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Towards a Risk Governance Culture in Flood Policy—Findings from the Implementation of the “Floods Directive” in Germany

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Abstract: The European Directive on the Assessment and Management of Flood Risks is likely to cause changes to flood policy in Germany and other member states. With its risk governance approach, it introduces a holistic and catchment-oriented flood risk management and tries to overcome shortcomings of the past, such as the event-driven construction of mainly structural measures. However, there is leeway for interpretation in implementing the directive. The present paper gives an overview on the implementation of the floods directive in Germany and is divided into two qualitative empirical case studies. Case Study I investigates the level of acceptance of the floods directive among decision-makers in the German part of the Rhine river basin. Findings show that the federal states respond differently to the impulse given by the floods directive. Whereas some decision-makers opt for a pro-forma implementation, others take it as a starting point to systematically improve their flood policy. Case Study II presents recommendations for a successful implementation of flood risk management plans that have been developed within a project for the water authority in Bavaria and might be interesting for other federal/member states. For a participation of the interested parties on the level of shared decision-making, the planning process has to work on sub-management-plan level (15–20 communities). The water resources authority has to adopt a multi-faceted role (expert, responsible or interested party depending on the discussed topics).

Keywords: floods directive; flood risk management; flood policy; stakeholder participation; risk approach; security approach; risk governance; water authority; decision-makers

1. Introduction

Flooding can be regarded as one of the most important natural hazards in Central Europe both in terms of casualties and damage to property. In Germany, the numerous flood events in the last decades—notably in 1993/1995 (Rhine river basin), 1997 (Oder), 1999 (Danube) and 2002 (Elbe)—have highlighted the need for action. In addition, there are more examples of flooding from all over Europe [1,2]. The European Commission estimates that between 1998 and 2004, Europe suffered from over 100 major flood events causing 700 fatalities and insured economic losses of at least €25 billion [3]. Flooding is also a potential threat to cultural heritage and the environment, causing damage that is difficult to quantify. Increasing human activity in flood-prone areas, environmental interventions such as river regulations, an increasing coverage of soil due to urbanization and construction and a trend towards more extreme weather events are thought to have contributed to the rising damage potential [2,4,5].

Even though areas potentially affected by river floods are easy to locate and allow for a relatively long warning period, many municipalities and their residents are unprepared for flooding or even unaware of being at risk [6]. In spite of numerous improvements in flood prevention, social scientists have repeatedly criticized the way flood risk is dealt with in Central Europe [7,8]: It is only after harmful flooding that measures are taken in order to be better prepared for upcoming flood events. Along with this event-driven course of action, a hierarchical and sectoral planning with a strong focus on structural protection measures prevails. Especially in areas protected by dikes and thus perceived as “safe”, the remaining risk of extreme flood events is not being communicated which explains part of the low level of risk awareness among the local population and authorities. Furthermore, there is a lack of communication and cooperation across administrative borders, resulting in conflicts between upstream and downstream communities.

In this context, the European Directive on the Assessment and Management of Flood Risks (2007/60/EC) [9] can make a significant contribution to modify the flood risk policy in Germany and other EU member states. Referring to an increase in damage caused by flooding all over Europe and to a lacking coordination between member states, the European Commission issued a communication on flood risk management in 2004 highlighting the need for further legal action. Following an intense consultation process involving member states, NGOs and the scientific community, a proposal for a directive was released in 2006. Within the formal consultation process, the directive passed through various European institutions with only minor modifications (e.g., better coordination between member states, more flexibility for the member states and stronger consideration of climate change) being made. Only 17 months after the first reading in the European Parliament, the Directive came into force on 26 November 2007 [10].

The concept of the directive comprises three steps (Figure 1). At first, member states are required to carry out a *preliminary flood risk assessment* by 22 December 2011. Since measures cannot apply

everywhere at the same time, this instrument allows to define those river sections which are currently regarded as flood-prone and need further risk appraisal. Secondly, member states have to provide *flood hazard maps* and *flood risk maps* for the previously defined zones until 22 December 2013. Flood hazard maps show the flood extent, water depths and flow directions/velocities for three different probability scenarios (high-, medium- and low-probability events), whereas flood risk maps refer to the number of inhabitants, economic activity, industries, cultural heritage and nature protection areas potentially affected by flooding. The third step of the directive is the preparation of *flood risk management plans* (FRM plans) which consist of objectives and measures that shall be identified by the responsible institutions until 22 December 2015. All steps have to be reviewed and updated in a six-year cycle [9].

Figure 1. The three implementation steps of the European Floods Directive.



Aiming at the reduction of the adverse consequences of flooding for human health, environment, cultural heritage and economic activity (and not at avoiding floods or fighting against them), the directive calls for a new culture of dealing with flood risks. It takes into account the above-mentioned scientific advice from the frontline of research and offers the possibility to reorganize flood risk policy in Germany and other EU member states. Not only will extreme events systematically be taken into consideration; modifications also include an enhancement of non-structural measures, catchment-based approaches, interdisciplinary planning, and bottom-up elements such as stakeholder participation. Consequently, the directive brings about a paradigm shift in the way we handle floods and offers the chance to establish a risk culture and a policy change from the prevalent *flood protection* to a holistic *flood risk management* (FRM).

In European environmental policy there is a trend towards a shift from classical government instruments to new modes of governance including bottom-up approaches, stakeholder participation and multilevel and cross-sector coordination [11]. Instead of command-and-control instruments with clearly defined objectives in the form of facts and figures, the new European environmental policy leans towards a management approach, *i.e.*, member states are obliged to set up plans and programs and define their own objectives. This trend is criticized especially in the German water law discourse,

e.g., by Reinhardt [12] who worries about the high transaction costs for the development of the plans without clear goals like defined security levels.

Whereas participation has a long-standing tradition in FRM in Anglo-Saxon countries [13], there is however, still a deficit in parts of continental Europe. In Germany, a current renaissance of participation can be observed as shown by the conflict about the “Stuttgart 21” railway project that sparked off protests of unexpected intensity and led to a referendum. This current debate in Germany offers the chance to actually implement intensive participation processes, as it opens a window of opportunity facilitating a higher level of acceptance towards participation among decision-makers.

This raises the question as to whether decision-makers within the German water authority are willing to accept modifications to the established flood policy and share responsibility or if they are reluctant to effectively implement some of the newly-introduced requirements and, thus, weakening the central idea of the directive by a pro-forma implementation. Besides, there are questions regarding practical problems such as the spatial scope of FRM plans or the intended forms and intensities of stakeholder participation. The aim of this article is to give an overview of trends in how best to implement the FRM directive in Germany, in addition to its level of acceptance and key implementation success factors that are transferable to other member states. The main research question is whether the directive can permanently modify the way our society deals with flood risk. Case studies and examples help to point out the direction the different German federal states have taken.

