined and implemented, without losing sight of its fundamental principles? This study introduces a theoretical framework that supports studies of SD implementation in the context of strategic disaster risk management, by defining what SD implies with regard to planning procedures. The framework is based on the procedural SD principles of participation and integration. It was originally developed for, and has shown great value in, the field of water resource management. In-depth interviews with senior risk management researchers indicate that the framework is also applicable to and valuable for disaster risk management studies. To illustrate the application of the framework, a study of the EU Floods Directive in Sweden is summarized with the framework as the basis for the analysis.

**Keywords** Disaster risk management · EU Floods Directive · Planning · Sustainable development · Sustainable Procedure Framework · Sweden

## 1 Introduction

Sustainable development (SD) implies integration of social, ecological, and economic concerns (Robinson 2004; Ginson 2006; Levin et al. 2013). This can be viewed as the “substantive” dimension of SD (Robinson 2004). In order

to accomplish this integration, however, considering the “procedural” dimension of SD is an equally important imperative<sup>1</sup> (Robinson 2004). This procedural dimension of SD, and its connection to the field of disaster risk management (DRM), is the focus of this article, specifically with respect to preventive and strategic DRM, such as in regional flood risk planning and municipal land use planning.<sup>2</sup> A sustainable procedure can be described as a political conversation about desirable futures informed by scientific knowledge from a broad range of integrated disciplines (Bradshaw and Bekoff 2001; Clarke and Dickson 2003; McMichael et al. 2003). Such a procedure also needs to be informed by the knowledge and perspectives of the actors who are affected in different ways by the plan or decision to be made (Pretty 2003; Ostrom 2009; Vaidya and Mayer 2014).

In the last 10 years the importance of integrative and participatory planning procedures has become recognized in the field of DRM (Pelling 2007; Evers 2008; Ikeda et al. 2008; Vinet 2008; Gamper and Turcanu 2009; Wisner 2011; Renn 2015). In natural resources management (NRM), where similar considerations have been well established, a theoretical framework that describes what an integrative and participatory procedure implies for strategic planning procedures has been developed (Hedelin 2007). The framework takes the SD principles of participation and integration as its point of departure. It has been successfully applied and has delivered practical recommendations

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<sup>1</sup> The substantive and the procedural dimensions of SD are inherently connected. See the Sect. 5 for details on the relationship between SD procedure and substance (state).

<sup>2</sup> Management of crisis situations, or management and design of specific preventive measures, were not part of this study.

for how to develop planning procedures and legislation in relation to SD (Hedelin 2008b; Hedelin and Lindh 2008).

The idea of this study is to assess, and possibly adjust, the NRM framework in relation to the field of strategic DRM, with a view to making it applicable to DRM studies. While there are already a number of important efforts to establish theoretical basis and frameworks for linking DRM and SD—see for example Becker (2014) and Nyberg et al. (2014)—the NRM framework would contribute to the DRM field in two main ways: its ability to systematically and explicitly relate DRM practices to the theoretical and ambiguous SD concept, and its procedural approach to SD. These points are explained in more detail in Sect. 2.

The theoretical and general character of the NRM framework, and the fact that it concerns procedure, suggest transferability to the DRM field. But important differences between the fields could affect the applicability of the framework. One difference is the character of the biogeophysical processes of natural hazards, which are both more uncertain and faster than most natural resources processes—for example, compare a flooding event with eutrophication or the long-term depletion of an aquifer. Another difference is related to participation. Disasters may engage the public more than natural resource issues because the consequences of disasters and response measures often affect the public more directly. Compare the flooded basement of a private house with the slow deterioration of an ecosystem. Another difference is that, in contrast to the NRM field, very few nongovernmental organizations (NGOs) are dedicated to disaster risk issues. These circumstances have consequences for how to effectively design planning procedures.

This study aims to contribute to the research on sustainable DRM procedures by introducing the sustainable procedures framework, focusing on participatory and integrative procedures. As a first step, the objective here is to assess whether the NRM framework contains any inconsistencies in relation to strategic DRM procedures, and, if inconsistencies can be identified, to adjust the framework in relation to the DRM field. Finally, to illustrate the application of the framework, the implementation of the EU Floods Directive in Sweden is used as a case study and analyzed on the basis of the framework.

## 2 The Sustainable Procedure Framework

The Sustainable Procedure Framework and its key ideas are summarized here (Table 1; for a detailed explanation of the framework and how it was developed, see Hedelin 2007). The framework was originally developed for natural resource management, such as river basin management and municipal land use planning. It is intended for research-

based analysis and development of planning procedures of strategic character at national, regional, and municipal levels.

