

FLOOD GOVERNANCE: A SHARED RESPONSIBILITY

AN APPLICATION OF THE OECD PRINCIPLES ON WATER GOVERNANCE TO FLOOD MANAGEMENT

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Information Note: This report is a contribution to the OECD strategy for the implementation of the OECD Principles on Water Governance in interested countries. It applies the OECD Principles to flood and identifies inspiring practices and policy responses through the lens of the 3P's co-ordination framework (policy, people and places). This report aims to present a coherent framework for decision-makers and stakeholders to combine effectiveness, efficiency and inclusiveness in managing floods. As part of this effort, an accompanying OECD "Checklist" including questions concerning the implementation of the OECD Principles for flood governance was developed to collect case studies. The checklist is also proposed as a voluntary self-assessment tool in order for actors involved in flood management to appraise the performance of flood governance arrangements against the OECD Principles and to take collective action to strengthen water governance to make societies fit to cope with current and future water challenges. The report is primarily addressed to decision-makers and stakeholders from the local to national levels who have responsibilities in flood management but also to a broader range of constituencies and actors.

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DRAFT

Foreword

This report is a contribution to the OECD strategy for the implementation of the OECD Principles on Water Governance in interested countries. It applies the OECD Principles to flood and identifies inspirational practices and policy responses through the lens of the 3P's coordination framework (policy, people and places). It is an attempt to apply the Principles to flood-prone contexts in order to strengthen governance frameworks for managing the risk of "too much" water. The report is primarily addressed to decision-makers and stakeholders from the local to national levels who have responsibilities in flood management, but is expected to also be of relevance to a broader range of constituencies and stakeholders than "risk managers".

As part of this effort, the OECD developed a "Checklist" containing questions on a number of specific governance conditions, which is intended as a self-assessment tool in order for actors involved in flood management to appraise the performance of flood risk governance arrangements against the OECD Principles. The Checklist was used to collect 27 case studies, between 10 October and 2 November 2016, which feature practical experiences on flood governance. These case studies were analysed to highlight common features and key challenges in flood governance, and populate the report with practical examples.

Previous versions of this report were discussed at the STAR-FLOOD Conference, "Towards more resilient flood risk governance", held in Brussels on 4-5 February 2016, at the Dutch Water Governance Centre Sunset Symposium in Amersfoort, the Netherlands on 10 March 2016 and the Adaptation Futures Conference in Rotterdam on 10-13 May 2016. The 7th Meeting of the OECD Water Governance Initiative in The Hague provided a third opportunity to test hypotheses and collect feedback. The report also builds on the guidance provided by the OECD Council Recommendation on the Governance of Critical Risks and its application to floods. An earlier version of this report was peer-reviewed during the 7th meeting of the Water Governance Initiative (23-24 June 2016, The Hague).

The report was originally co-ordinated and drafted by a core team led by Aziza Akhmouch, Acting Head of the Cities, Urban Policies and Sustainable Development Division in CFE, together with Delphine Clavreul, Counsellor. The report also includes inputs from Hakan Tropp (Head of the Water Governance Programme), Oriana Romano (Policy Analyst) and Natalia Altman (Junior Policy Analyst). An earlier version of this report greatly benefited from inputs by Emeline Hassenforder (IRSTEA). Valuable comments were also received from stakeholders and members of the OECD Water Governance Initiative, which are warmly thanked: Peter Driessen, Marloes Bakker, Marleen van Rijswick and Dries Hegger (Utrecht University), Tom Raadgever (TU Delft), Elwin Leusink (Sweco, Netherlands), Régis Thépot (EPTB Seine Grands Lacs), Hannelore Mees (University of Antwerp), Mathieu Morel (France), Jakub Lewandowski (Polish Academy of Sciences), (Utrecht University), Ellen van Lindert (Netherlands), Stefano Burchi (AIDA), Chris Seijger (Deltares), Karl Schwaiger, Gabriela Keusch, Clemens Neuhold and Ernst Überreiter (Austria), Igor Liska (ICPDR), Ian Barker (Water Policy International), Jaroslava Markofová and Novák Vladimír (Slovak Republic), Tadashige Kawasaki (NARBO) and Adrian Schmid-Breton (ICPR). The authors are particularly grateful to Caroline Wenger (Australian National University) for her thorough reading of and comments on an earlier draft of the report as well as the many practical suggestions and examples.

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Acronyms

ADB	Asian Development Bank
APSFR	Areas of Potentially Significant Flood Risk
CBOS	Polish Public Opinion Research Centre
CMA	Catchment Management Authorities
CMI	Joint Flood Commission
CNE	French National Water Committee
COPRNM	Steering Council for major natural risks prevention
DEFRA	Department for Environment, Food and Rural Affairs (United Kingdom)
EU	European Union
FEMA	Federal Emergency Management Agency (United States)

FRGAs	Flood Risk Governance Arrangements
FRMSs	Flood Risk Management Strategies
ICPDR	International Commission for the Protection of the Danube River
ICPR	International Commission for the Protection of the Rhine River
ICTs	Information and Communication Technologies
IPCC	Intergovernmental Panel on Climate Change
KZGW	Polish National Water Management Authority
NBS	Nature-based Solutions
NGA	National Governors' Association (United States)
NWRM	Natural Water Retention Measures
OECD	Organisation for Economic Co-operation and Development
PER	<i>Plan d'exposition aux risques</i> (Risk exposure plan)
PPR	<i>Plan de prévention des risques</i> (Risk prevention plan)
PPRI	<i>Plan de prévention du risque inondation</i> (Flood risk prevention plan)
PPRL	<i>Plan de prévention des risques naturels</i> (Natural hazard prevention plan)
SDGs	Sustainable Development Goals
UNISDR	United Nations Office for Disaster Risk Reduction
UNWWAP	United Nations World Water Assessment Programme
USD	United States Dollars
WGF	Working Group Floods
WIN	Water Integrity Network

Chapter 1. Managing flood today – Setting the scene

Mounting challenges of too much water

Almost no country in the world is spared by floods or risks of floods. By 2050, 1.6 billion people will be at risks from floods (compared to 1.2 billion in 2013), affecting nearly 20% of the world's population (OECD, 2013a). Europe and North America will face increasing economic, social and environmental risks related to flooding, while India, China and Viet Nam are salient examples of countries at risk from the developing world (Sadoff et al., 2015). China and India, in particular, have the largest projected potential urban flood damages with more than 100 billion USD by 2080 (OECD, 2015c). Floods, “the temporary covering by water of land not normally covered by water” (EU, 2007), include river or fluvial floods, flash floods, urban floods, pluvial floods, sewer floods, coastal floods, and glacial lake outburst floods (IPCC, 2012). Different forms of governance will be required for each of the different types of flooding if they are to be tackled effectively.

Megatrends such as climate change, population growth and urbanisation have a high impact on the frequency and the intensity of water-related events, like floods. Population growth increases the likelihood and the potential impact of floods as it puts pressure on sewer systems and prompts urban expansion into areas with high risk of flooding. Rapid urban expansion can result in the loss of farmlands, forests and lands, increasing the pressure of the drainage systems, as well as it can lead to increased flood flow in urban areas which may constitute a hazard for the population and infrastructure. Climate-driven rising sea levels will play a major role for coastal cities and low-lying island states and changing rain patterns associated to an excess of rainfall will lead to greater surface runoff. Moreover, mismanagement of land and water, obsolete infrastructure also impact water-related events. Floods can arise from rivers overtopping defences, rising groundwater levels, extreme rainfall or recharge events, inadequate drainage systems, coastal flooding and erosion, storm surge and isostatic readjustment of the land following the last ice age, or a combination of these.

Floods bring about social, economic and environmental consequences. Today, between 100 and 200 million people per year are victims of water-related disasters, of which almost two-thirds for floods. Floods account for one-third of all economic losses due to water-related disasters (OECD, 2012). Economic losses due to water-related disasters are estimated at USD 50-100 billion per year between 1980 and 2009.¹ Other losses may include damage to the environment, biodiversity and cultural heritage, as well as human life and health, property (OECD, 2018a) and crop production (OECD, 2018b).

Managing flood risks involves dealing with uncertainty and complexity, which calls for appropriate and resilient² Flood Risk Governance Arrangements³ (FRGAs) at the transboundary, national, regional and local levels.⁴ The scale, size and spatial organisation of a given place, coupled with demographic and governance dynamics, have an impact on flood water functions and management, linkages across sectors, ability to engage other stakeholders and implementation capacity. Hence, there is no one-size-fits-all governance response to floods worldwide, but rather a combination of approaches and place-based policies integrating territorial specificities. In addition, flood management is no longer based only

¹ The estimates of economic damage may not be entirely reliable due to the differences among countries in terms of definitions, estimation methods, monetary units and purchasing power.

² Resilience is the capacity of a social-ecological system to absorb or withstand perturbations and other stressors such that the system remains within the same regime, essentially maintaining its structure and functions. It describes the degree to which the system is capable of self-organisation, learning and adaptation (Gunderson & Holling, 2002; Walker et al. 2004). In the context of floods, resilience may entail the capacity to resist, absorb, recover and adapt. For a discussion on the concept of resilience see Keessen et al. (2013).

³ Institutional constellations resulting from an 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 (Hegger et al., 2014).

⁴ For state of the art knowledge on changing flood risks, see Alfieri et al. (2015)

on mitigating disasters, but rather on coping with floods and recovering from them (OECD, 2018b). Each country has different governance conditions and capacities to respond to these challenges. For example, the Netherlands has started to set strategies and solutions for the climate scenarios forecast for 2050 (OECD, 2018a) while in Bangladesh, responses tend to be short-term.

Global agendas are calling for the prevention of water-related disasters, including floods. Relevant Sustainable Development Goals (SDGs) are SDG 6 on supply and sanitation for all, SDG 11 on making cities and human settlements inclusive, safe, resilient and sustainable and SDG 13 on climate change. The Sendai Framework for Disaster Reduction 2015-2030 urges to “strengthen disaster risk governance to manage disaster risk”. An integrated urban water management and waste management system as part of an Integrated Water Resources Management, in line with the New Urban Agenda, can also help manage water resources in a holistic and sustainable manner. Meeting the Paris Climate Agreement and thus reducing emissions could contribute to reduced risk, damage and loss from flood disasters. In order to achieve these ambitious goals it is key to coordinate water management across people, policies and places.

The need to improve flood governance

Conventional approaches to manage flood include a focus on traditional physical or *grey* infrastructure and reliance on physical science and technical expertise (OECD, 2013a; STAR-FLOOD, 2016). Grey solutions are considered constructed assets, such as flood defences through dikes, dams and embankments and are typically implemented in urban areas. Moreover, investment needs estimation to reduce water risks and cost-benefit analyses are typically used as a basis for decision-making related to floods (OECD, 2013).

Although traditional approaches are a prerequisite for sound flood management they need to be integrated in more comprehensive multi-level governance approaches such as the “3Ps” (OECD, 2016), which combines mechanisms across people, policies and places to achieve co-ordination and enhance the effectiveness, efficiency and inclusiveness of water governance (OECD, 2015a). Conventional approaches alone cannot be the sole basis for decision making (Rees, 2002) for several reasons:

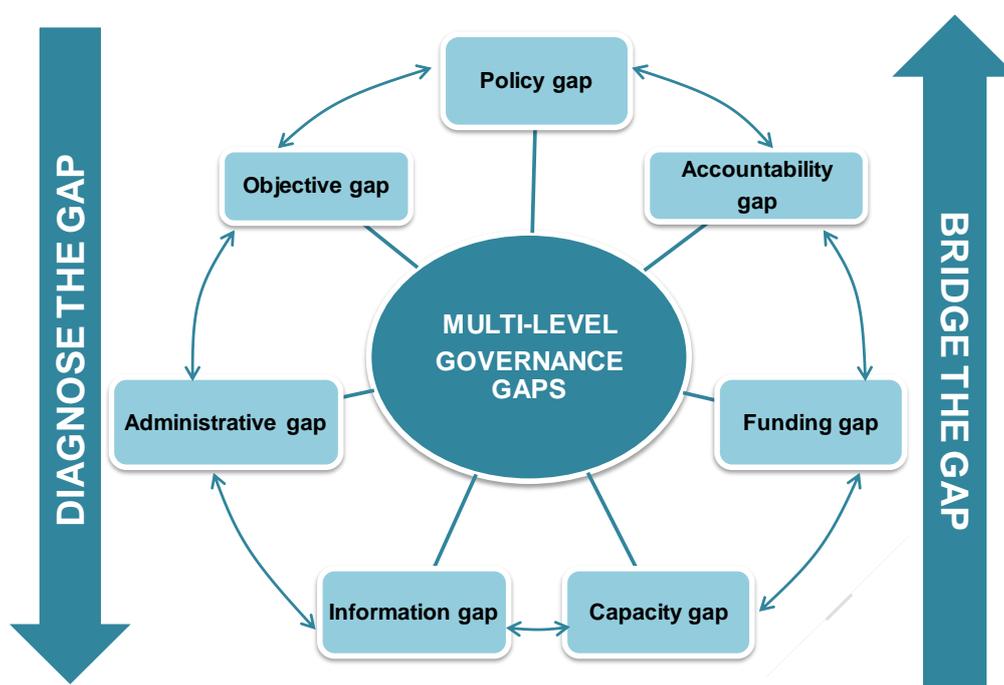
- First, flood risk assessment and management to date tend to overlook the perceptions of risk which various stakeholders (individuals or businesses) may hold. Yet such perceptions have an important influence on decisions affecting their vulnerability to flooding and ability to mitigate risk. Taking these perceptions into account is therefore a key element in seeking to assign clear roles and responsibilities for managing flood risks (Runhaar et al., 2016).
- Second, flood risk assessment and management to date often fail to capture the complex interconnections between various policy instruments (including technology) since they focus on simple, generic assessments of technical measures. They are often applied piecemeal to certain aspects of water management (e.g. drinking water standards, flood control) but do not cover water resource management holistically from a risk perspective (OECD, 2013a).
- Third, most adaptation scientists now acknowledge that traditional physical flood mitigation infrastructure encourages greater development of flood prone areas, putting more assets at risk and with higher potential damages. In the long term these infrastructures lead to geomorphological changes that can increase risk by reducing natural assets that act as mitigation measures. Combining grey infrastructure with green infrastructure approaches (in the form of, for instance, nature-based solutions) can lead to cost savings and improved risk reduction (UNWWAP/UN-Water, 2018).
- Fourth, most cost-benefit analysis methodologies discount the future (discount rate) and long term negative externalities of some measures that manifest decades later. This is a significant issue in the context of climate change. In addition, users of these methodologies have difficulty accounting for which cannot be assigned a monetary value, and often omit cross-sectoral externalities as well as indirect costs and benefits.

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- Fifth, non-structural flood mitigation measures offer a window of opportunity to bridge the existing inconsistencies between water and land management, as restoration of floodplains, removal of embankments, riparian buffers, and restriction of encroachments are land-based (Milman et al., 2017). Often, these measures imply many trade-offs, this is to say, incurring in costs or changes to provide flood protection for others. However, there is a broad agreement that land is needed to a greater degree than grey infrastructure. Thus, land use and management is a primary component of the flood risk system (Hartmann et al., 2018b). In addition, the basin level constitutes a “natural” scale for flood governance, where planning and mitigation measures can be coordinated across the basin (places) and linked with other sectors (policies) and stakeholders (people). Increasing attention needs to be paid to non-structural measures that should be mixed with structural ones in order to “live with floods” and be “prepared” for them (OECD, 2017). The Sendai Framework also highlights the importance of “public and private investments in structural and non-structural measures to increase economic and social resilience to disasters” (UNISDR, 2014).

A place that is resilient to flood from the water management perspective is one that can manage too much water in a sustainable, integrated and inclusive way, at least cost to society and in a reasonable timeframe, as it is suggested by the OECD Principles on Water Governance (OECD, 2015a). The OECD defines water governance as “the set of rules, practices and processes (formal and informal) through which decisions are taken and implemented, stakeholders can articulate their interests, and decision-makers are held accountable for water management” (adapted from OECD, 2015a). In other words, governance addresses the role of institutions and relationships between organisations and social groups involved in water decision making, both horizontally across sectors and between urban and rural areas, and vertically from local to international levels. Governance goes beyond government as it also includes the private sector, civil society and a wide range of stakeholders with a stake in water use and management. Flood management, which is considered to be a holistic and societal analysis, assessment and reduction of flood risk (Samuels and Gouldby, 2009), is an essential part of flood governance.

There is no one-size-fits-all response to the flood challenges worldwide, but a wide variety of situations within and across countries. Governance works as a means to an end and the type of governance needs to match the level of risk or the magnitude of the problem to fit policies to places and people (OECD, 2018a). In both OECD and non-OECD economies, from local to national and transboundary levels, there is still room for more adaptable, context-dependent and place-based policy responses. The water sector is still very fragmented and it is important to look at multiple, interconnected governance gaps that tend to reinforce each other (OECD, 2011). Governance systems should be designed according to the challenges they are required to address. Adopting a “comprehensive” approach to water policy requires diagnosing and overcoming multi-level governance challenges in design, regulation and implementation. These challenges include (OECD Multi-level Governance Framework):

Figure 1. Multi-level Governance Framework: Mind the Gaps, Bridge the Gaps



Source: OECD (2011), *Water Governance in OECD: A Multi-Level Approach*, OECD Publishing, Paris

- Institutional and territorial fragmentation of water-related disaster policy across multiple actors and lack of effective policy coherence across sectors (**policy gap**).
- Mismatch across administrative and hydrological boundaries to manage flood and water resources at the relevant scale (**administrative gap**).
- Questionable resource allocation and patchy financial management to carry out flood-related responsibilities (**funding gap**).
- Gaps in scientific, human, technical and infrastructural capabilities to design and implement sustainable, efficient and effective water-related disaster policies and strategies (**capacity gap**).
- Ineffective stakeholder engagement for inclusive and transparent flood-related decision-making; lack of or irregular use of monitoring, evaluation and enforcement mechanisms (**accountability gap**).
- Divergent objectives that inhibit synergies and complementarities to manage floods at the right scale (**objective gap**).
- Insufficient or incomplete flood-related data and information systems in support of decision makers (**information gap**).

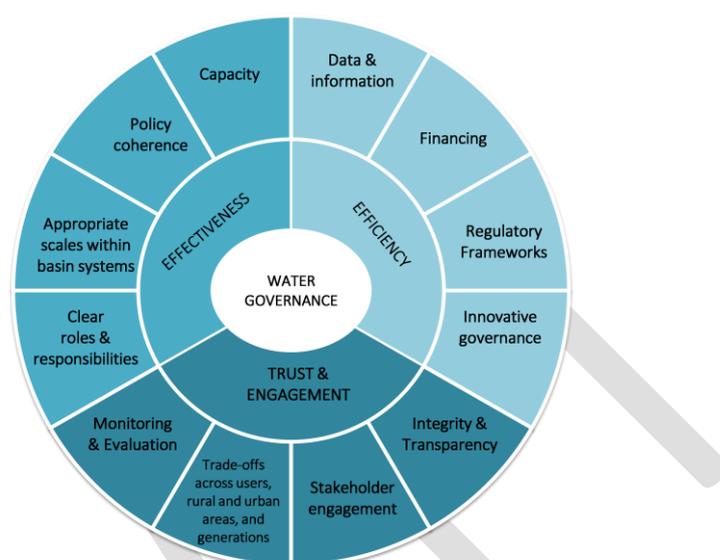
Analytical framework

The OECD Multi-level Governance Framework (as outlined above) can be a powerful diagnostic tool as well as a useful framework for stakeholders to bridge governance challenges that affect, to a greater or lesser extent, all countries, regardless of their institutional settings and water flows. This report offers a tool to identify the main multi-level governance challenges related to flood risk and can serve policy makers to foster effective, equitable and sustainable reforms. The OECD Multi-level Governance Framework is organised around seven “gaps”. They are interdependent, and therefore should not be considered in isolation. A single governance tool can help bridge several gaps, and conversely, a single gap may require multiple tools. Several governance instruments are often needed to overcome identified obstacles. Diagnosing multi-level governance gaps is a primary step to overcoming obstacles and promoting more integrated flood management.

In light of such implementation challenges, the Principles seek to assist governments and stakeholders at all levels to strengthen water governance to make societies fit to cope with current and future water

challenges. The OECD Principles were adopted in 2015⁵ and set standards for governments to improve the economic, social and environmental benefits of good water governance through effective, efficient and inclusive design and implementation of water policies. They aim to enhance water governance systems that help manage “too much”, “too little” and “too polluted” water in a sustainable, integrated and inclusive way, at an acceptable cost, and in a reasonable time-frame (Figure 2). The Principles apply to the overarching flood management cycle and should be implemented in a systemic and inclusive manner.

Figure 2. OECD Principles on Water Governance



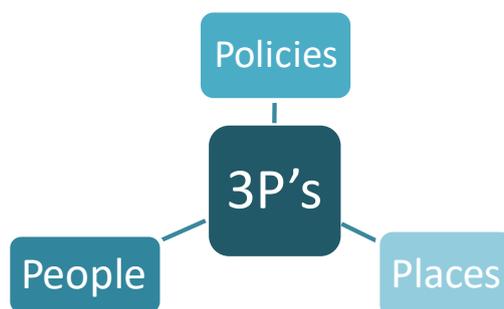
Source: OECD (2015a) accessible at <http://www.oecd.org/governance/oecd-principles-on-water-governance.htm>

The Principles recognise that governance is highly contextual. They acknowledge that water policies need to be tailored to different water resources and places, and that governance responses have to adapt to changing circumstances. The Principles argue that coping with current and future challenges requires robust public policies, targeting measurable objectives in pre-determined time-schedules at the appropriate scale, relying on a clear assignment of duties across responsible authorities and subject to regular monitoring and evaluation. They consider that governance can greatly contribute to the design and implementation of such policies, in a shared responsibility across levels of government, civil society, business and the broader range of stakeholders who have an important role to play alongside policy-makers.

The Principles were initially developed to apply to water governance arrangements in general, regardless of water management functions, water uses and ownership. Managing floods is an emblematic illustration of the shared responsibilities between public, private and civil society actors and across levels of government, and of the need for place-based policies within national frameworks. As such, it provides an opportunity to explore how the OECD Principles relate to the specificities of flood management and appraise the implementation of the framework conditions of the water governance system in place.

⁵ The OECD Principles on Water Governance were adopted by the OECD Regional Development Policy Committee on 11 May 2015 and welcomed by Ministers at the OECD Ministerial Council Meeting on 4 June 2015. The Principles were endorsed by 140 major stakeholder groups in 2015. Their development relied on a two-year bottom-up and multi-stakeholder process within the OECD Water Governance Initiative, a network of 100+ stakeholders from public, private and civil society sectors gathering twice a year in a Policy Forum.

Figure 3. The 3P's co-ordination framework



Source: OECD (2016), *Water Governance in Cities*, OECD Publishing, Paris.

The policy guidance provided in this report is articulated around the “3Ps”, a co-ordination framework for integrated flood management that relates to horizontal and vertical co-ordination across policies, places and people (Figure 3). It also taps into the OECD Recommendation on the Governance of Critical Risks (OECD, 2014a) (Box 1). Building on the identification of *multi-level governance gaps* hindering flood policy and the use of the *OECD Principles on Water Governance* to assess the state of play of flood governance, the present analytical framework also seeks to review *responses* and *instruments* to overcome flood management challenges in an effort to showcase best practices and strengthen the resilience of different scales across the world. Particular emphasis is put on the most prominent governance mechanisms that can foster effectiveness, efficiency and inclusiveness of flood governance (OECD, 2015c). They relate to vertical and horizontal coordination across:

- **Policies:** flood governance has consequences for, and can be affected by, a number of intrinsically related *policies* such as land use, spatial planning, environment, and agriculture, among others.
- **People:** a number of *people* from public, private and civil society sectors to water users or landowners have a stake or play a role in flood management.
- **Places:** water boundaries cut across *places* in terms of cities (i.e. when concerning more municipalities in a metropolitan area), hinterland (i.e. the surrounding environment, rural areas and watersheds, which sustain the major bulk of water demand from cities and where the actual sources of water are often located) and even countries.

Box 1. OECD Recommendations on the Governance of Critical Risks

The OECD Recommendations on the Governance of Critical Risks proposes five overarching actions that governments at all levels can take to better assess, prevent, respond to and recover from the effects of extreme events, including floods:

1. Establishing a comprehensive, all-hazards and transboundary approach to country risk governance.
2. Building preparedness through foresight analysis, risk assessments and financing frameworks.
3. Raising awareness of critical risks to mobilise households, businesses and international stakeholders and foster investment in risk prevention and mitigation.

4. Developing adaptive capacity in crisis management by coordinating resources across government, its agencies and broader networks.
5. Demonstrating transparency and accountability in risk-related decision making.

Source: OECD (2014a), Recommendation of the Council on the Governance of Critical Risks, Adopted on 6 May 2014 at the Meeting of the OECD Council at Ministerial Level in Paris, France.

