STAR FLOOD

Strengthening and Redesigning European Flood Risk Practices
Towards Appropriate and Resilient Flood Risk Governance Arrangements

Flood Risk Management in Europe: An exploration of Governance Challenges

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Preface

This report, together with three other reports, is the first deliverable of the EU 7th Framework Project STAR-FLOOD (see www.starflood.eu for an outline of the project). STAR-FLOOD focuses on flood risk governance. The project investigates strategies for dealing with flood risks in 18 vulnerable urban regions in six European countries: England and Scotland in the UK, Belgium, France, The Netherlands, Poland and Sweden. The project is assessing the institutional embedding of these strategies from a combined public administration and legal perspective, with the aim to make European regions more resilient to flood risks.

Within the first Work Package of STAR-FLOOD, four reports have been prepared providing an extended problem analysis related to flood risk governance in Europe:

i) Flood Risk Management in Europe: the flood problem and interventions (report no D1.1.1);
ii) Flood Risk Management in Europe: an exploration of governance challenges (report no D1.1.2; this report);
iii) Flood Risk Management in Europe: European flood regulation (report no D1.1.3);
iv) Flood risk management in Europe: similarities and differences between the STAR-FLOOD consortium countries (report no D1.1.4).

The four reports together aim to provide a problem analysis of flood risk governance in Europe. In so doing, they give a further specification of the scope of the STAR-FLOOD project and raise some preliminary conclusions, expectations and assumptions to be challenged in the subsequent Work Packages of the project. Furthermore, the reports identify relevant issues, questions and themes that are considered to be in need of further research and will be taken up in WP2 and WP3 of STAR-FLOOD.

Reports number D1.1.1 and D1.1.2 focus on the main trends and challenges that occur. D1.1.1 discusses the nature of the flood risks as well as the developments to be expected therein (e.g. increased vulnerability due to urbanisation and climate change). D1.1.2 approaches multi-level, multi-sector and multi-actor governance challenges related to Flood Risk Management from a theoretical perspective. Report number D1.1.3 focuses on European flood regulation, including the Water Framework Directive and the Floods Directive. The report discusses, amongst other things, the relationship between the Floods Directive and the Water Framework Directive as well as national law, the ambitions of different EU Member States regarding the FD and the state of affairs concerning implementation of the FD in these Member States. Report number D1.1.4 highlights essential similarities and critical differences between the STAR-FLOOD consortium countries

This report (D1.1.2), based on the input of all STAR-FLOOD consortium partners, explores the governance challenges that might result from a shift in Flood Risk Management strategies and defines questions for further research. These challenges and questions concern the role different actors, sectors and levels of governance might play, the rules that structure the interactions between these actors, the related power relations as well as the characteristics of societal discourses on FRM. The challenges identified in this report are more of a theoretical level. Whether and how these challenges are addressed in practice will be further explored in D1.1.3 and D1.1.4.

Yours sincerely,

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Executive Summary

In order to make European regions more resilient to flood risks a broadening of Flood Risk Management strategies (FRMSs) might be necessary. The development and implementation of FRMSs like risk prevention, flood defence, mitigation, preparation and recovery is a matter of governance, a process of more or less institutionalized interaction between public and/or private entities ultimately aiming at the realization of collective goals. Such processes are institutionally embedded in Flood Risk Governance Arrangements (FRGAs), which can be defined as *"the constellation resulting from a dynamic interplay between actors and actor coalitions involved in all policy domains relevant for Flood Risk Management – including water management, spatial planning and disaster management; their dominant discourses; formal and informal rules of the game; and the power and resource base of the actors involved*". This definition stresses that FRGAs have an actor dimension, a rule dimension, a power and resource dimension and a discursive dimension. By focussing on FRGAs we hope to get a better insight into the societal aspects of FRMSs and the way they are institutionally embedded in a broad sense. The concept allows us to combine insights from policy scientists as well as legal scholars and urges researchers to focus on FRMSs using combined perspectives.

The aim of this report is twofold. First we want to explore the governance challenges a shift in FRMSs may pose to society and second we will identify questions for further research. The report is based on a first exploration of relevant scientific articles and reports.

Governance challenges are found within each of the four dimensions of the FRGAs. We therefore discuss these dimensions in separate chapters. Major challenges in the actor dimension are the necessity to organise joint working between relevant actors in an effective way, to adequately involve stakeholders and to optimise the science-policy interface. In the rule dimension we have found that the major challenge concerns the translation of general Flood Risk Management principles into a set of more specific organisational, substantive and procedural provisions. Efficient and joint use of resources is the major challenge addressed under the power and resources dimension. The overarching discourse-related governance challenge is the realisation of a discursive shift. Overall, our exploration indicates that FRGAs tend to be highly fragmented. The overall challenge flood risk governance has to face is the development and implementation of inspiring bridging concepts which change agents may use to create synergies between key actors involved in flood risk governance. Concepts like Integrated Water Resources Management (IWRM) or climate proofing are examples of this. Empirical research is needed to further elaborate on this.

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1. Introduction

1.1 Shifts in Flood Risk Management

Climate change is expected to result in sea-level rise and to induce more extreme weather events. As a result, modifications in frequency, severity and duration of hydro-meteorological hazards will occur (IPCC 2011). The potential consequences of these weather events are intensified due to population growth, economic growth, urbanization and in some cases also soil subsidence (e.g., The Netherlands, Jakarta) (Mitchell 2003). Urban areas in particular face increasing flood risks.

It is therefore argued, both in literature and in practice that flood risks can no longer be dealt with by focusing solely on flood defences (building dikes, dams, embankments etc.). Actors at various levels (international, European, national as well as regional) wish for and make efforts at a diversification of Flood Risk Management Strategies, in which multiple strategies are applied simultaneously and linked together. These strategies include pro-active spatial planning (building permits), flood mitigation in various ways (e.g. urban green infrastructures, adaptive buildings), flood preparation and flood recovery (see also D1.1.1: Green et al. 2013). Literature suggests that such a diversification of FRMSs may lead to more resilience to flood hazards (Aerts et al. 2008; Innocenti & Albrito 2011; Van den Brink et al. 2011).

1.2 Position of this report

This report is deliverable D1.1.2 of the EU 7th Framework project STAR-FLOOD (see www.starflood.eu for an outline of the project). STAR-FLOOD focuses on flood risk governance. The project investigates strategies for dealing with flood risks in 18 vulnerable urban regions in six European countries: The Netherlands, Belgium, Sweden, France, Poland and The UK. The project assesses the institutional embedding of these strategies. The researchers within the project analyse this institutional embedding from a combined public administration and legal perspective, with the aim to make European regions more resilient to flood risks.

The current report is the second from a series of reports providing an extended problem analysis related to flood risk governance in Europe. The three other reports focus on the nature of the flood risks in the STAR-FLOOD consortium countries (D1.1.1), European flood regulation (D1.1.3: Bakker et al. 2013) and Essential similarities and differences between the STAR-FLOOD consortium countries (D1.1.4: Hegger et al. 2013). The focus of the current report is on the more theoretical governance challenges related to Flood Risk Management (D1.1.2)

The four reports together give a further specification of the scope of the STAR-FLOOD project and raise some preliminary conclusions, expectations and assumptions to be challenged in the subsequent Work Packages of the project. Furthermore, the reports identify relevant issues, questions and themes that are considered to be in need of further research and will be taken up in WP2 and WP3 of STAR-FLOOD.

The more detailed analyses on national level governance processes (by conducting case studies, interviewing and talking to people, observing meetings and attending conferences) will be done in WP3. WP1 restricts itself to seminal literature and policy documents, general information at country level as well as the main similarities and differences between countries. In WP2 a protocol will be developed which will be applied in the case studies in WP3. WP1 provides the basis for these next steps.

1.3 Governance challenges

It is increasingly acknowledged that developing and implementing Flood Risk Management strategies (FRMSs) (risk prevention, flood defence, mitigation, preparation and recovery) is more than a technological and economic issue. Developing and implementing these strategies does not occur in a societal vacuum. The development and implementation of FRMSs is also a matter of governance. Governance can be defined as a process of more or less institutionalized interaction between public and/or private entities ultimately aiming at the realization of collective goals (Lange et al. 2013). These processes are institutionally embedded in so called Flood Risk Governance Arrangements (FRGAs). These can be defined as *"the constellation resulting from a dynamic interplay between actors and actor coalitions involved in all policy domains relevant for Flood Risk Management – including water management, spatial planning and disaster management; their dominant discourses; formal and informal rules of the game; and the power and resource base of the actors involved*". This definition stresses that FRGAs have an actor dimension, a rule dimension, a power and resource dimension and a discursive dimension.