The framework can be seen as a response to the need to establish ways to explicitly and systematically relate practical planning procedures to the concept of SD. The difficulty of relating a specific practice to the abstract and theoretical concept of SD is well recognized (Robinson 2004). The framework's approach is to use two SD-principles—participation and integration—as the points of departure. These are well-established procedural principles of SD<sup>3</sup> and by far the most cited SD procedural principles recognized in the NRM field (see for example Gregersen et al. 2007; Sawhney et al. 2007; Henriksen et al. 2009). The principles still say little about how to design a planning process, however. Therefore, a set of criteria has been derived that describe necessary constituents of an integrative and participatory procedure. While the criteria do not describe a specific optimal design for a NRM process (specific design is context dependent), they say more than the SD principles about what a sustainable NRM procedure implies. The criteria are derived from the review and synthesis<sup>4</sup> of theoretical and empirical literature on what integration and participation implies in relation to strategic planning procedures. The scope of the relevant literature is wide and includes multiple levels of complexity. As a consequence, the criteria of the framework are still relatively general in character. A high level of generality is required in order to keep the framework applicable to a wide range of NRM cases.

One important contribution of the framework is its interdisciplinary character. The framework establishes a structure of integrated and composed scientific knowledge, systematized in relation to the concept of SD. In earlier studies the use of the framework has produced practical recommendations for how to make the studied planning cases better in relation to SD (Hedelin 2008b; Hedelin and Lindh 2008). In addition to analysis, another way to use the

<sup>3</sup> Well-established fundamental principles of SD have been identified in an extensive literature review (Hedelin 2008a). The principles identified have main bearing on either procedure or substance. The substantive principles are: use of resources within nature's boundaries, and, a fair distribution of resources in space and time. In addition to participation and integration, the procedural principles identified are: the principles of polluter pays, precaution, and a strategic and long-term approach. The latter is to some degree also included in the framework because of the character of its intended area of application (strategic, long-term planning), which constituted a point of departure for the development of the framework criteria.

<sup>4</sup> The production of a synthesis entails the integration of the relevant areas of the literature into a new whole (Kirkevold 1996). Rather differently from a traditional review, a synthesis claims to present connections that have not previously been made (Kirkevold 1996).

**Table 1** Overview of the sustainable procedure framework (for explanation of the criteria, see Hedelin 2007)

Sustainability principle	Structural component	Criteria
		Sustainable planning procedures must include, support, or promote:
Integration	...across disciplines	A Integration of knowledge from all relevant disciplines B Handling of different views of knowledge (for example, positivist, relativist) C Handling of different kinds of uncertainty
	...across values	D Identification of the most relevant values in relation to the current issue E Rational argumentation based on the identified values, by relating them to alternative choices in the planning process
Participation	...contributing to the process	F Inclusion of knowledge owned by relevant actors G Inclusion of the ideological orientations represented by relevant actors H Participation in the most critical phase(s) of the process
	...generating commitment, legitimacy, or acceptance	I A procedure for defining the actors who should be involved J Handling of power asymmetries K Procedures that ensure that ideological orientations are not suppressed L Learning

framework is as a baseline for transdisciplinary development of planning procedures.<sup>5</sup>

In short, criteria A to E stem from the concept of integration and are influenced by research on integrated planning and management (Born and Sonzogni 1995; Bellamy et al. 1999; Margerum 1999; Sneddon et al. 2002). They are structured based on the idea that integration can be obtained across disciplines (A–C) and across values (D and E) (Jepson 2001). Criterion A says that disciplinary knowledge must be integrated in the planning process (Lubchenco 1998; Ludwig et al. 2001; McMichael et al. 2003). To be able to do so, paying close attention to the issue of interaction between persons and knowledge fields that have different knowledge views is essential (B) (Ludwig et al. 2001), and the issue of uncertainty needs to be handled in a systematic way (C)—the research on adaptive management has much to contribute here (see for example, Holling 1978 and Folke et al. 2005). Criteria D and E say that values need to be integrated in the planning process. A first step is to identify the most relevant values<sup>6</sup> (D) so that these can be explicitly related to during the course of the process (E) (Klosterman 1983; Dahlgren and Khakee 1990; Rayner 1999; Söderbaum 2000).

Criteria F–L are closely linked to participation and influenced by participatory and collaborative planning, and by deliberative democracy (Dryzek 2000; Grote and Gbikpi 2002; Healey 2006). The criteria are structured

according to the main aims related to participation—increasing the quality of decisions, and generating the necessary commitment, legitimacy, or acceptance (Hemmati 2002). Criteria F and G say that the knowledge owned and the ideological orientations<sup>7</sup> represented by the concerned actors are vital for making well-informed plans and decisions (Olsson and Folke 2001; Hemmati 2002). Criterion H says that the participatory efforts need to be connected to the most critical phases of the process (Palerm 1999; Diduck and Sinclair 2002). In general, concerned actors (other than those directly responsible for the formal process) come in too late in the process, making it difficult for them to influence the fundamental direction of the decisions instead of details (Asplund and Hilding-Rydevik 1996). Criterion I says that one must have a systematic approach for identifying the actors that should be involved (Dryzek 1997; Lidskog 2005). Criteria J and K state that taking into account issues of power asymmetries is key to establishing a rational and democratic process (Flyvbjerg 1998; Wiklund 2002). Also, learning (L) is a key aspect in relation to democracy as well, because those involved need to have sufficient understanding of the complex issues at hand (Dryzek 1997; Dahl 1998; Lidskog 2005).