First, the floods directive will be analyzed and classified with regard to the concepts of *security approach* and *risk approach* [14]. Parallels and differences to the *risk governance* model are revealed. According to the discourse on a policy change from *government* to *new modes of governance*, a systematic risk governance concept as described by the International Risk Governance Council (IRGC) can prove helpful to effectively manage flood risk [15]. The empirical section of the implementation study consists of two case studies. Since federal states are responsible for environmental policy, Case 1 gives examples from several German *Länder* with a focus on the Rhine catchment and aims to describe the willingness of change among decision-makers. Case 2 focuses on a possible implementation strategy for the FRM plans in Bavaria which could be helpful elsewhere. Methods applied for the two case studies involve expert interviews, in-depth online documentary research and workshops with different participants including planning simulation games. Finally, there will be a conclusion whether the directive is likely to remodel flood policy in Germany.

2. A Paradigm Shift in German Flood Policy?

Wagner [14] argues that the FRM directive is the starting point for a paradigm shift in German flood policy—a change that traces back to a discourse initiated in Switzerland in the 1990s [16]. In Germany, the Federal Water Act (WHG) pursued a “*security approach*” until 2010, whereas the EU FRM directive and the March 2010 amendment to the Federal Water Act have introduced new standards mainly following a “*risk approach*”. The directive also introduces aspects of the “*risk governance*” concept according to the International Risk Governance Council (IRGC). In this chapter, the perspectives and principles of risk and security approach and of the risk governance concept are presented. Subsequently, the previous and updated versions of the Federal Water Act are assessed against the background of the described concepts.

As its name already indicates, the *security approach* (Table 1) aims to protect the society from flood hazards. Flooding is regarded as a process of the natural sphere, whereas social aspects leading to an increase in damage potential are not systematically taken into account. Suggested solutions are predominantly structural measures (levees) or top-down restrictions (designation of flood zones with land-use restrictions) oriented at a standardized level of protection (usually the 100-year flood, a medium-probability flood event in terms of the floods directive). Critics complain that, in doing so, the State creates a line of demarcation between risk areas and officially “safe” areas. As the residual risk of extreme flood events, dike failure or flooding of “protected” areas caused by groundwater or sewerage systems is not communicated; citizens and businesses in those areas are unaware of being at risk and accumulate remarkable amounts of values. This increase of damage potential in “protected” areas is also referred to as “safe development paradox” [17] or “levee effect” [18,19]. Furthermore, there is evidence that the damage potential is at its highest directly behind the boundary line of designated risk zones [20]. In case of extreme flood events such as 2002 in the Elbe river basin, municipalities and citizens in those zones are unable to cope with the situation instead of taking effective mitigation measures [7].

Table 1. Comparison of security approach and risk approach [14].

Main characteristics	Security approach	Risk approach
Aim	protection against threat emanating from flood events	develop a strategy how to handle flood risk, define which level of risk is acceptable
Terminology	danger, threat, security, protection	risk, residual risk, risk evaluation, risk management, risk governance
Scenarios	medium-probability events (HQ100) as the standard level of protection	high-/medium- and low-probability events, priorities regarding level of protection
Measures	focus on structural measures	combination of structural and non-structural measures
Involved parties	sectoral planning (water authority), top-down, implementation gap	interdisciplinary, bottom-up elements
Spatial focus	local solutions for local problems, oriented at administrative borders	across administrative borders, catchment-based
Time aspect	short-term solutions, event-driven, “trial and error”	medium-/long-term solutions, prevention, regular revisions

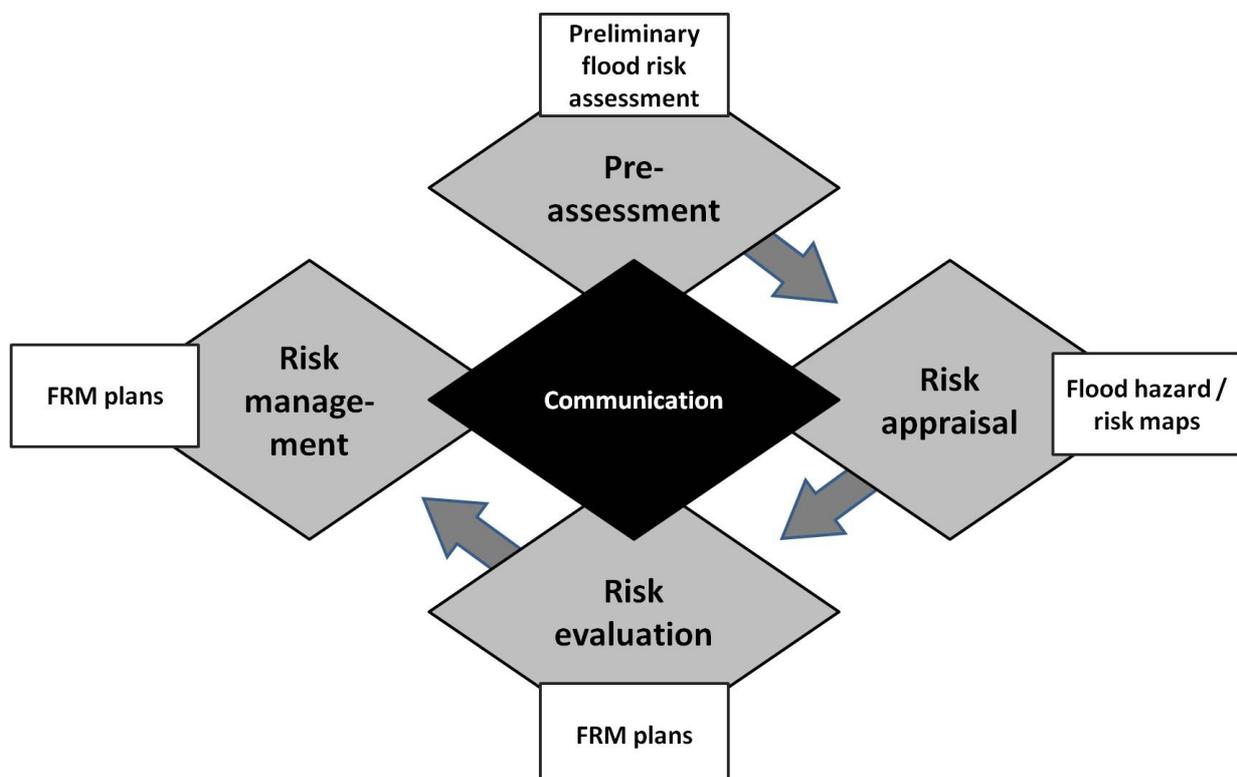
Another characteristic of the security approach is a strongly hierarchical planning system that lacks interdisciplinary coordination. Due to a long transfer of responsibility from local actors to state actors in flood management [6], the water authority has a strong influence in terms of legal competences and financial resources [21]. Feeling they know best which measures to take, the experts of the water authorities decide in a top-down manner and concede other stakeholders such as regional planners or municipalities little influence. This leads to a lack of implementation as stakeholders do not identify with imposed measures. Another drawback of the security approach is the lack of cross-border coordination which results in the so-called “upstream-downstream conflict” [22]: Upstream municipalities take own measures that increase flood risk for downstream river sections or refuse to provide retention areas since they do not benefit from them. Thus, the spatial focus of the security