Shifts in FRMSs will ask for a shift in one or more of these dimensions. Societies have to face the challenge of doing this in a good way. The overall challenge is to govern in a good way. Good flood risks governance however is a highly contested concept. Aim of this paper is to give a first exploration of the governance challenges (a shift) in FRMSs may pose to society and second to identify relevant questions for further research. The report is based on a review of scientific literature collected by using the search engines Scopus and Google Scholar and internal discussions within the STARFLOOD consortium.

1.4 Outline of the report

This report is structured in accordance with the four dimensions of the FRGAs. In chapter 2 we will discuss the actor dimension and we will argue that multiple actors representing different societal groups as well as different sectors and levels of policy making can play a role. Both horizontal and vertical coordination between different actors' perspectives and capacities is required. The rules and power and resources dimensions will be discussed in chapter 3 and 4 to be followed by the discursive dimension in chapter 5. In chapter 6 we conclude that FRM is developed and implemented in a highly fragmented structure. Bridging concepts are required to have a shift in FRMSs. Following this we identify some topics and questions for further research.

2.The actor dimension

In this chapter we will argue that different actors are involved in Flood Risk Management. These actors play different roles and represent different sectors and levels of policy making.

2.1 Multi-actor flood risk governance

First, the development and implementation of FRMSs takes place in a multi-actor setting. In modern societies, power and resources are diffused among different actors. An actor is an individual or organisation who has the power to act (or conversely to prevent others from acting. The framework of rules within which the individual actors operate must permit them to act. In North's terminology, the actors are the players and institutions are rules of the game (North, 1990). Actors will have an interest in the outcome of a decision process or will be affected by the consequences of the decision taken and the resulting actions. So, in this sense actors and stakeholders are similar groups. Both groups can consist of public or private parties that have a stake in FRM. Governing actors have to reconsider which others stakeholders they are willing to involve in the development or implementation of FRMSs.

Apart from governmental bodies, non-governmental organisations (NGOs), science and knowledge institutes, the business community and the publics will be involved in the development and implementation of FRMSs. Their roles, forms and legal position might differ per country. In most countries governments have a legal authority (power) to take a leading role in the development and implementation of FRMSs. They take the lead, especially since FRMSs do have a collective good character as it is hard to exclude actors from the benefits of FRMSs. Dikes, for instance, protect all inhabitants of a polder or dike-ring area.. By the introduction of a tax system free riding behaviour could be avoided. To be able to do so, a governmental body must produce convincing arguments to get a flood tax approved by a democratically chosen council.

Science and knowledge institutes have a role in providing knowledge in order to reduce uncertainties. They can make clear what is known with what degree of precision, accuracy, validity and reliability about flooding in the past and the present; and, based on this knowledge, develop scenarios in which possible futures are sketched or identify and assess different societal preferences concerning flood risks. In theory scientific input might reduce these uncertainties but this raises the epistemological questions of what can be known and how precisely it can be known. Ideally, developing and implementing FRMSs requires authoritative knowledge. In practice however, science is often too fragmented or too uncertain to provide such – undisputed – knowledge.

The general public may also participate in the development and implementation of FRMSs. The European Flood Direction (see D1.1.3: Bakker et al. 2013) for instance is aiming for an 'active involvement of all interested parties'. Such participation might be based on normative, substantive and/or instrumental rationales (Glücker et al. forthcoming). From a normative point of view it can be argued that public participation should enable people affected by a decision to influence that decision. Moreover it should also enable participants to develop citizenship skills like interest articulation, communication and cooperation and, at the same time, provide them with an opportunity to actively exercise citizenship. Third, it can be argued that public participation should also enable deliberation among participants and thus lead to social learning. Finally, formerly marginalised individuals and groups should be empowered and the distribution of power in society should be altered. A substantive rationale for public participation can be found in an improved quality of the decision output as new (experimental and value based) information and knowledge might be provided which for instance tests the robustness of information from other sources. Finally,

generating legitimacy and resolving conflict, two objectives of public participation frequently referred to have an instrumental underpinning.

2.2 Multi-sector flood risk governance

The problem with water is that it is so highly connected to other policy areas (e.g. transport, energy, agriculture, urban development, health, development) that neither water management nor specifically Flood Risk Management can be isolated from these other policy sectors. So, at a certain level of government different governmental organisations or departments will be involved. The relevant actors are action specific (Green et al. 2007). For example, local governments frequently have the dominant role in urban planning (Wilson 2006; Storbjörk 2007) but commonly do not have the power to construct dikes on main rivers, and may not have the power to build flood storage outside of their administrative boundaries.

So dealing with the prevention, defence, mitigation, preparation of and recovery from flooding is not only a challenge for water managers, but also for other policy sectors. FRM is a multi-sector issue. By proactive spatial planning flood risks can also be reduced. Governments can actively try to redirect investments away from vulnerable areas or stop tolerating the construction of buildings in these areas. Spatial planners also play a role in land use planning of relevant infrastructure and/or retention facilities. The latter might conflict with alternative land uses and could generate an involvement of stakeholders with competing land use claims. Water quantities are also relevant for the functioning of ecosystems and agricultural production systems. These sectors will also be involved (intentionally or spontaneously) in the development and implementation of FRMSs.

Different sectors are not only represented by different governmental agencies but are also manifest within science. As flood preparation deals with catchment systems, different components and their interconnections have to be analysed and integrated. For example, preparing a flood forecast involves integrating data and knowledge from meteorologists and hydrologists. Other actors will be responsible for developing a flood warning, while again another group has responsibilities for disseminating the warning to the end-users and also for responding to requests from the end-users for further information. Emergency and social services be granted tasks in taking appropriate action on the basis of the warning issued. They have to develop and implement disaster plans and to ensure the evacuation of people. In the Netherlands the latter is done by the Ministry of Security and Justice and 25 so-called safety regions. Governmental actors and sectors will play a role in flood recovery as well. Apart from governments, private insurance companies can be involved, as in some countries private flood risks insurance systems have been introduced.

2.3 Multi-level flood risk governance

Due to its flowing character, the chance that water will cross borders between constituencies (local, regional and/or national) is pretty high (see D1.1.3: Bakker et al. 2013). From a bottom-up perspective this situation requires coordination of the activities of different actors. Up- and downstream actors have to resolve any conflicts of interests they have. Alternatively constituencies' interests could be balanced if a third actor has authoritative power to do so. In many countries such a hierarchical situation tends to exist although in other countries, the Constitution restricts the role of the upper levels of government to interfere in those areas which are constitutionally reserved to lower levels of government.

Box 1: Two examples of Multi-level flood risk governance

In the USA, the Federal Constitution reserves the Police Power to the individual states and the Constitutions of some States have then reserved that power to lower levels of government. Since the Police Power is taken to include both land use control and building regulation, the Federal government has no power to introduce such requirements on flood plains. The National Flood Insurance Program can be seen as an indirect means for the Federal government to introduce limited building regulations (but not development control) in high-risk flood areas (GAO 2005). In state-border crossing settings however, the latter is not the case. International catchment organisations do exist, but they lack hierarchical steering power.

In Germany the federal states have key powers in in water management. The structure is multilevel as the federal authorities a.o. have the power to cooperate internationally. The introduction of the catchment approach by the WFD reinforced the multilevel character as a new level of decision making was added to the existing German situation as many German catchments are located in the territories of more than one of the states. The introduction of the catchment approach couldn't be done without changing the German Constitution (Troch & Kirschner 2013; Moss 2003).

According to the *subsidiarity principle* action to reach a certain objective should ideally be taken at the lowest level of government which is capable of effectively addressing a problem (see also D1.1.3: Bakker et al. 2013). This principle is one of the general principles of EC law that relate to environmental protection. The principle is defined in general terms in Art. 5(3) of the Treaty establishing the European Community: in areas which do not fall within its exclusive competence, the Community shall take action, in accordance with the principle of subsidiarity, only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can therefore by reason of the scale or effects of the proposed action be better achieved by the Community. Following the subsidiarity principle would imply that the more detailed (aspects of) FRMSs will be elaborated upon on the regional and local level. On the catchment level (but also on the national and/or EU-level) more strategic and non-localized initiatives have to be taken. Ideally these initiatives integrate the different views and positions of the lower level actors. Apart from this vertical coordination, effective FRMSs also ask for a more horizontal coordination which means that actors operating on the same level of policy making should coordinate or even integrate their activities. In D1.1.4 (Hegger et al. 2013) we give an empirical illustration of this.