Methodology

A Checklist to apply the OECD Principles on Water Governance to flood management (see Chapter 2), containing 100+ questions, was developed as part of this work to assess the preparedness of flood risk governance arrangements (FRGAs) and, more broadly, to appraise the governance system, building on the OECD Principles. It is conceived as a self-assessment tool supporting the implementation of the OECD Principles on Water Governance. For each principle, the checklist assesses the state of play of flood risk governance arrangements against the OECD Principles (diagnosis), the effect of current policy choices (impact) and the governance tools in place (mechanisms). The objective is to stimulate a transparent, neutral, open, inclusive and forward-looking dialogue across stakeholders on what works, what does not, what should be improved and who can do what. This checklist is applicable across all governance scales and can foster integrated strategies throughout the flood management cycle.

Drawing from the findings of the checklist that collected 27 case studies across OECD and non-OECD countries (Table 1), this report attempts to unpack the key characteristics of flood governance arrangements to analyse common features and identify good practices. It builds on case studies that provide valuable insights on the realities of “practicing” flood governance. The case studies were collected through a broad call sent between 10 October and 2 November 2016 through different channels, including existing networks of flood protection professionals (e.g. StarFlood networks, EU Working Group Floods members, etc.) and water-related email lists (e.g. OECD water list). These experiences, together with discussions with flood practitioners, have shed light on persisting challenges to overcome in order to deal with fragmentation and to make flood governance effective, efficient, inclusive and trustworthy. The case studies represent a panorama of existing governance arrangements in areas where floods are a prevalent issue, and are introduced throughout the report to illustrate the assessment. Details on the case study sample are provided in Box 2 and the list of case study promoters is available in Annex B. List of case study promoters.

In parallel and since the beginning of this process in 2015, the OECD Secretariat has been involved in other projects to support the implementation of the OECD principles that can offer additional policy guidance. The report “*Implementing the OECD Principles on Water Governance*” (OECD, 2018a), for instance, takes stock of the use of OECD Principles on Water Governance and its dissemination. The report proposes two major tools for interested cities, basins, regions and countries to strengthen their water policies. First, it provides a voluntary multi-stakeholder self-assessment tool to understand the performance of water governance systems composed of : (1) a traffic light system based on 36 input and process indicators; (2) a Checklist of 100+ questions to guide policy dialogue; and (3) an Action Plan to help decision-makers prioritise actions and reforms over the short, medium and long run. Second, it sets out 50+ concrete practices documenting the implementation of the Principles. This comprehensive framework, together with the lessons learnt from the wide range of practices, provide complementary guidance and are flexible enough to be appropriately tailored to suit the specificities of flood governance and thus contribute to strengthen it.

Table 1. List of case studies collected

	Case study	Location
1.	Upstream-downstream co-operation on flood management in Austria	Austria
2.	Strategies for delta governance in Bangladesh	Bangladesh
3.	The Piracicaba watershed flood in 2010 and 2011	Brazil

4.	Infrastructure vulnerability assessment of impacts of climate change in the United Counties of Prescott and Russell Culvert	Canada
5.	Adapting the suburb of Lystrup to heavy rain	Denmark
6.	Copenhagen Cloudburst management plan	Denmark
7.	Flood governance in Middle Awash	Ethiopia
8.	Participation and flood management on the Rhone River	France
9.	Flood management in the up-stream Bièvre River Basin	France
10.	Flood management in the Vilaine River basin	France
11.	Action programme for flood prevention of the Alsace-Moselle inter-municipal water service provider	France
12.	Flooding precaution update flood protection concept of Cologne in 1996	Germany
13.	The development of a draft Plan for the mitigation of hydrogeological risk in metropolitan areas and urban areas with high levels of population exposed to flood risk	Italy
14.	The role of the State Water Commission in flood protection in the state of Morelos	Mexico
15.	National Programme against Hydraulic Contingencies (PRONACCH)	Mexico
16.	Enhancing the emergency preparedness of flash flood victims in the Moldavian-Ukrainian transboundary Prut river basin by establishing a numerical flash flood early forecasting service	Moldavia / Ukraine
17.	The "Room for the River" programme	Netherlands
18.	The Flood Defence Programme of the Rivierenland Regional Water Authority	Netherlands
19.	Flood river management in the Chakar river basin of Sibi Balochistan	Pakistan
20.	Mediating integrated actions for reducing flooding in a changing climate	Poland
21.	The Eddleston Water Project	Scotland
22.	Assessing the Dynamics of Flood Governance following the 2013 Seoul floods	South Korea
23.	Participatory flood management in Arga and Aragon rivers	Spain
24.	Flood management in Granada	Spain
25.	The Herne Hill and Dulwich Scheme: Implementing partnership funding policy for flood management	England and Wales
26.	Surface Water mapping for Flood Risk Regulations	England and Wales
27.	West Sussex Pathfinder: building community resilience	England and Wales

Source: Author's elaboration.

Box 2. Overview of case studies on the governance of floods

The 27 case studies collected in the framework of the project represent a diversity of geographic location, management scale and thematic focus. These cases were submitted by national government representatives (5 cases); subnational authorities (3 cases); river basin organisations (5 cases); operators (2 cases), research institutes (11 cases) and a consulting firm (1 case).

- **Geographic distribution:** The case studies collected are from 22 OECD and 5 non OECD countries, and cover all five continents, with an overrepresentation of European cases, which can be explained by the important role played by European researchers (StarFlood) and the EU Flood Working Group in disseminating the call for case studies.

Table 2. Cases by geographic distribution

Europe [19 case studies]	Austria, Denmark (2), France (4), Germany, Italy, Netherlands (2), Poland, Scotland, Spain (2), England and Wales (3). One case study concerns transboundary contexts of the Prut river [Moldavia/Ukraine].
Latin America [3 case studies]	Brazil and Mexico (2)
North America [1 case study]	Canada
Asia-Pacific [3 case studies]	Bangladesh, Pakistan, Korea
Africa [1 case study]	Ethiopia

Source: Author's elaboration.

- **Scale:** Case studies are set at different scales, according to administrative (national, regional, local) or functional boundaries (floodplain, sub-basin, basin, transboundary basin, etc.).

Table 3. Cases by scale

Administrative boundaries	National level [7 case studies]
	Regional/provincial/state level [3 case studies]
	Local level [5 case studies]
Functional boundaries	Floodplain [2 case studies]
	River Basin [9 case studies]
	Transboundary basin [1 case study]

Note: Author's elaboration.

- **Thematic focus:** Case studies recount a variety of experiences on flood management.
 - 1 case focuses on a transboundary strategic plan for flood management;
 - 9 cases concern national policy and/or programmes;
 - 5 cases describe the governance arrangements for the day-to-day management of floods in specific locations;
 - 3 cases present state/provincial flood management plans;
 - 3 cases look at specific flood events; and
 - 6 cases concern research projects, at national or basin level.
- Although the case studies provide valuable insights and feedback on the reality of flood governance, they do not intend to reflect the multitude of views, arrangement and players in this field.

Chapter 2. Unpacking the key dimensions of water governance in flood management

This section uses the OECD analytical framework for flood governance as a tool to carry out a comparative analysis with a view to sketch out best practices and lessons learned for more effective, efficient and inclusive flood management. As such, applies the Multi-level governance gaps framework, the OECD Principles on Water Governance and the 3P's co-ordination framework in flood-prone contexts in order to strengthen governance frameworks for managing the risk of “too much” water. The case studies narrate practical experiences on flood governance and provide detailed information based on the Checklist.

Roles and responsibilities

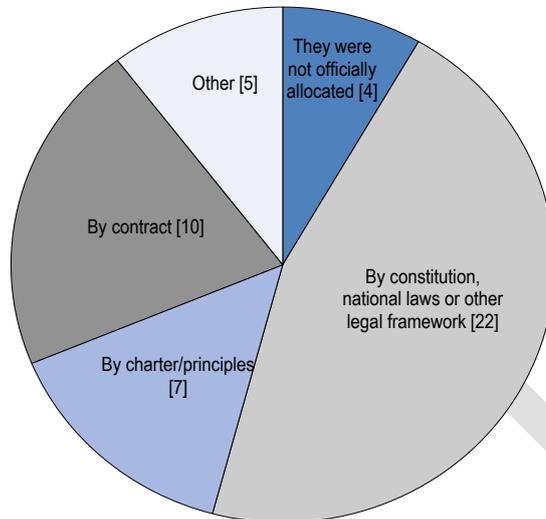
Principle 1. *Clearly allocate and distinguish roles and responsibilities for water policymaking, policy implementation, operational management and regulation, and foster co-ordination across these responsible authorities*

Observations

Various roles and responsibilities are involved in water management at large, and flood management in particular. In many OECD and non OECD countries, the allocation of roles and responsibilities in flood management is widely distributed across several scales ranging from national to subnational and basin levels, as well as across sectors. Responsibilities are typically defined and allocated by the Constitution or by national law (this is the case for 22 out of the 27 case studies collected). In other instances, modalities for defining the allocation of roles and responsibilities are set by contract, as evidenced by 10 of the case studies collected or by a charter, for seven cases. The case studies also illustrate situations where roles and responsibilities are not officially allocated but rather defined according to informal agreements, such as in the framework of partnerships (Figure 4). Unclear roles and responsibilities can lead to conflict between institutions, as occurred with the delta governance in Bangladesh. In France (Action Programme for flood prevention) the problem concerns the asymmetry of technical expertise and knowledge that undermines co-ordination across authorities.

Figure 4. How roles and responsibilities for flood management are defined

22 case study promoters responded



Note: Responses correspond to the total number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from studies on flood governance collected for the OECD project (October 2016).

Various reforms affect the allocation of roles and responsibilities. New regulations or the increasing use of soft instruments such as gentlemen's agreements are cited as levers to define "who does what", as illustrated by 18 case studies. Territorial reforms, whether it is decentralisation, regionalisation or recentralisation, also influence decisions on which institution is responsible for what at which level (such as in 17 cases). New ways of cooperating between the public and private sectors, financial policy changes (e.g. less public funding at local level, changes in procurement systems), and market-oriented reforms (e.g. in the insurance sector) are other factors that trigger a reshuffling of roles and responsibilities.

Allocation of roles and responsibilities may be regularly reviewed to adapt to changing circumstances and ensure they are always fit. For example the European Floods Directive imposes that Flood Risk Management Plans be reviewed every six years including roles and responsibilities. The review and/or update of flood risk management policies and plans can be a timely occasion to take stock of and adjust the allocation of roles and responsibilities, as illustrated by 19 case studies. Other means include the organisation of internal meetings as part of projects; citizen platforms, such as observatories or public meetings; or it is the prerogative of the national regulator or a parliamentary commission. Often, several of these means are used concomitantly to revise the allocation of roles and responsibilities. For 19 out of 27 case studies collected, more than one review mechanism is used.

The design and implementation of Flood Risk Management Strategies⁶ (FRMSs) often take place in a fragmented setting. To varying degrees, countries have allocated increasingly complex and resource-intensive competences to lower levels of government, including the management of floods that are not always compatible with their unstable and insufficient revenues (funding gap). This has resulted in a dynamic relationship between multiple authorities.

⁶ Approaches for dealing with flood risks which can be distinguished from one another by their focus on the probability of flooding, its consequences or on recovery after a flood has struck (Hegger et al., 2014).

- This is the case in France for instance, where decentralisation led to more and more local-based flood management policies. While the national government maintains a central position regarding law-making and the control of procedures, responsibilities for flood infrastructure are partly devolved to the municipal level. Moreover, current territorial reforms in France have reallocated competencies towards the inter-municipal and metropolitan levels, such as for the maintenance of hydraulic structures regarding flood prevention. However, French state services keep on managing flood and coastal risk prevention plans (PPRI, PPRL) to prevent asset increase in flood hazard area at municipal level.
- Such multi-level fragmentation is also observed in England where the Floods and Water Management Act of 2010 attempted to tackle the issue by creating a statutory duty for national agencies and local authorities to co-operate and align their strategies (Hegger et al., 2013).
- Division of responsibilities is also a significant issue in Australia. The state governments are constitutionally responsible for land and water management, and by extension, flood management. However, Australian state governments and their development planning portfolios tend to prioritise development, economic growth and provision of affordable housing over long term community safety. One of the reasons for this is that responsibility of state governments for flood prevention/mitigation has been decoupled from the consequence of failing to prevent/mitigate. In Australia the majority of consequences of irresponsible development (e.g. development in a flood prone area) are paid for by a different level of government: the federal level (see Productivity Commission, 2014; Abel et al., 2011). Allocation of roles and responsibilities should be clearly stated in supporting institutional frameworks.

Institutional fragmentation can affect the effectiveness of flood risk governance arrangements. Two-thirds of the case studies collected assess this impact using methods such as interviews, stakeholder consultation, and stakeholder mappings or parliamentary reviews. In these cases, the assessment revealed that fragmentation can spark conflicts among stakeholders in charge of flood management (as illustrated in 13 case studies); generate negative environmental impacts (in 8 case studies); or lead to an uneven distribution of resources and unclear accountability lines (seen in 8 case studies also). Experience in other case studies attest to multi-level challenges that can derive from institutional fragmentation, including inconsistencies between national and local goals/strategies, overlapping or conflicting policies, and a heavy workload imposed on lower levels of government when it comes to flood management.

However, dispersion across agencies is not necessarily inherently negative. It may also imply what is called “polycentricity” (Cairney, 2012) – not all responsibilities are concentrated at one place. It is essential to carefully assess whether dispersed decision-making is positive and desired or negative and unwanted. Among other steps, this implies looking at coordination mechanisms in place across responsible authorities and stages of flood management and their effectiveness. In the United States for example, the Federal Emergency Management Agency (FEMA) has the responsibility for “coordinating government-wide relief efforts. It is designed to bring an orderly and systemic means of federal natural disaster assistance for state and local governments in carrying out their responsibilities to aid citizens” (FEMA, 2016).

Various mechanisms are used to address the negative effects of institutional fragmentation. The majority of case studies collected illustrate that organisations and tools that bridge knowledge development and decision-making processes are most often used. They typically include research institutes, interactive maps, as well as simulation models. Other typical mechanisms to tackle overlaps or conflicts of interest are vertical and horizontal co-ordination mechanisms such as conferences that gather local and subnational players in flood governance, and the use of coordinating actors (as in 17 case studies). Information and knowledge also help to coordinate roles and responsibilities, such as shared database and information systems and platforms through which stakeholders can create collective knowledge (as in 14 case studies). Inclusive decision-making processes are key for co-ordinating various flood management actors, interests and conflicts. For instance, Alsace-Moselle Water and Sanitation Union (SDEA) in France has deployed an adaptive governance model to overcome fragmentation challenges (OECD, 2018a) that consists of allocating roles and responsibilities at the

lowest appropriate level taking into account the topic concerned. This is done through the SDEA's Thematic Commissions, which provide an opportunity for members to make proposals on the projects that SDEA is developing.

While monitoring the effectiveness, efficiency and inclusiveness of coordination mechanisms is ongoing practice, it is not yet mainstreamed in flood risk governance arrangements. Less than half of the collected case studies reported assessing the strength of their coordination tools. Those that do rarely use the same approach: some rely on indicators and regular monitoring (in 2 case studies), parliamentary reviews (1 case), research projects (1 case), while others carry out project implementation reviews (3 cases) and ex-post evaluations (2 cases).

Areas to improve

As the observations show, the water sector is associated to high levels of territorial and institutional fragmentation of actors and lack of policy coherence (policy gap), and thus to deep complexity provided that it faces overlaps. For each of the [five stages of flood management](#)⁷ (see definitions in annex of the checklist), a diversity of stakeholders, at various scales, are responsible for policy making (e.g. defining flood policy-directions), policy implementation (e.g. financing and budgeting, capacity development, evaluation), operational management (e.g. running of the warning systems, owning and maintaining flood risk assets), and regulation and enforcement (e.g. regulation on construction of houses in floodplains, transposition of the European Floods Directive at the national level in Europe, standards, licensing). The lack of co-ordination mechanisms across multiple actors can hinder effective policy design and implementation for flood management (e.g. delays, high transaction costs, asymmetry of information, etc.). In the case of flood management in the city of Granada, Spain, there are too many institutions involved which ends up dissipating responsibility and leadership and affects the decision-making processes. There is an inherent potential for conflicts when the allocation of roles and responsibilities across policy areas and between levels of government is unclear.

Ways forward

In addition to the division of responsibilities over multiple levels, the distribution of responsibilities over sectors is relevant (e.g. water system management, disaster management, spatial planning) (see principle 3). A clear definition and allocation of roles, responsibilities and the interface between them in flood management is thus essential to diagnose inconsistencies and redundancies, to avoid grey areas, and to ensure the effectiveness of the water policy cycle. It can also serve to mobilise sufficient and stable finance for flood management. Furthermore, catchment authorities (where they exist) and increasing autonomy of lower levels of governments need to be accompanied by financial support and capacity building to carry out flood functions. Closing the knowledge and expertise gap may facilitate collaboration amongst authorities. Co-operation in the form of partnerships is required between levels of government and basin levels, as well as across sectors, to meet flood challenges. The case studies collected also highlight that often, more than one co-ordination mechanisms is needed, and that coordination is mainly achieved through a mix of instruments, both formal (coordinating bodies, contractual arrangements) and informal (bridging concepts such as multi-layered safety, etc.).

Scale

Principle 2. *Manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions, and foster co-ordination between the different scales.*

Observations

⁷ Flood anticipation or foresight, flood prevention or mitigation, flood preparation or preparedness, flood response, flood recovery.

Water issues, including floods, cut across administrative boundaries both in their ecological and political dimensions. The relevant scale for flood management depends on the area which is considered as a unit of management, which may vary from transboundary to city levels:

- In the case of *transboundary or international river basins*, which are shared among several states, various governments may be involved in flood management. Both the European Flood Directive and the Water Framework Directive recommend cooperation among neighbours in order to produce one single international Flood Risk Management Plan (Art. 8.2) covering the entire transboundary river basin.
 - The Danube Flood Risk Management Plan is an exemplary transboundary initiative that connects places. It was produced by the International Commission for the Protection of the Danube River (ICPDR), adopted in December 2015 and endorsed by Danube Ministers in February 2016 (ICPDR, 2015). The plan can be considered as a major riparian cooperation mechanism on flood management at the basin-wide scale. Similar progress has been achieved in other international river basin commissions in Europe, such as on the Rhine and Elbe rivers. Other transboundary initiatives include bilateral agreements, such as one for crisis management established after the 1997 flood on the Odra river basin shared between the Czech Republic, Poland and Germany. Similarly, bilateral agreements between the Slovak Republic and its neighbours define management steps in the case of critical hydrological situations.
 - Another example of linkages across scales but also of policies across levels is the Rhine flood risk management plan, coordinated through the International Commission for the Protection of the Rhine (ICPR) created in 1950. In particular, coordinated measures implemented since 1995 and the drafting of the corresponding balances every 5 years have proved to be successful. The first Flood Risk Management Plan concerns the period 2015 to 2021 and will be assessed and eventually updated after 6 years. In the future, a digital instrument developed in 2015 should help ICPR determine the reduction of flood risks and the effects of measures when assessing the implementation of the flood risk management plans in the IRBD Rhine. The initiative has also connected people given that public participation was key in the drafting of the plan.
 - Many other cooperation mechanisms are in place for transboundary flood management. The EU Common Implementation Strategy provides a platform to agree on views for implementation of both the European Flood Directive and the Water Framework Directive through the subsidiarity principle. It concerns the eight river commissions within ICPDR countries including the Danube and the Rhine.
- National *river basins or sub-basins*, which are basins falling entirely within the boundary of a State, are the primary scales considered by the European Flood Directive and the Water Framework Directive for the management of flood risk. Catchment based governance in theory offers decision makers more FRM options compared to decision-making on a smaller scale (Dieperink et al., 2013). For instance, it is relevant for flood forecasting and warning systems to be set up along the whole river. Catchment management organisations can also offer a platform for exchanging ideas and experiences on spatial planning, allocation politics, or flood defence infrastructure construction. However, it is also worth noting that catchment approaches often come at odds with existing administrative boundaries.
- In addition, the national scale often plays an essential role in flood governance. Governments set out FRMS and are involved in the funding of flood-related measures. Moreover, since cultures of risk, administrative structures and dominant approaches to flood risks vary within countries, local initiatives should be consistent and coordinated with national frameworks. In Belgium, England and The Netherlands some good practices were found (e.g. Delta Programme and Room for the River in The Netherlands; coordinating role of environment agency in England, river committees in Wallonia,

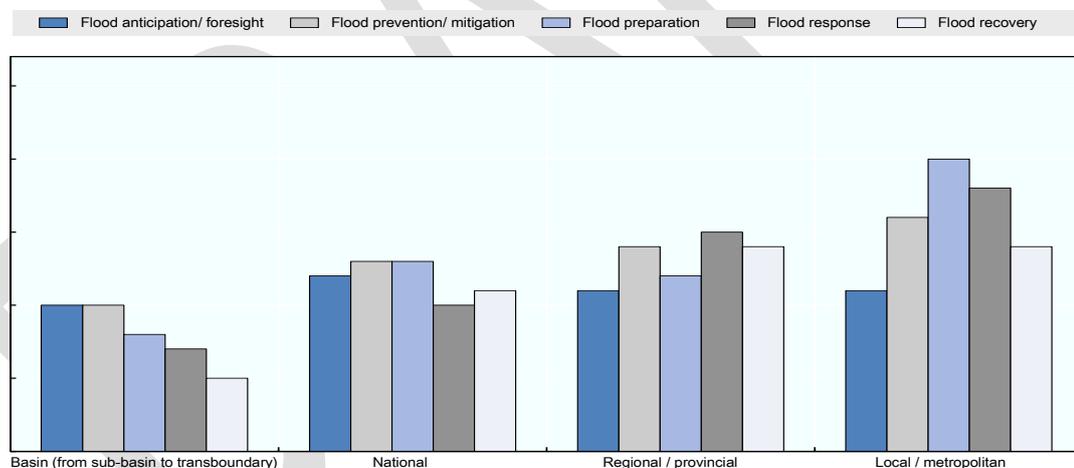
coordination and stimulation by the Flemish Environment Agency (Vlaamse Milieumaatschappij)).

- Finally, in many countries, crisis management, public information about floods and spatial planning are all managed at the *city scale*. In France for instance, the recent territorial reform gave new competencies on flood management to metropolitan areas and inter-municipal authorities, thus re-enforcing flood management at the city level. On the other hand, as is the case with Poland, shifting responsibilities to the municipal level without adequate resources can cause tensions or even backfire. In addition, responsibilities for public risk awareness and spatial planning are distributed at different scales: municipal, departmental, regional and national.

The relevant scale for flood management can also depend on the flood management function(s) under consideration. The collected case studies illustrate that in a given flood governance setting, different functions are managed at different scale. Figure 5 shows that while in a nearly equal number of cases, flood anticipation and foresight are managed at national (for 12 case studies) or subnational (either regional/provincial or local/metropolitan) levels (for 11 cases), flood prevention/mitigation, flood preparation and flood response are functions primarily managed at the local/metropolitan level (for 16, 20 and 18 cases respectively). Lastly, flood recovery is most often managed at subnational level (either regional/provincial or local/metropolitan) (see definitions of each function in annex of the checklist).

Figure 5. Scale at which flood management functions are managed

27 case study promoters responded



Note: Responses correspond to the total number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

A number of challenges regarding flood management lie in aligning approaches at the various scales. How to achieve a basin approach when governments are simultaneously devolving responsibilities to the local or city levels? How to ensure that local solutions, aiming to get rid of excess water as soon as possible, do not harm neighbouring communities? In many instances, vertical coordination is hampered by conflicting agendas, priorities and interests (as pointed out by 19 case studies), unbalanced powers, capacities and resources across scales (illustrated in 14 case studies). Challenges can also be the result of the legal allocation of roles and responsibilities or inconsistent budgeting, procurement and regulatory processes across levels of governance. In Australia for instance, the division of responsibilities is not described in the constitution while the national approach to floods and resilience is not prescriptive and has no power of enforcement. In the Australian context, flood mitigation planning and implementation are funded via state competitive grants processes, requiring local resources. This can create a patchwork of gaps and inequities. Flood management is devolved to municipal levels, and

usually only extends to city boundaries when preparing flood studies. Hence, flood management cannot be described as targeting a ‘basin’ scale. Catchment management authorities, in states that have them, have little legislative power to manage flooding and are severely under-resourced. Municipal government resources and skills to carry out flood management functions are also limited and subject to competing local demands.