approach is rather local. Moreover, “in many basins (...) it appears that the decisions are very much driven by events. In the aftermath of major floods, far reaching decisions are often made and implemented swiftly” [1].

In contrast, the risk approach aims to establish a risk discourse among the society of a region in order to come to a common conclusion as to how flood risk should be dealt with. This implies, in particular, a transparent risk communication. Authorities have to provide potentially affected people and enterprises with consistent information regarding the risk of extreme flood events, *i.e.*, they have to avoid guaranteeing “absolute security” [23]. In Southern Germany, however, the term “Hochwasserfreilegung” (=freeing an area from the flood hazard) is still frequently used. In the risk management cycle not only natural processes, but also social aspects as damage potential and vulnerability are analyzed. The wide variety of possible mitigation measures—including improved warning systems or disaster relief trainings—should be evaluated by a cost benefit or multi criteria analysis [24] leading to a higher level of protection for highly vulnerable areas such as major cities or industrial areas and a lower level of protection for sparsely-populated rural zones.

In case of the floods directive, the initiated planning process resembles the *risk governance concept* as described by the International Risk Governance Council [15,25]. Risk governance is a model consisting of four steps that aim to develop a strategy which defines how a state, region or society wants to deal with risk (Figure 2). It has initially been developed for technological risks, but can be transferred to natural risks as well. First, a *pre-assessment* or framing is carried out in order to define a frame of reference for the following risk assessment and management. The first step of flood risk management is to define zones or areas with a medium or high flood risk.

Figure 2. Comparing the risk governance concept [25] to the floods directive.



Secondly, in the course of *risk appraisal*, risk is described in its spatio-temporal patterns, which involves a detailed description of the occurrence probability of natural processes (including worst-case scenarios) as well as the vulnerability of the society described by the damage potential. The risk appraisal is carried out by experts since it aims to provide “objective” expertise for upcoming decisions. This step is also the second step of the floods directive. While the flood hazard maps have to include all necessary information (e.g., water depths for the different scenarios), the flood risk maps give a rather superficial overview which reduces the usability for cost benefit analysis or emergency planning. The third step is called *risk evaluation* and envisions an evaluation of risk compared to the effort needed for its reduction. It seeks to answer the question: “Which (residual) risk is acceptable?” Since evaluation always implies a certain level of subjectiveness (*i.e.*, there are different interests among the different groups of a society), experts cannot carry out an evaluation on their own. In contrast, stakeholder groups of the civil society have to be given a chance to participate. The final step is *risk management* and comprises of a decision-making process among all stakeholder groups, which results in a common strategy of how to deal with risk. In the floods directive these two steps are combined. All four steps ideally go along with a coherent risk communication which is also addressed in article 10 of the directive.

Regarding the Federal Water Act (Wasserhaushaltsgesetz) in Germany after the amendments in 1996 and 2005, there are numerous standards that can be assigned to the security approach. For decades, technical flood protection designed for a 100-year flood event has been the most important measure adopted against flooding. A second strategy was to designate flood plains (in most cases, again, for a 100-year flood event) that go along with land-use restrictions. The 2005 amendment was the first to introduce a new zoning category for areas that can be flooded in case of low-probability floods or levee failure (§ 31b WHG 2005) [26]. It also provided a new instrument called “flood protection plans” (§ 31c WHG 2005) [26] which, on the one hand aimed to sum up measures on the catchment-scale, but on the other hand referred exclusively to the 100-year flood event. In fact, online research for Case Study II has shown that there are not many flood protection plans developed up to now.

The date of the 2005 amendment is no coincidence and proves the event-driven course of action in German flood policy. Corresponding with the Sir Michael Pitt Review in England (one year after the 2007 floods) and the report of the Flood Policy Review Group in Ireland (shortly after the 2002 floods) [27,28], it was the 2004 DKKV report on “lessons learned from the 2002 disaster” [7] that triggered off the adjustments to the German flood policy in 2005. In the transposition of the EU floods directive into the Federal Water Act (2010 amendment), there are some pitfalls to the FRM approach. First, the headline “flood protection” (and not “flood risk management”) can be seen as a legacy of the security approach. Another drawback, which is contrary to the risk approach, is the fact that (according to § 75 II WHG) [29] FRM plans have to refer at least to a 100-year flood event, *i.e.*, the low-probability scenario is optional.

Altogether, it seems that the implementation of the flood risk directive *does* mark a turnaround in German flood policy. Even though the new German legislation differs in a few points from the risk approach, newly-introduced standards such as a systematic risk mapping, a holistic combination of measures and an intense participation of interested parties are a valuable complement to existing instruments. Since the directive and its transposition into German environmental legislation, when

compared to the water framework directive, is less formalized, there is some leeway for interpretation making it depend on the decision-makers how effectively the risk approach will be implemented. This will be analysed in the following sections.

3. Methods

The empirical part of this study is divided into two case studies. Case I gives an overview on the implementation of the FRM directive in Germany and is focused on the level of acceptance among decision-makers in the administration of different federal states. It is based on a 10-month study at the Geography department of the University of Bonn [30]. Case 2 gives a more detailed insight into problems and key factors at implementing the new regulations on FRM in Bavaria. Here, research was carried out in the context of a one-year project that aimed to develop a strategy for implementing FRM plans on behalf of the Bavarian administration. In both cases, qualitative methods including documentary research, expert interviews and stakeholder workshops were applied.