The criteria are linked in various ways—for example, the integration of knowledge and values (A–E) is dependent on the involvement of concerned actors' knowledge and ideological orientations (F and G), and in order to meet criterion L (learning), almost all of the other criteria have to be fulfilled.

<sup>5</sup> A transdisciplinary research approach addresses societal problems through interdisciplinary research as well as collaboration between researchers and other actors. Its aim is to enable mutual learning processes between science and society (Jahn et al. 2012).

<sup>6</sup> The most suitable method for identifying those values is dependent on context.

<sup>7</sup> Value systems or ethics are other terms used with a similar meaning (Söderbaum 2000).

**Table 2** Researchers interviewed for the purpose of assessing the Sustainable Procedure Framework's applicability to the DRM field

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 Discipline, organization, title, and research interests
 

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Geographer. Bonn University and Karlstad University

Ph.D., Professor. Water resources and flood risk management, decision support systems, participation

Chemist. Karlstad University

Ph.D., Professor. Risk management, systems theory

Physical geographer. Karlstad University and Swedish Civil Contingencies Agency

Ph.D., senior researcher. Risk management, learning from accidents

Psychologist. Swedish Defence University

Ph.D., Professor. Behavioural science in relation to risks, crisis management

Physical planner. Swedish Civil Contingencies Agency

Licentiate, senior expert. Learning from accidents, disaster risk analysis

Hydrologist. Karlstad University

Ph.D., senior researcher. Risk management

Chemist (atmospheric). Swedish Geotechnical Institute and Gothenburg University

Ph.D., senior researcher. Risk assessments and risk evaluation and the connection to sustainable development

Political scientist, national economist, political economy. Linköping University

Ph.D., senior researcher. Climate policy, economic sustainability criteria for water management, participation, climate vulnerability, and adaptation, socioeconomic aspects, climate negotiations

Political scientist. Uppsala University

Ph.D., senior researcher. Public policy, public management, crisis management, learning from and for risk management

Political scientist. Gothenburg University

Ph.D., Professor. Water and flood risk management, participation and democracy in multilayer governance

Sociologist. Mid Sweden University

Ph.D., senior researcher. Organizational theory, collaboration for management of risks and crisis

Political scientist. Uppsala University

Ph.D., Professor. Evaluation, public policy, collaborative governance

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### 3 Method

The study design is based on the idea that if no inconsistencies in the NRM framework can be identified in relation to strategic DRM procedures it can be seen as methodologically valid to apply and evaluate the framework in the context of DRM procedures. To identify inconsistencies 12 senior researchers of integrated or participatory approaches to DRM were interviewed (hereafter referred to as respondents; Table 2).<sup>8</sup> Respondent-driven sampling was

used to select respondents. The 12 interviews, ranging from 1 to 2 h, were conducted by phone or by face to face meetings, and recorded digitally.

The background, objectives, and method of the study were explained in the invitation e-mail. The respondents were asked to read the article explaining the NRM framework (Hedelin 2007) before the interview. During the interviews the meaning of the framework and its criteria were clarified, criterion by criterion. This enabled the respondents to qualitatively assess the framework with respect to DRM procedures using their scientific

<sup>8</sup> Interdisciplinary and scientific knowledge are used as the basis for the assessment of the framework because of the interdisciplinary and deductive character of the framework. If the framework can be established as a valid theoretical tool, it can be applied and assessed in relation to DRM practice and practitioners' knowledge. Detailed

Footnote 8 continued

arguments for using a group of experts as a basis for understanding complex issues that integrates multiple perspectives can be found in the Delphi literature (Novakowski and Wellar 2008).

knowledge and perspectives of DRM procedures as the basis for the assessment. During the interviews the question of inconsistency was brought up repeatedly: In light of your knowledge and perspective of strategic DRM procedures, are there aspects of the framework as a whole or in parts that are inconsistent with such procedures? Could you point out a necessary issue, aspect, or principle that is currently lacking/that needs to be reformulated/that needs to be excluded, in order to make the framework consistent with DRM procedures?