A menu of options exist when it comes to multi-level coordination mechanisms. These mechanisms are used more or less regularly depending on the scale. At the local and basin levels, responses entail enhanced engagement in flood-related decisions while at the national level, vertical and horizontal mechanisms stand out. For instance, participatory processes are common practice at local/metropolitan level in the case studies, together with joint programmes of measures, co-financing arrangements and joint projects or contracts. At the national level, the use of shared data and information systems is more widespread as are inter-governmental dialogues, while at the basin level the river basin committees and other participatory processes tend to be the preferred options. As a result of these coordination mechanisms, more than half of the case studies report having flood risk management plans that are aligned with national policies and/or locally adapted to local conditions. The Netherlands national policy and flexible local implementation approach is a good example of resolution between geographical scales. At the international level, co-ordination is also essential, in particular across basins. The International River Protection Commissions for the Danube and Rhine rivers (ICPDR and ICPR respectively) were set-up to foster transboundary basin-wide management and enhance co-ordination at the river basin scale building on existing national administrative arrangements and in line with the river basin management approach dictated by the EU Water Framework Directive.

Areas to improve

Further efforts are needed to align the administrative boundaries of municipalities, regions and states to hydrological imperatives, and thus reduce the administrative gap. The blurred allocation of roles and responsibilities, coupled with limited co-ordination across scales and levels of government often lead to contradictory flood management strategies. For instance, an adequate alignment between local initiatives and national frameworks was lacking in Sweden. Besides, the issue of scale touches upon conflicts and the lack of connectivity between spatially dislocated communities in upper storage and lower impacted catchment, which is a key challenge for the Eddleston Water Project. An integrated flood management approach and risk management strategy becomes difficult among downstream and upstream countries without a whole-basin approach (e.g. this is the case for some Bangladeshi sections of the Ganges, Brahmaputra, Meghna basins and adjoined sub-basins that are located downstream while upstream developments are in India and China).

The missing linkages between water and land can hinder governance, in particular, at the catchment scale. Land, whether private or public, can be very challenging when managing floods given that private property rights can be highly controversial in a context of increasing climate-driven flooding. This raises questions such as: who should pay to protect private property? Who is in charge of compensating the destruction of land that is suffering devaluation (McCarthy et Al., 2018)? Managing flood in the public space and reducing the risk of flooding at a property level has been a key challenge for the Herne Hill and Dulwich Flood Alleviation Scheme in England.

Ways forward

There is no unique or agreed solution on how to align approaches at the various scales. Equal attention needs to be paid to the trade-offs that such co-ordination efforts imply as it takes time and institutional effort, and it can generate multiple types of costs. Managing trade-offs related to fairness and equity in flood management is also key to ensure that general and specific interests are heard. In the case of flood management, assessing the hydrological and geographical logics is fundamental to addressing the linkages between urban, rural and watersheds. Addressing the scale can also serve manage other multi-level dynamics inherent to flood management, in particular linkages and co-ordination between water and land management. Involving landowners is just as important as haggling amongst administrative bodies in order to find potential solutions and mechanisms to mitigate and prevent floods.

Ensuring that flood is being managed at the right scale requires clear roles and responsibilities, as well as adequate resources and skills to carry out their functions. Devolution of flood management at appropriate scales needs to address such coordination issues. In this sense, it is key to acknowledge that the institutional setting is not only defined at the national level, but in many cases it can be related to transboundary water entities (Menard et al., 2018). Mechanisms and incentives to co-ordinate among riparian states are very important when it comes to inter-jurisdictional transboundary flood governance, as they can build on existing national administrative structures.

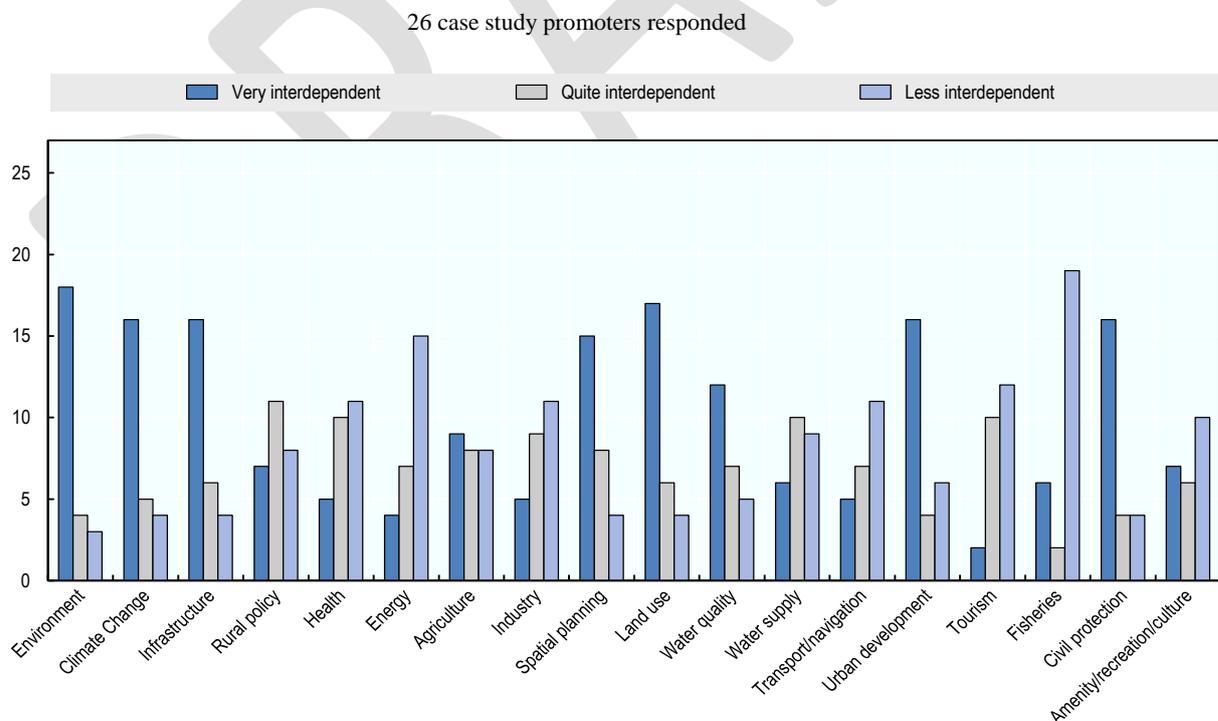
Cross-sectoral co-ordination

Principle 3. Encourage policy coherence through effective cross-sectoral co-ordination, especially between policies for water and the environment, health, energy, agriculture, industry, spatial planning and land use.

Observations

Flood risks are affected by decisions taken in various sectors. Amongst the most inter-dependent sectors are land use, civil protection, the environment, climate change, infrastructure, spatial planning and urban development (Figure 7). Thus, FRMSs cannot be isolated from these policy fields. Recent research shows that integration within a specific strategy or sector, such as FRM for instance, can actually lead to a lack of integration among strategies (Matczak et al. 2016). Hence policy coherence within FRMSs, but also between FRMSs and other policy areas, is essential. For instance, FRMSs may require dams to be empty in order to store floodwater while water supply strategies may require dams to be full in order to guarantee sufficient stored water for all uses. This may become more critical if climate change puts pressure on water supplies. Water supply needs can also influence flood risk if groundwater extraction leads to subsidence, which is an issue in some cities.

Figure 6. Interdependence between flood management and other policy areas



Note: Responses correspond to the total number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

Even though flood risks are often managed by water managers, spatial planners and risk managers also have an important role in cross-sectoral coordination. Indeed, when considering cross-sectoral

coordination, one should not undermine the role of spatial planners who are generally in a good position to look at areas holistically (Hartmann & Driessen, 2013). Flood management should be included in spatial planning curricula, and spatial planners should learn to take flood risks into account (De Smedt, 2014). Effective planning controls are the first line of defence and are at the heart of effective flood management. Integrating flood management and spatial planning is a number one priority for effective cross-sectoral co-ordination in the field of FRM. It is essential that sectors other than water start to see flood risks as their problem. In addition, while in many countries, such as the Netherlands, water agencies have the lead on water infrastructure, very often flood management is coordinated by risk managers, either through interior, civil protection, or a directorate general for the prevention of risk.

A lack of policy coherence can have severe distributional impacts in terms of both the costs and benefits of flood management. Policy incoherence can: raise economic costs, such as when infrastructure investments could have been avoided with better coordination (as exemplified in 19 case studies); generate conflicting actions, for instance when urban policies support the development of housing in floodplains while concomitantly flood management policies use these floodplains or flood discharge (in 17 case studies); or increase flood risks (16 cases). Other types of negative impacts caused by policy incoherence include greater risks of human casualties and transaction costs, such as when conflicts arise between stakeholders involved in flood management. Thus, the lack of coherence in water-related areas can work against flood prevention policies if insufficiently co-ordinated.

There is an array of mechanisms in place to facilitate coherence and mitigate conflicts between flood management policies and other policy sectors. Some are legal/administrative mechanisms including legislation, regulation, cross-sectoral plans, inter-institutional agreements between subnational authorities, financial incentives (e.g. subsidies) and contracts; while others are learning mechanisms such as research programmes, schooling and knowledge co-creation projects across different sectors. These mechanisms can help ensure that flood management strategies include considerations for other sectors. For instance, 22 case studies collected reported that their strategies include information on areas that have the potential to retain flood water (e.g. natural floodplains), while in other cases the strategies include aspects of land use, infrastructure, environmental protections, spatial planning, and soil/water management.

In many countries, existing procedures, rules and instruments could enable more proper consideration of flood risks in spatial planning. Examples of cross-sectoral policy coordination include the “water test” and “signal areas” in Flanders. The “water test” (*watertoets*) implies that governments obtain expert advice of authorized water managers before granting construction permits (Wiering and Crabbé, 2006). “Signal areas” (*signaalgebieden*) are still undeveloped areas with a hard planning destination (residential and industrial areas) located in flood-prone areas (De Smedt, 2014). Both these concepts involve permits being declined or granted subject to flood mitigating measures (e.g. flood proof housing). French “zoning plans” (*plans locaux d’urbanisme*) and “territorial coherence plans” (*schéma de cohérence territoriale*) and Polish “local spatial development plans” (*miejscowy plan zagospodarowania przestrzennego*) take into account housing developments, environmental considerations, transport and networks. These approaches have been found to stimulate reflection on flood risks. Key elements within these approaches include risk awareness, knowledge exchange, active policy entrepreneurs and instruments that are not only enforceable but also enforced. These urban plans can also be constrained, in high flood risk areas, by flood risk prevention plans elaborated by State services in association with local authorities.

The State of Victoria in Australia is another example of cross-sectoral coordination which emphasizes the need for independent oversight to ensure such coordination. For decades, Victorian Catchment Management Authorities (CMAs) were referral agencies that had the power to impose development conditions or to veto proposed development in flood hazard areas. However CMAs were under-resourced, which limited implementation. For example, the number of studies for the identification of flood hazard areas was limited due to funding availability. This referral power was recently removed. Queensland’s revised development legislation is now considering the possibility of giving Emergency Response Agencies a say as their personnel are put at risk by inappropriate development which can have an effect on their resourcing requirements if there are more homes at risk. However, these

instruments are not always used/enforced, in part because planners choose not to make use of the powers they, in principle, have. They seem not to give flood risks sufficient priority, e.g. vis-à-vis economic interests (Raadgever et al., 2016).

Areas to improve

OECD and non-OECD countries generally face problems when striking a balance between conflicting financial, economic, social, environmental areas and policy drivers for collective enforcement of flood policy (objective gap). For instance, municipalities may be willing to develop new housing and real estate but this objective may go against the need to reduce flood risk. Often, time scales for policies diverge and can be difficult to align. In Bangladesh, for instance, there is intense competition between sectors, in particular, for financial resources. In line with competition, one of the biggest challenges for the Surface Water Mapping for Flood Risk Regulations in England and Wales was the limited data and information sharing across ministries and other core water-related players. What is more, water and flood policies are, in many cases, driven by decisions made in policy areas over which water experts have little say (OECD, 2011).

In practice, policy coherence regarding flood management is undermined by several factors: differences in policy goals, vested interests and perverse incentives, insufficient consultation and coordination as well as inconsistencies and rigidities in the institutional structures governing sectoral policies. Poor allocation of roles and responsibilities can favour silos and amplify conflicting objectives. This is often the case when the delimitation of ministerial portfolios is strict and without mechanisms for cross-sectoral coordination.

Ways forward

Water is not an isolated sector and thus needs to implement win-win approaches going beyond zero-sum logics while combining various interests. Overcoming frequent bottlenecks through policy coherence and greater co-ordination is therefore essential if governments want to prevent and mitigate floods. Conflict mitigation and resolution mechanisms are needed to manage trade-offs across flood-related policy areas and enhance synergies. Carrying out assessments of the distributional impacts on flood management of decisions taken in other areas can help anticipate to future mismatches.

Making the most of policy complementarities is about sharing responsibility, but also adequate information production and sharing between ministries and other water-related actors in order to better guide decision-making. The temptation of retreating into silo approaches can be softened by a stronger involvement of spatial planners and risk managers in flood management, as they generally set issues in a broad and interdisciplinary context. Governance mechanisms favouring policy complementarities can offer a window of opportunity to increase capacity (e.g. by combining management of multiple sectors – waste, water, energy) and to optimise the use of financial resources.

Capacity

Principle 4. *Adapt the level of capacity of responsible authorities to the complexity of water challenges to be met, and to the set of competencies required to carry out their duties.*

Observations

Flood governance is contingent on mobilising the right capacities. OECD defines capacity as “the process by which individuals, groups and organisations, institutions and countries develop, enhance and organise their systems, resources and knowledge; all reflected in their abilities, individually and collectively, to perform functions, solve problems and achieve objectives” (OECD, 2006). Capacities fall under different categories⁸: *technical* capacity (e.g. modelling, early-warning systems, projections);

⁸ Generally, capacities can be distinguished between “soft” and “hard”. “Hard” capacities relate to tangible financial and infrastructural “deliverables” and associated technical skills (e.g. early-warning systems, urban green infrastructures, tax systems). “Soft”, more intangible capacities include human aspects such as leadership, staff motivation, shared values, coordination, social expertise, communication, facilitation, and knowledge.

financial capacity (e.g. ability to allocate funds for the construction of flood defences, willingness and capacity to pay for insurance schemes, capacity to raise taxes); *human* capacity (e.g. knowledge, skills, leadership, stakeholder engagement); *governmental* capacity (e.g. departments dedicated to flood management, policies, cooperation with research institutes); and *infrastructural* capacity (e.g. capacity to build green infrastructure, adaptive buildings, retention facilities, dams). The case studies indicate that each of these capacities is needed and in use for flood governance. They condition the effective prevention and management of floods. Yet capacity levels may be very different from place to place: for example, rural areas with low population density have very different capacities to cope with flood risks than highly dense urban areas.

Some of the most common capacity gaps⁹ in water and floods management include carrying out reforms, managing multi-level relations, allocating responsibilities and funds, ensuring co-ordinated, coherent policy approaches, and attracting skilled and competent flood risk professional. This is why assessing where technical capacity, staff, time, knowledge or infrastructure are lacking is a critical step to bolster FRGAs. The case studies collected showcase different ways to identify capacity gaps: 16 case studies carry out studies examining governance capacity at various levels, 14 cases conduct post-event reviews, while a smaller number rely on index of technical, financial, infrastructure or human capacity.

If infrastructure is one of the ‘hard’ capacities generally well-developed in OECD countries, more attention could be paid to the quality and resilience of these infrastructures. The G7 Ise-Shima Principles for Promoting Quality Infrastructure Investment call for i) ensuring effective governance, reliable operation and economic efficiency in view of safety and resilience against natural disaster; ii) ensuring job creation, capacity building and transfer of expertise and know-how for local communities; iii) addressing social and environmental impacts; iv) ensuring alignment with economic and development strategies including aspect of climate change and environment at the national and regional levels; and v) enhancing effective resource mobilisation including through public-private partnerships.¹⁰ In addition, the OECD has developed a Framework for the governance of infrastructure that offers a methodology to analyse challenges, map out options on how to solve them, and guide decision-making processes.¹¹

Developing and strengthening capacity throughout the policy cycle can be a daunting and resource-intensive task. The case studies collected illustrate some ways to address capacity gaps (Figure 7), such as guidance documents (used in 15 case studies), hiring a diverse cross-sectoral skill set and peer-learning (in 11 cases). Workshops and public meetings, guidebooks, and support programmes on flood risks are highlighted in the case studies as mechanisms that help educate and train flood governance stakeholders (e.g. flood plan managers, flood risk professionals).

The case studies showcase several instruments to respond to co-ordination failures. With regards to policy complementarities, the Dutch Delta Programme in collaboration with many other ministries and actors,¹² has set up a Water and Climate Knowledge and Innovation Programme focused on knowledge development and joint fact-finding through the development of a coherent set of knowledge agendas based on three pillars: 1) bringing together all explicit and implicit knowledge from all stakeholders including knowledge institutes, 2) developing knowledge only if it supports decisions and 3) managing knowledge only on demand. Social media and digital tools were used to stimulate learning from each other (Bloemen, 2010). Furthermore, in Japan, drills (emergency exercises) are organised annually to prepare potential disasters with all stakeholders concerned at all levels and sectors. Such exercises

⁹ In the case studies collected, these capacity gaps are assessed most often through specific studies examining governance capacity at various levels (in 16 case studies), post-event reviews (in 14 cases). Four of the case studies collected indicated not assessing capacity gaps.

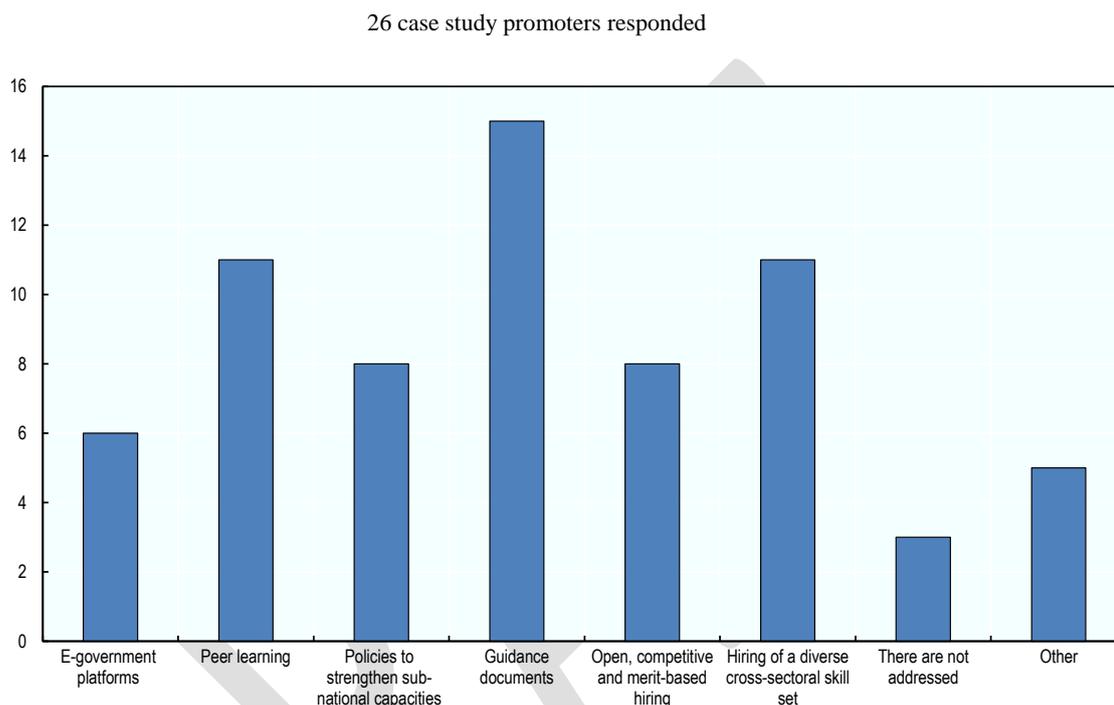
¹⁰ They were released on 27 May 2016, see <http://www.japan.go.jp/g7/summit/documents/index.html>

¹¹ See OECD (2015), *Towards a Framework for the Governance of Infrastructure*, available online at: <https://www.oecd.org/gov/budgeting/Towards-a-Framework-for-the-Governance-of-Infrastructure.pdf> (accessed on 6 October 2016).

¹² Ministry of Infrastructure and the Environment, the Ministry of Economic Affairs, the Foundation for Applied Water Research (STOWA), the Netherlands Organisation for Scientific Research (NWO), the Royal Netherlands Meteorological Institute (KNMI), the Netherlands Environmental Assessment Agency (PBL), Deltares, the independent research organisation TNO, Alterra, universities, and the Top Sector Water.

contribute to enable interactions while building knowledge and behaviours on emergency response in actual situations of disasters. Finally, in England and Wales, a research study on potential measures to address financial capacity failures was carried out by UK Water Industry Research (UKWIR, 2016). The aim is to shed light on the best ways to align funding processes with various bodies involved in resolving flooding, allowing to identify and prioritise collaborative funding opportunities across sectors, as well as to unlock partnerships. Consequently, this research illustrates ways to co-ordinate horizontally across policies and across people as increased knowledge of funding opportunities and capabilities amongst communities has enabled them to implement flood risk measures and improve collaboration with water companies and other stakeholders.

Figure 7. How capacity gaps are addressed in flood governance



Note: Responses correspond to the total number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

Areas to improve

Many case studies face persistent challenges in making flood governance effective, efficient, inclusive and trustworthy. In the Chakar river basin of Sibi Balochistan, Pakistan and in the section of the Arga and Aragon rivers in Spain there is a need to build capacity among key stakeholders like farmers, water users associations and citizens, so that they can effectively take part in decision-making processes. Asymmetric capacities not only affect the wide range of stakeholders but also reflect and can amplify territorial disparities (urban, peri-urban and rural). In those cases, the differences in terms of capacities, political and economic factors can complicate the relationship between places (OECD, 2013b).

A mismatch between the capacity needed to shoulder flood-related responsibilities and the actual responsible authority's capacity can be detrimental to the implementation of flood management policies. Shortfalls in financial resources; in political will to allocate resources to capacity development; in staff and technical skills; and in training tools and methodology affect capacity development and need to be addressed. As an example, the human capacity, tools and experience required to implement the EU Floods Directive are not readily available in the Western Balkans countries (European Commission, 2015). At present, higher education institutions in most of the countries are not turning out flood management experts and water professionals in sufficient numbers, with the required skills to establish and operate databases, monitoring and early warning systems necessary for the Floods Directive implementation (European Commission, 2015). In addition, organisations often fail to

recognise the wide range of characteristics (i.e. both soft and hard) that make up effective capacity for flood management. Capacity strengthening may include educating engineers to adopt a more holistic perspective on flood management, knowledge exchange through communities of research and practice and knowledge co-creation.

Ways forward

The assessment of capacity gaps is a critical step to reinforce the skills needed to face and manage flood risks. Once diagnosed, ensuring a diverse skill set within organisations can be key to effecting change and can have a major influence on organisational culture and the flood management approach used (see e.g. Huitema, 2002). Inclusiveness of stakeholders coming from the public, private and non-profit sector is highly important to pool resources, skills and expertise, and the possibility for a more integrated flood management approach, as well as knowledge-sharing. This also relates to the science-policy interface mentioned in Principles 5 and 8. Policymakers and decision makers can quickly take up measures and approaches they are familiar with (e.g., from their specialist field) but they may resist ‘evidence based’ findings if they do not sit with their values or world views. For example, engineers may be resistant to uptake new ecosystem based measures, while this may change when hiring ecosystem scientists (Huitema, 2002). Thus, having personnel in organisations who understand and are receptive to scientific advances across a range of fields and disciplines is very important, as well as ensuring that capacity building consists of a combination of soft and hard skills.

Data and information

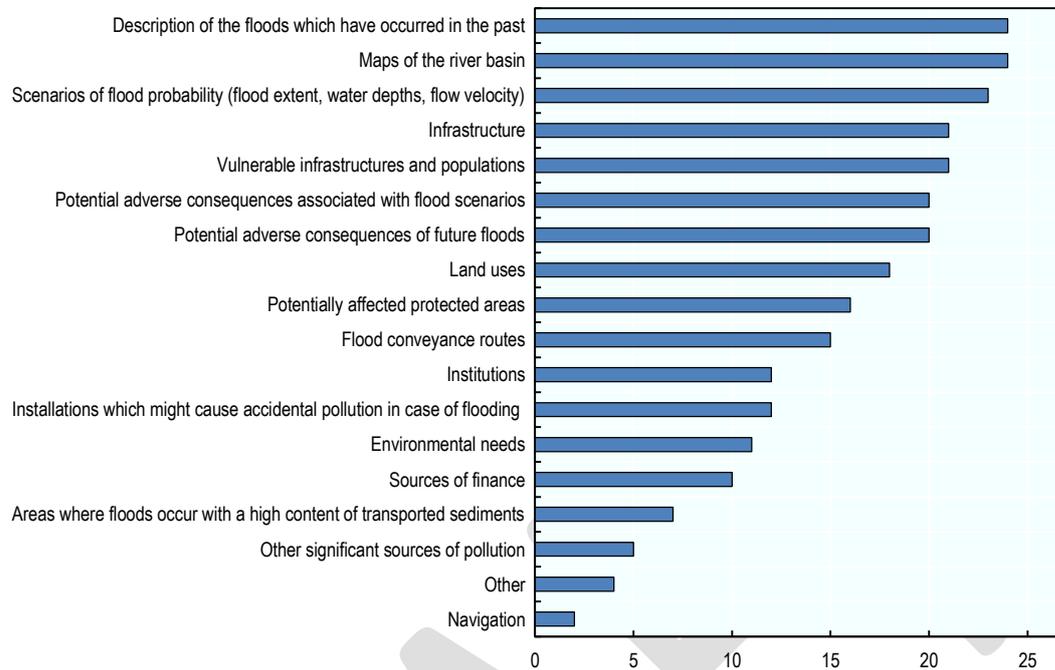
Principle 5. Produce, update, and share timely, consistent, comparable and policy-relevant water and water-related data and information, and use it to guide, assess and improve water policy.