Since the implementation of the directive is responsibility of the federal states and has to be oriented at hydrological catchments, the German part of the Rhine river basin was chosen as an area of investigation. From October to December 2009, 17 interviews were carried out with experts from the six federal states Bavaria, Baden-Württemberg, Hesse, Rhineland-Palatinate, Saarland and North Rhine-Westphalia. Interview partners were professionals from the water authority (ministries of the environment, environmental agencies, regional governments), municipalities (flood partnerships, head organizations of municipalities) and other catchment-based institutions (International Commission for the Protection of the Rhine, local water boards). In 2010/2011, the findings from the Rhine river basin were complemented by three more expert interviews with a focus on the role of flood partnerships and their role at implementing FRM plans in Southwestern Germany as well as online documentary research on implementation strategies in other German and European river basins.

Case Study II has been carried out by the Chair of Forest and Environmental Policy of the Technische Universität München within a project funded by the Bavarian Ministry of Environment. The project ran from March 2010 to March 2011 and aimed to develop an implementation concept for FRM plans with intense stakeholder participation on the level of “partnership” as defined by Arnstein [31]. Therefore, online research, expert interviews and FRM workshops were arranged. The interview part comprised of nine qualitative interviews with several institutions on “lessons learned” from the implementation of the Water Framework Directive, Habitats Directive and Birds Directive in Bavaria as well as 14 interviews on FRM with representatives from the administration and stakeholder groups in the Upper Palatinate (Oberpfalz) region. Additionally, four FRM workshops were carried out—two of them with professionals from the water authority and two with other stakeholder groups (regional planning, municipalities, civil protection, agriculture, nature protection, industry and citizens’ groups). The workshops involved between 30 and 50 participants each and included interactive sessions with planning simulations and role-play. The concept developed within the project does not apply to the Bavarian part of the Main river basin since the transitory clause of Art. 13 FRM directive was used here so that a FRMP could be created with reduced participation. However, there are plans to apply the described strategy here in the second implementation cycle after 2015.

The qualitative methods were carried out according to high scientific standards [32]. Since the implementation of the floods directive will not be completed until December 2015, the findings cannot give an exhaustive overview on the strategy in every federal state. Also, there is no guarantee for a 1:1 implementation of the concept for FRM plans in Bavaria developed by the Technische Universität München. However, the authors of this article believe that conclusions in terms of the general reaction of decision-makers towards the flood risk management directive can be drawn and that the present findings are suitable for pointing out key factors for a successful implementation.

4. Results and Discussion

4.1. Case Study I—Acceptance of the FRM Directive in the Rhine River Basin

In the Rhine river basin, a high level of acceptance of the FRM directive has been observed (Table 2). Most of the interviewed decision-makers seemed to agree that it is necessary to make modifications to the existing flood policy in order to establish a risk approach. Above all, the systematic consideration of extreme events (Cit. A), the shift from structural towards non-structural measures (Cit. B) and the implementation of consistent standards valid for all European countries (Cit. C) are well received. The bureaucratic efforts that go along with the implementation of the directive are perceived as a resource-consuming, albeit necessary, side effect. Another proof of acceptance is evidence that decision-makers have already internalized the terminology of the directive and make use of it in their day-to-day routine (Cit. D). The impression that the directive's way of thinking seems to be more widespread within higher levels of the administration might stem from the fact that the implementation cascade of European directives reaches the local level later in time.

Table 2. Citations showing acceptance of the FRM directive.

Interview No.	Citation	Reference
Cit. A	<i>"I have always seen this very strong orientation towards the 100-year flood event and the negligence of those areas that could be affected in the case of rare events as a gap of the former German approach."</i>	[33]
Cit. B	<i>"I think what's really new for the directive is that we say we do have structural protection measures and that's great, but it won't protect us from each and every flood event. That is to say, we turn a bit away from the idea of protection. We accept that we have to live with the fact that there is a risk and we can only cope with it if we are pro-active and start to think about possibilities of prevention."</i>	[33]
Cit. C	<i>"When the deadline has elapsed, I can go to every European country and have a look at a FRM plan and see how flood risk is dealt with and I can find a place which is safe from flooding. That is of course an advantage."</i>	[33]
Cit. D	<i>"In the beginning it was common to say 'floods directive' or 'flood protection directive' and that was where I started to protest vehemently and insisted that it is about flood risk."</i>	[33]

In terms of the implementation strategy, there are two different approaches. The decision-makers in some federal states such as Hesse and Saxony see the implementation of the FRM directive as an adaptation of existing routines (see Table 3). They opt for a top-down approach at preparing the FRM

plans (Cit. E). Instead of (in their opinion) expensive and time-consuming ways of participation, they prefer to make do with a consultation process where interested parties are given the chance to have their say which might or might not be taken into account. As decision-makers pursuing a *pro-forma implementation* believe that stakeholders do not have the competence to participate in decision-making processes, they see a top-down strategy as the more efficient approach (Cit. F, G).

Table 3. Citations revealing a pro-forma implementation strategy.

Interview No.	Citation	Reference
Cit. E	<i>"It is going to cover all that what we already know, arranged in a different structure. Then we draw conclusions, a task which we would have done, anyway."</i>	[33]
Cit. F	<i>"There, it seems practicable to give the task of the implementation of the plans to the municipalities but to keep the preparation of the plans in our hands."</i>	[34]
Cit. G	<i>"Discuss the objectives with a municipality, with a pressure group? It doesn't work. I guarantee you won't get anywhere with it!"</i>	[34]

In contrast, federal states like Baden-Württemberg, Bavaria and Rhineland-Palatinate want to install new standards in flood policy with the help of the floods directive (see Table 4). Instead of writing plans that serve the needs of the European Commission but disappear into the desk drawer afterwards, they want plans that serve the needs in order to deal with flood risk in a better way (Cit. H). The directive, thus, is perceived as an instrument that legitimizes the decision-makers' intentions (Cit. I) and the creation of FRM plans is seen as an interdisciplinary task (Cit. J). Given the implementation gap in German flood policy, experts believe that a more intense participation of stakeholders is likely to increase risk awareness and implementation efficacy. In this context, some respondents from the water authority refuse to be the only party responsible for taking decisions. Alternatively, they suggest adopting the role of an expert who offers in-depth knowledge (in the form of flood hazard/risk maps) and acts as one party involved in the decision-making process (Cit. K). Owing to the fact that there is no legal obligation to implement measures from FRM plans (in spite of monitoring), it is seen as crucial that stakeholders identify with defined measures (Cit. L).

Table 4. Citations reflecting intentions to seize the chance to remodel flood policy.