Ideally the boundaries of governance systems are similar to physical boundaries. Water management specialists have always argued that the catchment is the natural unit of governance with regard to water management (Global Water Partnership Technical Advisory Committee 2000; see also D1.1.1 and D1.1.3) although groundwater specialists point out that aquifers are both important and that their boundaries frequently do not coincide with those of catchments. Catchment based governance in theory offers decision makers more FRM-options compared to decision making on a smaller scale. For instance, it is easier to find retention areas in the less populated parts of a catchment. Moreover flood forecasting and warning systems should be set up along the whole river. A catchment management organisation could also offer a platform for exchanging ideas and experiences on the other FRMSs. Actors could discuss experiences with pro-active spatial planning, allocation politics, the construction of dikes, dams, embankments, urban green infrastructure, urban management, disaster planning, evacuation plans, the rebuilding of areas and insurance systems.

So a complex set of actors is involved in FRM. In D1.1.4 we illustrate this for the STAR-FLOOD consortium countries (D1.1.4: Hegger et al. 2013). Dependent on the issue, several advocacy coalitions can be identified consisting of groups of actor that promote a similar solution.

2.4 Actor related challenges

Within this multi-actor, multi-sector and multilevel setting, several challenges may emerge. Joint working is required not only horizontally (between departments of the same level of government been different units of the same level of government such as different municipalities, in addition to the different companies in the market sector, NGOs and so forth), but also vertically (between levels of government).

One of the major challenges is to identify the relevant stakeholders (Green & Penning-Rowsell 2010) and to involve them in an adequate way (Rowe & Frewer 2005). Framed in terms of Scharpf (1978), the question will be which actors have to be activated and which not. Initiating actors have to find a balance between involving too many actors on one hand and too little on the other hand. Selective activation is necessary to find a balance between democracy and effectiveness. The involvement of some actors will be crucial because of the resources they have, while the involvement of others might be motivated to get more societal support for the final proposal that has to be developed. Whether actors will actually participate depends of course on the presence of other 'hot items' on their agenda's (Driessen et al. 2001). The involvement of stakeholders may vary between the organisation of hearing where NGOs and civilians will have the right to bring in ideas and comments on (draft) FRMSs to partnerships in which public and private actors team up to join forces. However, the larger the area and number of stakeholders is the more complicated stakeholder involvement will be. The adoption of a catchment based approach on one hand and public participation or stakeholder engagement on the other as prescribed in the WFD seems to be an internal contradiction (Technical Support Unit 2003).

Scientific institutes are a specific kind of stakeholders. The development of a well-structured science-policy interface is another actor related challenge. The question can be raised which knowledge institutes have to be involved in knowledge creation, exchange and dissemination, how this can be organised and if and – if yes – in what way other stakeholders will be involved in research. In trans-science or joint knowledge production policy makers and scientists actually work together in specific projects in order to produce usable knowledge (Hegger et al. 2012).

3. The rules dimension

Rules – either formal or informal – structure interactions and by doing this create normative issues as structuring interactions in one way excludes several other options. In flood risk practices some societal interests will prevail over another and will be protected by policies, while others might get less attention (Driessen & Van Rijswick 2011). So, developing and implementing FRMSs implies that normative choices have to be made. Several principles and more specific rules might guide these collective choice processes.

3.1 Normative choices

The de facto implementation of Flood Risk Management strategies (FRMSs) at a certain period in time could imply that not all inhabitants of a country are equally protected against flood risks. From an economic point of view it can be motivated to give the economically more important areas higher protection levels. However, shifts in FRMSs might change this status quo and could therefore result in a (perceived) redistribution of risks, costs and benefits and therefore into conflicts.

The intensification of Flood Risk Prevention by new and pro-active spatial planning measures will probably limit the functionality of certain areas. If a new zoning policy no longer allows the construction of buildings in wash lands, conflicts might result. Flood defence by constructing dikes, dams or embankments might have negative impacts on (traditional) landscapes that might upset the local population. Flood Mitigation can also be conflict prone. The construction of urban green infrastructure or emergency not only has direct costs but also opportunity costs. The moment the Dutch government attributed the Ooijpolder the status of emergency polder, its inhabitants were really upset and unwilling to accept this (Roth & Warner 2007). The development of warning systems and disaster and evacuation plans is costly, but at first sight it will not be probable that taking Flood Preparation measures will result in conflicts. In cases of Flood Recovery, when areas have to be rebuilt, costs could be very high and the question is of course who will have to pay the bill. Insurance systems might pay, but they will not be solvent to do so in serious cases of flooding. Either governments or civilians have to deal with the non-insured risks. Apart from this, profit driven privatised insurance systems do exclude those unable to pay their tariffs. So normative choices have to be made about the role private insurance companies can play either alone or in the form of a public-private partnership as exists now in France and Spain, and as the insurance industry is proposing should be adopted in the UK.

If a shift in FRMSs occurs this could have re-distributional effects. It will be a political necessity and a maybe a legal duty to compensate the people that experience disproportional disadvantages of such shifts. Resistance of German landowners to the Room for the River plans for instance made clear that compensation measures have to be found to proceed in the implementation of river bed enlargement policies (Hartmann 2013). In theory victims of the implementation of FRMSs could submit a request for compensation to the administrative party involved. Only disproportionate damage that is not classified as an accepted risk (the burden must be abnormal) and is borne by a limited group of persons or interested parties (the burden is special) would probably qualify for compensation (administrative proceeding). In cases in which the interested party is dissatisfied with the outcome of the administrative proceeding court appeal will be possible. In some countries access to court might be restricted to those parties with a clear interest. In other countries like the Netherlands anyone who is of the opinion that he/she is entitled to compensation can come up with a claim, no matter the size of the damage (see further D1.1.4: Hegger et al 2013).

3.2 Principles

Normative principles are basic notions of justice that reflect a basic consensus on the basis of which the courses of action are to be taken. Normative principles can be codified in laws, be traced in

worldviews or policy utopias or in the daily practices of interacting parties. In general principles will be further specified in more specific rules that guide the actions of public authorities and individuals. However principles may also to some extent channel actions that are not fully regulated (Van Rijswick & Havekes 2012: 79). The question can be asked which normative principles are or should be relevant in the practices of developing and implementing FRMSs? In depth legal research is required to answer this question as several legal sources have to be traced in order to find these principles. Principles might be found in relevant international (like the UN-Convention on the Non-navigable Uses of International Watercourses) or EU-legislation (the Water Framework and Flood Directives) in the legislation of the Member States or the publications of leading scholars. The precautionary principle, the proportionality principle, the principle of cost recovery, the no shift principle, the principle that benefits and costs should be equitably divided as well as the compensation principle might guide the development and implementation of FRMSs (Driessen et al. 2011; Van Rijswick & Havekes 2012; De Kruif 2012). The importance of normative principles may be more significant in code based systems of law than in the Anglo-Saxon system of Common Law where a more evolutionary approach to responding to specific conflicts developed (Getzler2004).

Climate science may be not free from controversies, but according to the Precautionary principle it is not necessary to have complete scientific evidence to take measures against flood risks. In a strong interpretation this would mean that in cases of doubt action should (not) be taken. A more lenient weak interpretation would argue that uncertainty is no excuse for not taking action but that arguments concerning innovation, economic interests, societal support, proportionality, legality and/or equity have to be taken into account too (Driessen et al. 2011). Following the proportionality principle the ratio between positive and negative effects of FRMSs should be positive, reasonable and equitable. For actors that adhere this principle this might mean that certain FRMSs should not be implemented if an adequate flood protection can also be reached by measures with lower negative side effects. (see also D1.1.1: Green et al. 2013). It can be argued that the costs of FRMSs should be recovered. According to the user pays principle costs will be recovered by those that benefit from it. Following this principle, farmers in agricultural areas that benefit form flood risks measures have to pay for them. Costs can also be recovered within projects. Construction costs of floating houses in general can and will be paid by the future owners although due the innovative aspects of such houses governmental subsidies might be provided to cover (parts of) their development costs.

According to the no shift principle FRMSs implemented in one area should not result in problems in other areas. This restricts the construction of dikes or drainage systems in upstream areas as such systems might cause problems downstream. Flood plain enlargement in upstream areas could have negative downstream effects as well. In these cases the polluter pays principle will suggest that the upstream parties compensate the downstream parties. The principle of an equitable division of benefits and costs implies that costs and benefits should be shared and that a minimum safety level for each inhabitant exists. Measures taken in the community's interests should be paid for by the community. However, groups that exceptionally suffer from FRMSs (like the inhabitants of retention polders) should be compensated. The idea that losses should be compensated is based on the principle of equity of public charges.