Observations

Improving flood prevention requires hydrological, technical, economic, financial and social data and information to analyse every situation objectively, and to devise performance-oriented, cost-effective and pertinent strategies at different levels. Standard data and information collected for flood management cover a wide range of topics and include the description of past floods and their consequences, maps of river basins where flood occur, scenarios of flood probability, vulnerable infrastructure and population (e.g. elderly, hospitals), etc. (Figure 8). Such data and information are used to develop flood risk management plans (as illustrated by 21 case studies); to assess flood risks (in 20 cases); to develop flood risk/hazard maps (19 cases); and to inform participatory decision-making processes (in 15 cases).

Figure 8. Data and information collected for flood management

27 case study promoters responded



Note: Responses correspond to the total number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

One of the key elements of the development of the knowledge base on water risks is flood risk assessment, and notably assessment of potential losses related to flooding (OECD, 2013a). However, such assessments do not necessarily need to be lengthy or costly. The sophistication of risk assessment should match the level of water risk. In big cities, where billions of critical assets are at risk, robust risk appraisal may be required. But in places where current levels of risk are low, a basic risk appraisal might be sufficient. Priority 4 of the Sendai framework on Disaster Risk Reduction emphasises the importance of “people-centred multi-hazard, multi-sectoral forecasting and early warning systems, disaster risk and emergency communications mechanisms, social technologies and hazard-monitoring telecommunications systems [...]” (UNISDR, 2015b) which are all key elements of flood risk assessments.

Developing a robust information system that can guide decisions related to floods is a shared responsibility across countries, levels of government and stakeholders. The production and use of data and information on flood risks involve different actors, beginning with governments (Figure 9). On the one hand, insights from case studies collected highlight that public authorities at various levels (including river basin organisations) are the biggest data producers, followed by forecast agencies and statistical offices. Some case studies indicate that independent consultancies and NGOs also contribute to producing data. On the other hand, governments are also the first users of flood-related data and information, together with experts and scientists. To a lesser degree, citizens, private companies and water operators also use such data. Science and knowledge institutes play an important role to inform decision makers about past, present and future flooding. Based on this knowledge, future scenarios can be developed with stakeholders affecting and affected by floods and different societal preferences concerning flood risks can be assessed (e.g. through joint fact-finding and interactive planning).

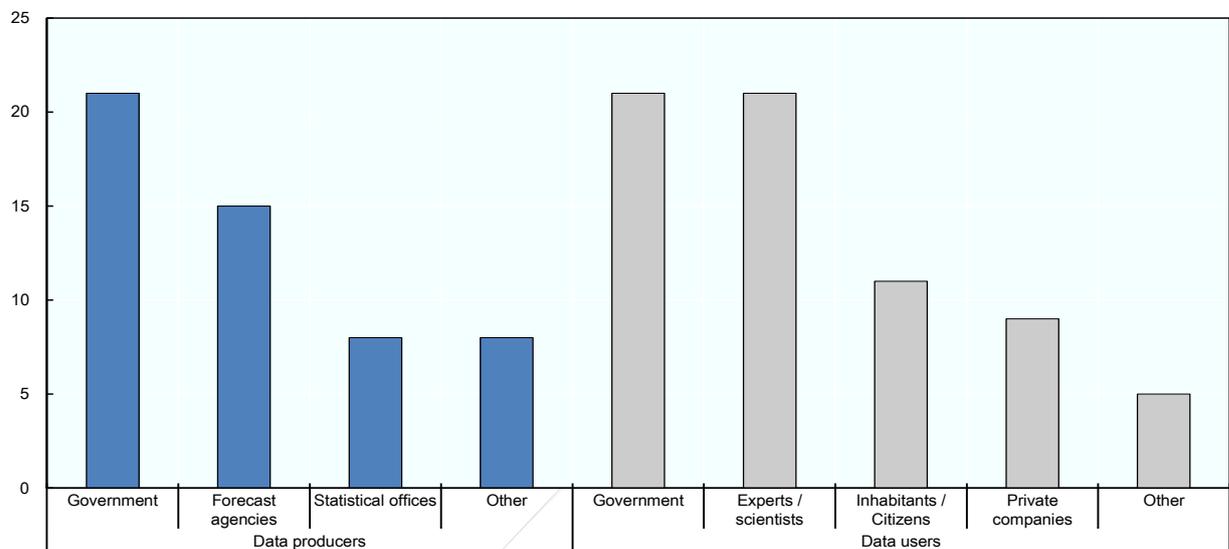
Examples of good practices that consolidate data from various sources and actors can be found in online atlases, such as the transboundary Rhine Atlas developed in 2015¹³. In addition, the obligation within

¹³ http://geoportal.bafg.de/mapapps/resources/apps/ICPR_EN/index.html?lang=en

the EU Floods Directive (EU, 2007) to issue flood hazard and flood risk maps seems to have served as a positive driver in this respect. The Netherlands launched in 2013 the Digital Delta initiative in partnership with IBM to integrate and analyse water big data (OECD, 2014b). These instruments can serve to help co-ordinate across knowledge institutes, governments, water managers, citizens and companies. Furthermore, the case of India showcases the importance of information sharing at the transboundary level to push governments to collaborate towards better decision-making. India used to face obstacles to access information from upstream countries like China but in 2015 a memorandum of understanding required China to provide Brahmaputra data flows during the flood season. However, co-ordination across places and policies is still incipient, and not without setbacks, particularly because there is not an integrated framework to manage flood risk for all riparian states in the area, which can exacerbate political instability.

Figure 9. Flood-related data producers & users

Data producers: 27 case study promoters responded, Data users: 26 case study promoters responded



Note: The blue bars represent data producers and grey bars represent data users. Responses correspond to the total number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

Co-ordination is a fundamental building block for improving data and information. This can be done through experience-sharing mechanisms, as exemplified in the case studies: 23 report relying on meetings among organisations and agencies producing flood-related data, while 16 point to visits of flood risk professionals to other areas affected by floods to meet with their peers, and 15 to conferences between data producers and users. A broader set of approaches is also used to share flood risk and flood-related data, starting with closed-door meetings (i.e. within river basin organisations, flood-related associations, etc.) and web-based technologies such as interactive web-based flood risk information systems, maps and data banks, online forums, newsletters, as well as social media, which are useful mechanisms to co-ordinate across people. Public meetings organised by public authorities or flood observatories contribute to sharing information with civil society, together with traditional media (e.g. press releases, radio broadcast, report and videos). The Global Earth Observation System of Systems (GEOSS) is a good example of collaborative data sharing among scientists and space agencies in the European Union, the United States and Japan.¹⁴ It is assuming an important role from the aspect of making use of satellite data on disaster risk reduction and water resources management.

Areas to improve

¹⁴ <https://www.earthobservations.org/geoss.php>

Asymmetries in the quality, quantity and type of flood-related information between different stakeholders involved in water policy remains a major concern when managing too much water. Inadequate information generation and sharing among relevant actors, as well as scattering and fragmentation of the generated primary data tend to be important bottlenecks. Overall, policy makers rarely use the research results; and the science-policy interface remains rather weak in terms of guiding decision making and implementation. Furthermore, the use of common terminology and clear definitions is not always evident. These obstacles are generally exacerbated by a lack of capacity. For instance, in Ethiopia there is a lack of technical capacity to collect, process and analyse flood-related data and information. What is more, in Bangladesh updating flood information systems and databases is extremely expensive and time-consuming. The lack of capacity can also affect the user, as well as the co-ordination between data producers and users. For instance, in West Sussex, information was not always sufficiently down-scaled to reach the stakeholders working on flood resilience at the community level.

Dispersed, heterogeneous and incomplete data jeopardises the efficiency of flood governance. For instance, this can occur for data on the terrain, the watercourses or hydro-meteorological phenomena. Unnecessary data overload and dispersion can make it difficult for decision makers to choose what to use to develop policies, lead to inconsistencies and uncertainties in models and scenarios, generate delays, or create overlaps across data producers. Moreover, the asymmetry of information across institutions can lead to win-lose situations. In a highly fragmented context like Belgium for instance, it was found that the expertise developed in flood governance approaches could be better exchanged between Flanders and Wallonia such as on spatial planning instruments and river contracts (Hegger et al., 2013, Mees et al., 2016).

Ways forward

Tracking data and information overload and asymmetries should thus be emphasised to a greater extent in FRGAs through specific reviews, meetings between data producers and users, or the re-priorisation of objectives for data collection and data requirements, hindering the pathfinder scheme. In this regard, it is key to continue developing practices and projects that aim at a consolidated information base in order to drive informed policy discussions, as well as guided budgeting debates. Ultimately, evaluation of the use of the data and information produced is also key to ensure relevance and effectiveness.

Focusing efforts towards more adequately generating and sharing information, particularly on the economic and institutional implications of flood management, can provide a robust foundation for evidence-based flood governance approaches. The production and adequate use of data and information is a typical illustration of a shared responsibility, and of the need of interaction with civil society action and measures and other flood-relevant stakeholders. Even though many approaches are producer and user-friendly, many others apply new technologies that may exclude vulnerable communities living in rural areas and informal areas. Bridging the digital divide is thus key to engage the broad range of stakeholders for an improved preparedness and response to floods. In addition, reducing the gap between scientific findings and flood governance practices, is fundamental to take better joint decisions and prioritise actions.

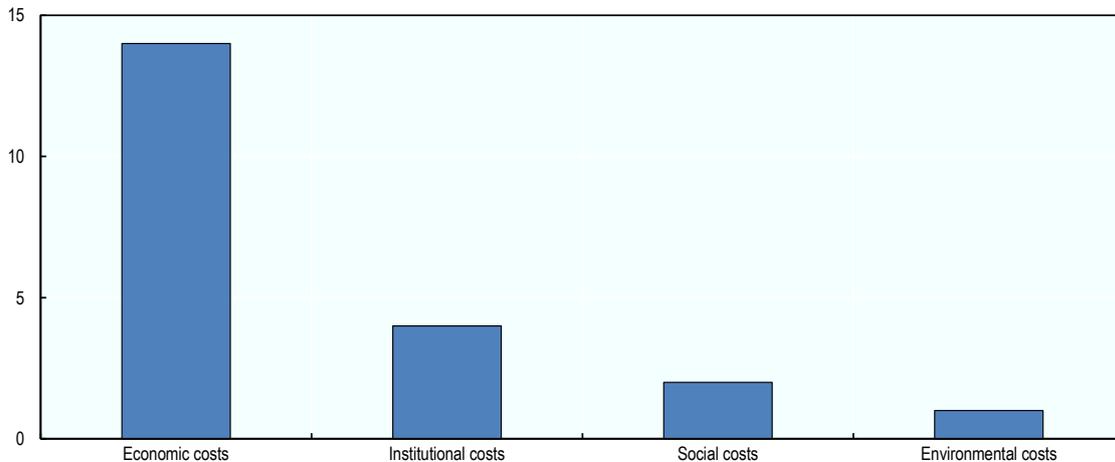
Financing

Principle 6. Ensure that governance arrangements help mobilise water finance and allocate financial resources in an efficient, transparent and timely manner

Financial resources matter to sustain effective flood management measures, both in terms of institutions and infrastructures. Flood governance raises a number of costs, be they economic (e.g. building protection infrastructure, producing and collecting data), institutional (e.g. coordination with stakeholders), social (e.g. social conflicts, population displacement), or environmental (e.g. impact on ecosystems, land management, etc.) (Figure 10). Countries differ in how the costs of flood management are covered, and use different mechanisms to do so. Nonetheless, the financial aspect of flood governance tends to include varying degrees of sophistication amongst places.

Figure 10. Major costs related to flood governance

20 case study promoters responded



Note: The figure considers the types of costs rated 1 on a scale from 1-major to 4-minor. Responses correspond to the number of case studies.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

Three main sources of finance can be mentioned:

- *Contributions from the government:* the main source of finance is contributions from the general budget of public authorities, either at national or regional levels. These contributions can come from taxation of actions that do contribute to the flood problem, for example new constructions in flood risk areas that increase the impermeability of the soil, the occupation of natural flood areas or nonconformity with various regulations.
 - Public money was by far highlighted as the most relevant source of funding for flood governance by the case studies (although in some cases contributions came from private sources). This option bears the risk that the availability of resources for flood management becomes dependent on political whims. However, tax money from authorities such as governments or the EU are by far the biggest source of funding, in particularly related to flood defence. In this regard, OECD countries differ tremendously in the funding base available. Poland for instance has been shown to be highly dependent on European funds like the solidarity fund and the European cohesion fund, while The Netherlands has a national mechanism (“Delta fund” to which 1 Billion Euros will be contributed each year in the coming years) and 23 regional water authorities (functional democracies) with tax raising power. Flood management differs from other water functions, like water supply for instance, in that cost recovery is not necessary called for. A few examples of cost recovery for flood management can be mentioned, for example through payments for insurance premiums, payments by beneficiaries directly (e.g. where local drainage boards or local water authorities charge to landowners or inhabitants their expenses to reduce flood risks) or indirectly making use of a solidarity fund (WGF, 2012).
- *Insurance schemes:* the second source of finance for flood management is insurance schemes, operating more at the individual or private level. Insurance schemes can be very effective in preventing people from erecting new constructions in risk areas and in providing incentives to stimulate property owners to better manage the flood risk to which they are exposed (WGF, 2012).
- *Transfers:* the third source of finance is transfers from European funds or international funds, such as the European Fund for Regional Development, the European Cohesion

Fund, the European Social Fund, the European Agricultural Fund for Rural Development or others.

Payments for ecosystem services are also increasingly considered as a source of finance for flood management. The development of a green infrastructure for example can provide flood regulation services but also alternative services such as recreation or climate regulation. In the United Kingdom for example, a pilot project was set up in Yorkshire where a Country Park was created to address surface water flood risks through swales, bunds, ponds, replacement of permeable road and car park surfaces and conversion of amenity grassland to semi natural grasslands and more varied woodlands. This green infrastructure would also deliver water quality, recreation opportunities (through ‘floodable’ sports pitches, a pavilion, fishing ponds, circular walking and cycling routes), landscape and amenity and climate regulation (Urban Heat Island effect and carbon sequestration). Several buyers were solicited for the project including the local water company, the local community (through volunteer works and payment for the use of sport facilities), and other national and European organisations (DEFRA, 2013).

The ‘polluter pays’ and ‘user pays’ are two principles that can have implications in terms of who should pay for flood management and can offer a solution for managing trade-offs across places. In the case of flood management, ‘polluters’ are the stakeholders contributing to increasing the level of flood risk, for example by creating impermeable areas. The ‘polluter pays’ principle can also be applied to flood mitigation measures that reduce flood storage areas, for example through wetland destruction or isolating floodplains. In such cases funding collected from polluters could be used to offset impacts through wetland restoration, improved floodplain connectivity or construction of artificial wetlands. To some extent, the ‘polluter pays’ and ‘user pays’ principles lead in opposite directions: the former charges for runoffs, while the latter charges those benefiting from a reduced probability of flooding, or reduced consequences from flooding. In Germany, the “polluter pays” principle is widely adopted at the urban level to charge for surface water runoff on the basis of impermeable area. However, in other countries like Ethiopia, legislation is needed to allow these principles to help bridge the funding gap.

More and more, co-finance schemes that bring together several partners are being employed as a mechanism to co-ordinate flood policy across levels. In England and Wales, for instance, pooling resources at the relevant scale has been a useful way to co-operate and optimise resources. In this case, funding came from private, public sector organisations as well as the local community. Consequently, partners did not only align funding programmes but also policy on the ground. The other key aspect for the effective collaboration was the transparency of outcomes and benefits amongst partners to ensure the sustainability of the Herne Hill and Dulwich schemes. The Plan Rhone was also a success story as it was able to mobilise state and regional funding, together with funding coming from local interest groups for flood risk prevention (OECD, 2017), allowing to engage different stakeholders at that stage of the cycle.

Differing normative principles underpin these various funding options. For example in France, solidarity is seen as a key value, thus leading to the choice of a national solidarity financing system based on a compulsory Cat-Nat (for natural catastrophes) insurance system through a public-private partnership between State and insurance companies. In a context of global financial crisis, public-private partnerships are seen as one, among other, financial solution to sustain effective flood management. In the United Kingdom the private interest principle is seen as more important, hence leading to public-private partnership funding mechanisms based on cost benefit analysis. These choices also touch upon the legitimacy issue as to whether governments want to provide an acceptable level of basic safety to all citizens or only “the best affordable safety” based on cost and benefits.

Areas to improve

Existing funding gaps hinder the effective implementation and sustainability of water-related disaster policies and the ability of responsible authorities to efficiently carry out their tasks. In terms of policy operationalisation, challenges generally stem from a mismatch between administrative responsibilities and resources and unsustainable and/or insufficient revenues. In Bangladesh the obstacles emanate from insufficient capacity to implement financial schemes like water taxes or charges, resort to the Green Climate Fund or enhance creditworthiness of water-related investments. Overcoming financial

obstacles is thus very important to manage flood across levels of government and for building capacity at the local and national scale. Financing is a particularly challenging topic in transboundary river basins where impacts caused by floods are not limited to a single country, and regional or international actions are needed.

Another challenge related to financing is the delicate link between recovery and prevention. If strong recovery mechanisms are in place, like the French CAT-NAT system¹⁵, this may reduce the incentive for pro-active spatial planning aimed at reducing the consequences of flooding. Risk exposure plans (“*plans d'exposition aux risques*” or PER), the predecessors of risk prevention plans (PPR), were a counterpart for the implementation of the national Cat-Nat solidarity system and included prescriptions on existing assets in flood prone areas. Yet they could not entirely counterbalance the effects of a strong recovery system.

Ways forward

Bridging this gap implies ensuring sound governance frameworks for sustainable financing as well as funding to carry out flood-related responsibilities in a cost-effective way. Even though recovery and prevention activities are primary for flood management, policy and financing continuity in between two or more floods is also key to efficient flood governance. Sufficient and sustainable sources of finance require adequate regulation, offering incentives to different actors to engage in flood governance. This will require that roles and responsibilities, as well as the necessary funds to put them into practice are clear. This is not usually the case for transboundary river basins. However, the global financial markets can play a key role in this regard and, as suggested by the High Level Panel on Water and Disasters, mainstreaming disaster risk reduction in financial strategies is important to fit for the future. Governance arrangements shall bolster and help to ensure shared financing schemes between the broad range of actors, which can favour a stronger stakeholder engagement and ownership. In this sense, adopting mechanisms or incentives that foster the efficient and transparent allocation of the funds could increase the attractiveness and trust of co-funding and other financial schemes.

Regulatory frameworks

Principle 7. *Ensure that sound water management regulatory frameworks are effectively implemented and enforced in pursuit of the public interest*

Observations

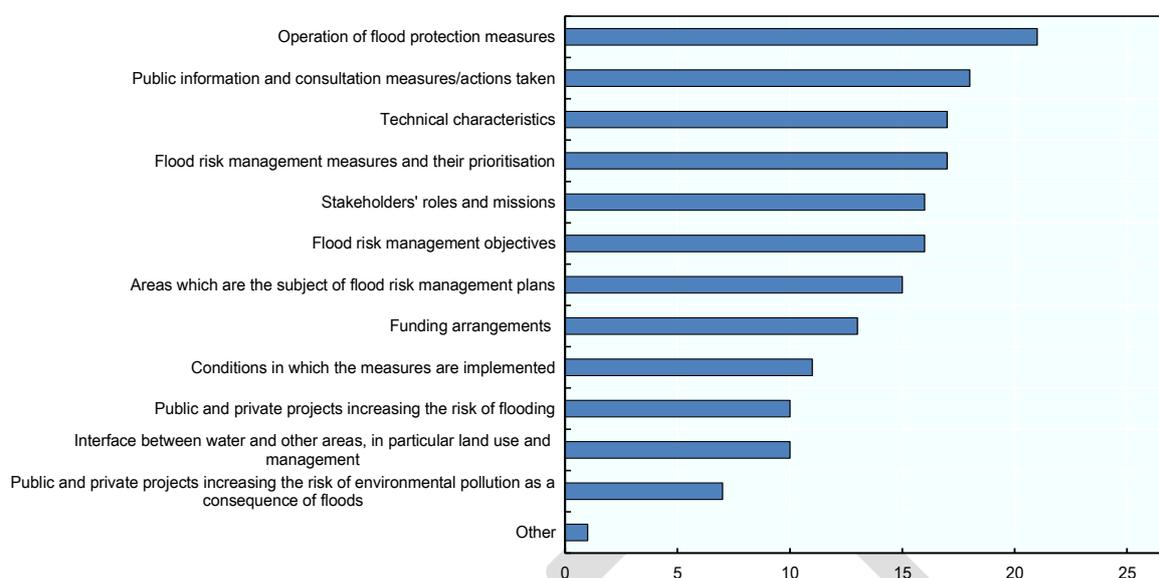
Regulation concerning flood management is not only about infrastructure, but involves other functions, such as the establishment of efficiency incentives, collection of information and monitoring of performance, and the organisation of citizen’s engagement in decisions related to water security. Nor is the institutional framework only defined by laws or the national level, but by many other subnational actors setting the rules (in many cases by informal water institutions such as customary water rights). Unclear or non-existent regulatory frameworks can widen the accountability gap.

The case study promoters report that their FRGAs regulate primarily the operation of flood protection measures; public information and consultation measures/actions; flood management measures and their prioritisation; technical characteristics of flood management; and stakeholders’ roles and missions (Figure 11 **Error! Reference source not found.**). Thus, flood management schemes may be multifunctional and synergies with other societal goals need to be sought. Moreover, a distinction should be made between substantive and procedural regulatory frameworks. In the Netherlands, substantive regulatory frameworks involve legally embedded safety norms. For example, procedural regulatory frameworks involve flood risks to be reflected upon in spatial planning procedures. The relevance of these options depends on physical and institutional contexts.

¹⁵ The CAT-NAT system is a French natural catastrophe insurance and reinsurance regime. It requires property damage insurance policies to include a provision for natural catastrophe coverage. When the state of natural disaster is declared by inter-ministerial decree, the provision extends the cover of the insurance to all “uninsurable damage” caused by natural phenomena (OCDE, 2014a).

Figure 11. What is regulated in flood management

25 case study promoters responded



Note: Responses correspond to the number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

Regulatory frameworks may concern various levels of regulation, from the local to the international levels, the latter being illustrated for instance by the European Floods Directive. Insights from the case studies show that, most often, local institutions (e.g. municipalities, local drainage boards, local water authorities, etc.) bear regulatory functions for flood management (as observed in 22 case studies), followed by national authorities (e.g. ministries, agencies, inter-ministerial committees, etc.), as in 17 case studies. To a lesser degree, some case studies report that river basin committees perform regulatory functions. In many cases, regulatory prerogatives are not concentrated at one level alone, but shared between national and local authorities (as in 11 cases), between basin and local authorities (in 6 case studies), or occasionally between supranational and national levels (in 3 cases). To promote compliance and achieve regulatory objectives for flood management, these authorities rely on different procedures and incentives: in most case studies (19), specific multilateral discussions and meetings are used, together with common agreements. Others use penalties, sanctions, reparations, incentives or rewards.

The case studies point to various challenges raised by uncoordinated regulatory frameworks, such as conflicts about roles and responsibilities (in 12 case studies); when policy complexity and confusion in the implementation of regulation (10 cases); and rising costs of implementing regulatory frameworks (in 9 case studies).

In France, the Joint Flood Commission (CMI) brings together the Steering Council for major natural risks prevention (COPRNM) and the National Water Committee (CNE), allowing co-ordination not only between the water and flood actors but also with civil protection, environmental protection, urban planning and land-use stakeholders. Flood Risk Management Plans (FRMPs) are strategic tools decreed by the river basin District Coordinator Prefect (the representative of the State at District level). They are opposable to all administrative decisions in the field of water policy, including flood risk prevention plans (PPRI) and local urban masters plan in the river basin district. They are implemented through local strategies at the scale of Areas of Potentially Significant Flood Risk (APSFRR).