The respondents were also asked specifically about suggestions made by preceding respondents (adding, removing, or reformulating issues/aspects/principles). This was done to assess, develop, and integrate the suggestions during the process (thereby applying a flexible research design; see Robson 2002, pp. 163–200). Data collection was considered complete when no new arguments that were assessed to have an impact on the study result came up during several succeeding interviews.<sup>9</sup> As a final step, the respondents were invited to comment on the main results from the interview process by e-mail.

## 4 Results

The interviews did not identify any inconsistencies in the framework as a whole, or in parts. None of the respondents could point out a principle, issue, or aspect that needed to be included, excluded, or changed. The main reason provided was that the criteria are general in character, and that differences between the NRM and DRM fields would be apparent only in their application or specific interpretation in practice. Another reason presented was that the framework concerns procedure (not substance).

During the first interviews the question whether the framework lacked any principles for sustainable DRM procedures was specifically posed, citing the precautionary principle as an example. The question was dropped after seven interviews because clear arguments for not including the precautionary principle had been expressed by the respondents. The main argument made was that in DRM, deciding the level of acceptable risk is often the very focus of the procedure and much related to prioritizing among values (criterion E). Stating by principle that risk should preferably be avoided is inapplicable in most DRM cases. The precautionary principle, the respondents argued, springs from the management of complex environmental

issues and is therefore more important in relation to such issues.

Related to the issue of SD principles, and specifically to the principle of integration (integrating sectors, administrations, geographical scales, and so on), the first respondent suggested that the framework might be lacking contextual issues such as who is in charge of the procedure, its relationship to formal legislation, roles, mandates, and relationships between the involved actors. The succeeding interviewees were asked for their assessment in relation to this suggestion. Most respondents argued that the extension of the scope of the criteria would be valuable, while some argued that such an expansion would not make the framework better. None of the respondents argued, however, that the lack of such contextual issues would make the framework inconsistent with respect to DRM procedures.

Another suggestion (made by the fourth respondent) that found broad support among the subsequent respondents was to make the framework easier to use for DRM practitioners. The theoretical and abstract style of the framework, they argued, makes the framework suitable as a research tool rather than a practitioners' tool.

A number of additional suggestions for how to describe individual criteria were also made. These suggestions were all intended to clarify the meaning of individual criteria and did not concern issues of consistency with DRM procedures. One respondent suggested changing “handling” to “management” in the definition of criteria B, C, and J. Another respondent suggested changing the term “ideological orientation” to “perspective” (criterion G). Another suggestion was to divide the criterion of uncertainty (C) into two or more criteria that would identify different kinds of uncertainties. None of these suggestions, however, had broad support from the succeeding respondents.

The respondents showed a positive attitude to the framework, for example, arguing that it covered important aspects: “I think all of these [criteria] are important” and “I think that it is really good that you have included [aspects of] power in this [...] I am very positive about the criteria.” One respondent, however, was concerned about the normative character of the framework—the fact that it defines what a sustainable procedure “should” support or promote. The same respondent asked for an explanation of the relationship between procedure and state by raising the question of what guarantee the procedure, as defined by the criteria, will provide for a sustainable state.

## 5 Discussion

The objective of this study was to assess whether the NRM framework contains any inconsistencies in relation to strategic DRM procedures, and, if inconsistencies are

<sup>9</sup> The adopted methodology supports a knowledge-based selection of respondents and interview process. The study design does not rule out, however, that another group of respondents, or a considerably larger number of respondents, could have an influence on the study result.



identified, to adjust the framework to the DRM field. Based on the interviews, no inconsistencies exist in the framework, neither as a whole nor in parts. Accordingly, there is no need to adjust the framework at this stage. Further application of the framework in the field of DRM will provide more insights into the potential need for adjustment or further development.

The interviews laid the basis for constructive discussions about the framework—related to its fundamental ideas and principles and to possible ways of developing it further. One respondent pointed out the normative character of the framework. The normative character of the framework is a consequence of the normative character of the SD concept (Leach et al. 2010). The SD concept holds that ecological, social, and economic values must be integrated, that we must see to the needs of future generations, and that on a long-term basis we must keep within the boundaries of nature, and so on. But since it also holds to the principle of participation, it follows that those who are most affected by a decision must be consciously engaged in making that decision. A sustainable state can never be defined based on scientific standards alone. However, the fact that those affected by a decision are involved does not safeguard that the decision taken is sustainable. Power imbalances, lack of scientific knowledge input, among others are factors that hamper a participatory procedure. It is here that the normative character of the procedural framework introduced finds its obvious support; power asymmetries must be handled (criterion J), the procedure must support stakeholder learning (criterion L), and so on.