Interview No.	Citation	Reference
Cit. H	<i>"I can try to do it in detail and exactly that is our approach because we have an administration out there that can and shall go on and work with that data afterwards."</i>	[33]
Cit. I	<i>"We want to take the directive as a reason to put flooding and flood protection back on the agenda. This is not just an unpleasant duty, no!, we definitely see an advantage there."</i>	[33]
Cit. J	<i>"In my opinion it is no specialized plan in our field of responsibility and this idea of an interdisciplinary plan has spread in the meantime."</i>	[34]
Cit. K	<i>"The only thing we do is to take the temperature and to present facts. At present, the water authority is a scapegoat and therefore it has to be an interdisciplinary body representing different interests that takes decisions."</i>	[33]
Cit. L	<i>"I think it is very important, especially with respect to the municipalities, that we include them when writing the FRM plans. In the end, it is them that have to take the bulk of responsibility at implementing the plans. They are deeply affected and we cannot ignore that."</i>	[34]

A concept that has received a lot of attention is the idea of *flood partnerships* that has been introduced in Baden-Württemberg in 2003 and is now being taken over by Rhineland-Palatinate, Saarland and Luxembourg as a means to facilitate the process of establishing FRM plans. Flood partnerships are voluntary associations consisting of several municipalities that have united in order to pursue common goals in FRM. In Baden-Württemberg, there are currently 26 flood partnerships that comprise, on average, of 50 municipalities each [35]. They are instructed by a training centre funded by the water authority. In Rhineland-Palatinate, Saarland and Luxembourg, flood partnerships are supported by the International Commission of the Protection of Moselle and Saar and, outside the Moselle and Saar catchments, by the Association of Municipalities. Compared to Baden-Württemberg, flood partnerships are much smaller with around ten municipalities each.

The qualitative interviews in Southwest Germany have revealed that, even if flood partnerships are a promising concept to promote objectives in FRM, they cannot serve as the only body of participation for the implementation of the floods directive unless they include other groups as well. One of the drawbacks is that flood partnerships are not suitable for multi-stakeholder participation since they consist of municipalities and only in some cases local business. Yet, other important stakeholder groups concerned by flood risk (e.g., farmers associations, nature conservation organizations) are not taken into consideration. Another disadvantage of flood partnerships is that taking part is voluntary and, therefore, municipalities that do not want to take part have to be given another formal means of participation to have their say.

Regardless of the chosen implementation strategy, all respondents intend to establish FRM plans that refer to extreme events and not only to HQ₁₀₀ (see Table 5). In many cases, they had not even taken notice of the exception from § 74 WHG [29] (Cit. M). However, a possible pitfall for a successful implementation is the heavily criticized mismatch between the ambitious aims of the directive and the tight deadlines. In particular, those decision-makers who are willing to pursue an implementation that does not only serve to satisfy the European Commission but also criticize the tight “corset” of the directive that impedes them while carrying out high-quality work. Beside, the advancing cutbacks in staff numbers of the public administration entail a shift from technical tasks to quality checks of the work carried out by private offices. It also leads to a “brain drain” in the public administration (Cit. N).

The transposition of the floods directive into the Federal Water Act (Wasserhaushaltsgesetz) in Germany leads to a focus “only” on riverine and coastal flooding, excluding floods from sewerage systems (as permitted by Art. 2, No. 1 of the directive) and free run-off due to torrential rain and flooding caused by groundwater. Since there is a discussion on developing the Common Implementation Strategy (CIS), respondents in Case Study I have raised fears of supplementary modifications such as an extension of the definition of “flooding” that would include other types of flooding and, therefore, lead to extra work (Cit. O). It was argued that other types of floods were not consistent with the three-step approach of the floods directive. Surface water runoff can occur nearly everywhere and, because of its high flow velocity, can cause heavy damages even at low water depths. This makes it very difficult to illustrate the associated risk on usual flood hazard maps. However, the interviewees acknowledged that it is important to develop strategies and measures against surface water flooding as a part of flood risk management planning.

Table 5. Other comments on the chances to effectively implement the floods directive.

Interview No.	Citation	Reference
Cit. M	<i>“In that case, it would contradict the EU and I cannot imagine that because they have to determine the risk for an extreme event as well and that would be a logical break. I don’t think the EU would accept that. It doesn’t make sense, anyway.”</i>	[33]
Cit. N	<i>“In the long run, we can’t keep our staff with temporary contracts. It doesn’t work and we don’t get anywhere. Everybody is happy finding a permanent employment somewhere else and then they leave. I can’t hold it against them, but all the know-how leaves with them and that is where we are really struggling now.”</i>	[34]
Cit. O	<i>“How do we deal with the annual exceedance probability of flash floods? And what about the water depth? That is not important in that case. There can be 20 centimeters of water running down a slope and flooding your house. I can’t even measure that! Flash floods can happen anywhere! So do I have to paint the whole map in blue?! What for?”</i>	[34]
Cit. P	<i>“By applying our criteria of significance, we have tried to establish a quantity of areas at risk which is still manageable. In the long run, we intend to create maps for all the watercourses registered for the implementation of the water frame work directive, but within that time frame and in this dimension it is not feasible. That’s why we have less areas of potential significant risk in the end.”</i>	[34]

Concerning groundwater, there is experience with groundwater flooding, but no concept to assign it to annual occurrence probabilities. In fact, the 1993 and 1995 flood events in Cologne led to record water levels of the Rhine. Yet, during the less severe 1988 flood event the groundwater level was quite high so that numerous basements were flooded [36]. This can be explained by the fact that the risk of groundwater flooding depends both on the height and the duration of a flood event and can therefore not be covered by the annual occurrence probability of “regular” river flooding. A comprehensive strategy to integrate groundwater or sewerage flooding is missing in Germany. Nevertheless, some federal states such as Rhineland-Palatinate and Baden-Württemberg include areas protected by dams into the 100-year event maps, which includes the risk of groundwater or sewerage flooding because of their proximity to the river.

However, there are also rules that are welcomed as a relief by member states, e.g., the transitory clause of Art. 13 which allows to apply documents that have been developed previously or the preliminary risk assessment which enables member states to define a quantity of river sections that is not too big to handle (Cit. P). The transitory clause has also been applied in the Bavarian part of the Main river basin. Thus, the leeway for interpretation is both a chance but also a disadvantage. On the one hand, the failure of the “German Working Group on Water Issues” (LAWA) to establish homogenous standards for all federal states [37] most notably resulted in a lack of homogenous definitions for the probability scenarios that can lead to contradictions on the borders of federal states. For instance, the decision of Hesse to define the 200-year flood event as a “low-probability scenario” is contrary to the risk approach and can lead to conflicts with neighboring federal states that have chosen to apply a 1000-year scenario. On the other hand, the lack of defined standards is suitable for taking different regional circumstances into account (e.g., it makes sense to permit different scenarios in high-mountain regions and in floodplains).