An array of tools can help improve the quality of flood management regulation. Some tools relate to *monitoring and evaluation* as is the case for: regulatory impact assessments, particularly when carried out at the early stages of the policy process; reviews of existing regulations, including costs and benefits; and mechanisms or institutions that oversee procedures and goals to support the implementation of

regulatory policies. Others relate to *transparency and participation*, such as to ensure that regulations are comprehensible and clear to the public, and that parties can easily understand their rights and obligations, and to provide meaningful opportunities (including online) for the public to contribute to preparing regulatory proposals. The EU Floods Directive requires EU Member States to involve the public in planning procedures and drafting FRMPs. For example, in Bavaria, Germany, flooding planning passed on to Regional Water Forums, which is an important participatory mechanism under the Water Framework Directive. All these tools are often complemented by remedies that can be claimed through access to justice. 12 case studies report using damage compensations, while 8 include social interest litigation and 7 have ombudsmen. 6 case studies out of 27 mentioned not having any remedies to be claimed.

Areas to improve

Unclear regulatory frameworks are embedded in a bad allocation of regulatory functions and, thus, in the lack of knowledge and awareness of rights and responsibilities. This can be linked to a mismatch between government-induced water policies and deeply embedded informal institutions (Menard et al., 2018). Conversely, flood-related regulatory frameworks can be a barrier at times; in Granada, Spain the over regulation has generated additional administrative burdens for flood risk management in the past. In addition, even in cases where these frameworks are in place, they can be ineffective, irrelevant or undermined by a lack of collaboration between levels of government and ministries. For example, in Bangladesh, differentiated approaches between the Ministry of Water Resources, Ministry of Environment and Ministry of Disaster Management and Relief unleashed inconsistencies undermining enforcement of existing legislation. Furthermore, For instance, co-ordination with entities with related responsibilities is often pursued on an ad hoc basis rather than through systematic and institutionalised mechanisms. Therefore, more can be done to make flood regulation more coherent with regulations in other fields.

Ways forward

Flood management requires the establishment of a high quality regulatory framework that supports sound regulatory practices and protects people against floods as efficiently as possible and with the highest possible benefits for all actors involved. Regulatory measures for the enforcement of legislation related to flooding, and for more coherence with regulations in other fields, such as land use, law on local governance or local regulations are therefore necessary. Namely, bridging the divide between land and water is a central element of regulations related to flood management and also a path to unlock greater co-ordination, in particular across places and policies. Apart from increasing flood management efficiency, a sound institutional framework needs to consider and address the potential clashes that flood regulations can have with land, as property owners become increasingly exposed to risk. Furthermore, flood management regulation related to public participation and clear and transparent regulatory functions offer a window of opportunity for co-ordinating various actors and interests. In sum, regulation, coupled with flood policy and long-term strategies, could provide a more holistic approach if adopted with regards to flood management.

Innovative governance

Principle 8. Promote the adoption and implementation of innovative water governance practices across responsible authorities, levels of government and relevant stakeholders.

Observations

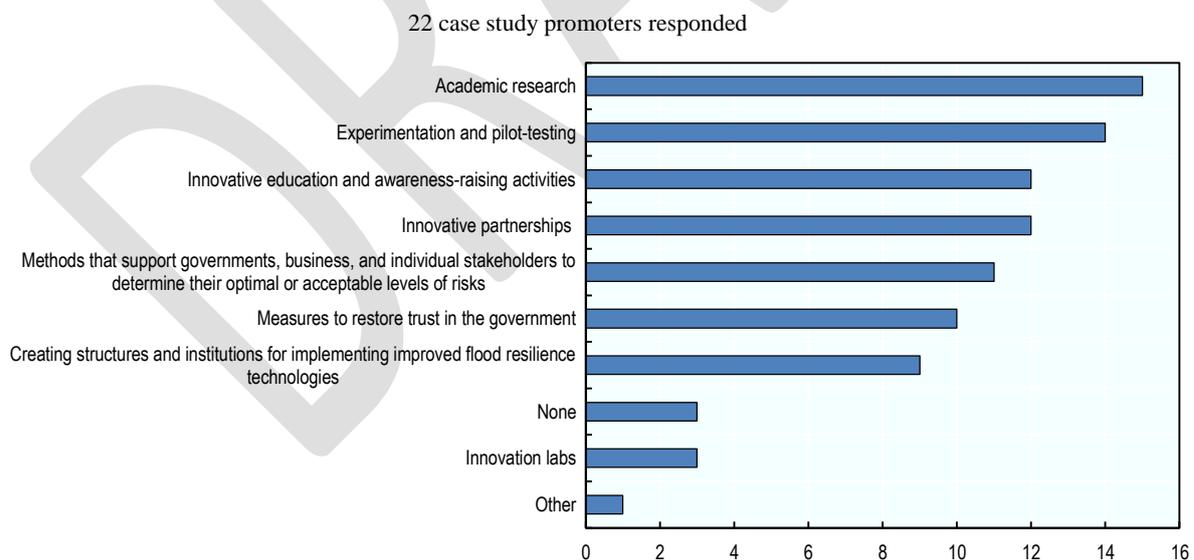
Rising risks of water-related disasters require new solutions. Challenges induced by climate and societal changes call for innovative approaches to flood governance practices. Innovations in the context of flood governance are new or more effective set of rules, practices and processes through which decisions for flood management are taken and implemented, stakeholders can articulate their interests and decision-makers are held accountable (adapted from OECD, 2015a). Innovations can relate to any of the other 11 water governance principles such as, data and information (e.g. involving citizens in the collection of flood-related data) or financing (e.g. new insurance schemes). Innovation may become

necessary, for instance in cases of major floods with low recurrence, such as the ones that hit the Seine and Loire valleys in France in 1910 and 1907. In such cases, governance frameworks tend to innovate as a response to a rare disaster. However, flood governance should not only innovate after a disaster, but also be preventive and take lessons from other regions and countries where disasters are more frequent.

However, the capacity of decision makers to innovate in flood governance practices is fraught with a number of challenges. The case studies point first to the fragmentation of institutions and responsibilities as the main barrier to innovative governance (as indicated by 16 case studies). The lack of awareness and preparedness of populations to deal with flood risks was also identified as an obstacle to innovation in 14 case studies, while 10 have to deal with insufficient knowledge on the economic value of flood risks. These obstacles can hinder solutions that allow to “do better with less money” and more people on board contributing to accelerate innovation.

Efficient flood management involves both innovative flood management and innovative flood governance. Examples of innovations regarding flood *management* include, among others, green infrastructures such as green roofs and sustainable urban drainage systems (e.g. rain gardens, bio-retention ponds), or technology developments such as mobile apps to record live flooding and early warning systems. Innovations regarding flood *governance* involve for example citizen involvement, financial incentives towards green infrastructures or innovative policies and ordinances. The objective of innovative flood *governance* is to ensure that a broad range of management options, including alternatives to traditional flood management, are considered before decisions are taken. Examples of innovative flood governance practices include academic research, such as the development of models to estimate the effectiveness of evacuation decisions or to evaluate risk exposure considering evolving risk patterns (as observed in 15 case studies); experimentation and pilot-testing (in 14 case studies); innovative education and awareness-raising activities (e.g. involving school kids in flood control curriculum or flood control games); and innovative partnerships, between governments, knowledge institutes and the business sector for instance (as in 12 cases) (Figure 12).

Figure 12. Innovative flood governance practices implemented in the case studies



Note: Responses correspond to the number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

National and local authorities can collaborate to encourage experimentation and pilot-testing on prevention and mitigation, by scaling up (or down) replicable practices. This is the case for 14 out of 27 case studies that indicate relying on inter-municipal collaborations, which is an innovative way to improve co-operation among places, but also to pool resources and capacity, build synergies across sectors and search for efficiency gains. A majority of case studies also use tools such as digital maps

and social media to promote social learning and facilitate dialogue and consensus building. Various innovative flood governance practices exist that could be a source of inspiration for other countries and actors involved in flood management. For example, one could cite the Thames estuary 2100 in the United Kingdom, the Sigma plan in Belgium, Room for the river in the Netherlands. Other programmes set up by local stakeholders, such as local governments or private actors, have been identified in several countries like France, Ireland and The Netherlands. They constitute interesting examples of innovative practices at a more local level. The coordination of retention measures along the Rhine and the Danube transboundary basins can also be inspiring in terms of innovative practice that cuts across countries.

The science-policy interface is also a critical element of flood governance and management measures. Effective coordination of interdisciplinary water research programmes including social sciences, and involvement of water end-users, for instance, can be useful for reaching a critical mass in the uptake of the results. However, replication of good practices and pilot-tests is not straightforward. Innovation uptake and implementation rely on high-level support. It requires not only changes in actions and behaviours, but also changes in the assumptions guiding these actions and even more deeply of the structural context and factors that determine these assumptions. These elements are commonly referred to as triple-loop learning (Hargrove, 2002; Pahl-Wostl, 2009). Change also requires adaptive capacity. This underlines the importance of strong knowledge infrastructure, knowledge institutes and large research programmes. However, these aspects are not easy to implement on the ground and pose challenges regarding the uptake of innovative flood governance practices.

Innovation can mean going back to basics. In this regard, outreach campaigns can successfully influence attitudes towards what today can be considered innovative solutions (e.g. temporary flood storage) but, in fact, have been around for thousands of year (e.g. nature-based solutions (NBS)). Colombia was able to unleash a local behavioural change through social marketing campaigns in Valle de Cauca that contributed to increasing the number of upstream landowners and downstream water users implementing conservation measures, as well as to trigger inter-sectoral collaboration through the establishment of watershed management committees (OECD, 2018a). The co-benefits of NBS to reduce flood risks, such as nature conservation and natural resources management, were made tangible and ended up generating strong stakeholder engagement in Pilsen, Czech Republic (OECD, 2018a). Developing innovative practices nowadays can be especially linked to the combination of NBS with grey infrastructure such as the “sponge cities” programme in China aiming to help 30 cities re-use rainwater to deal with floods.

Areas to improve

Different places face different challenges and have different financial resources and capacities to respond. Many OECD and non-OECD case study promoters report shortcomings associated to a lack of capacity to embark in innovation. When innovative practices are in place, fragmented institutional structures, actors and responsibilities have a negative impact on the possibilities of sharing and up-scaling innovation. Scattered innovative policies and tools across many scales and countries increases the risk of actors “reinventing the wheel” each time and thus, incurring in unnecessary costs and time-consuming tasks. Another important challenge refers to, not only sharing mechanisms and responses with other regions and countries, but also learning how to capitalise the acquisition of knowledge internally. Being able to use the lessons learnt to move forward and apply these in other settings has proven difficult in many cases.

Ways forward

Innovation, apart from being central for the achievement of the 2030 Development Agenda (SDG 9 concerns innovation, infrastructure and industry), can help to bridge any of the seven multi-level governance gaps, as well as it can enhance solutions that connect policies, people and places. Future flood management should strive to find a balance between different innovative approaches in search for more resilient social-ecological relations. Innovation should combine technical and non-technical solutions, as well as integrate the potential power of nature to spark the transition of sustainability. In this sense, the science and research community will have a strong role in finding pathways to use innovation to find solutions that mutually support nature, society and the economy and contribute to

better governance. Bridging the divide between scientific findings and flood governance practices can enable better forward-looking knowledge sharing, communication and co-ordination between stakeholders for responsive policy formulation.

When it comes to innovative governance, the governance timescale is also important. For example, to address increased flood risks due to climate change there is a need for long term planning horizons. These may allow anticipating future problems, split incentives between those who generate the risks and those who bear related liabilities, as well as land use decisions that generate long term commitments and liabilities.

Integrity and transparency

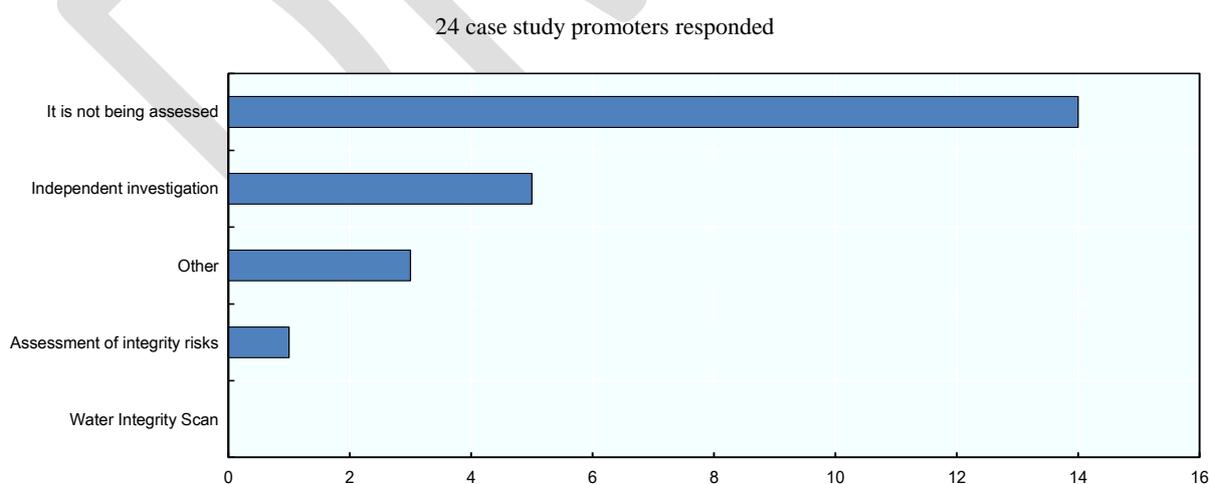
Principle 9. *Mainstream integrity and transparency practices across water policies, water institutions and water governance frameworks for greater accountability and trust in decision-making*

Observations

Corruption in the water sector can pose a significant risk to integrity, transparency and safety. In 2014 for example, the Mayor of Venice and 35 other people were arrested for allegedly siphoning off millions from the “Moses” flood prevention project. The Mayor was accused of having received illicit funds from the consortium behind the construction of the project to fast-track the approval of contracts. Politicians used the funds for their electoral campaigns as well as for personal gain. In France, the Mayor of La Faute-sur-Mer was sentenced to four years in jail for manslaughter after the Xynthia storm due to his local land-use policy.

The lack of accountability and transparency in water policy is a symptom of governance deficiencies both in the private and the public arenas. Insights from practice reveal that the risks and impacts of corruption in flood management are still rarely diagnosed and assessed (Figure 13). While some tools exist to map potential drivers and risks of corruption (e.g. action plan), their use is still anecdotal in flood governance. The majority of case studies collected acknowledged that institutions involved in flood governance do not conduct any diagnosis. By the same token, there is little done to assess the impact of corruption in terms of environmental, social or economic costs. Only a few isolated case studies conduct independent investigations or integrity risk assessments.

Figure 13. How is the impact of corruption assessed in flood governance?



Note: Responses correspond to the number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

Legal and institutional frameworks on flood governance put an emphasis on information to ensure accountability. The majority of case studies count on the right to information as the primary channel to hold decision makers and stakeholders accountable, and to ensure that flood risk policy making is

transparent. However, in some cases this is not enough, like in Ethiopia, where there is a need of enforcement tools to guarantee compliance with existing principles of integrity and transparency. Multi-stakeholder approaches and social witnesses are also considered useful avenues to identify and address integrity and accountability, as well as to build trust among partners. In Austria, for instance, the ICPDR has developed a set of rules of procedure that mainstream integrity and transparency practices, which range from the micro-organisational level to the international arena with fundamental treaties, to drive their decision-making processes.

Many countries suffer an “accountability gap” when there is little public concern in water-related policy making, or when monitoring and evaluation of water policy outcomes are absent (OECD, 2011). In the Netherlands, risk communication to citizens is rather low; partly because according to law it is the national and regional water authorities that are responsible for dealing with water safety and because the country has not experienced any serious flooding since 1953, rendering people unaware of the risk. This results in a false perception of safety and choices of decision makers regarding flood management being rarely scrutinized or questioned (OECD, 2014b). Following policy recommendations formulated by the OECD in 2014, various awareness-raising activities have been undertaken by the Dutch government such as a “water week” organised twice a year as well as a website¹⁶ that was set up for citizens to fill in their postal code and see whether they are at risk for flooding and what to do in case that should happen. This has been an effective response to existing asymmetries of information and co-ordination issues across people. In addition, it is important to cite another stakeholder-related challenge. The increasing importance of the private sector as a strategic partner for flood management was accompanied by the transformation of the traditional governance accountability (OECD, 2011) which sometimes fractured stakeholder engagement approaches that undermined mutual control mechanisms to ensure integrity.

Areas to improve

Various gaps exist in OECD and non-OECD countries to ensure integrity and transparency in flood management across the different constituencies (OECD, 2011). These gaps can have severe consequences. Corruption and bribery undermine the protection of citizens against floods and can take place at all stages of the flood management cycle, from anticipation to recovery. For example, embezzlement and fraud can threaten the quality of flood protection measures and put lives at risk. Contracting, permitting and licensing processes are particularly vulnerable. Bribes and collusion, for example, are common means to steer design and procurement processes and can amount to grand corruption in large-scale infrastructure development (WIN, 2016b). Moreover, another stakeholder challenge can arise from the inclusion of private sector stakeholders. The increasing importance of the private sector as a strategic partner for flood management was accompanied by the transformation of the traditional governance accountability (OECD, 2011) which sometimes fractured stakeholder engagement approaches that undermined mutual control mechanisms to ensure integrity.

In many countries, institutional dysfunction, and opaque decision-making undermine collective action to properly manage floods. Accountability in flood management tends to be predominantly limited to technical reporting and financial accounting to institutional superiors. Few mechanisms exist to hold flood risk managers accountable to the public. Also, a lack of transparency among actors regarding practices and operations can be a barrier to institutional lesson-learning. In that respect, lessons learned from post-tsunami reconstruction in Indonesia, Malaysia or Pakistan are relevant since flood response is a governance stage which is particularly vulnerable to corruption (see ADB, OECD and Transparency International, 2005).

Ways forward

¹⁶ www.overstroomik.nl

Integrity and transparency need to be mainstreamed throughout governance approaches related to floods, and at all levels and sectors, to promote change towards greater accountability, transparency and participation. Various aspects can be emphasised to make it happen (WIN, 2016b):

- *More co-operation*: between the water sector, the anti-corruption sector, public finance institutions and the judiciary is needed through joint investigations and information sharing or judicial assistance; between flood actors and public finance institutions; between water agencies, authorities involved in flood management and users to support and build trust around the operations and maintenance processes;
- *More participation and multi-stakeholder decision-making*: it can foster awareness about citizen's rights to water and building capacity for participation;
- *Information should be shared*: information on the quality and sustainability of flood risk infrastructures and services could and should guide decisions;
- *Sources of funding should be included in the budget in a clear and transparent way*, while funding and evaluation mechanisms should be aligned;
- *Set up comprehensive accountability mechanisms*: independent monitoring of activities by the media, governmental and non-governmental institutions, academic institutions and civil society holds flood risk managers accountable. Mechanisms like procurement processes should be transparent, fair, non-discriminatory, accountable and verifiable.

Stakeholder engagement

Principle 10. *Promote stakeholder engagement for informed and outcome-oriented contributions to water policy design and implementation*

Observations

Citizens are important protagonists in flood governance and it is essential for them to be at the core of flood management policies, but more can be done to entice their contribution. In England, local flood action groups have developed community flood emergency plans. Another example can be found in Belgium where, since 2013, the Belgian drinking water and sanitation service provider, Vivaqua, has partnered with municipalities and citizens to develop a participatory flood monitoring programme. It consists in carrying out "audits" of building conditions as regards flood risks and identifying the practical measures to be taken to reduce the magnitude and frequency of floods. To date, a number of visits have been realised and successfully provided inhabitants with the information they requested to take the necessary measures for protecting their business against floods (OECD, 2015b). Insights from the case studies also highlight that citizens and inhabitants of flood-prone areas are second to governments as the stakeholders most often involved in decision making on floods management. However, this observation should be qualified, as in several European countries (Netherlands, Belgium, Sweden, Poland, France and even England, the latter of which seems the most advanced in this respect) it was found that risk communication to citizens is difficult and that citizens seem to have a tendency to adopt a "the government will take care for me" attitude (Hegger et al., 2013). For example, in the Netherlands or Poland, there is a striking "awareness gap" among citizens related to key water management functions, how they are performed and by whom, the regional water authorities they belong to and the basics of evacuation policy. Perception of water risks is equally low (KZGW 2012; OECD, 2014b). This can partly be explained by the fact that Dutch and Polish citizens are legally entitled to a certain degree of flood protection, either at local or national levels (CBOS, 2010). However, similar attitudes were found in England and Belgium, where flood management authorities only have permissive power and citizens do not have an explicit constitutional right to flood protection.

As risks of floods intensify, new players have gained interest and influence in flood governance. Amongst others, property developers and landowners are playing an important role as spatial development generates long-term liabilities and financial implications in terms of water management, such as compensation for the loss of nature values, green areas and water amenities. They can contribute to harnessing new sources of finance and to the development of non-technical solutions to manage floods. This is the case in Belgium for instance, where a new paradigm emerged in the 1990s that considers flood management as a shared concern of water managers and spatial planners, and which

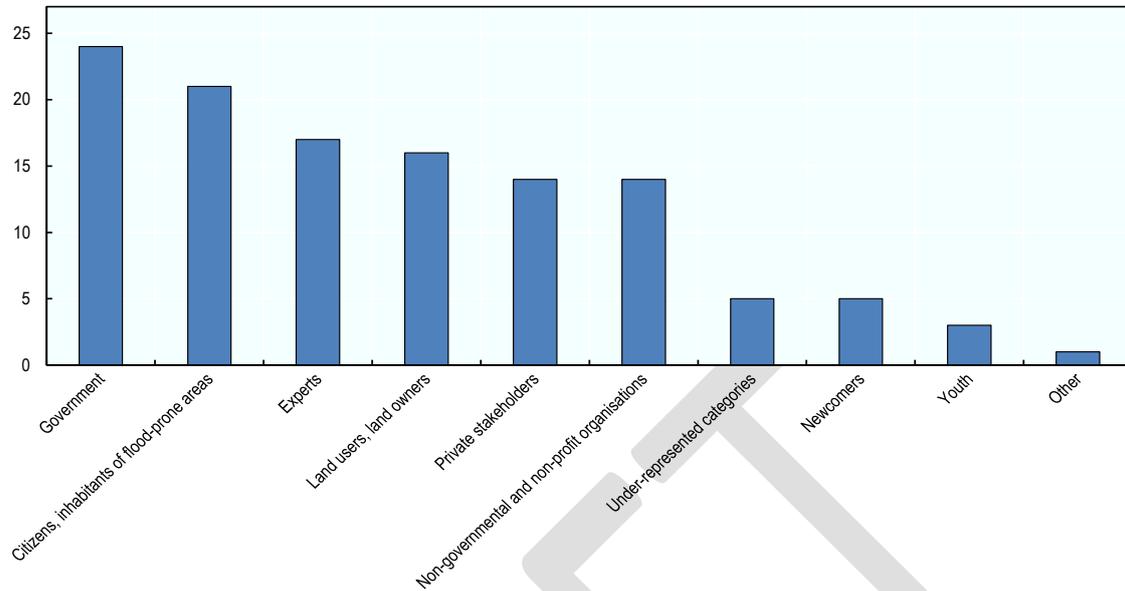
was institutionalised through the creation of a Coordination Committee on Integrated Water Policy in Flanders and the Interdepartmental Flood Group in Wallonia (Mees et al., 2016). In Italy, the Council of Ministers Presidential Decree dated May 28, 2015 gave a legal and transparent framework to the allocation of functions and definition of procedures that have helped anticipate flood-related bottlenecks. Finally, the Kampen (Netherlands) experience, by engaging civil society, has contributed to bridging the capacity gap of the public administration to manage floods (OECD, 2018a).

Innovative stakeholder engagement mechanisms and decision tools are gaining traction in the water sector because of technological advances as well as greater skill and openness in applying the tools for discussion. While “traditional” engagement tools that enhance collaboration across people such as meetings/workshops, policy dialogues and river basin committees are still largely used (as exemplified by the majority of case studies collected), new tools are emerging. Amongst others, the concept of electronic participation (or e-participation) can contribute to more responsive, cost-effective and inclusive flood governance. E-participation has been used for instance to set up citizens observatories for flood management in the Netherlands and the United Kingdom where it consisted in a variety of citizen groups (volunteers, elected citizens, citizen scientists and communities) and rested on a range of communication modes from listening as a spectator to expressing and developing preferences on specific issues (Wehn, Rusca and Evers, 2014). However, non-face-to-face communication may also have adverse negative impacts, such as biases or misunderstandings which need to be taken into account.

Monitoring and evaluation mechanisms are increasingly being used to assess stakeholder engagement processes, and their outcomes, so as to identify where weaknesses lie and improvement is needed. These include regular stakeholder meetings (as observed in 17 case studies), cost-benefit analysis (in 12 case studies), questionnaires and interviews. The case studies identify many other actors as key players in how flood-related decisions are made, including land users and landowners, experts/scientists and private actors such as water industries, water providers and insurance companies (Figure 14). In fact, in many instances, requirements for stakeholder engagement are part of flood-related projects (as observed in 18 case studies), organisational practices include multi-stakeholder forums (in 13 case studies), or river basin committees dealing with flood management include representatives of various stakeholders (in 11 cases).