Box 2: Guiding principles in the Water Framework Directive and Floods Directive (see D1.1.3: Bakker et al. 2013)

- Subsidiarity principle
- Solidarity principle
- Precaution principle
- Proportionality principle

3.3. Organisational, substantive and procedural provisions

Principles and more specific provisions structure the interactions between the different actors involved in FRM. Rules are necessary to define authorities and to specify task of the different actors. Rules also specify the rights one actor has in relation to another. Rules therefore reduce uncertainties. Several classifications of rules can be found in literature. Ostrom (1990) originally provided a set of rules for the design of institutions, while Williamson (2000) has classified rules according to their changeability. Changing a constitution is for instance more complicated than changing a law or a regulation, as constitutions contain more fundamental rules. Van Rijswick & Havekes (2012: 31-35) make a distinction in organisational, substantive and procedural provisions. Organisational rules will define who will be competent authorities (Green & Fernández-Bilbao 2006), what the competences are and how competences and responsibilities between governmental actors and between governmental and other actors are divided. Substantive and procedural rules have a more direct impact on the division of societal and individual benefits and costs. Both organisational and substantive and procedural rules can have a formal or an informal character. Formal rules will be found in or based upon international agreements, EU-Directives, national conventions and laws etc. Informal rules are rooted in daily practice of the actors involved. What legal status informal rules have will be a matter of debate. They are probably less binding that formal rules, but legal research is required to confirm or reject this.

3.4. Rules related challenges

The development and implementation of FRMSs implies that societies have to face the challenge of making normative choices. They have to set priorities and face the challenge to specify general 'feel good' principles into more specific rules to regulate the development and implementation of FRMSs. Prioritising and translation of these principles into a concrete mix of flood risks management strategies and related rules on taxation, allocation, compensation and instruments will be country, region and /or actor specific. In societal decision-making processes costs and benefits of FRMSs have to be divided. Ideally these processes reflect the more general normative notion of good governance, which means that governance should be participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive and should follow the rule of law (UNESCAP 2013). The exact meaning and possibly context specific interpretations of this concept have to be identified in comparative research. In addition to this we conclude that in depth legal research is needed to define which principles and more specific rules are relevant for FRM, what they mean in practice, how they relate to each other, what formal and/or informal rules might conflict etc. Existing normative systems may differ between countries as a first elaboration of this in D1.1.1.4 has shown (Hegger et al. 2013).

4. Power and resources

Using the term 'power' immediately raises the question of which organisation is or should be allowed to use what forms of power over whom, for what purposes and under what conditions. This raises questions of legitimacy, authority, accountability and the nature of justice (Green 2009). Other terms for power such as 'resources', 'influence' or 'capacity' may be used instead but at the risk of hiding the issues of legitimacy, authority, accountability and justice. In this chapter we define power as the capacity to induce or resist change. This capacity is based on the amount of and the division of resources among the different actors involved in FRMS. We will first address the different sources of power that might be discerned and will also introduce the related concept of capacity. Next we will discuss the relation between rules and power and we will argue that by restricting power rules create boundaries. Rules set boundaries to power and define the degrees of freedom actors have in making choices.

4.1 Different sources of power

Several sources of power can be discerned. Power can be based on legal authority, but also on knowledge and the availability of financial resources. Some actors have legal authorities related to the different aspects of FRM, while others are more knowledgeable and still others may have more funds to invest

Rules grant authority and powers to specific actors. Hence, rules and power are best viewed as a duality; to understand one requires understanding the other. In general governmental actors will have constitutional powers to set rules, raise taxes, expropriate property in cases in which physical changes in a catchment have to be made. Knowledge is a second source of power. The development and implementation of FRMSs requires different kinds of knowledge. These knowledges will be spread over different disciplines. The construction of a dike for instance will be based on meteorological knowledge, civil engineering knowledge etc. The availability of money is a third source of power. Actors that can allocate funds can clearly exert influence by defining the conditions under which they are willing to pay. Social norms are often an effective form of power.

Ideally, problem ownership and problem mitigation powers overlap. Imbalances occur in cases in which people that suffer most from flooding lack the power to deal with it. Probably no stakeholder is completely powerless as generally speaking, mutual dependencies between the stakeholders involved in FRM will exist. Funding agencies are for instance dependent on knowledge provided by other agencies. This might result in principle-agent problems or dilemmas as the latter (the agent) might prefer to act in their own interest instead of the interest of the funding agency (principal).

As said above, the concepts of power and capacity are more or less similar. Following the UNDP capacity can be defined as *"… the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner"* (UNDP 2007: 3). The concept can be further specified as for instance done by Van Loon et al (2010) who make a distinction between institutional capacity, organizational capacity, human capacity, scientific capacity, technical capacity, and resource capacity. Van Buuren et al. (2013) 's classification of institutional, organizational, resource, collaborative an learning capacities is almost similar. Several other conceptualizations of capacities are present, such as used by Koens (2003) & Olson (2007) who followed Jännicke's (1997) distinction between political-institutional, cognitive-informational and economic technical conditions that are necessary to change a situation into a more sustainable direction.

4.2 Boundaries

Rules have been argued to serve a number of purposes (Rutherford 1996), not least of which is to reduce the complexity of reality to manageable domains. Rules delimit power, but in practical terms, they have the effect of creating spatial, functional and other boundaries to power; and hence of disintegration. This in turn creates the problem of fit (Young et al 1999); the existing institutional framework not matching the scale of the environmental problem to be addressed. Water management is always a transboundary problem: only the nature of the boundaries differs. Boundaries necessarily fragment management approaches. Governments for instance have only authority to deal with issues within their borders. In general catchments for example are rarely congruent to existing administrative boundaries. Moss (2003) identified this mismatch between administrative and catchment boundaries as being a key problem in implementing the WFD in Germany and the nature of the boundaries of administrative units was an historic problem in FRM in England (Sheail 2002). Problems of scale and fit are widely discussed in governance (Young et al. 1999).

An example of functional borders can be found in Scotland. In Scotland, Sustainable Urban Drainage Systems (SuDS) for Flood Risk Management purposes are the responsibility of the local authorities whilst SuDS for water quality management purposes are the responsibility of the Scottish Environment Protection Agency. Ideally, however, a SuDS will fulfil both functions. Often an important set of boundary conditions is created by administrative line budgets. It would be illegal for an administrative unit to spend money outside the purpose specified in the line budget (Détournement de pouvoir). An administrative unit for Flood Risk Management may be for instance precluded from wholly funding a wetland if that wetland also provides water quality benefits, the responsibility for which is the responsibility of another agency. Accountancy definitions of what constitutes capital expenditure and what is Operations and Maintenance (O & M) expenditure creates further boundaries. Temporal boundaries, such as those set by financial years, can also be important. In so far as there exist economies through specialisation (e.g. into disciplines) or of scale and scope, boundaries ideally should be created at that point where diseconomies set in. Whether under such conditions institutions can be designed will be a matter of debate.

Another example of boundaries is the English experiences with Local Resilience forums. In England, the local authorities are required to set up a 'Local Resilience Forum' including both what are termed 'Level 1' responders to floods (e.g. the emergency services) and 'Level 2' responders (e.g. the utilities) (Pitt Review 2008). However, in the 2007 flood it was found that privatised utilities had not and did not engage in the appropriate Resilience Forum, nor participate effectively in management and response to the event itself. As privatised companies, some of the utilities saw such participation as an unnecessary expense. In addition, they had concerns that sharing some information might breach their fiduciary duty to their shareholders, particularly if that information could be considered to be market sensitive. In theory, the Floods and Water Management Act 2010 has ended this fragmentation by creating a statutory duty to cooperate. This law also asks for vertical cooperation by specifying that Flood Risk Management plans and local governments' strategies in England and Wales should be consistent with the national strategies as prepared by the Environment Agency.

Boundaries are frequently created by the definition of terms. Most countries differentiate between different categories of watercourse in terms of which administrative unit has what powers to take in regard to that category of watercourse. Definitions of the extent of a watercourse also differ, notably in terms of whether the watercourse is regarded as distinct from the land and whether any of the adjacent land is included in the watercourse as far as powers to act are concerned. In England for instance, the Environment Agency has the power to build and maintain Flood Risk Management works on 'main rivers'. On 'non-main rivers', depending upon the location of the watercourse, that power rests with the local authority or the Internal Drainage Board.

Rules may create boundaries, but may also leave gaps and ambiguities as to who, if anyone, has the power to act in a particular way for a particular purpose in a particular area? Therefore, a key question in is to identify these boundaries.

4.3 Power and resource related challenges

Resources to be used in developing and implementing FRMSs will be spread unequally between the actors involved. Generally speaking, governmental actors will have legal and financial resources to take relevant initiatives, but they might be dependent on other actors to get the relevant knowledge and additional funding. NGOs and civilians can provide governmental actors a 'license to operate'.
For the actors it will be a challenge to use their resources in an efficient way. However, due to power dispersion principle-agent problems might occur. The practical problem is thus to deliver an integrated approach from a fragmented mosaic of administrative units. By defining rules with appealing bridging concepts, such as the catchment approach or the water test, policy entrepreneurs should try to combine powers of different actors. Ideally a win-win situation should result from such efforts.