4.2. Case Study II—An Implementation Strategy for FRM Plans in Bavaria

At the beginning of the project, the aim was to define a strategy for FRM plans in Bavaria, which required defining the following research questions:

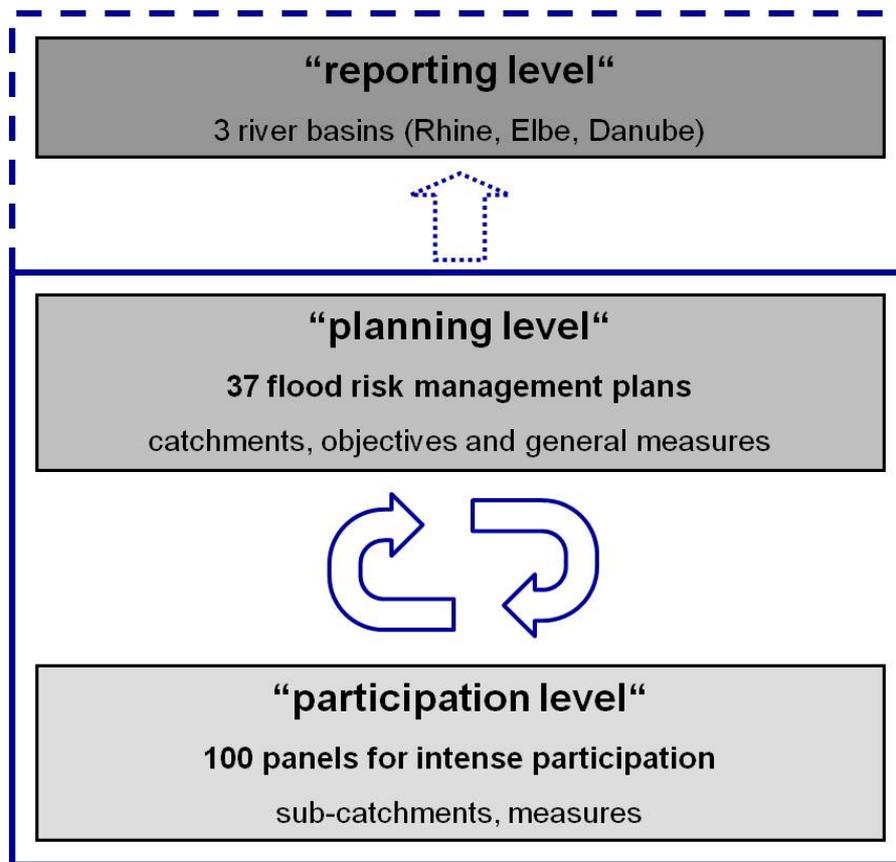
- On which spatial scale should FRM plans be created in order to guarantee high chances of implementation?
- Which interested parties should be given a chance to participate (this issue is also closely related to the spatial frame of the FRM plans)?
- How should the FRM planning process be organized and which role should the water authority adopt within that process?
- What further circumstances can foster an effective implementation of the new FRM standards?

4.2.1. On Which Spatial Scale Should FRM Plans Be Created?

The first issue to be investigated in Case Study II, was the spatial scale for the creation of FRM plans in Bavaria. Since the spatial reference of FRM plans has an influence on other decisions such as the responsible authority, groups of involved stakeholders, participation intensity and procedure, it is of great importance. In addition to the “reporting level”, which serves to sum up objectives and measures on river-basin (Elbe, Rhine, Danube) or management unit scale (Saale, Main, Lake Constance, German Danube), there should be a “working level” for the creation of implementation-oriented management plans. The workshops with planning simulation games have shown that, on a higher scale consisting of around 37 catchments (e.g., Naab and Regen river, 3,000 km² or Pegnitz river, 1,200 km²), participants succeeded in defining goals and discussing measures in a greater context. In contrast, on a rather local scale consisting of sub-divisions of the above mentioned catchments, participants had difficulty to discuss objectives or effects of measures on the whole catchment. Yet, there was a lot of creative potential at developing local measures.

The central challenge, thus, is to find a balance between focusing on the catchment-level and leaving room for the creation of local measures at the same time. Therefore, it was recommended to split the creation of FRM plans on two levels (Figure 3). The upper level comprises 37 catchments and serves to define objectives and a framework. In a second step, the catchments should be divided into sub-catchments where, within the context of the decisions made on catchment-level, measures should be developed in FRM workshops. Afterwards, the results are summed up in FRM plans on catchment and river basin level. The sub-division of the catchments is necessary as in each of the 37 catchments, there are on average 31 municipalities at risk (maximum 77), let alone other stakeholder groups that have to be added to the interested parties. Since local stakeholders are not willing to travel far and tend to think of concrete measures instead of general objectives, it is not feasible to organize an intense participation process on catchment-level. In contrast, a quantity of 10–15 municipalities plus other stakeholders on sub-catchment level would be ideal for intense participation. Another finding that supports the two-level approach is the Flood Risk Management (Scotland) Act [38] that distinguishes between “*Flood Risk Management Plans*” and “*Local Flood Risk Management Plans*”.

Figure 3. A multi-level concept for the creation of FRM plans.



4.2.2. Which Interested Parties Should Be Given a Chance to Participate?

Given that there is no definition of “interested parties” in the floods directive, it was decided that the term requires a rather broad interpretation, taking into account all groups or institutions concerned with flooding: water authority, municipalities, civil protection, regional planning, agriculture, forestry and nature conservations. In the case of agriculture and nature protection, there are both authorities and NGOs. It was recommended that none of the groups should be excluded from the planning process since otherwise the excluded groups would challenge the FRM planning as a whole and could create negative publicity against it. On the one hand, including interest groups into the planning process could reveal conflicts. On the other hand, it would be an advantage if these conflicts were discussed in an institution that is suitable to negotiate interests and would not, as common practice, lead to short-term political decisions.