Figure 14. Stakeholders involved in flood-related decision making

25 case study promoters responded



Note: Responses correspond to the number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer. “Under-represented” categories refer to youth, the poor, women, indigenous people, and domestic users; “newcomers” include property developers and institutional investors.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

Areas to improve

Stakeholder mapping is a useful instrument to assess how effectively flood functions are carried out and can help achieve synergies across policies and sectors through the diagnosis of gaps and redundancies, but adequate stakeholder engagement also means going beyond “who does what”. In other words actors within and outside the flood domain need to be identified and engaged. For instance, residents can be collaborative actors in flood mitigation and co-responders in flood response, particularly in rural areas. FRGAs should promote behavioural change and increased responsibilities of all stakeholders, including decision-makers, youth, land users and landowners. Insurance systems can play a major role in that matter. In Germany for instance, insurance companies, along with the German Flood Competence Centre, were involved in the development of a “Flood certificate for buildings” (*HochwasserPass*)¹⁷, which focuses on measures to reduce the impact of floods on a building, while generating linkages with another sector.

Some players may dominate decision-making processes and/or “capture” the stakeholder engagement process. Hydraulic bureaucracies are a potential governance hazard for decision-making processes (Molle et al., 2009). In some countries, flood prevention/mitigation can for instance be dominated by engineering firms as they have the expertise to carry out flood studies, to assess options and carry out cost benefit analysis. This may result in unintended bias due to the skills required for these tasks. In Australia for example, some State governments fund various engineering options but they do not fund mitigation measures like house raising or relocation of properties at risk. Stricter building controls may be supported by a local government but blocked by the State government. This implies a need to secure the required financial and human resources at the appropriate levels to sustain the engagement process and avoid over-representation. Enabling co-decisions and co-production of policies is key to allow “unheard voices” take more control and develop a sense of ownership over processes and outcomes.

¹⁷ For further information, see <http://www.hochwasser-pass.de/>

In many cases compensation is not effective for those asked to reduce the risk across the watershed while they experience increased flood risk in their property (Thieken et al., 2007). This is often rooted in bad measurement of the values and impacts of flood for different landowners and more broadly, stakeholders. Diverging preferences and motivations for flood strategies among landowners reflect the heterogeneity of world-views across the whole range of players; they can be shaped by factors like utility-maximisation perspective, governance values or by a perceived responsibility for protection, among others (Milman et al., 2017). Understanding their motivations and interests is also fundamental when mapping all stakeholders who have a stake in the outcome or that are likely to be affected.

Ways forward

Flood governance is not only a government issue since many other stakeholders play a role. Trust and public acceptance in policy choices related to flood management should rely on inclusiveness, bottom-up decision-making and the capacity of policymakers to accommodate a broad range of often conflicting interests across the water chain and policy cycle. Governments now acknowledge that water policies, however well-intentioned, require stakeholder engagement for their implementation on the ground. This holds true for flood governance. The traditional role of governments as the single decision-making authority has in many instances been replaced by multi-level, poly-centric governance. Furthermore, a critical test of trustworthy and legitimate flood management approaches is not just whether stakeholders are engaged, but whether they are also playing their part. Unbalanced power, interests and needs may be hard to align and result in problems to co-ordinate actions and strategies, as stakeholders are very different. The fragmentation of players with unclear and overlapping responsibilities can lead to a high degree of policy incoherence.

Participation of stakeholders throughout the policy cycle is deemed essential for informed and outcome-oriented FRMSs. Stakeholder engagement in flood management often relates to specific measures, like establishing flood risk maps, but less to setting objectives and strategies. Even though evidence of the benefits of stakeholder engagement is becoming more robust, barriers remain regarding the time and resources necessary to set up such engagement processes. Discussions and trade-offs are required regarding, among others, the objectives of the engagement process, the stakeholders to be engaged, the decisions to be made or the required information to be collected, and the balance between available resources.

Trade-offs between users, places and generations

Principle 11. Encourage water governance frameworks that help manage trade-offs across water users, rural and urban areas, and generations

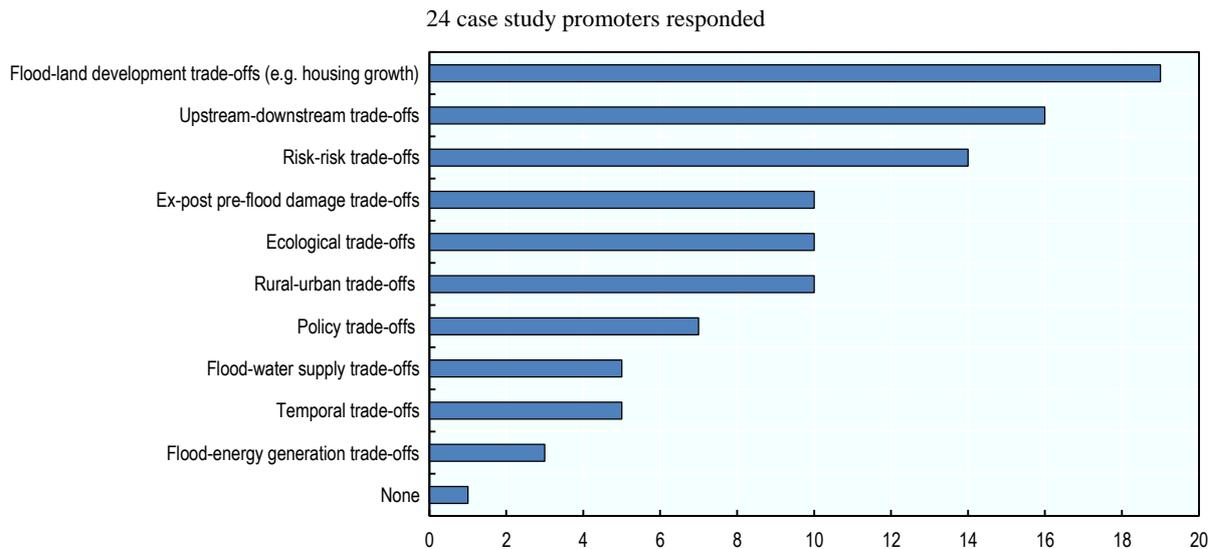
Observations

The governance of floods inherently generates trade-offs that need to be managed. A trade-off occurs when two opposing situations or qualities have to be balanced, which can sometimes result in accepting something bad in order to have something good. The implementation of FRMSs at a certain time can imply that not all inhabitants of a country are equally protected against flood risks or that those who generate future liabilities do not always bear related costs. Compromises and trade-offs are needed to manage imbalanced distribution of flood-related costs and benefits across stakeholders and places. Major trade-offs related to flood management are (Figure 15):

- *Upstream-downstream trade-offs:* the construction of dikes, drainage systems or flood plain enlargements in upstream areas can have negative downstream effects. In Austria the downstream area of the Aist catchment is highly vulnerable as it is shaped by context conditions like economic indicators, social development and administrative/political differences. The upstream municipalities tend to present lower economic indicators than the downstream small towns, where there is a larger industrial sector and hence, more job opportunities (Seher et al., 2018). The opposite is also true as retention areas created upstream can also have effects downstream. FRGAs also need to ensure that upstream actors do not bear more costs than downstream actors, even more so in the case of transboundary flood management. The relation between tributaries and the main course of a river also requires particular attention.

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- *Risk-risk trade-offs*: A risk-risk trade-off occurs when interventions to reduce one risk can increase other risks. This may impact policy choices, such as in Turkey or Japan where governments have to prioritise among water-related risks or seismic risks. It may also impact other water risks. For example, in many places, climate change generates droughts at some periods of the year and floods at others, therefore calling for flood-drought trade-offs.
 - *Ex-post - pre-flood damage trade-offs*: Floods can cause ex-post damage, but measures to prevent floods from happening can also cause losses and damages to small groups of people (pre-flood damage), for example when houses are located in dike construction sites.
 - *Ecological trade-offs*: Sea level rise in coastal areas often means that a choice has to be made between managing retreat so as to allow offshore mudflats to maintain their area or protecting the existing onshore ecosystems. Retention measures having positive effects both on reducing flood hazard/risk and the environment (e.g. dike shifting). Flood risk management strategies therefore need to balance these trade-offs and integrate green intervention strategies.
 - *Rural-urban trade-offs*: Flooding may generate higher damages in cities due to higher population densities and greater levels of stormwater runoff due to the increase in impermeable surfaces (OECD, 2013a). In parallel, higher protection levels are often given to economically more important areas. This is the case for the draft plan for the mitigation of hydrogeological risk in Italian metropolitan and urban areas with high levels of population exposed to floods. Both these aspects can generate imbalances between cities and rural areas. It is essential for FRGAs to ensure rural areas are not only used as floodplains and bearing the costs of FRMSs targeted to protect cities.
 - *Policy trade-offs*: as highlighted in principle 3, other policy areas regarding housing or transport for instance may have positive or negative impacts on flood management. The inherent-conflicting views can express in the form of an objective gap. Cross-sectoral coordination is required to find the balance between competing land uses.
 - *Temporal trade-offs*: Decision-making tools that discount the future can be problematic as they may lead to short-term solutions and quick fixes. Short-term solutions are rife in development planning. When selecting structural solutions, decision-makers do not necessarily look at their long term impacts such as the degradation of ecosystem services, natural resource or environmental assets, and increased flood risk. Strengthening intergenerational linkages is one among other possible options to address temporal trade-offs. The Water and Waste Services Regulation Authority (ERSAR) in Portugal manages trade-offs across generations with tariff policies and service provision practices defined by the regulator.

Figure 15. Main trade-offs linked to flood management



Note: Responses correspond to the number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.
Source: Data from case studies on flood governance collected for the OECD project (October 2016).

Areas to improve

The above trade-offs point to a number of multi-level governance gaps – e.g. accountability, objective, administrative and policy– which highlight several areas of improvement. First, due to the complex nature of the trade-offs involved in flood management, the relative benefits and costs of FRMSs are often controversial (OECD, 2013a). Second, compensation is generally monetary, without consideration of the ecosystem. Many benefits and costs do not necessarily have a market value which is particularly true when dealing with water-related disasters that can lead to irreversible and disastrous outcomes. Third, different stakeholders may have different views on justice. Is one willing to accept a higher risk at some locations and compensate for possible damages? And what if citizens can freely choose to live in a flood-prone area: should they be protected at the same level of safety as those people who choose to live in a naturally safer area? In order to tackle these challenges, integrated FRMSs are required which encourage the participation of multiple stakeholders. If they are properly involved in public debate and empowered to identify and address barriers to access quality flood management measures and resources, stakeholders can adapt their behaviour and discuss justice issues.

This situation calls for a thorough assessment of the distributional consequences of flood-related policies on citizens and places. Such consequences may require certain stakeholders to bear the costs of flood management but not other actors (e.g. property developers), require upstream countries to bear the costs of infrastructure investments, or leave poor and marginalised populations increasingly vulnerable to floods. A FRMS implemented in one area should not result in problems in another area. In France, a win-win approach was implemented for the action programme for flood prevention of the Alsace-Moselle in order to maximise benefits and outcomes. An equitable division of benefits and costs of flood governance approaches should be shared while ensuring an acceptable and minimum safety level for all. The poorest people are often unable to afford insurance, or do not have the resources to readily recover their lifestyle and livelihood after a flood event. This is the case in the UK where many individuals were struggling to obtain affordable insurance if their households were at high risk and/or had been flooded before. In order to address this issue, the government has introduced Flood Re, which is a reinsurance scheme designed to keep premiums affordable, and funded by a levy on all insurance premiums. However, no help is provided for those who cannot afford insurance or flood-proof their homes. Tackling such injustice issues was one of the reasons for establishing the EU Floods Directive.

Ways forward

The trade-offs generated by flood governance must be better assessed and addressed through, for instance, public debate, stakeholder consultation, and cost-benefit or multi-criteria decision analyses. In Bulgaria, a participatory approach was adopted to resolve the complexity of trade-offs. The design of a drought and flood management strategy in the Upper Iskar Basin implied the involvement of a wide range of regional stakeholders including government ministers, private companies, NGOs, local council members, national experts, and local residents (Daniell et al., 2011). Inter-municipal co-operation in Austria is an example of effective flood alleviation and planning co-ordination across places (upstream and downstream) based on a catchment-approach. Aist's case also shed light on the primary role of land use planning, which is considered as a necessary formal instrument to ensure binding land use regulations that integrate flood management, as well as coherence across sectoral policies (Seher et al., 2018).

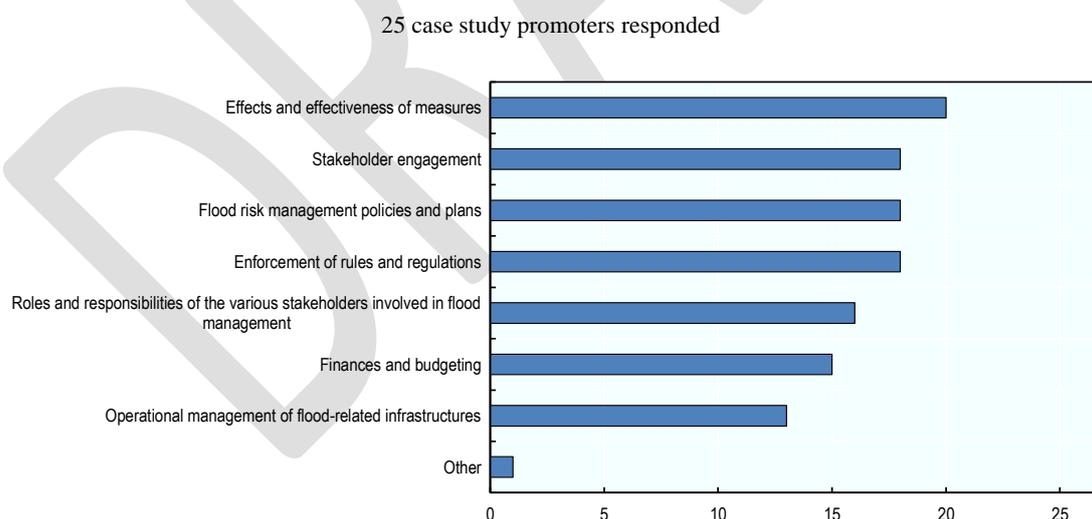
Monitoring and evaluation

Principle 12. *Promote regular monitoring and evaluation of water policy and governance where appropriate, share the results with the public and make adjustments when needed.*

Observations

Insights from case studies highlight that FRGAs' evaluation often includes checking the effects and effectiveness of flood risk management measures (as in 20 case studies), the enforcement of rules and regulations, the implementation of flood risk management policies and plans, and compliance with stakeholder engagement requirements (as seen in 18 cases) (Figure 16). Reviews of flood risk management plans typically cover any changes or updates since the publication of the previous versions of the plans (as observed in 15 case studies collected); the assessment of the progress made towards the achievements of objectives (in 14 case studies); the description of any additional measures taken since the previous version of the plans (in 11 cases); and/or the rationale for any measures foreseen in earlier version of the plans which have not been implemented (in 10 cases).

Figure 16. What is monitored and evaluated in flood risk management strategies



Note: Responses correspond to the number of case studies that ticked each possible answer in the Checklist. Respondents could tick more than one answer.

Source: Data from case studies on flood governance collected for the OECD project (October 2016).

Monitoring frameworks can also draw on indicators at different levels, such as the EU Floods Directive monitoring system (e.g. scoreboard, EU Court of Justice ruling for non-compliance), national supervision (e.g. flood safety standards) or municipal assessments (e.g. on risks and costs of flood events in land-use planning). This raises questions as to how monitoring and evaluation results can be fed back into the flood management process in an iterative manner and with appropriate delays and formats. For example in France, local strategies and action programmes on territories exposed to floods

were approved in 2016 in accordance with their related Flood Risk Management Plans. However, these monitoring and approval processes can at times be hampered by time mismatches whereby some local strategies cannot be included in Flood Risk Management Plans because they would not be finalised at the time these plans should be issued.

Monitoring and evaluation is a shared responsibility between different authorities and stakeholders. Insights from the case studies highlight that river basin organisations, citizens, experts (e.g. scientists, knowledge institutes specialised in flood management) and private actors (e.g. auditing and consultancy firms) are involved alongside national authorities in monitoring and assessing FRMSs. Monitoring the implementation of flood management policies can inform policy makers, those providing investment funds and citizens regarding public investment and public spending. This holds true provided that the data collected is shared with all interested stakeholders, for instance through closed-door (e.g. within river basin organisations) or public meetings, ICTs or traditional media, as observed in the case studies. Such data can also inform the effects and effectiveness of implemented or planned measures on the reduction of risk (e.g. GIS-Tool of the ICPR in the case of the Rhine transboundary basin). In Poland, Belgium (Flanders), France¹⁸ and England for instance, the government is using cost-benefit analyses to increase the efficiency of flood governance approaches (Hegger et al., 2013).

Areas to improve

As flood-related policies or programmes may not work or new risks and information may arise, timely evaluation and analysis are needed to figure out whether a given FRMS is still fit for purpose. Assessing flood risk governance arrangements encompasses evaluating their effectiveness, efficiency and inclusiveness. It also consists in reviewing flood management plans and accounting for the progress made towards the achievement of the stated objectives. Evaluation can provide useful insights into why some flood protection measures may be highly efficient in one basin, but not necessarily in another or to understand why some comparisons over time are not always possible. In all, evaluation can provide the evidence base to guide decision-making and planning with tangible data and information, and to identify which flood governance models are most cost-effective and replicable.

Indicators can help address information and accountability gaps. The OECD has recently launched an indicator framework that can be useful to assess the diversity of flood dimensions and serve as a self-assessment tool to track and measure them, although it needs to be accompanied by other evaluations (OECD, 2018b). The goal of the framework is also to help identify flaws and to trigger action to bridge any of the seven governance gaps. For example, in Scotland, the difficulties encountered in processing and assessing data were rooted in the lack of adequate technical and human capacity. There is common agreement that many countries are lagging behind in terms of data production and sharing. This is why the 2030 Agenda has placed high importance on regular and integrated monitoring, opening a window of opportunity to foster action at all levels, to unlock funding and to use SDGs indicators to ensure accountability and transparency.

Ways forward

Consolidating the information base and the monitoring framework involves implementing the appropriate mechanisms to collect information and to consolidate key performance indicators agreed upon by all concerned stakeholders. Such mechanisms include reviews of previous flood events or of flood risk management plans, strategic meetings, or occasionally online reporting platforms, as evidenced in the case studies. Since various stakeholders may have diverse values and a different framing of the topic, monitoring and evaluation frameworks need to be adapted to them. For instance, simple indicators may be needed which can be used to consult non-specialists, like citizens, on FRMSs. On the other hand, more detailed indicators may be used when collaborating with academia and researchers on the monitoring and evaluation of FRMSs. Monitoring and evaluation need to be sufficiently generic to allow for comparisons to be made across FRMSs, but they also need to adapt to

¹⁸ For more information, see: <http://www.developpement-durable.gouv.fr/Analyse-multicriteres-des-projets.html>;
http://www.developpement-durable.gouv.fr/IMG/pdf/Annexes_techniques_V7_CC_ACB_PAPI-2.pdf;
<http://www.eau-mer-fleuves.cerema.fr/cout-des-protections-contre-les-a1313.html>.

the requirements, needs and resources of each specific case. It is a challenge to develop knowledge on the effectiveness and efficiency of new FRMSs – e.g. spatial planning and awareness raising – and to be able to compare costs and benefits across strategies, measures and instruments.

Monitoring and assessment can be a milestone for effective governance across multiple scales, policies and authorities as they cut across all the OECD governance principles and can be distinguished according to what and when they measure as: input, process, output, outcome, impact (UNDP, 2013). Tracking performance indicators and sharing databases and information systems can be a useful means to co-ordinate vertically and horizontally. In transboundary contexts such as the case of China, India and Bangladesh, monitoring and sharing hydrological data of the river during monsoon season (even though still limited and irregular) in the highly vulnerable Brahmaputra basin can be extremely useful for India and Bangladesh to plan and co-ordinate strategies and policies. Nonetheless, it has provoked a strong dependence that can only be partially overcome with countries building their own capacity to monitor hydrological data. Secondly, the case of Eddleston is an example of a mechanism that can stimulate co-ordination across people through adequate stakeholder engagement to report and monitor effectively to guide decision-making. Co-evaluation is also a powerful means to allow the participation of multiple sectors. Moreover, cost-benefit analyses should put a strong emphasis on stakeholder engagement to ensure that the interests of all the actors, including the under-represented ones, are respected and that an adequate distribution of flood-related impacts, benefits and compensation across people but also places is ensured. To do so, it is no longer possible to rely on monetary measures. It will be key to integrate ecosystem services and to consider how individual values can shape the perception of benefits.

Conclusion

There is a growing consensus that the frequency and number of people at risk from floods will increase in the future (OECD, 2012). Typically, natural and technical science perspectives and related measures tend to dominate flood management and associated risks. This report demonstrates that governance is critical to make flood management more effective, efficient and inclusive across a wide range of measures that include forecasting, prevention/mitigation and preparation, flood response and recovery. This suggests a complex governance web of responsible government authorities, stakeholders, policies, regulations and actions taking place at multiple scales.

The report proposes that the OECD Principles on Water Governance have proved to serve as a comprehensive framework to analyse flood governance across different geographical contexts, management scales, with diverging flood challenge conditions and actors involved. The report points to adaptive governance as being essential for dealing with complexity and uncertainty associated with flood management. Consequently, there are no blue-print governance responses to strengthen flood management since they are highly contextual and place-based and depend on various dynamics in relation to stakeholders and to the policy environment.

It is important to acknowledge that the survey draws attention to a diversity of approaches and models of how floods are governed and managed.¹⁹ The report did not compare existing policy frameworks with one other but rather captured the state of play vis-à-vis the Principles in each case study. The analysis of what influences the implementation of the Principles provided a basis to understand *what works, what does not, what should be improved and who can do what*. The type of governance in place may look very different around the world and can vary a lot across and within OECD and non-OECD countries, but what is of interest is the existence and level of implementation of the framework conditions of the flood governance system in place. If these are deployed and properly functioning, any governance scale (local, basin, national or transboundary) and system can apply and adjust the Principles to their context and succeed. The case study practices showcase a number of multi-level governance gaps and accomplishments, and above all highlight diverse results, policy responses and lessons learnt that can inspire similar cases on flood governance.

As part of the outcome of the survey, the report offers a coherent framework for analysing flood governance in the pursuit of effectiveness, efficiency, inclusiveness and trust. The applicability and

¹⁹ There has been a diversification of risk management approaches. See Driessen and van Rijswijk, 2011; Hegger et al., 2014).

value of this framework as a self-assessment tool was demonstrated through the development of a revised version of the checklist, used by stakeholders to assess the performance of their flood governance arrangements against the *OECD Principles on Water Governance* and identify the “must-haves”. The refined checklist takes stock of the use and outcomes of the original version (2016), and incorporates relevant questions (on inputs, process and impact) from the OECD Water Governance Indicator Framework (2018) that can be applicable to floods. The checklist is composed of a number of questions concerning the status of the 12 Principles and aims to trigger an evaluation and consolidation of flood governance systems. The bottom line is that it is voluntary and not prescriptive; its primary objective is to stimulate a transparent, neutral, open, inclusive and forward-looking dialogue among stakeholders and to trigger actions to enhance the performance of water governance systems for improved flood management. The methodology is suggestive since each place, willing to improve flood governance, can contextualise the application of the Principles and decide how to use them based on, for example, the extent of comprehensiveness required and order of governance priorities.

Multi-level governance dynamics are inherent to flood management. This report also zoomed in on policy responses to overcome the fragmented nature of water observable from a territorial, institutional, sectoral and stakeholder perspective (OECD, 2011a). A primary step to achieve effective policy responses is to understand the different institutional layers and their interactions with administrative and geographical boundaries, as well as their implications for stakeholder engagement. Setting up multi-stakeholder co-ordination mechanisms can contribute to overcoming misalignments and fostering integrated flood management. Given that flood management is a shared responsibility across levels of governments, depending on the service required, and a wide range of stakeholders, a multi-level governance framework is required to minimise fragmentation, complexity and overlaps. Although place-based approaches to floods are very important, they may not be sufficient, as its impacts can spread across geographical and temporal scales. Hence, cities, for instance, always need to work with other levels of government, and vice-versa, for policy making, information, monitoring, evaluation, regulation and financing. Thus, co-ordination implies not only connecting levels of government and scales, but also including coordination of sector policies and other stakeholders.