Further research should first focus on a further conceptualization of the power and resources dimension. Second, the dispersion of resources and related powers among the actors involved and the boundaries which are created have to be addressed on the empirical level. An analysis of constitutions, laws and policy plans will identify clear single-actor responsibilities, but probably many more overlapping or shared responsibilities and powers. Moreover an identification of bridging mechanisms between different actors, sectors and levels as well as between research and policy is necessary. A further exploration of this can be found in D1.1.3 (Bakker et al. 2013) and D1.1.4 (Hegger et al. 2013).

5. The discursive dimension

Discourses can be defined as 'ensembles of ideas, concepts and categories though which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices' (Hajer &Versteeg 2005: 175). A discourse provides the basic terms for analysis, debates, agreements and disagreements (Dryzek 1997) and enables subscribers to interpret bits of information and put them together into coherent stories or accounts.

Discourses structure communication. How an issue is framed in communication can be intended to influence how others interpret the issue. If one framing achieves hegemonic status then it is generally adopted and ceases to be a deliberate attempt to frame the issue in a particular way, simply becoming the way in which all frame the issue.

Discourse is necessarily associated with ideologies since any claim to a complete theory of man and society will develop a discourse from that theory (Scruton 2007; Hamer et al. 2013). Social 'norms' can therefore technically be regarded as a hegemonic ideology. A particularly influential current ideology is Neo-Liberalism with its philosophical roots in Hayek, Friedman and Nozick (Hayek 2001; Friedman, 1989). The neo-liberal ideology adopts a specific meaning to the term 'market' and treats the 'state' as an all-embracing term of abuse. Different scientific disciplines are in contrast partial theories and each has its own discourse. Hence, there are discourses derived from partial theories in addition to ideological discourses.

There are multiple discourses which are widespread within the discussion of Flood Risk Management. These discourses may be synergistic (e.g. the discourse on climate proofing cities) or antagonistic (e.g. the conflict between the principles of integration and subsidiarity). The importance of discourse as a way of framing the problem and as a polemic is most obviously demonstrated by the title of the ministry having primary policy responsibility for FRM. That the name of that Ministry in England changed from the Ministry of Agriculture to the Department for the Environment, Food and Rural Affairs clearly illustrates this reframing. In doing so, responsibilities for water management which had been fragmented were also brought into a single Ministry. A related set of discourses concerns the different framing of floods, either as a free-standing problem (as in the Floods Directive), or as a water management problem (e.g. the IWRM framing) (Technical Support Unit: 2003), as one of several hazards, often specifically natural hazards (which might be argued to be the traditional French approach) or in terms of adaptation to climate change (see also D1.1.1: Green et al. 2013).

Different actor groups tap from and contribute to discourses. Sometimes discourses can be distinguished on the level of societies as a whole, but they can also be distinguished at the level of concrete policy sub-systems and amongst citizens groups. In this chapter we will address eight topics within which different flood related discourses can be distinguished. These topics concern the public private divide (5.1), the framing and communication of risks and uncertainties (5.2), the interpretation and translation of normative principles (5.3), standards of protection (5.4), the role of cost-benefit analysis in priority setting (5.5), who should pay for FRM (5.6), whether FRM should be based on engineering or more on natural processes (5.7) and the preferred FRM intervention strategy (5.8). The chapter is concluded in 5.9.

5.1 The public private divide

Both public and private actors have a role to play in FRM (Agrawala & Fankhauser 2008). However, both scientific and societal discourses address the public private divide. Main question in this discourse is whether a collective approach or a more individualistic approach is needed. Mees et al

(2012) give an overview of the arguments which are put forward in these scientific and societal discourses.

First, it is argued that measures could be left with the market, in cases in which the benefits of measures are relatively localized and private. Another advantage of markets is their innovative power: they encourage innovative solutions. The ideology of Neo-Liberalism also asks for a reduction in scope and scale of governments and a privatization (flood insurance systems) of Flood Risk Management.

Governmental involvement is required in cases of market failure, for instance if the market parties do not have access to sufficient information. Governments can generate and distribute such knowledge. Equity is another argument for governmental involvement. Government can decide to compensate the most vulnerable groups. Another argument for a governmental role to play put forward by economists is the public good character of many FRMSs. Dikes protect all inhabitants of a polder and it is impossible to exclude some of them. On the other hand in some cases governmental involvement can result in inefficient outcomes.

Within collective approaches it is also debated which actor can set priorities. According to the Flood Directives each Member State has to designate a 'competent authority'. This authority has to define the priority order for implementing Flood Risk Management strategies. The discourses on this differ between EU member states; in Germany, for example, under the Constitution, the States (Länder) had got water management responsibilities, while in England, the competent authority was designated to be the Environment Agency, a national agency.

Stakeholder and public involvement has to be organised. Different modes of involvement might be opted for (Rowe and Frewer 2005). Participation, deliberation and co-determination of those actors which have a stake in the policy issue tend to increase the legitimacy of public policy. Such a private involvement in FRM in theory can take many forms, varying from ad hoc hearings on one hand and more hybrid governance arrangements, which cross the public-private divide, such as policy network, co-management, public-private partnerships and private-social partnerships on the other. In practice however it seems to be very hard to involve stakeholders as their responses tend to be more reactive than proactive, especially since flood frequencies are often very low and stakeholders have trust in traditional flood defence measures (Ramsbottom 2009). D1.1.4 (Hegger et al. 2013) further reflects on the discourse on stakeholder involvement.

5.2 The framing and communication of risks and uncertainties

Framing in the social sciences refers to the set of concepts and theoretical perspectives individuals, groups, and societies use to perceive, organize and communicate about reality. Such a framing of reality might differ between different groups which complicates communication between them. Differences in framing is one of the reasons why effective interdisciplinary research has proved so difficult to achieve (Lyall 2011). This topic has been extensively dealt with within the FLOODsite project. The project included studies on risk perception, community behaviour and social resilience. It was found that a suitable approach for examining social vulnerability and resilience in distinct national, local and cultural contexts should be context-sensitive, event-specific and open-minded. (Samuels 2009: 18).

Flood risks can be framed in different ways. Scientific framing will differ from laymen's frames.
Experts have used models to define 'objective risk' and hence to decide what are 'acceptable risks', framed in terms of estimated probabilities, and use these as a standard for judging the subjective risk perceptions of the public (Mostert & Junier2009). The use of the term 'objective' as opposed to, for

example, 'rigorously' derived, is itself problematic as it implies that there is some yardstick against which this can be tested. Moreover, even if unbiased, it will not necessarily be correct. Lay persons often use a different, more holistic risk concept than technical experts (Mostert & Junier2009). Whereas technical experts usually separate risk assessment on the one hand, and risk acceptability and risk management on the other, lay persons do not (ibid). Their assessment of risks includes factors such as their trust in crisis management, their own degree of control, vulnerability to the risk, the voluntary or involuntary character of the risk, their general attitude towards the risky activity or situation, the benefits derived from the activity or situation, and fairness of the distribution of costs and benefits" (Mostert & Junier2009). Whereas the expert discourse focuses upon the probabilities, the public appear to be more interested in why the risk occurs and what could be done to reduce it. In the debates after a flood, the public frequently want to know why it happened, could it have been prevented, whether it was anyone's fault and what can be learnt from it. Before a flood, they want to know what they could do or what could be done. Thus, the public can be seen to be adopting a rational approach of seeking to identify the alternatives and to decide which the best available alternative. That is, they tend to focus upon the causal chains, and the benefits and costs of the alternative courses of action to adopt. Laymen especially seem to have difficulties to 'correctly' interpret risks with low probabilities but high consequences, such as a flood disaster (Keller et al. 2006). They tend to care more about the number of people that is exposed to threats and the familiarity they have with the threat (experience), than paying attention to statistical probabilities (Slovic 1987).

There is, no reason why the public should uncritically accept the risk assessments made by the experts as the expert's measure of risk may not reflect the values of the public (Mostert & Junier2009). Giddens (1990) notion of 'expert systems' may be useful in this respect. According to Giddens, laymen make use of various expert systems (amongst which those that deal with flood risks and particularly the subsystem that provides risk assessments). Laymen lack insight into all details of these systems because of an imbalance in relative expertise and hence they have to base their trust or distrust in these systems on 'something else'. According to Giddens, we can distinguish between 'basic trust' and 'active trust'. The former refers to situations in which individuals have few alternatives at their disposal and no reason to doubt (e.g. because of the absence of shock events, or in Giddens' terminology 'fateful moments'). Basic trust thus has a high degree of 'taken-for-grantedness'. But, in the current era we will more and more often encounter situations of active trust, that is situations in which trust is no longer taken for granted but instead a leap of commitment in which individuals deliberately have to invest their trust in abstract systems. People's trust in risk assessments will likely lie somewhere on the continuum between basic trust and active trust. This will be different in different contexts.