On catchment-level, regional stakeholders (e.g., planning regions, regional water experts of the farmers’ associations, *etc.*) are appropriate participants. For the sub-catchments, stakeholders with a local perspective should be chosen (e.g., city planning offices, local groups). The general public however, should not participate actively in the process of creating FRM plans. In the context of the project in Bavaria, it was argued that strategic planning as intended by the floods directive is not suitable for the participation of individuals and a FRM plan meets the requirements of Art. 13 floods directive if the final document is made available to the public. However, the authors of this paper strongly recommend that municipalities and agricultural authorities communicate intensely with

individuals (e.g., local inhabitants, farmers) about measures they wish to implement in their field of responsibility and that the water authority develop a strategy on how to support the communication between municipalities and their citizens.

4.2.3. Which Role Should the Water Authority Adopt?

In connection with the shift from sectoral to interdisciplinary planning, the representatives of the water authority have to redefine their position. As in Case Study I, there are different positions (Table 6). The water authority has increasingly taken over the responsibility in flood management and water resource issues. The key slogan developed within a corporate image process is “Wir sind für das Wasser da—we are responsible for the water.” Other stakeholder groups are therefore not believed to have any knowledge that could contribute to solutions (Cit. Q). In contrast, social scientists recommend “experts” to rethink their position and accept that they can profit from local stakeholder knowledge in a double-loop learning process [39,40]. Thus, the recommended role model for FRM planning is rather multi-faceted. For structural protection measures along major water bodies, for the designation of flood plains and for the first two steps of the floods directive the water authority remains responsible. In addition, members of the water authority act as experts in questions regarding hydrological and technical expertise that can be helpful for decision-making processes. In the whole planning process, the water authority acts as a stakeholder that represents public welfare (Cit. R). A fourth facet is the “motivator” who encourages other parties to take part in the planning process.

Table 6. Citations representing different positions on roles of the water authority in FRM planning.

Interview No.	Citation	Reference
Cit. Q	<i>“Neither would a doctor ask patients and their relatives which way he should do a surgery.”</i>	[34]
Cit. R	<i>“I believe everybody from the water authority is capable of adopting the role of an interested party. I am not at all afraid that hydrological interests would get lost.”</i>	[34]

In the final report of the project in Bavaria it was recommended that the water authority abandon the role of the sole responsible and adopt the multi-faceted role model stated above. A similar recommendation was made by the Environment Agency in England—until recently the responsible institution for flood management. In a report on their role in FRM planning, the Environment Agency refused to be the “lead local flood authority” and opted for a decentralized, catchment-based strategy [41]. Even if Art. 45 of the Bavarian Water Act defines the Ministry of the Environment as responsible of the implementation of the FRM plans [42], it does not prevent the Ministry from pursuing a participation process that permits interdisciplinary planning. In the final report of the project on FRM plans in Bavaria, the seven “Regierungsbezirke” (regional governments) are recommended as responsible authorities for the third step of the floods directive, the development of the FRM plans. Having different departments (water, nature conservation, regional planning, and civil protection), helps to best represent the need for interdisciplinary planning.

When enhancing multi-agency cooperation in Bavaria, it has to be guaranteed that (potential) flood victims know that they are at risk of flooding and where they can get further flood risk information. Moreover, they need to know exactly who to call and how to act when flooded. Therefore, it was recommended that the Bavarian Environment Agencies develop a consistent communication strategy for cooperation with municipalities. In the ideal case, there is a local institution such as the “Hochwasserschutzzentrale Köln” (Flood Protection Centre Cologne) that is well-known among citizens and provides a link between the citizens’ needs and state authorities.

4.2.4. How to Deal with Municipalities?

As the role of each of the above-mentioned stakeholder groups in flood management cannot be discussed here in detail, the authors of this paper want to cast another look on the role of the municipalities which are regarded as one of the most important groups that can contribute to a successful FRM planning. Municipalities in Bavaria are (partly) responsible for urban and rural planning and civil protection and can provide an important link between other state authorities and citizens, e.g., in terms of flood risk communication.

The workshops and interviews have highlighted that different reactions of the municipalities towards FRM are likely. The expected participation activity depends among other things on recent experiences with flooding and on the existence of structural protection measures. Altogether, two types of reactions towards the requirements of the floods directive could be observed (Table 7): Type I are municipalities with a positive attitude towards FRM plans which stems from an awareness that they cannot solve flood problems on their own (Cit. S). This type of municipalities should be given a chance to actively participate in the planning process. Secondly, there are communities with a negative approach (Cit. T) that are afraid of partly losing their local autonomy due to FRM restrictions. This type of communities has to be explained that flood hazard/risk maps (especially maps depicting worst-case scenarios) provide better reliability when planning. As difficulties in making municipalities participate in the workshops and interviews have shown, there is also a large group of communities that adopt a wait-and-see attitude. Both skeptical and indifferent municipalities have to be convinced by the benefits of interdisciplinary and catchment-oriented FRM. A pilot FRM plan in one of the 37 catchments can prove helpful. In addition, municipalities that have not participated actively in the creation of a FRM plan should be given a chance to comment on the draft version.

Table 7. Citations representing municipalities with different opinions on FRM plans.

Interview No.	Citation	Reference
Cit. S	<i>“In my opinion, it is the most reasonable approach to have a look at the entire catchment and see where is the best place to do adopt measures in order to reduce flood risk. It is better for me to look beyond my own horizon and in the end I benefit from that.”</i>	[34]
Cit. T	<i>“We wish to free our properties from flooding by building a dam. If we want to permit new building applications in our flood zone, we have to provide retention areas somewhere else. We do our homework, so what more can the European Union ask for?”</i>	[34]

4.2.5. How Should the Planning and Participation Process Be Organized?

A participation method has to be chosen so that it permits the above-mentioned recommendations and facilitates a bottom-up participation process. Therefore, a method comparable to the “future workshop”, a concept aimed at developing creative solutions, seems promising [43]. The FRM planning process should be divided into two sessions with several steps (Scheme 1). In the run-up, all involved parties should be invited and given a chance to have a look at the flood hazard/risk maps beforehand. The first session begins with an introduction stage that presents the basic principles of FRM and the FRM plans to the participants and enables them to start the management planning on an equal level of knowledge. Afterwards, the maps should be presented by a representative of the water authority who acts in the role of an expert.

The second session starts with a discussion on processes that explain the history of the local/regional flood problem. Which effects have increased flood risk in the catchment/sub-catchment in the past? Subsequently, objectives or measures have to be developed in a creative session in groups with an aim to define how stakeholders want to deal with flood risk in the future. Finally, all details such as the institution responsible for the implementation of a measure and the order of priority of all measures have to be chosen. There should be a revision phase in order to discuss aspects that could not be agreed on. Altogether, the second session contains more subjective components, which is why it is strongly recommended to contract an external moderator that guarantees neutrality and credibility. Furthermore, it is recommended to choose participation experts instead of engineering companies that offer participation as an “add-on”. In addition to this informal participation process, the draft FRM plan and the responding environmental report should be published with the view of a formal consultation process.