This is connected to the second fundamental issue raised by one of the respondents—whether a procedure according to the framework criteria guarantees a sustainable state. While the argument that a sustainable procedure always brings a sustainable state needs to be proven, procedures that do not meet the procedural SD principles have no place in sustainable development. The framework's approach is to define SD for procedures to provide a tool for studying procedures. Other criteria, emanating from state SD principles, need to be applied when studying decisions and plans (outcomes of procedures). Deliberative processes, as described by the framework, are thought to support long-term and common interests by means of the discursive mechanism, which allow individual arguments to interact and transform rather than aggregating unchallenged individual interests.<sup>10</sup> Therefore, a procedure as described by the framework can be seen to have large potential to deliver a sustainable state.

Related to the procedure-state issue is the issue of how the framework supports integration of DRM and NRM.

The substance (state) of a decision or plan depends heavily on the process by which it is developed. Since integration is one of the two main conceptual components of the framework, the application of the framework will support integration of NRM and DRM. For example, the framework states that all relevant values of the issue at hand need to be integrated (criteria D, E, G). This means that a process of, for example, water resources management needs to involve systematic handling of flood risk. Lack of such considerations in a studied planning process will generate case specific knowledge and recommendations for how to include values threatened by floods in the specific case. And vice versa, when a DRM process is studied, the framework will support identification of potential barriers and possibilities to make the process better in terms of integrating the main environmental/natural resource values concerned by the plan or decision.

In relation to the issue of SD principles, the result does not suggest that any additional SD principles need to be included in the framework. Several of the respondents agreed, however, that inclusion of contextual issues such as the integration between organizations, legislations, sectors, and geographical scales, would be valuable ways to develop the framework further. The following Swedish case will provide a good example of this, illustrating how relationships between administrative levels and policy fields are key factors for establishing integrated flood risk management. Some of the framework's criteria provide important support for studying such issues (mainly A, B, D, F, G, and I), but integration with respect to organizational issues are currently not the focus of the framework. Inspired by the study results, a study has been carried out for developing the framework further in this respect (Hedelin 2015b).

Based on the interviews, another idea for further developing the framework was to develop it into a practitioners' planning support. Development work would be needed to adjust the framework to meet the needs of practitioners, for example, as a toolbox, handbook, or guide. In such a project, as well as in a project aimed at developing a specific planning procedure based on the framework, transdisciplinary research approaches could be useful. Designing forms for involvement of actors, tools for handling of data, and methods for structuring a rational discourse that explicitly relates to the main values involved, requires a thorough understanding of the planning context in addition to the scientific knowledge synthesized by the framework (see van Herk et al. 2011 and Ribarova et al. 2011 for recent examples of participatory and transdisciplinary research in the fields of flood risk and water resource management). One important use of the framework is to provide a scientific point of departure for transdisciplinary research, aimed at the operationalization of SD for strategic planning and decision-making procedures.

<sup>10</sup> See literature on deliberative democracy and collaborative planning for explanation of the deliberative processes and the discursive mechanism, for example Dryzek (2000).

Forthcoming work related to the framework can be engaged in both developing the framework further and in developing specific planning procedures and practical support for planners. The perhaps most obvious use of the framework is for the analysis of planning procedures. The Swedish case, presented below, provides an example of the type of results such assessments can provide.

## 6 Illustration of the Sustainable Procedure Framework: The Case of the EU Floods Directive in Sweden

During the autumn of 2012 the framework was used as a basis for the analysis of the ongoing procedures of implementing the EU Floods Directive in Sweden (see Hedelin 2015a for a full account of the study). A summary of the case study is presented here to illustrate the kind of results the framework can provide.

### 6.1 The EU Floods Directive

All EU member states are working on implementing the EU Floods Directive (EU 2007) that aims to reduce and manage the risks associated with floods. One of the directive's primary ideas is that an integrated management approach is needed to successfully handle flood risks. Many formulations of the Floods Directive (FD) support this: the requests to coordinate actions within river basins, the broadly formulated objective to protect human health, the environment, cultural heritage, and economic activities, and the request to coordinate the FD and the Water Framework Directive (WFD) (EU 2000). Another fundamental idea behind the FD relates to participation—the active involvement of the actors concerned with flood risk management: “Member States shall encourage active involvement of interested parties” (EU 2007, Article 10:2). In order to render these fundamental ideas operational, the FD prescribes three main steps: preliminary flood risk assessments in all water districts (step 1); the development of flood hazard maps and flood risk maps for the areas identified (steps 2a and 2b); and the establishment of flood risk management plans (step 3). The work will be carried out in 6-year cycles—the first ended in December 2015 with the completion of the first generation of risk management plans.

The main actors for the handling of flood risks in Sweden are the local municipalities (around 300 in number). The municipalities are directly responsible for land use planning, flood risk planning, and crisis management. But the Flood Risk Ordinance (Government of Sweden 2009)—which is how the FD has been written into Swedish legislation—does not place any new formal obligations on the municipalities.