The above implies that in developing communication strategies experts have to find ways to connect their frames to the frames of the general public. Communicating flood risks to the public in a refined and understandable way is crucial for a number of reasons (Rowan 1991): (i) building trust in the communicator, (ii) raising awareness (e.g. of a potential flood hazard), (iii) educating, (iv) reaching agreement (e.g. on a particular strategy or investment plan) and (v) motivating action (e.g. precautionary measures against flooding of residence). It has been emphasized the role of flood risk communication to strengthen people's risk awareness and to motivate the population at risk to take preventive actions and to be prepared for an emergency case (Hagemeier-Klose & Wagner, 2009). Risk communication should be adjusted to the specific needs of the people at risk to give them the possibility of judging their own risk situation and making informed decisions according to preparedness and personal safety measures (see also Samuels 2009 p. 18). De Boer et al. (2012) show that communication can influence laymen's risk awareness, but they also show that around 50% of the people they interviewed were not aware that they were living outside a dike-ring.

The following problems relate to risk communication in general (Covello et al. 1987). First "the public" is not a homogeneous entity; instead, there are many publics, each with its own framing of interests, needs, concerns, priorities, and preferences. Second the choice of one communication strategy often requires a complex balancing of multiple, competing objectives (e.g. community's "right to know", costs of unnecessarily alarming people, etc.) and third divergence of viewpoints, as governments usually provide aggregate or population statistics, while individual citizens are more likely to view risks from a micro-perspective. Apart from these, the question is whether or not uncertainties have to be communicated, as uncertainty communication often suffers from highly technical, mathematical language (Faulkner et al. 2007; Mostert & Junier2009; Wardekker et al. 2008). Many experts believe that water managers and the public cannot cope with uncertainty, but there is growing evidence that this is not correct and that many non-experts can understand uncertainty and in fact cope with it on a daily basis (Wynne 1992; 1996; Frewer 2004; Mostert & Junier2009; Pappenberger & Beven 2006). From Giddens (1990) we can derive the point that so-called 'access points' could play a crucial role in this respect. These access points are the points where laymen actually interact with expert systems: for instance, the stewardess and the website of the Airport are access points to the air traffic system. Also in case of flood risk communication, there will be access points (e.g. a renowned scientist, Mayor, SMS from the Environment Agency). It has been suggested (Giddens 1990) that trust in abstract systems in large part occurs via these access points. Moreover, trust may stem not only from actual *performance* of these access points, but also from other attributes, including 'reputation', 'appearance' etc.

Traditional risk communication was often implicitly based on the public understanding of science (PUS) or the scientific literacy model, which is based on the assumption that there is a need for the stakeholders to understand particular scientific concepts and facts and that the researchers should teach them these (Mostert & Junier 2009). Recent practices as participatory hazard mapping such are based on a two-way communication model in which citizens become active stakeholders in information capturing, evaluation and communication (McCall, 2008). They will play a similar role in the development of Flood Risk Management plans as a required in the EU Floods Directive 2007/60/EC (see D1.1.3: Bakker et al. 2013). Since the public view risk in a significantly different manner to the scientific community, those responsible for developing Flood Risk Management plans need to understand the ways in which members of the public discern risk. Lack of understanding by authorities is known to cause failures in Flood Risk Management policies.

We can conclude that several different discourses may be distinguished within the topic of framing and communicating risks and uncertainties. The actors tapping from and contributing to different discourses can most likely be divided along the dividing line of laymen versus experts. But within both groups, various different discourses will probably be distinguished in empirical research. For instance, the public is not to be seen as a homogeneous entity, but amongst other things differences may be found in the extent to which they trust risk assessments or the extent to which they are risk aware. Also amongst professionals, different discourses may be distinguished drawing more on either the model of the public understanding of science vis-à-vis the model of involving stakeholders in risk communication. Shifting from the PUS model to a stakeholder engagement approach, from a one-way system of communication, to an exchange is increasingly seen as being a central requirement in the delivery of sustainable development (Figueroa et al. 2007; Warnock 2007).

5.3 The interpretation and translation of normative principles

In policy processes normative principles will be clarified, specified and prioritised. Organizational, substantive and procedural rules will result from policy processes in which principles could be a starting point for societal debates. Through processes of social construction complex legal system will emerge.

In Germany for instance construction of houses in floodplains is subject to quite complex regulations. A list of conditions has to be met to get authorization. As stakeholders (policy makers, water management agencies, landowners, land use planners) perceive floodplains differently either as sometimes being profitable, sometimes dangerous, sometimes controllable and sometimes inconspicuous the legal regime is quite complicated, Hartmann (2009) arguing that the system must necessarily be "clumsy" rather than the search being for the 'optimal'.

As deliverable report D1.1.4 (Hegger et al. 2013) shows, the interpretation and translation of normative principles may lead to different outcomes in two respects. First, there will be different outcomes in terms of the extent to which principles such as the solidarity principle or the private interest principle are actually implemented in practice: how much focus is there on one principle vis-à-vis the other? Second, there will be differences in the way in which the principles are implemented, which can be done via legal provisions, formal and informal divisions of responsibilities amongst (e.g. amongst public and private actors) and via financing structures amongst others.

5.4 Standards of protection

The design of flood defence structures is based on calculated probabilities which are contested in discourses. The old approach of focusing upon reducing the probability of flooding, rather than considering the consequences of flooding, led to the question what the probability of the flood should be that is taken as the design basis. Many countries adopted as an ad hoc standard the 100 year return period event but this seems to have emerged as a nice round number rather than for any logical reasons. In England, agricultural land drainage was usually provided with a system that could cope with the 5 or 10 year return period flood on the basis that when the probability of flooding during the growing season was reduced to this level, farmers would be prepared to shift to a higher valued cropping pattern: the increased returns in some years making up for the losses in flood years. In Denmark, national law set standards for the channel capacity of different watercourses (Hansen, 1996). Following the 1953 flood, In the Netherlands national standards were set for the different categories of polders (see D1.1.4: Hegger et al. 2013); these were considerably higher than those either formally adopted or practised in other countries. In Hungary, under the Communist regime, whilst a 1000 year return period flood design standard was set for three critical areas, the remaining polders were to be provided with a design standard of protection to the 100 year return period event (Vituki 1998). With the coming of democracy, maintaining the 100 year design standard of protection was found to be neither economically efficient nor financially affordable (Evans et al. 2000). So, different situations may ask for different standards of protection which might be based on different normative assumptions. One can logically assume that these standards of protection are a reflection of underlying national or sector-specific cultures of risk.

5.5. The role of cost-benefit analysis in priority setting

In the UK, with adoption of cost-benefit analysis, the design standard of protection came to be set at that level where the ratio of benefits to cost was maximised. In turn, the basis for the inclusion of individual projects in the annual programme of capital works (by now funded almost entirely by the general taxpayer via central government) was the benefit-cost ratio of the individual project. Given the available budget, only projects with a benefit-cost ratio of at least 6:1 were included. Since most schemes continued to be embankments or flood walls where the benefit-cost ratio is determined by the area protected times the potential loss per unit area per unit length of embankment/wall, this prioritised urban schemes (higher density of loss per unit area) on wide flood plains (large areas protected per unit length of embankment/wall). People in those areas where a possible flood alleviation project would not have a sufficiently high benefit-cost ratio to be funded, or only a relatively low design standard of protection could be justified on economic grounds, argued that this was unfair. Instead, they called for 'consistent standards'. But an analysis of a sample of flood

alleviation schemes found that using a number of different bases for consistency (e.g. including cost per property protected) would result in differing orders of priorities over those schemes (Ramsbottom & Green 2004) As predicted by Sen (1992), different definitions of equality gave different outcomes; adopting a uniform standard of protection meant widely different 'subsidies' from the general taxpayer to the local residents in the form of providing a flood alleviation scheme. Equally, given a relatively fixed annual capital works budget, providing a scheme for one area necessarily means that a scheme for another area is at best deferred.

In addition, there was a claim that the use of benefit-cost analysis meant that the rich were more likely to be provided with a scheme than low income households. Technically, this was an incorrect claim as it is the density of loss per unit area which influenced the benefit-cost ratio and since low income households tend to live in high density areas, loss density tends to be higher in low income areas than in high income areas. The adoption of income weighting by the UK's ministry of finance also meant that the weighted value of a loss to a low income household was higher than the weighted value of a loss to a high income household (Green 2003) .