A particular area of policy coordination misalignment is between water and land management. Particular land use changes can explain mounting flood risks such as through deforestation, agricultural practices, drainage and urbanisation (Roger, et al., 2017). However, land management is also part of the solution to decrease flood risks, by for example, creating more room for water bodies, or to increase groundwater infiltration in cities. Nonetheless, important governance challenges remain since land in many places tends to be private property and where owners are rarely involved when debating solutions for flood retention and resilience. It can also imply high transaction costs of coordinating land ownership fragmentation. The consideration of multifunctional and innovative land uses like temporary flood retention and flood storage on private land sheds light on the need to reconcile land and flood management (Hartmann et al., 2018a). Land entails economic issues, legal aspects of private property rights, and political dimensions of public participation and public subsidies. Forward-looking flood management strategies need to thoroughly understand and take into account landowners’ perspective in order to combine local land management approaches with catchment governance from a multi-level perspective. In parallel to respecting place-specific issues, interests and property rights, it is important to ensure policy coherence and consistency across scales (Hartmann et al., 2018b). Adopting a more comprehensive and river-basin-wide approach can help manage multi-level dynamics inherent to flood management, and in particular between upstream and downstream users and/or urban areas and rural settlements (Milman, et al., 2017).

The report stresses that governance matters to improve flood management as analysed through the lens of the Principles. Future avenues and directions of flood governance will need to highlight the inclusion of stakeholder engagement (people), articulate flood governance across different scales (places) and coordinate and align policies across sectors, levels of government and institutions that are set to enforce them (policy). Building on the gaps detected, the Principles and the 3Ps framework, some policy insights can be drawn that can help improving flood management:

Making the most of coordination across places: The design and implementation of flood management strategies should be tailored to the place that policies and investments aim to serve. Flood governance cuts across geographical spaces such as rural-urban and upstream-downstream. The issue of coordination draws attention to important questions such as deciding about acceptable risk levels for

different actors, who pays the costs and who reaps the benefits of flood management measures. Questions like these can enable a multi-actor discussion on which mechanisms can help manage these multi-level dynamics and which compensation measures are fit to address trade-offs based on an understanding of how to better balance costs and benefits. Frequent misalignment between hydrological and administrative boundaries often hinders integrated flood management, which calls for further co-ordination across scales. Multiple scales thus need to be combined within a river-basin-wide approach to bridge investment, information or sector policy gaps.

Making the most of policy complementarities and alignment: A range of policy areas such as environment, agriculture, urban development and infrastructure influence flood management. It is important to reflect upon how each policy areas' strategy should contribute to reducing flood risk. Furthermore, managing water provokes a strong mutual dependency between subnational authorities and central governments. A useful way to reduce gaps and attain policy alignment is to concentrate on effectiveness (are policies having intended effects?) and strengthen the articulation of flood management plans elaborated at both national and basin levels, with the means of implementation and specific conditions at the local level. There is a much broader range of mechanisms that can help co-ordinate flood policy between the local government, neighbouring cities, and upper levels of government as well as horizontally in order to develop a strategic and integrated view of flood in a broader economic, social, political and environmental spectrum. The latter can include cross-sectoral planning instruments, regulations, inter-institutional agreements but also learning mechanisms through interdisciplinary knowledge such as research programmes, schooling and co-creation projects. Vertical co-ordination mechanisms that can foster dialogue across flood-related authorities include shared data and information systems, participatory processes, co-financing arrangements and basin committees, among others.

Making the most of stakeholder engagement: The effective and efficient coordination across places and sectors requires results-oriented stakeholder engagement. Stakeholder involvement can build trust and ownership, raise awareness on water risks, manage conflicts on trade-offs and help set convergent objectives across policy areas. It is therefore important to map all those who have a stake in or are likely to be affected by flood management decisions and their core motivations in order to better define roles and responsibilities of different public actors, water users and other stakeholders. Flood governance needs to pay further attention to unheard voices, emerging players and non-water sector actors (e.g. youth, land users, women, indigenous people, local communities). To ensure constructive and non-discriminatory engagement it is important to set in place appropriate stakeholder engagement platforms for frequent and continuous mutual communication and inputs for decision-making, together with clear and transparent procedures, and that adequate resources and capacities are available. In order to allow fair stakeholder processes, governments may need to "level the playing field" so that marginalised or less well-organised voices are heard. Regular assessment of the process and its outcomes for learning purposes is key to adjust, improve and make stakeholder engagement platforms fit-for-purpose.

Nonetheless, coping with current and future flood challenges concerns other multi-level governance flaws appearing as bottlenecks in the co-ordination and implementation of flood policy. Special attention should be paid to multi-level dimensions related to capacity, monitoring and evaluation and innovation. These cut across the 3Ps framework and the Principles longitudinally and transversally.

- In the first place, it is crucial to build relevant capacity²⁰ among key stakeholders so that they can effectively take part in decision-making processes on flood management. Without tailored capacity of different levels of government, sectors, places and public and private stakeholders involved in the complexity of flood management, the achievement of critical Principles can be jeopardised.
- Secondly, monitoring and evaluation cuts across all Principles because "you cannot manage what you do not measure". As such, getting the evaluation process right is key to loop in monitoring outcomes in planning, policy-making and implementation. In this sense, improving databases, information and monitoring systems on flood management, including by strengthening staff capacity to process data and increasing financial resources for maintenance can be very helpful.

²⁰ Notably capacity includes a wide range of areas: planning, rule-making, project management, finance, budgeting, data collection and monitoring, risk management and evaluation.

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- Finally, relevant improvements of flood management will be hard to accomplish without the promotion of innovative solutions. Policy frameworks encouraging innovations, institutions promoting the scaling-up of replicable flood management practices and experience-sharing tools are essential to improve flood management.

This trial on the application of the Principles to flood management is a way forward in supporting the implementation of the OECD Principles on Water Governance as it scales-up practices that can help governments and stakeholders move from vision to action. Moving forward, this research has the potential to help address a neglected gap in the study of flood governance, by providing an evaluative approach that builds on the OECD Principles, and which can be applied at different scales to assess the strengths and weaknesses of flood governance. This framework could also serve as an important means of facilitating peer-learning among decision makers, professionals and emerging or voice-less players working on flood management, from which valuable, and replicable lessons could be identified.

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Annex A. Applying the OECD Principles on Water Governance to flood management

Rationale for assessing flood governance

This Checklist is conceived as a self-assessment voluntary tool to assess the state of play of governance frameworks for managing the risk of "too much" water. It is intended to be applicable across governance scales (local, basin, national, etc.). Its primary objective is to stimulate a dialogue among stakeholders on whether existing water institutions, policies and governance instruments are performing well or where adjustments are needed. The assessment can be carried out in order to: promote collective thinking among stakeholders; share knowledge and address asymmetries of information across governments and stakeholders; foster learning across stakeholders involved in the water sector; raise awareness about the performance or underperformance of the system; identify deficits in existing policies, institutions and instruments; develop critical thinking on who does what and how; enhance transparency and accountability of water leaders, resulting in increased levels of trust. The self-assessment aims to be forward looking as it can serve as a baseline against which to compare a second assessment, which could occur a few years later.

The Checklist seeks to help interested stakeholders, from the local to national levels who have responsibilities in flood management, to assess the performance of flood risk governance arrangements against the OECD Principles. It contains 100+ questions that can help assess flood governance conditions. Interested stakeholders are invited to fill in the Checklist by ticking the boxes and providing the qualitative responses to open questions. For each Principle, the Checklist assesses:

- The current situation, in a "**diagnosis**" section
- The effect of current policy choices, in an "**impact**" section, and
- The governance tools currently in place, in a "**mechanisms**" section.

A Checklist to apply the OECD Principles on Water Governance to Flood Management

INTRODUCTION
Please specify <u>your role</u> in regards to the case study (i.e. government representative, project manager, project participant, researcher, passive observer, private investor, donor, etc.)
Please provide a description of the case study (What is it about? Who is involved? What is at stake? When does it happen? How would you characterise the flood risks in your case study area? What are the future projections and challenges, if available?)

Principle 1: Clear roles and responsibilities

Clearly allocate and distinguish roles and responsibilities for water policymaking, policy implementation, operational management and regulation, and foster co-ordination across these responsible authorities. To that effect, legal and institutional frameworks should:

- a) Specify the allocation of roles and responsibilities, across all levels of government and water-related institutions in regard to water
 - Policy-making, especially priority setting and strategic planning;
 - Policy implementation especially financing and budgeting, data and information, stakeholder engagement, capacity development and evaluation;
 - Operational management, especially service delivery, infrastructure operation and investment; and
 - Regulation and enforcement, especially tariff setting, standards, licensing, monitoring and supervision, control and audit, and conflict management;
- b) Help identify and address gaps, overlaps and conflicts of interest through effective co-ordination at and across all levels of government.

DIAGNOSIS

1.1. Who is in charge (formally/informally) of what for the following stages of flood management in your case study? Please indicate as many responsible organisations as relevant for your case study.

	Policymaking	Policy implementation ²¹	Operational management ²²	Regulation and enforcement
Flood anticipation/foresight				
Flood prevention/mitigation				
Flood preparation				
Flood response				
Flood recovery				

1.2. How are roles and responsibilities allocated? Generally speaking, *role* defines your position in an organisation and *responsibility* defines the functions of your position

- They were not officially allocated, allocation results from historical arrangements
- By constitution, national laws or other legal framework
- By charter/principles
- By contract
- Other, specify:

1.3. How are roles and responsibilities regularly reviewed to adapt to changing circumstances and make sure they are always fit? Please tick as many as apply to your case study.

- They are not regularly reviewed
- Parliamentary commission
- National regulator
- Citizen observatory
- Revision of flood risk management policies and plans
- Internal meetings within projects
- They are not reviewed
- Other, specify:

²¹ i.e. financing and budgeting, data and information, stakeholder engagement, capacity development and evaluation.

²² i.e. infrastructure operation and investment.

1.4. In your case study, which reforms or changes in other policy areas affect the allocation of roles and responsibilities on flood management in particular? Please tick as many as apply in your case study.

- Territorial reforms (e.g. decentralisation, regionalisation, recentralisation, etc.)
- Regulation (e.g. new regulations, increasing use of 'soft' instruments such as gentlemen's agreements)
- New cooperation between public and private partners
- Competitiveness / Market-oriented reforms (e.g. in the insurance sector)
- Financial reform (e.g. less public funding at the city level, changes in procurement systems)
- None
- Other, specify:

1.5. Is there a dedicated flood policy, indicating goals, responsibilities, resources needed?

- Yes
- No

1.6. Are there flood-related legal and institutional frameworks or regulations in your country?

- Yes. Please specify:
- No

1.7. Have applicable binding and non-binding flood-related international or supranational frameworks and regulations been transposed at national (or subnational) level(s)?

- Yes. Please specify:
- No

IMPACTS

1.8. Were the impacts of a fragmentation of roles and responsibilities on the effectiveness of [flood risk governance arrangements](#) assessed in your case study?

- Yes. Specify how:
- No

1.9. In the case when fragmentation is negative and undesired, what were the impacts of a fragmentation of roles and responsibilities on the effectiveness of flood risk governance arrangements ? Please tick as many as apply to your case study.

- Uneven distribution of resources
- Lower levels of government have a heavy burden of work regarding flood management
- Inconsistency between national and local goals and strategies
- Conflicts among stakeholders in charge of flood management
- Overlapping or conflicting policies
- Unclear accountability lines/chains
- Negative economic impacts
- Negative environmental impacts
- None
- Other, specify:

MECHANISMS

1.10. Which vertical coordination mechanisms are in place in your case study to regularly identify and address gaps, overlaps and conflicts of interest regarding roles and responsibilities for flood governance?

- Presence of coordinating actors
- Contractual arrangements
- Intermediate bodies or actors
- Conferences between local and subnational flood governance players
- Bridging concepts (e.g. multi-layered safety)
- Shared databases and information systems
- Performance indicators
- None
- Other, specify:

1.11. Which horizontal coordination mechanisms are in place in your case study to manage interdependencies for flood policy design and implementation?

- Organisations/tools that bridge knowledge development and decision-making processes (e.g. research institutes, interactive maps, simulation models)
- Knowledge multi-stakeholder co-creation processes
- Financial transfers or incentives
- Inter-municipal or metropolitan collaboration
- Informal co-operation around projects
- Inter-ministerial co-ordination platforms
- Joint financing
- None
- Other, specify:

1.12. In your case study, are the effectiveness, efficiency and inclusiveness of such mechanisms monitored and evaluated?

- Yes. Please specify how:
- No

Principle 2: Appropriate scales within basin systems

Manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions, and foster co-ordination between the different scales. To that effect, water management practices and tools should:

- a) Respond to long-term environmental, economic and social objectives with a view to making the best use of water resources, through risk prevention and integrated water resources management;
- b) Encourage a sound hydrological cycle management from capture and distribution of freshwater to the release of wastewater and return flows;
- c) Promote adaptive and mitigation strategies, action programmes and measures based on clear and coherent mandates, through effective basin management plans that are consistent with national policies and local conditions;
- d) Promote multi-level co-operation among users, stakeholders and levels of government for the management of water resources; and,
- e) Enhance riparian co-operation on the use of transboundary freshwater resources.

DIAGNOSTIC

2.1. At which scale are the flood management functions primarily managed in your case study?

	Basin (from sub-basin to transboundary)	National	Regional / provincial	Local / metropolitan	Other, specify:
Flood anticipation/foresight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Flood prevention/mitigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flood preparation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flood response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flood recovery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

2.2 Are there Integrated Water and Flood Risk Management policies and strategies?

- Yes. Please specify:
 No

IMPACTS

2.3. What are the challenges towards vertical coordination (i.e. coordination across administrative levels)? Please tick as many as apply to your case study.

- Conflicting agendas, priorities and interests
 Capacity gaps
 Inconsistent budgeting, procurement and regulatory processes across levels
 Languages barriers
 Unbalanced power, capacities and resources
 Legal allocation of powers and responsibilities
 None
 Other, specify:

MECHANISMS

2.4. In your case study, are there policies in place to manage floods at the hydrographic scale?

Please tick as many as apply to your case study.

- River basin plans
 Early warning systems
 Information system
 Models and decision support system
 Research, development and innovation
 Other, specify:

2.5. In your case study, are existing plans to manage flood risks consistent with national policies and local conditions?

- There are no flood risk management plans
 Flood risk management plans are in place but some aspects are contradictory with national policies
 Flood risk management plans are in place but some aspects are not adapted to local conditions
 Flood risk management plans are in place and they are aligned with national policies
 Flood risk management plans are in place and they are adapted to local conditions
 Other, specify:

2.6. Which multi-level and riparian co-operation mechanisms are in place among users, stakeholders and levels of government for the management of floods?

	Basin (from sub-basin to transboundary)	National	Regional / provincial	Local / metropolita n	Other, specify:
Basin committee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Participatory processes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Shared data and information systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Joint programmes of measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Joint projects or contracts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Co-financing arrangements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Inter-governmental dialogue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Public participation fora	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Early warning and alarm procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Joint research and innovation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Principle 3: Policy coherence

<p>Encourage policy coherence through effective cross-sectoral co-ordination, especially between policies for water and the environment, health, energy, agriculture, industry, spatial planning and land use through:</p> <p>a) Encouraging co-ordination mechanisms to facilitate coherent policies across ministries, public agencies and levels of government, including cross-sectoral plans;</p> <p>b) Fostering co-ordinated management of use, protection and clean-up of water resources, taking into account policies that affect water availability, quality and demand (e.g. agriculture, forestry, mining, energy, fisheries, transportation, recreation, and navigation) as well as risk prevention;</p> <p>c) Identifying, assessing and addressing the barriers to policy coherence from practices, policies and regulations within and beyond the water sector, using monitoring, reporting and reviews; and</p> <p>d) Providing incentives and regulations to mitigate conflicts among sectoral strategies, bringing these strategies into line with water management needs and finding solutions that fit with local governance and norms.</p>
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DIAGNOSTIC

3.1. In your case study, which policy areas are the most interdependent with flood management?

	Very interdependent	Quite interdependent	Less interdependent
Environment (including ecosystems, nature conservation and development)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate Change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rural policy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Agriculture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spatial planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transport/navigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urban development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Tourism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fisheries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Civil protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Amenity/recreation/culture (architectural and cultural assets, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.2. Please indicate the policy area(s) where synergies with flood management have been found:

- Environment (including ecosystems, nature conservation and development)
- Climate Change
- Infrastructure
- Rural policy
- Health
- Energy
- Agriculture
- Industry
- Spatial planning
- Land use
- Water quality
- Water supply
- Transport/navigation
- Urban development
- Tourism
- Fisheries
- Civil protection
- Amenity/recreation/culture (architectural and cultural assets, etc.)
- None
- Other, specify:

3.3. Do flood risk management strategies include:

- Costs and benefits
- Flood extent
- Flood conveyance routes
- Areas which have the potential to retain flood water (e.g. natural floodplains)
- Environmental objectives
- Soil and water management
- Spatial planning
- Land use
- Nature conservation / nature-based solutions
- Water quality
- Water supply
- Navigation
- Infrastructure
- Tourism
- Fisheries
- Amenity/recreation/culture (architectural and cultural assets, etc.)
- Flood risk prevention plans (elaborated for industrial facilities, schools, etc.)
- None
- Other, specify:

IMPACTS

3.4. How are barriers to policy coherence identified, assessed and addressed in your case study?

- They are not identified, assessed or addressed
- They are identified through cross-sectoral groups/meetings
- They are identified through cross-sectoral policy reviews
- They are identified through external/independent reviewers
- They are identified by political leaders and/or policy entrepreneurs who have a stake in the issue
- They are identified by citizens or NGOs
- Other, specify:

3.5. Is there an assessment of the distributed impacts on flood management of decisions taken in other areas such as spatial development, agriculture or environment?

- Yes. Please specify:
- No

3.6. To what extent does policy incoherence have an impact on flood management?

- Economic costs (e.g. infrastructure investments that could have been avoided with better coordination)
- Greater risk of human casualties
- Social costs (e.g. if measures destroy public amenity or divide communities ‘inside’ and ‘outside’ a levee)
- Environmental costs (e.g. if measures cause geomorphological changes or isolate floodplains)
- Transaction costs (e.g. conflict among stakeholders involved in flood management)
- Conflicting actions (e.g. urban policies for the development of housing in floodplains vs. flood management policies using these floodplains for flood discharge)
- Reduced implementation capacity
- Increase in flood risks
- It does not have any impact
- Other, specify:

3.7. Are costs due to absent/poor policy coherence evaluated and available to decision makers?

- Yes. Please specify how:
- No

MECHANISMS

3.8. In your case study, which mechanisms are in place to facilitate coherence and mitigate conflict between flood management policies and other policy sectors?

	Basin (from sub-basin to transboundary)	National	Regional / provincial	Local / metropolitan	Other, specify:
Legislation/regulation/specific policy instruments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Financial incentives/Subsidies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Contracts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cross-sectoral plans & programmes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cross-sectoral groups/meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Joint actions of ministries/agencies at subnational level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Inter-institutional agreement between subnational governmental actors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Technical means (e.g. flood water stored for irrigation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Conditionalities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Catchment authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Research programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Schooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Knowledge co-creation projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stakeholder groups facilitating collaborative solutions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Public consultation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
None	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

3.9. Are there conflict mitigation and resolution mechanisms to manage trade-offs across flood-related policy areas?

- Laws, regulations
- Public consultation
- Stakeholder groups facilitating collaborative solutions
- Not in place
- Other, specify:

Principle 4: Capacity

Adapt the level of capacity of responsible authorities to the complexity of water challenges to be met, and to the set of competencies required to carry out their duties, through:

- a) Identifying and addressing capacity gaps to implement integrated water resources management, notably for planning, rule-making, project management, finance, budgeting, data collection and monitoring, risk management and evaluation;
- b) Matching the level of technical, financial and institutional capacity in water governance systems to the nature of problems and needs;
- c) Encouraging adaptive and evolving assignment of competences upon demonstration of capacity, where appropriate;
- d) Promoting hiring of public officials and water professionals that uses merit-based, transparent processes and are independent from political cycles; and
- e) Promoting education and training of water professionals to strengthen the capacity of water institutions as well as stakeholders at large and to foster co-operation and knowledge-sharing

DIAGNOSTIC

4.1. In your case study, which capacities are in place to manage floods today and in the future?

- Technical capacity (e.g. modelling, early-warning systems, projections)
- Financial capacity (e.g. capacity to allocate funds for the construction of flood defences, willingness and capacity to pay for insurance schemes, capacity to raise taxes)
- Infrastructural capacity (e.g. capacity to build green infrastructure, adaptive buildings, retention facilities, dams)
- Human capacity (e.g. knowledge, skills, leadership, stakeholder engagement)
- Governmental capacity (e.g. departments dedicated to flood management, policies, cooperation with research institutes)
- Multilateral and/or international agreements
- None
- Other, specify:

4.2. In your case study, how are capacities in flood governance systems assessed in terms of responding to actual problems and needs?

- Regular reviews
- Public hearings
- Commissioning reports
- National monitoring
- They are not assessed
- Other, specify:

4.3. How are capacity gaps identified in your case study?

- They are not identified or addressed
- Guidelines for *ex-ante* appraisal available and used at all levels of government
- Index of technical, financial, infrastructural or human capacity
- Studies examining governance capacity at various levels
- Post-event reviews
- They are not identified
- Other, specify:

4.4. How are capacity gaps addressed?

- E-government platforms
- Peer learning
- Policies to strengthen subnational capacities
- Guidance documents
- Open, competitive and merit-based hiring (for human capacity)
- Hiring of a diverse cross-sectoral skill set
- There are not addressed
- Other, specify:

4.5. Are there incentives to create “flood” careers for staff in the public sector?

- Yes. Please specify:
- No

4.6. Are there guidelines or standards for capacity building across authorities at your level?

- Yes. Please specify:
- No

4.7. Are there flood-related networks at national level?

- Yes. Please specify:
- No

IMPACTS

4.8. Which of the following gaps have an impact on capacity development in your case study?

- Financial resources
- Lack of training tools and methodologies
- Lack of political will to allocate resources to capacity development
- Lack of staff and technical skills
- None
- Other, specify:

MECHANISMS

4.9. In your case study, which mechanisms are in place for the education and training of relevant stakeholders (e.g. flood plain managers, flood risk professionals)?

- None
- Information provision; guidebooks
- Training and communication support programmes on flood risks
- Workshops
- Other, specify:

4.10. Are the mechanisms used for the hiring of public officials and flood risk professionals (tick the box when appropriate)?

- Merit-based?
- Transparent?

-
- Independent from political cycles?
 Other, specify:

4.11. Are there decentralised development co-operation mechanisms in place (e.g. twinning, peer-to-peer learning activities, capacity building and knowledge transfer)?

- Yes. Please specify:
 No

Principle 5: Data and information

Produce, update, and share timely, consistent, comparable and policy-relevant water and water-related data and information, and use it to guide, assess and improve water policy, through:

- a) Defining requirements for cost-effective and sustainable production and methods for sharing high quality water and water-related data and information, e.g. on the status of water resources, water financing, environmental needs, socio-economic features and institutional mapping
- b) Fostering effective co-ordination and experience sharing among organisations and agencies producing water-related data between data producers and users, and across levels of government;
- c) Promoting engagement with stakeholders in the design and implementation of water information systems, and providing guidance on how such information should be shared to foster transparency, trust and comparability (e.g. data banks, reports, maps, diagrams, observatories);
- d) Encouraging the design of harmonised and consistent information systems at the basin scale, including in the case of transboundary water, to foster mutual confidence, reciprocity and comparability within the framework of agreements between riparian countries; and
- e) Reviewing data collection, use, sharing and dissemination to identify overlaps and synergies and track unnecessary data overload.

DIAGNOSTIC

5.1. Which flood risk and flood-related data and information are currently being collected for flood management in your case study? Please tick as many as apply to your case study.

- Maps of the river basin
 Description of the floods which have occurred in the past including their consequences
 Potential adverse consequences of future floods
 Scenarios of flood probability and for each, the flood extent, water depths and flow velocity
 Flood conveyance routes
 Potential adverse consequences associated with flood scenarios, especially number of affected inhabitants, affected economic activity
 Vulnerable infrastructure and populations (e.g., elderly, hospitals)
 Installations which might cause accidental pollution in case of flooding
 Potentially affected protected areas
 Areas where floods with a high content of transported sediments and debris floods can occur
 Other significant sources of pollution
 Environmental needs
 Land uses
 Navigation
 Infrastructure
 Institutions
 Sources of finance
 None
 Other, specify:

5.2. How are flood risk and flood-related data and information used to guide decision-making?

- They are incorporated in flood risk and flood hazard maps
 They are used to develop flood risk management plans
 They are shared within participatory decision-making processes
 They are used to assess flood risk

Other, specify:

5.3. In your case study, who are the main flood risk and flood-related data and information producers?

- Statistical offices
 Forecast agencies
 Government
 Other, specify:

5.4. Who are the main flood risk and flood-related data and information users?

- Government
 Private companies
 Inhabitants / Citizens
 Experts / Scientists
 Other, specify:

5.5. How are flood risk and flood-related data and information shared?

- Traditional media (press release, newspaper inserts, reports, radio broadcasts and video presentations)
 Web-based technologies (flood risk information systems, fora, newsletters, social media, data banks, maps)
 Other information and communication technology (SMS, information hotlines)
 Open public meetings (e.g. organized by public authorities or flood observatories)
 Closed meetings (meetings of river basin organisations, of flood-related associations)
 Engaging schools and community groups
 They are not shared
 Other, specify:

5.6. Is the flood risk information system harmonised, integrated, standardised and co-ordinated across relevant agencies and responsible authorities across relevant governance scales?