At the regional level, the county administrative boards (21 in number) have mostly a supporting and supervisory role in risk management. The implementation of the FD has added two important tasks to the county administrative boards (CAB)—the development of flood risk maps and flood risk management plans (steps 2b and 3). At the national level, the key actor is the Swedish Civil Contingencies Agency (MSB) who is the main national authority on risks and crises. The MSB leads and coordinates the national FD work, represents Sweden at the European level, and carries out the preliminary flood risk assessments (step 1) and the development of flood hazard maps (step 2a). At the central governmental level the Ministry of Defence is responsible for FD issues (Fig. 1).

### 6.2 Case Study Method

A full account of the method used to apply the Sustainable Procedure Framework to the analysis of the procedures of implementing the EU Floods Directive in Sweden is provided by Hedelin (2015a). The FD study was based on interviews with the key persons responsible for designing and leading the work of the FD in Sweden at the national and regional levels:

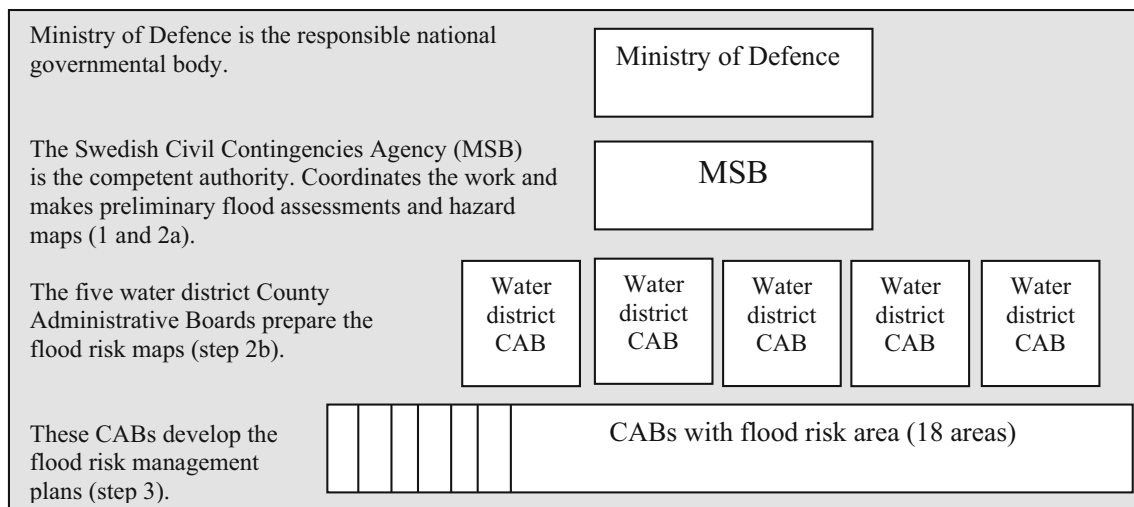
- the leader of the early working group for the implementation of the FD in Sweden who investigated the regulatory and organizational settings;
- the person who handles FD-related issues at the Ministry of Defence;
- the two project leaders at the national competent authority (MSB);
- four (of the five) key persons at the CABs responsible for the flood risk maps in the five super-regional water districts. (The fifth person had only just started in his position at the time during which the interviews were conducted.)

The eight interviews were undertaken in the fall of 2012, each lasting 1–2 h. The framework provided structure for the interviews, and a basis for phrasing follow-up questions to the main interview question—“how is the FD work carried out (or will it be carried out)?” Directed content analysis was used and the framework was used as the theoretical basis for categorization (Shannon and Hsieh 2005).

### 6.3 Case Study Results

#### 6.3.1 (A) Integration of knowledge from all relevant disciplines

The respondents all agreed that a broad range of knowledge is required in the management of flood risks, including geology, hydrology, environmental protection, GIS, modelling,



**Fig. 1** Outline of the formal organizational system for the Floods Directive in Sweden

technical infrastructure, flood prevention measures, crisis management, land use planning, law, and cultural heritage. Many referred to the four areas highlighted in the directive itself—health, environment, cultural heritage, and economic activities (EU 2007, Article 1)—as effectively steering the need for knowledge integration and data collection.

Actions supporting the integration of knowledge are taken at national and regional levels. The MSB has established a national reference group including those authorities that have formal responsibilities connected to the FD, and also seeks to encourage knowledge and information exchange in relation to the CABs, by arranging meetings, producing “dialogue letters,” and maintaining a homepage. The CAB respondents, however, primarily perceive these efforts as serving the interests of top-down information provision. All water district CABs collaborate, or plan to collaborate, internally with different departments and externally with other CABs.

### 6.3.2 (B) Handling of different views of knowledge (for example, positivist, relativist)

The CAB collaborations include persons with different knowledge backgrounds from different departments. These collaborations are perceived to work very well. One respondent noted: “We have raised the understanding of each other’s tasks and perspectives and we work well together.”