5.6 Who should pay for FRM?

The WFD requires the adoption of full cost recovery across the agricultural, industrial and household sector (Lindhout, 2012). Equity is a key element in the discourse on how this should be achieved. Who should pay for FRM? Central is the question of what is fair or just. Fairness and justice have been disputed all over human history, either in a procedural or in distributional or substantive sense (Wendorf & Alexander, no date). Perhaps the shortest definition of justice is that it is 'a moral principle consistently applied (Green, 2003). This definition exposes the two contested areas: what moral principle (or principles) should be applied; and what differences between individual cases should be taken into account and which should not? In those cases where there is no significant difference which ought to be taken into account, cases should be treated equally. As Lloyd (1991) observed: 'alike cases should be treated alike' that there are two aspects to justice means that a focus on only one aspect, such as distributional justice, is unlikely to be satisfactory in practice.

Who pays for FRM is an articulation of social relations and the cultural definition of these relationships differs markedly between countries. In many EU countries, a central goal of collective decision making is the maintenance of social solidarity; an explicit goal in the case of France where the Preamble to the Constitution states that there will be solidarity in the face of natural disasters. In other countries, there is said to be a search for consensus in the development of public policy (Lijphart 1999). Conversely, in the UK, the traditional assumption was that public decisions should be decided in the national or public interest; thus presuming that this interest was objectively determinable, and collectively agreed as the appropriate goal of public policy.

The 'polluter pays' and 'user pays' principles are both moral claims as to who should pay for Flood Risk Management. In the case of Flood Risk Management, they lead in opposite directions: in the first case, to charges for runoff and in the second, to those benefiting from a reduced probability of flooding or reduced consequences from flooding, paying all of the costs. In England this is a long standing discourse. The Royal Commission on Land Drainage (1927) already reviewed the arguments that had been put forward over the previous 50 years as to whether upland land owners should contribute to the cost of providing flood alleviation to those occupying the lowland flood plains. The Commission concluded that they ought to make some contribution i.e. that increasing runoff constitutes a form of 'pollution'. A third option to have FRM paid for - not based on the polluter pays or user pays principle but merely inspired by notions of solidarity is contribution made from the general budget of a governmental body, either at the national or regional level.

Germany has probably gone furthest in applying the 'polluter pays' principle, although only at the urban level, by the widespread adoption of charging for surface water runoff on the basis of impermeable area (Green & Anton 2012). In France, legislation was recently revised to allow for the adoption of this practice whilst in England although separate charges for surface water runoff on the basis of impermeable area were being progressively introduced for non-domestic properties across the different wastewater company areas, this now appears to have stalled as a result of the way in which these charges were introduced by United Utilities substantially increased the costs to voluntary and charitable organisations such the Scouts and churches.

The 'user pays' principle has pragmatic problems as well as the equity issue that those in areas where flood alleviation schemes can be created cheaply and those with high incomes will be able to afford schemes whereas as those with low incomes or where costs would be high will not be able to afford such schemes. The pragmatic problem is that a wholly user pays approach would make it difficult to develop either a catchment or an integrated approach. At its worst, it might result in the equivalent of the 'dike raising wars' on the Mississippi in the nineteenth century where communities on opposite banks sought to raise the heights of their polders so that flooding was deflected onto the community on the other bank (Harrison & Mooney 1993). Similarly, there is apocryphal story that where the Red River runs from the USA into Canada, an embanked road was built in Canada just above the border which happened to have culverts with an insufficient capacity to pass the flow from a major flood. In consequence, flooding occurred in the USA but not in Canada. At best, it would be difficult to persuade or require any community not to install that form of flood alleviation intervention which the community chose on cost or other grounds when that intervention was undesirable from a catchment perspective.

Countries differ in what proportions of the costs of flood alleviation measures are borne by whom. In England, there has been a progressive shift towards all of the costs of capital works being paid by the general taxpayer through central government. In the 1970s, these costs were shared between the region and central government, the proportional share varying between the regions (there being no formal 'regions' in England, the region here meaning the Regional Water Authority which then was a catchment based public body which provided all water management functions including flood alleviation). Thus, in 1977-78, whilst the proportion of central government financing for approved schemes was 40% in the Severn catchment, it was 64% in the Norfolk and Suffolk areas of the Anglian region (Parker & Penning-Rowsell 1980). The differences in central funding were intended to take account of the differences in the scale of the problem and the relative income of the areas. The reasons for this shift will be investigated in WP3 but one obvious possibility is the extent to which local government is now almost entirely funded by either general or ring-fenced grants from central government (IMF 2008). Hence, supposed local funding was in practice central government funding and the transfers and flows of finance between the different actors in Flood Risk Management became extremely complicated. Secondly, decision making as to which schemes would be funded became progressively more centralised, shifting from regional Flood Defence Committees (which included local stakeholders) to the Environment Agency. Conversely, in Austria, a mixture of regional and local funding is currently adopted (Bundesministerium für Land- und Forstwirtschaft no date) as is also the case in Germany. The current government in England is seeking to promote local partnership funding, notionally as part of its localism agenda but probably also, at a time in which the government is seeking to reduce government spending, to increase the investment available for Flood Risk Management and also to allow communities which would not qualify for funding under the project criteria to build flood alleviation schemes.

We can conclude that in practice various discourses related to the question who should pay for FRM can be distinguished. These may roughly be distinguished according to explicit or implicit principles such as the polluter pays principle or the user pays principle amongst others. It is an empirical question to what extent these discourses can be distinguished in different countries and cases and

whether they can be found across all flood related policies in a country or case or are very specific for a certain policy sub-domain.

5.7 Engineering versus nature in FRM

Key issue in this form of discourse is whether technological engineering options should be the dominant approach at the costs of ecological losses or whether FRM should be nature based.

The discourse on the relationship between the individual and nature has shifted from a dominant, nineteenth century view of the desirability of taming of an unruly nature to human ends, one where every drop of water that reached the sea was a drop of water wasted, to one where the perhaps the opposite view is now dominant: that interference with nature is wrong, to an idealisation of nature and to the framing of natural processes as somehow superior to and different from engineering interventions (WWF 2002). For example, dams were demonised (it is relevant to note that it was the physical intervention that was highlighted rather than either the storage that was the function of a dam or the release pattern from storage which affected downstream ecosystems). Thus, an essentially distinction was created between engineering interventions and natural processes. This is an artificial distinction as in the end both necessarily work through and with the laws of physics, chemistry and biology. So, at a fundamental level, the classic engineering approaches and those of working with nature have the same basic principles at their heart. The basic difference then between the old, classic engineering approaches to Flood Risk Management and those of working with nature are that the former left a barren ecosystem whereas the latter are characterised by maintaining the existing ecosystem or ecosystem enhancement. Secondly, the focus in the second is often on changing the way in which land is used rather than changing the river.

The WFD requires that there be no further damage to riverine ecosystems (D1.1.3: Bakker et al. 2013). A caveat to be made here is that in dynamic systems, decisions often involve environmental trade-offs, one ecosystem can only be conserved if another is sacrificed. This most commonly seen on the coasts where sea level rise often means that the choice is between managed retreat so as to allow offshore mudflats to maintain their area or protecting the existing onshore ecosystems. But these green intervention strategies have their own drawbacks; wetlands, for example, are often emitters of methane and nitrous oxide (Mitsch & Gosselink 2000) and flood plain wetlands radically change the downstream flow regime of the river with consequent changes to the nature of the ecosystems in that downstream river. Ecosystems are adapted to the prevailing variation in flows so any change in the flow regime is likely to produce a change in the downstream ecosystem. It is equally a mistake to think that all flooding is always good for ecosystems: floods may deposit sand or gravel and nutrients which damage the existing ecosystems.

Afforestation may reduce peak runoffs and hence some floods but trees are even more successful in capturing the precipitation in dry periods so that afforestation can make droughts worse (Calder 2004). Flood plain forests (Richards et al. 2003) can increase live storage on flood plains by increasing frictional resistance but the mechanisms by which trees adapt to coping with occasional flooding release chemical compounds which may be harmful to other species (Parolin & Witman 2010). Like any area of flat land, wetlands can be useful for flood storage (and have other benefits) but the area required to provide a given volume of storage depends upon the depth to which water can be held. Hence, upland flood storage reservoirs have a small land footprint than the equivalent storage in a lowland wetland. So, in China when one wetland was introduced for flood storage, three times as many people were displaced per unit volume of storage than were by the Three Gorges Dam (Wang 2002).

Examples of green interventions strategies include the traditional use of washlands for flood storage in England (Morris et al. 2004) and the Netherlands, the inclusion of increased flood storage on the

flood plain as part of the Rhine Flood Action Plan (Warner et al. 2012) (although there is a claim that this will have no effect upon the flood risk in the Netherlands), the planting of 100 kms of flood plain forest around Wuhan in China (Green, personal observation) and the proposal to re-establish beavers in parts of the Mississippi catchment so that beaver pools would retain some of the flood flow (Hey & Philippi 1994) and the use of multi-form channels in the Jubilee river basin. It is notable that many river rehabilitation projects are constructed using flood alleviation funding. However, Land use changes can be effective at reducing the flood flows in high frequency events on small catchments but have progressively less effect on either extreme events or in large catchments (see D1.1.1: Green et al 2013).