Scheme 1. Scheme of the recommended planning and participation process.

Stage	Responsibility
(0) Preparation phase	
(1) Introduction phase	} water resources administration
(2) Dealing with maps	
(3) Linking maps + experience	
(4) Problem definition phase	} external institution/ moderator
(5) Creativity phase	
(6) Elaboration phase	
(7) Follow-up tasks	

4.2.6. What Further Recommendations Can Be Made?

It is beyond question that legal requirements such as the designation of flood plains or the cost-benefit analysis which is used to prioritize state-funded structural protection measures in Bavaria are not challenged by the FRM planning. Nevertheless, it is recommended to include all types of measures into the FRM plans. The authors recommend that the water resources authority present the prioritization as part of the expert session. Even though the prioritization method shall not be discussed, this helps to provide transparency. Furthermore, it is a sensible option to concentrate on less controversial issues such as civil protection, flood-resilient building design, information campaigns and individual protection measures in the first implementation cycle. Conflict-prone topics like the abandonment of vulnerable buildings or increasing water retention capacity can be discussed in less detail and/or be shifted to the following implementation cycle. Since during one of the workshops the problem of flooding caused by surface water was brought up by some of the participants, it was recommended that the local panels can also develop measures referring to surface water flooding without having detailed hazard or risk maps.

It is expected that numerous conflicts will emerge during the participation process. There are conflicts between upstream and downstream stakeholders, between an increase of retention areas and the development potential of a municipality and between agricultural use and natural retention capacity. A central recommendation is to reveal the matter of conflict and its cause and effects. If no solution strategy can be found within the described FRM planning process, conflict resolution (e.g., feasibility study, mediation process) should be defined as a necessary measure of the FRM plan.

In addition, the development of a communication strategy is strongly recommended. Only if FRM planning goes along with a consistent communication, can the development of FRM plans be successful. First of all, the water authority has to come to a common decision as to which role to adopt. Secondly, the communication with other stakeholder groups should highlight the benefits of FRM planning and prevent misunderstandings that might stem from the different terminology used by involved stakeholder groups. Using pictures from flood events in the local area or at least of a neighboring catchment can help to foster risk awareness in the beginning of the participation process.

On the long run, it is recommended to reorganize the system for agricultural funding as part of the reform of the EU Common Agriculture Policy. The expert interviews have shown that farmers have adopted a cooperative attitude towards nature conservation whereas the water authority is still perceived as an “*enemy*” trying to impose usage restrictions instead of compensations. An introduction of funding that serves measures of FRM could help to reconcile agricultural practices and FRM.

5. Conclusions

All over Europe traces of a paradigm shift from the security approach to the risk approach can be discerned [44]. Nevertheless, an approach for both analysis and management of flooding explicitly based on the concept of *risk* is rarely applied [44]. This can be regarded as an advantage of the directive to provide a coherent framework for the ongoing modification processes of flood policy in the European Union member states. The high level of acceptance towards the risk management

approach of the floods directive can not only be found by the authors in the Rhine river basin, but also during the internet consultation process for the directive in 2005 [45].

However, Case Study I has shown that decision-makers in the federal states have different point of views regarding the willingness to accept far-reaching modifications in flood policy. Owing to the tight deadlines, it may prove difficult to create FRM plans that do not only serve the purpose of a pro forma implementation but also serve the need to change the existing flood policy. The Directive's limitation to framework/process requirements and its abstract objective are a drawback and advantage at the same time. This entails leeway for interpretation that could lead to contradictory information in border regions but also allows implementation strategies that match the particular circumstances of countries or federal states. The implementation of the FRM directive in Germany and other European countries is likely to make important changes to the way flood risk is perceived and dealt with. It introduces standards of the risk approach and is a further step towards a risk governance culture. However, it can be expected that within the short time frame, not all of the features of the risk approach will be implemented in a satisfactory manner in the first implementation cycle. The constant revision of the three steps of FRM is, therefore, an advantage that offers member states to improve their flood policy step by step—also after the completion of the first FRM plans in 2015.

The implementation of FRM standards can also lead to a combination of traditional approaches to avoiding floods, complemented by effective measures that help to counter drawbacks of these concepts such as the levee effect [18]—it does not have to be one or the other. If responsible agencies continue to provide 100-year flood protection structures for built-up areas, but additionally conduct disaster relief trainings and provide information campaigns highlighting the residual risks that these structures can be flooded in case of extreme events, great achievements can be obtained.

Based on the findings from Bavaria, the following recommendations for the process of creating FRM plans can be made:

- *Spatial scale of FRM plans:* It is important to find the right balance between a focus on the catchment-level and a reasonable stakeholder participation. Local actors have problems to think on a catchment-level. A multi-level approach as suggested for Bavaria and also found in Scotland [38] might be useful for other countries.
- *Interested parties:* All stakeholder groups should be given the opportunity to have their say. There should be intense participation in particular for municipalities. It is a crucial challenge to guarantee that stakeholders contribute by suggesting measures in their own field of responsibility instead of leaning back and relying on others.
- *Role of water authority:* The role of the water authority in FRM planning is multi-faceted. At times, it is helpful to adopt the role of an expert who is not the sole responsible for all decisions.
- *Participation method:* In addition to formal consultation, there should be participation methods that allow stakeholders to leave room for developing measures and entering into dialogue. Ticking a box on a list of measures is not likely to increase the chances of implementation. More progressive methods like the “future workshop” are promising tools for participation.
- *Communication:* Communication has a key role: A consistent strategy for communication supports effective FRM and facilitates making modifications to existing practices.

- *Other recommendations:* The general framework should be kept in mind by decision-makers for the long run. They should support modifications (e.g., conflict-solving strategies, modifications to funding-systems, as an incentive for participation in FRM planning).

In the best of cases, FRM planning is carried out in reasonably divided catchments and under participation of all stakeholder groups concerned with flood risk. Administration and stakeholder groups enter in dialogue and establish a target-oriented strategy on how to deal with flood risk. Although FRM is not likely to be implemented right out of the textbook in less than five years, it is a fundamental change in strategy with an impact that can be observed in the next years. Taking this into account the authors share the opinion that the directive offers the opportunity to lastingly modify the way our society deals with flood risk.

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