Three of the CAB respondents, however, viewed the collaboration between the county and the national level as being somewhat complicated, relating perhaps to aspects of academic background and professional culture. One noted: “There are different schools involved [...] I guess it’s a functional personal thing that makes it a little hard to get things going sometimes.” No specific strategy currently

exists for the avoidance of potential problems relating to knowledge views and academic backgrounds.

### 6.3.3 (C) Handling of different kinds of uncertainty

On the question of which kinds of uncertainties are important in their work with the FD, the consequence of alternative scenarios and the areal distribution of water during floods are the primary uncertainties raised by the respondents. The work involves the promotion of systematic ways to handle these uncertainties, for example, by developing differentiated scenarios (50-, 100-, and 200-year floods), and by creating a new national digital elevation model.

Another kind of uncertainty concerns the preconditions of the work, such as the content and formats of maps, the time plan for deliverables (draft reports and maps), financing, and the formal status of the flood risk management plans. Lower level organizations wait for guidelines from higher levels (CAB–MSB–EU), and a sense of frustration is expressed: “And that, I feel, has permeated the whole FD implementation. These uncertainties become a hindrance” and “I’m feeling held back right now.” Project plans exist and are being developed within the organizations involved, but no shared, overall project plan exists.

### 6.3.4 (D) Identification of the most relevant values in relation to the current issue

The FD categories—human health, environment, cultural heritage, and economic activities—function as a broad basis with respect to value identification. More detailed instructions for the selection of values to be presented on the risk maps will be provided by the EU. Both the MSB and the CABs plan to use a wider set of values (data) than those required.



6.3.5 (E) *Rational argumentation based on the identified values, by relating them to alternative choices in the planning process*

The preliminary assessment of flood risks (step 1) is an important step in the handling of alternatives and in relating the planning process to values. GIS analysis using flood scenarios and the four value categories were carried out by the MSB, resulting in 18 identified population centers affected by potential flooding. The values could be weighted to generate alternative selections of areas.

Another important step in the prioritization of values is the establishment of flood risk management plans (step 3). The MSB is of the view that the plans will primarily include measures that are municipally planned, based in part on the new risk and hazard maps provided. The CAB respondents, however, have a more expert-based view of the plans where the measures are more considered as a logical outcome of the produced maps.

6.3.6 (F) *Inclusion of knowledge owned by relevant actors*

Besides the responsible authorities, the municipalities are the main actors in terms of knowledge. The MSB sees the municipalities as the key users of the assessments and risk/hazard maps. As such, knowledge of their needs is crucial to rendering the material as useful as possible for them. Open meetings bringing together the municipalities and the CABs are planned, where different municipal departments will need to participate. The MSB also sees the municipalities as the main contributors to the flood risk management plans. The CABs tend to focus on the flood risk maps. If needed, the municipalities will be asked for complementary data. For the flood risk management plans, the general picture provided is that the CABs will develop preliminary plans that will then be discussed with the municipalities concerned.

The general view is that non-municipal actors (for example, river regulators, private citizens, fishing organizations) can become involved indirectly in the work via municipal processes for the handling of risks (for example, in land use planning) regulated by other legislations that prescribe consultation. In addition, all respondents refer to the formal consultation process prescribed by the FD, which provides an opportunity to comment on draft plans. One respondent highlighted the possibility of focusing on river groups<sup>11</sup> in relation to the inclusion of knowledge.

<sup>11</sup> River groups are local, river system-based stakeholder groups mainly composed of regulation companies, power companies, municipalities, and CABs (convener). Their main task is to spread knowledge among, and coordinate the involved actors, especially in times of high flows.

6.3.7 (G) *Inclusion of the ideological orientations represented by relevant actors*

During the process of preliminary flood risk assessment a number of expert authorities were consulted. A workshop was conducted with the national reference group where the method including weighting for selection of flood risk areas was explained and discussed. None of the CABs were involved at this stage.

According to the MSB, stakeholders will be indirectly involved in the FD work, through formalized municipal processes, such as land use planning and risk and vulnerability assessments. But the issue of the ideological orientations of those local actors involved in the process has not been fully developed.

6.3.8 (H) *Participation in the most critical phase(s) of the process*

Thus far, a number of expert authorities have been engaged in the process while municipal involvement has mainly concerned the flow of information from higher levels. The key phase for municipal involvement is seen to be step 3 (flood risk management plans). According to the MSB, the municipalities' planned measures for reducing flood risk will constitute the basic data for the establishment of the plans. The CAB respondents plan to consult the municipalities after having established plans based on the flood hazard and flood risk maps (see also E and F).