Engineering and nature based options are not mutually exclusive but can of course also be combined. The construction of reservoirs, land use changes by introducing more forest, moving obstacles, including summer dykes and vegetation from floodplains and creating a hydraulic corridor can be combined with a realignment of flood defences (Ramsbottom 2009: 35). The question is though, in which situations and to what extent both discourses are interlinked and whether there are also situations in which they are still largely separate.

5.8 Preferred intervention strategies

As is highlighted in a bit more detail in D1.1.4 (Hegger et al. 2013), a prominent form of discourse is the one on the preferred intervention strategies. It is tentatively concluded (Hegger et al. 2013) that this form of discourse is probably the most prominent one, because the dominant approach to flood management has been a technologically oriented one. From an engineering perspective, it makes sense to talk about concrete intervention options. Five more general treads have been identified which developed successively in various countries: changing the challenge (with a focus on traditional methods of channel modification, dikes and other forms of structural intervention); non-structural methods (White 1964); river restoration (Hansen 1996; Schneider 2000; Brooks 1988; Purseglove 1988); a catchment approach (RSPB & WWF 2007, Johnstonova 2009) and green infrastructure (Green Values 2013).

5.9 Discourse related challenges

The overarching discourse related governance challenge will deal with the realisation of a discursive shift. Discursive shifts will occur if dominant paradigms are reframed. Such a reframing asks for effective communicative strategies of possible change agents. Discursive shifts might result by the introduction of bridging or unifying concepts, which could integrate multiple frames. Concepts like Integrated Water Management (IWRM) (Global Water Partnership Technical Advisory Committee 2000), sustainable water management, water security or climate proofing could have such an integrative potential. The concept of Integrated Water Resource Management (IWRM) for instance is a discursive attempt to integrate land and water management. The introduction of so-called water tests in spatial planning also contributes to a further integration between land and water management. The Regional Spatial Strategy for London (RSS) for instance - introduced by the Blair government did incorporate a strategic approach to water management into spatial planning (Mayor of London 2007).

In this chapter we have distinguished between eight flood-related topics within which discourses can be distinguished. In the next WPs of STAR-FLOOD, the notion of discourse should be worked out further theoretically, to make it empirically researchable. This should predominantly be done within WP2. As we have seen, within some topics different forms of discourse can quite readily be distinguished and sometimes it is even clear to some extent who are the actors that tap from and contribute to the discourses (e.g. in the case of the topic of the framing and communication of risks and uncertainties. For other topics, such as the one on engineering vs. nature and the one on normative principles, we have been able to sketch the extremes, but it is still an open question which

discourses exactly can be distinguished. This should be further studied. A final question that arises is how salient each topic is in the sense that the discourses in that topic actually manifest themselves in observable societal debates, as opposed to a situation in which the discourses are tacitly reproduced in flood risk practices. The findings of D1.1.4 (Hegger et al. 2013) suggest that the debate on the preferred intervention option is still the most salient one hitherto.

6. Bridging in a fragmented structure

In the previous chapters we have shown that a multitude of actors are involved in FRM. Rules define their rights and responsibilities, but also create boundaries. Moreover, resources are unevenly spread over the actors, that might also frame flood risks, FRM and the necessity to realize a shift in FRMSs differently. Overall we must conclude that existing flood risk governance arrangements are fragmented. So, a shift in FRMSs will ask for bridging, both in the actor, in the rules, in the power and resource as well as in the discursive dimensions. Theories on collaborative governance, network governance or reflexive governance could provide strategies to find workable ways to take multiple frames into account and build bridges between them (Termeer et al. 2011). Theories on institutional adaptation can offer another source of inspiration (Adger 2000).

In the actor dimension policy entrepreneurs or networks have to take initiatives to start bridging activities and bring relevant actors together in joint meetings (Partzsch & Ziegler 2011; Brown and Clarke 2007; Huitema & Meijerink 2009). A reflection on the necessities and (im)possibilities to induce changes in existing legal systems will be necessary as well as a shift in the societal resources bases. Discursive shifts and the introduction of new unifying concepts might trigger discursive changes.

Interdisciplinary or even trans-disciplinary working is necessary to build bridges too. Synthesising knowledge from different disciplines however is complicated as it involves different cultures (Geertz, 1993). Trans-disciplinarily or 'transcience' which requires the integration of expertise with stakeholders is even more complicated.

In short, FRGAs tend to be fragmented. Bridging is required to change existing FRMSs.

7. Concluding remarks and questions for further research

In the previous chapters we have argued that Flood Risk Management is institutionally embedded in FRGAs. Making areas more resilient to flooding might imply that the existing combinations of Flood Risk Management Strategies should be changed in the future and that this in turn requires changes in FRGAs. The question however is in what direction these FRGAs have to be changed and how this can be done. From a normative position one could argue that ideally flood risks governance processes should meet good governance requirements (be effective and efficient, follows the rule of law, participatory, consensus-oriented, accountable, transparent, responsive, equitable and inclusive) (see a.o. Crabbé & Leroy 2008). However, these criteria are very general and a further specification is required. This could be done by referring to some ideal world processes or by doing comparative empirical research. We opt for the latter and will focus on flood risk governance systems; their stability and shifts over time as well as their performance in normative terms. This might enable us to identify good practices.

In empirical research we first have to identify the main actors involved in FRM, the roles they play and the sectors and levels they represent. Secondly we have to identify normative principles recognized at the different levels of policy making and their translation and elaboration into rules and powers. Furthermore the characteristics and relevance of discourses in different contexts have to be investigated. In this way different types of FRGAs might be identified.

Box 3 Questions for further research

The actor dimension

- Which (international, national, regional, local) actors have which authorities and responsibilities in the development of FRMSs?
- Which (international, national, regional, local) actors have which authorities and responsibilities in the implementation of FRMSs?
- Is there a discrepancy between the two – if yes, how does this come and will/has this result(ed) in barriers?

- Which actors (on which levels) are necessary to deliver a particular strategy?
- How do different actors cooperate both horizontally and vertically? (top-down or bottom up approaches). What official mechanisms exist? What informal mechanisms exist?
- What forms of public and/or stakeholder participation can be found in practice?
- How is public and/or stakeholder involvement organized?
- Which stakeholders actually participate in stakeholder processes? Why are some stakeholders excluded?
- In what way is the science-policy interface structured? And by whom?
- Which actors support a shift in FRMSs? And why do they do this?
- Which actors block a shift in FRMSs? And why do they do this?
- Which differences and similarities can be found between the STARFLOOD-countries

The rules dimension

- Which normative principles are recognized in national legislation?
- Which aspects of flood risks governance do they address?
- Which normative principles have been translated in national rules and norms?
- What status do those rules and norms have?
- What freedom of action do the rules leave to the actors involved?

- What rules are relevant in transboundary situations?
- Which differences and similarities can be found between the STARFLOOD-countries?

Power and resources

- Which actors have which financial resources to develop and implement FRMSs?
- Which actors have which knowledge base to develop and implement FRMSs?
- Why would all the actors necessary for effective delivery work together? Has this occurred in the past? Why not?
- Which bridging mechanisms between scale levels can be identified?
- Which bridging mechanisms between water and spatial planning can be identified?
- Which bridging mechanisms between research and policy can be identified etc.
- Which differences and similarities can be found between the STARFLOOD-countries?

The discursive dimension

- In what way is the topic of priority setting addressed?
- In what way are risks communicated to the public and/or the policymakers?? How and by whom are these risks defined?
- What standards of protection are discussed? What arguments are put forward to diversify standards? What narratives are shared in which coalitions?
- In what way and with what effects is the full costs recovery principle been discussed? What arguments are used to charge different groups differently?
- What, if any, is the role of cost-benefits analysis in societal debates about FRMS?
- To what degree will the costs of the development and implementation of FRMSs be recovered?
- What combinations of nature development and FRMSs are discussed and by whom?
- Which other discourses on FRMSs are dominant? What narratives are shared in which coalitions?
- What shifts in FRMSs are discussed? What arguments are used?
- What bridging concepts are used in the discourses?
- Which differences and similarities can be found between the STARFLOOD-countries

The arrangement

- In what way do the actor, rules, power and discursive dimension reinforce each other?
- Who gets what when and how?

Apart from the above questions further research also asks for a refinement of the 4 dimensions of the flood risks governance arrangements. Their mutual relations should be further clarified. A norm for instance is held by one or more actors, it is a discourse and defines a set of rules as to how an issue is to be framed and approached. To the extent to which it does influence the framing and approach to an issue, it is also a form of power. The concepts as used in this paper are pretty general and need further clarification and elaboration before they can be used in empirical research. The latter will be done in WP2.

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