The flood risk management plans will be subject to formal public consultation and will be made available at the MSB's homepage. The MSB has the view that stakeholders and the general public will primarily become involved indirectly, via the normal municipal processes for the handling of risks regulated by other legislative documents that prescribe a process of public consultation.

6.3.9 (I) *A procedure for defining the actors that should be involved; (J) Handling of power asymmetries; (K) Procedures that ensure that ideological orientations are not suppressed; and (L) Learning*

Concepts like participation and democracy are not generally used by the respondents. The Ministry of Defence and the leader of the early working group for the FD implementation describe democracy as an issue of low relevance in relation to the FD. One respondent at the CAB level noted that: "The issue of democracy and anchorage is not included as an important issue in this work. [...] I don't know why, but that is how I perceive it."

Much in line with these approaches to democracy, there are no systematic activities to identify those actors that are most affected by the decisions undertaken, and no concrete

**Table 3** Overview of the results from the evaluation of the EU Floods Directive in Sweden

Criteria	Summary of results
A Integration of disciplinary knowledge	A broad spectrum of knowledge is seen as important and is also represented in the work. Horizontal knowledge integration is facilitated while vertical integration needs to be further developed
B Handling of different views of knowledge	Differences in academic and professional backgrounds are seen as both valuable and as a possible difficulty in terms of learning and communication. No strategy exists for avoiding potential problems connected to academic backgrounds and knowledge views
C Handling of different kinds of uncertainty	Systematic ways of handling uncertainties related to floods are part of the work, for example through differentiated scenarios. Systematic ways of handling institutional uncertainties are less developed
D Identification of the most relevant values	A broad set of values are identified based on the value categories highlighted in the FD (health, environment, cultural heritage, and economy). See also G
E Rational argumentation based on values and alternatives	A method supporting rational argumentation in relation to alternatives and values is used in the preliminary flood risk assessment. The risk maps being produced can also facilitate such argumentation
F Inclusion of relevant actors' knowledge	Knowledge from national and regional authorities with formal responsibilities is included. Local knowledge is not yet included, but there are plans to involve the municipalities concerned
G Inclusion of ideological orientations	Ideological orientations from the key authorities are included. It is uncertain to what degree municipal perspectives will be included
H Participation in the most critical phase(s)	The municipalities concerned, who are the main actors concerned, will be involved only indirectly, as providers of basic data for risk maps and for input to the plans. The management plans will be subject to traditional public consultation
I A procedure for defining the actors that should be involved	The local actors who are the most directly affected by the decisions under way have not been systematically identified
J Handling of power asymmetries	There is no explicit approach for handling power asymmetries
K Safeguarding ideological orientations	There is no explicit approach to ensure that ideological orientations are not suppressed
L Learning	There is no strategy for stakeholder learning, but the hazard and risk maps can support such learning

plans to involve local actors other than the municipalities. Issues of handling power imbalances or stakeholder learning are not covered.

#### 6.4 Case Conclusions and Recommendations

The results (Table 3) show that there is strong potential in the current work in relation to the criteria concerning integration across disciplines and values (A–E). Still, the work can be developed further, especially with regard to knowledge exchange between the national and the regional levels. Frustration concerning uncertainties connected to administrative issues, and divergent views of roles and mandates (for example, formal status of risk management plans) show that an extended exchange between levels is urgent. The establishment of a national-regional working group would be a first step. Another would be to develop a shared process plan, as the means for a transparent, systematic, and continuous conversation and learning about how the work can be carried out.

Furthermore, the results clearly show that issues of participation and democracy are still waiting to be developed by the FD administration. In relation to criteria F–H (participation contributing to the process) the work is

characterized by the knowledge and perspectives owned by experts rather than by the provision of input of knowledge and perspectives from those at the local level. Another key objective here is anchorage and democracy (criteria I–L). In order to attain the advantages of a participatory planning approach, the FD administration needs to develop their work much further in this respect. One strategy is to involve the appropriate actors directly in the tasks prescribed by the FD. It would be useful to engage the river groups when designing participatory structures. Another strategy would be to support and encourage the municipalities to involve their citizens and other stakeholders in the existing municipal processes for the handling of flood risks. Handbooks and other information activities are possible tools for operationalizing such a strategy.

#### 7 Conclusion: The Applicability of the Sustainable Procedure Framework to DRM Procedures

This study did not identify any theoretical inconsistencies in the Sustainable Procedure Framework in relation to strategic DRM procedures. It can therefore be seen as methodologically valid to apply and test the framework in

relation to such procedures. The Swedish case illustrated the use of the framework and exemplified the kind of practicable recommendations that such studies can provide. Future use of the framework will produce more knowledge, not only of the studied DRM procedures, but also about the usefulness and possible further development needs of the framework. The basis is now laid, however, for application of the Sustainable Procedure Framework to a wide range of cases of strategic DRM.

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