- Yes
 No

5.7. Are there real-time data and do they guide decision making?

- Yes. Please specify:
 No

5.8. Are there platforms for dialogue between data producers and users?

- Yes. Please specify:
 No

5.9. Do online platforms/tools/agreements exist for experience and knowledge sharing?

- Yes. Please specify:
 No

5.10. Do tools exist to produce, disclose and use flood-related data and information, through innovative ways? (Examples are big/smart/mobile data, digital maps, real-time sensors and monitoring)

- Yes. Please specify:
 No

IMPACTS

5.11. How are unnecessary data overload and dispersion of information regularly tracked in your case study?

- Reviews of data collection, use, sharing and dissemination

- Re-prioritization of the objectives for data collection and data required
- Participatory workshops including data producers and users
- Data producers and users meetings
- It is not being tracked
- Other, specify:

5.12. What is the impact of data overload and dispersion of information on flood management?

- Overlap: many levels and agencies produce and share the same information
- Conflicting data and difficulty to choose what to use to develop policies
- Data inconsistencies leading to greater uncertainty in models and scenarios
- Delays in processing data
- None
- Other, specify:

MECHANISMS

5.13. Which co-ordination and experience sharing mechanisms are in place in your case study?

- Meetings among organisations and agencies producing flood-related data
- High-level meetings on exchange of information between member states before drafting flood risk assessments, flood hazard maps, flood risk maps in the case when floods affect international areas
- Conferences between data producers and users
- Online platforms / Knowledge infrastructure
- Visits of flood risk professionals to other areas affected by floods and meeting with colleagues
- None of the above
- Other, specify:

5.14. Are there bottom-up mechanisms to produce and disclose flood-related data and information across levels of government, public, private and non-profit stakeholders?

- Yes. Please specify:
- No

Principle 6: Financing

Ensure that governance arrangements help mobilise water finance and allocate financial resources in an efficient, transparent and timely manner, through:

- a) Promoting governance arrangements that help water institutions across levels of government raise the necessary revenues to meet their mandates, building through for example principles such as the polluter-pays and user-pays principles, as well as payment for environmental services;
- b) Carrying out sector reviews and strategic financial planning to assess short, medium and long term investment and operational needs and take measures to help ensure availability and sustainability of such finance;
- c) Adopting sound and transparent practices for budgeting and accounting that provide a clear picture of water activities and any associated contingent liabilities including infrastructure investment, and aligning multi-annual strategic plans to annual budgets and medium-term priorities of governments;
- d) Adopting mechanisms that foster the efficient and transparent allocation of water-related public funds (e.g. through social contracts, scorecards, and audits); and
- e) Minimising unnecessary administrative burdens related to public expenditure while preserving fiduciary and fiscal safeguards.

DIAGNOSTIC

6.1. What is the nature of the major costs related to flood governance in your case study? (Rank from 1-major cost to 4-minor costs).

- Social costs (e.g. social conflicts, population displacement)
- Economic costs (e.g. building protection infrastructure, producing and collecting data)

Environmental costs (e.g. impact on ecosystems, land management, etc.)
 Institutional costs (e.g. coordination with stakeholders)

6.2. What are the most relevant sources of finance for flood governance in your case study? (Rank from 1-biggest source to 7-smallest source; N/A when not applicable to your case study).

- Public funding (national, regional or local)
- Private funding
- Local funding (e.g. solidarity funds or more direct contributions from beneficiaries)
- Contribution from the beneficiaries (private, public or voluntary organisations or communities)
- Taxes on actions that contribute to the flood problem
- European funding (e.g. Fund for Regional Development, Cohesion Fund, Social Fund, Agricultural Fund etc.)
- Joint financing between public and private sources

6.3. To which strategies are these sources of finance allocated? (Use +++ to indicate high amounts, ++ for medium amounts and + for small amounts)

	Public funding	Private funding	Local funding	Contribution from the beneficiaries	Taxes	European funding	Other, specify:
Flood prevention							
Flood mitigation							
Flood response							
Flood recovery							
Flood rehabilitation							

6.4. Are there enough financial revenues to cover operational costs and long-term assets renewal to mitigate floods?

- Yes. Please specify:
- No

6.5. Are there investment plans and programmes and do they guide decision making?

- Yes. Please specify:
- No

6.6. In your case study, how are administrative burdens related to public expenditure regularly being tracked?

- They are not being tracked
- Audits of financial administrations
- Investments in the skills and capacity of staff to perform their roles effectively (line ministries, other institutions)
- Other, specify:

6.7. Are there clear budget transparency principles and rules applied at all levels of government?

- Yes. Please specify:
- No

IMPACTS

6.8. What are the main impacts of obscure, ineffective financial governance in your case study?

- Build-up of large, unsustainable debts

-
- Financial problems during difficult economic times
 - Local opposition
 - Corruption/opaque decision-making
 - Future liabilities for current generations
 - Lack of consideration of low-cost options (e.g. green infrastructure/permeable surface, instead of large reservoirs)
 - None
 - Other, specify:

MECHANISMS

6.9. Do flexible and solidarity mechanisms exist in case of water-related disasters?

- Yes. Please specify:
- No

6.10. In your case study, what measures have been taken to help ensure availability and sustainability of investments?

- Diversification of financial sources
- Identification of financial risks and debate about the appropriate fiscal policy course to adopt
- Use of innovative financing instruments
- Incentives and capacity-building to increase the ability of the utilities to charge for water
- No measure has been taken
- Other, specify:

6.11. Are there measures to minimise unnecessary administrative burdens when collecting and disbursing water-related revenues?

- Yes. Please specify:
- No

6.12. Which mechanisms are used to ensure that practices for budgeting and accounting are sound and transparent and that they provide a clear picture of flood risk activities and any associated contingent liabilities?

- Budget documents and data are open, transparent and accessible
- A comprehensive, participative and realistic debate on budgetary choices
- No mechanism is used
- Other, specify:

6.13. Which mechanisms are used to align multi-annual flood risk management strategies to annual budgets and medium-term priorities of governments?

- Multi-annual FRMSs are not aligned to annual budgets and medium-term priorities of the government
- A strong medium-term dimension is included in the budgeting process, beyond the traditional annual cycle
- Budget allocations are organized and structured in a way that corresponds readily with national objectives
- Close relationship between Central Budget Authority and flood-related ministries/agencies (e.g. planning ministry)
- Mechanisms for reviewing existing expenditure policies, including tax expenditures
- None of the above
- Other, specify:

6.14. Which mechanisms are in place in your case study to foster the efficient and transparent allocation of flood risk-related public funds?

- Social contracts
- Scorecards
- Audits

- Cost Benefit Analysis
- Reporting
- No mechanism is in place
- Other, specify:

6.15. In your case study, which mechanisms are in place to assess short-, medium- and long-term investment and operational needs?

- Sector reviews
- Strategic financial planning
- Ex ante and ex post evaluation
- Economic and affordability studies
- Forecasts and projections
- “Value for money”
- Multi-annual budgeting or planning
- None
- Other, specify:

Principle 7: Regulatory frameworks

Ensure that sound water management regulatory frameworks are effectively implemented and enforced in pursuit of the public interest, through:

- a) Ensuring a comprehensive, coherent and predictable legal and institutional framework that set rules, standards and guidelines for achieving water policy outcomes, and encourage integrated long-term planning;
- b) Ensuring that key regulatory functions are discharged across public agencies, dedicated institutions and levels of government and that regulatory authorities are endowed with necessary resources;
- c) Ensuring that rules, institutions and processes are well-co-ordinated, transparent, non-discriminatory, participative and easy to understand and enforce;
- d) Encouraging the use of regulatory tools (evaluation and consultation mechanisms) to foster the quality of regulatory processes and make the results accessible to the public, where appropriate;
- e) Setting clear, transparent and proportionate enforcement rules, procedures, incentives and tools (including rewards and penalties) to promote compliance and achieve regulatory objectives in a cost-effective way; and
- f) Ensuring that effective remedies can be claimed through non-discriminatory access to justice, considering the range of options as appropriate.

DIAGNOSTIC

7.1. In your case study, what is regulated in flood management? Please tick as many as apply to your case study.

- Areas which are the subject of flood risk management plans
- Flood risk management objectives
- Flood risk management measures and their prioritisation
- Operation of flood protection measures (dams, retention basins ...)
- Technical characteristics (e.g. resilience of dykes)
- Conditions in which the measures are implemented (e.g. level of acceptable risk)
- Interface between water and other areas, in particular land use and management
- Stakeholders’ roles and missions
- Funding arrangements
- Public information and consultation measures/actions taken
- Public and private projects increasing the risk of flooding (e.g. floodplain development)
- Public and private projects increasing the risk of environmental pollution as a consequence of floods (e.g. plants using dangerous substances)
- Other, specify:

7.2. Which institutions bear these key regulatory functions?

-
- International: International River basin committee, European Union
 - Basin: River basin committee
 - National: Ministry of Environment, Environment Agency, inter-ministerial flood committee
 - Local (municipalities, local drainage boards, local water authorities)
 - Other, specify:

7.3. Are regulatory authorities endowed with necessary resources?

- Yes
- No

7.4. Do regulatory authorities have clearly stated mandates and powers?

- Yes
- No

7.5. Are there reviews of the governance and performance of regulatory authorities?

- Yes
- No

7.6. In your case study, which enforcement rules, procedures, incentives and tools are used to promote compliance and achieve regulatory objectives?

- Incentives / rewards (e.g. reduction of insurance premiums when owners or tenants sign up to flood warning service and fit measures such as flood boards)
- Specific multilateral discussions and meetings, common agreements
- Penalties, sanctions (e.g. fines for owners of buildings which increase flood risk)
- Reparations
- Requirements to disclose information and inputs used for regulatory decisions
- None
- Other, specify:

IMPACTS

7.7. In your case study, what are the impacts of uncoordinated, irrelevant and ineffective regulatory frameworks?

- Conflicts about roles and responsibilities
- Increased policy complexity leading to confusion when it comes to their implementation
- Costs of implementing regulatory frameworks overcoming the benefits
- Authorities adopting an “I-choose-what-I-prefer” approach
- Distrust towards actors bearing regulatory functions
- None
- Other, specify:

7.8. Are flood-related legislations subject to regulatory impact assessment?

- Yes
- No

MECHANISMS

7.9. Are there co-ordination instruments between flood relevant ministries and bodies?

- Yes. Please specify:
- No

7.10. In your case study, which regulatory tools are in place to foster the quality of regulatory processes and make the results accessible to the public, where appropriate?

- Participation: providing meaningful opportunities (including online) for the public to contribute to the process of preparing draft regulatory proposals
- Transparency: ensuring that regulations are comprehensible and clear and that parties can easily understand their rights and obligations
- Mechanisms/institutions for oversight of procedures/goals, support and implementation of regulatory policy
- Regulatory Impact Assessment in the early stages of the policy process
- Reports on the performance of regulatory policy and reform programmes
- Reviews of existing regulations (including consideration of costs and benefits)
- None
- Other, specify:

7.11. Which remedies can be claimed through access to justice?

- No remedies can be claimed
- Social interest litigation
- Damage compensation
- Ombudsman
- Other, specify:

7.12. Are evaluation mechanisms in place to systematically and regularly assess performance/effectiveness, gaps and overlaps in the regulatory framework? (E.g. areas with regulatory gaps, incoherent and/or contradictory objectives, deficient implementation and/or limited enforcement, overlaps/duplication of responsibilities, etc.)

- Yes. Please specify:
- No

7.13. Where self-regulation mechanisms exist, are they subject to regular performance assessment?

- Yes
- No

Principle 8: Innovative governance

Promote the adoption and implementation of innovative water governance practices across responsible authorities, levels of government and relevant stakeholders, through:

- a) Encouraging experimentation and pilot-testing on water governance, drawing lessons from success and failures, and scaling up replicable practices;
- b) Promoting social learning to facilitate dialogue and consensus-building, for example through networking platforms, social media, Information and Communication Technologies (ICTs) and user-friendly interface (e.g. digital maps, big data, smart data and open data) and other means;
- c) Promoting innovative ways to co-operate, to pool resources and capacity, to build synergies across sectors and search for efficiency gains, notably through metropolitan governance, inter-municipal collaboration, urban-rural partnerships, and performance-based contracts; and
- d) Promoting a strong science-policy interface to contribute to better water governance and bridge the divide between scientific findings and water governance practices.

DIAGNOSTIC

8.1. Which innovative flood governance practices are implemented in your case study?

- Experimentation and pilot-testing
- Creating structures and institutions for implementing improved flood resilience technologies (e.g. door guards, flood resilient cavity wall insulation, mobile barriers)
- Innovative partnerships (e.g. consortiums gathering governments, knowledge institutes and the business sector)

-
- Innovative education and awareness-raising activities (e.g. involving school kids in Flood Control curriculum and flood control games)
 - Innovation-labs
 - Academic research (e.g. models estimating the effectiveness of evacuation decisions, evaluation of risk exposure considering evolving risk patterns)
 - Measures to restore trust in the government (e.g. transparency, accountability)
 - Methods that support governments, business, and individual stakeholders to determine their optimal or acceptable levels of risks
 - None
 - Other, specify:

8.2. Are there institutions encouraging bottom-up initiatives, dialogue and social learning as well as experimentation in flood management at different levels?

- Multi-stakeholder platforms
- Entities sharing knowledge and experience
- Entities fostering the science-policy interface
- Entities enabling crowdsourcing
- None
- Other, specify:

8.3. Which policy frameworks and/or incentives are in place to foster innovation in flood management practices and processes?

- Incentives for innovative financing
- Frameworks that incentivise experimentation
- Pilot-testing to draw lessons and share experience prior to generalising a given reform or process at a larger scale
- None
- Other, specify:

8.4. Are information and communication technologies used to guide better public action in flood management and how?

- Yes. Please specify:
- No

IMPACTS

8.5. In your case study, what are the main barriers to innovative governance?

- Lack of integration of scattered monitoring networks
- Uncertainty in meteorological forecasts for flood and drought risk assessment
- Lack of integration of different dimensions of risk
- Insufficient knowledge on the economic value of risk
- Lack of awareness and preparedness of populations to deal with risks
- Fragmentation of institutions and responsibilities
- None
- Other, specify:

MECHANISMS

8.6. In your case study, which mechanisms to promote social learning are in place to facilitate dialogue and consensus-building?

- Networking platforms
- Social media
- Information and Communication Technologies (ICTs)
- User-friendly interface
- Digital maps
- Big data, smart data and open data

- None
- Other, specify:

8.7. Which innovative ways to co-operate are in place in your case study, to pool resources and capacity, build synergies across sectors and search for efficiency gains?

- Metropolitan governance
- Inter-municipal collaboration
- Urban-rural partnerships
- Performance-based contracts
- None
- Other, specify:

8.8. Which science-policy interface is in place in your case study to contribute to better flood governance and bridge the divide between scientific findings and flood governance practices?

- Science-policy platforms
- Organisations or tools that bridge knowledge development and decision-making processes (e.g. research institutes, interactive maps, simulation models)
- Knowledge multi-stakeholder co-creation processes
- Scientists involved in drafting policy briefs
- None
- Other, specify:

8.9. Are there reviews to evaluate the state of play of and potential for technical and non-technical innovation, costs/benefits of innovation, as well as regulations and standards hindering innovation?

- Yes. Please specify:
- No

Principle 9: Integrity and transparency

Mainstream integrity and transparency practices across water policies, water institutions and water governance frameworks for greater accountability and trust in decision-making, through:

- a) Promoting legal and institutional frameworks that hold decision-makers and stakeholders accountable, such as the right to information and independent authorities to investigate water related issues and law enforcement ;
- b) Encouraging norms, codes of conduct or charters on integrity and transparency in national or local contexts and monitoring their implementation;
- c) Establishing clear accountability and control mechanisms for transparent water policy making and implementation ;
- d) Diagnosing and mapping on a regular basis existing or potential drivers of corruption and risks in all water-related institutions at different levels, including for public procurement; and
- e) Adopting multi-stakeholder approaches, dedicated tools and action plans to identify and address water integrity and transparency gaps (e.g. integrity scans/pacts, risk analysis, social witnesses)

DIAGNOSTIC

9.1. In terms of integrity and transparency, where has the emphasis been put in your case study?
(Rank from 1-Major emphasis to 4-No emphasis)

- Public procurement
- Costs
- Quality of infrastructure
- Levels of risks

9.2. Are there independent authorities (not necessarily water-specific) and supreme audit institutions that can investigate water-related issues and ensure proper enforcement (e.g. policy effectiveness and procurement)?

- Yes. Please specify:
 No

9.3. When roles and responsibilities for flood management and risk reduction are delegated to dedicated public or private entities, are there contractual arrangements between organising and executive bodies?

- Yes
 No

9.4. Are relevant international conventions, resolutions or frameworks related to transparency and integrity transposed into national legislation?

- Yes
 No

9.5. Are there provisions for whistle-blower protection in legal and institutional frameworks?

- Yes. Please specify:
 No

9.6. Are corruption risks and actual corruption in the water sector (e.g. manipulation of knowledge and information, bribery, extortion) diagnosed?

- Yes. Please specify how:
 No

9.7. Are there requirements in place for regular financial disclosure of assets, income and interests?

- Yes. Please specify:
 No

IMPACTS

9.8. In your case study, how is the impact of corruption assessed in terms of environmental, social and economic costs?

- Water Integrity Scan
 Assessment of integrity risks
 Independent investigation
 It is not being assessed
 Other, specify:

MECHANISMS

9.9. Which legal and institutional frameworks that hold decision-makers and stakeholders accountable are in place in your case study?

- There are no frameworks that hold decision-makers and stakeholders accountable
 Right to information
 Public procurement
 Transposition on applicable international conventions
 Parliamentary commissions
 Other, specify:

9.10. Are norms, codes of conduct or charters on integrity and transparency in national or local contexts in place and their implementation monitored?

- They are not in place
- They are in place but not monitored
- They are in place and monitored

9.11. Which accountability and control mechanisms for transparent flood risk policy making and implementation are in place in your case study?

- Financial disclosure of income, assets and interests
- Conflict of interest restrictions
- Freedom of information
- Immunity provisions
- None
- Other, specify:

9.12. Are potential drivers of corruption and corruption risks regularly diagnosed and mapped in all institutions involved in flood management at different levels, especially:

- They are not diagnosed and mapped
- Identification of corruption risk areas
- Identification of internal and external drivers
- Evaluation of the frequency and potential severity of risks
- Risks prioritisation
- Action plan using online or offline platforms
- Other, specify:

9.13. In your case study, how are integrity and transparency gaps regularly identified and addressed?

- They are not identified and addressed
- Multi-stakeholder approaches
- Integrity scans/pacts
- Risk analysis
- Risk maps
- Auditable anti-corruption plans
- Social witnesses
- Other, specify:

Principle 10: Stakeholder engagement

Promote stakeholder engagement for informed and outcome-oriented contributions to water policy design and implementation, through:

- a) Mapping public, private and non-profit actors who have a stake in the outcome or who are likely to be affected by water-related decisions, as well as their responsibilities, core motivations and interactions;
- b) Paying special attention to under-represented categories (youth, the poor, women, indigenous people, domestic users) newcomers (property developers, institutional investors) and other water-related stakeholders and institutions;
- c) Defining the line of decision-making and the expected use of stakeholders' inputs, and mitigating power imbalances and risks of consultation capture from over-represented or overly vocal categories, as well as between expert and non-expert voices;
- d) Encouraging capacity development of relevant stakeholders as well as accurate, timely and reliable information, as appropriate;
- e) Assessing the process and outcomes of stakeholder engagement to learn, adjust and improve accordingly, including the evaluation of costs and benefits of engagement processes;
- f) Promoting legal and institutional frameworks, organisational structures and responsible authorities that are conducive to stakeholder engagement, taking account of local circumstances, needs and capacities; and
- g) Customising the type and level of stakeholder engagement to the needs and keeping the process flexible to adapt to changing circumstances.

10.1. In your case study, who are the stakeholders involved in flood-related decision-making:

- Government (e.g. ministries, agencies and authorities at different levels)
- Private stakeholders (e.g. water industry, insurance companies)
- Non-governmental and non-profit organisations (e.g. Flood Action Group)
- Experts (e.g. scientists and knowledge institutes specialised in flood management)
- Citizens, inhabitants of flood-prone areas
- Land users, land owners
- Youth
- Under-represented categories (youth, the poor, women, indigenous people, domestic users)
- Newcomers (property developers, institutional investors)
- Other, specify:

10.2. Are stakeholder engagement mechanisms flexible to adapt to changing circumstances?

- Yes. Please specify how:
- No

10.3. Is the Aarhus Convention and/or other legal and institutional frameworks for stakeholder engagement adopted?

- Yes. Please specify:
- No

10.4. Was a stakeholder mapping carried out to make sure that all those who have a stake in the outcome or that are likely to be affected are clearly identified, and their responsibilities, core motivations and interactions understood?

- Yes. Please specify:
- No

10.5. Are the ultimate line of decision making, the objectives of stakeholder engagement and the expected use of inputs clearly defined?

- Yes. Please specify:
- No

10.6. Is needed information for result-oriented stakeholder engagement shared?

- Yes. Please specify how:
- No

10.7. Do tailored communication strategies exist for relevant stakeholders, including the general public, regarding all aspects of flood management?

- Yes. Please specify:
- No

IMPACTS

10.8. In your case study, what are the main barriers to stakeholder engagement in flood management?

- Stakeholder-based barriers (e.g. lack of institutional support, 'closed' institutional culture, lack of flexibility for open and transparent discussions due to unclear lines of accountability, lack of capacity of government to explain/persuade/coordinate to stakeholders)
- Time-related barriers (e.g. stakeholders engaged only at the later stage of the policy cycle)
- Barriers caused by power inequalities (e.g. power imbalances, consultation capture)
- Financial barriers
- Scepticism towards the stakeholder engagement process (e.g. not seen as seeking genuine input)
- Lack of transparency of the decision-making process
- Information about flood risk or involvement mechanisms do not fit with targeted audience
- None
- Other, specify:

10.9. Are there mechanisms or regular assessments of stakeholder engagement costs or obstacles at large?

- Yes. Please specify:
 No

MECHANISMS

10.10. Which stakeholder engagement mechanisms are in place in your case study, and at which stage of development? Please tick as many as apply to your case study.

	Early stages	Decision making	Implementation/operation	Evaluation
Alert-systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meetings/workshops/fora	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flood-related associations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
River basin organisations/councils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web-based technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Policy dialogues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10.11. Are there mechanisms in place to engage with scientists in decision-making?

- Yes. Please specify:
 No

10.12. In your case study, at which scale are these efforts carried out:

	Basin (from sub-basin to transboundary)	National	Regional / provincial	Local / metropolitan	Other, specify:
Meetings/workshops/fora	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flood-related associations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
River basin organisations/councils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Web-based technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Alert-systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

10.13. Which monitoring and evaluation mechanisms are in place to assess the process and outcomes of stakeholder engagement to learn, adjust and improve accordingly?

- Cost-benefit analysis
 Questionnaires
 Satisfaction surveys
 Interviews
 Participant observation
 (Regular) meeting with stakeholders
 None
 Other, specify:

10.14. Which legal and institutional frameworks, organisational structures and responsible authorities conducive to stakeholder engagement are in place in your case study?

- Stakeholder engagement is a requirement prior to any project
 Existence of a basin committee including representatives of the various stakeholders
 Multi-stakeholder fora
 None

Other, specify:

Principle 11: Trade-offs across users, rural and urban areas, and generations

Encourage water governance frameworks that help manage trade-offs across water users, rural and urban areas, and generations, through:

- a) Promoting non-discriminatory participation in decision-making across people, especially vulnerable groups and people living in remote areas;
- b) Empowering local authorities and users to identify and address barriers to access quality water services and resources and promoting rural-urban co-operation including through greater partnership between water institutions and spatial planners;
- c) Promoting public debate on the risks and costs associated with too much, too little or too polluted water to raise awareness, build consensus on who pays for what, and contribute to better affordability and sustainability now and in the future; and
- d) Encouraging evidence-based assessment of the distributional consequences of water-related policies on citizens, water users and places to guide decision-making.

DIAGNOSTIC

11.1. What are the main trade-offs linked to flood management in your case study?

- Rural-urban trade-offs
- Upstream-downstream trade-offs
- Policy trade-offs
- Ecological trade-offs
- Temporal trade-offs
- Risk-risk trade-offs
- Flood-water supply trade-offs
- Flood-energy generation trade-offs
- Flood-land development trade-offs (e.g. housing growth)
- Exposed pre-flood damage trade-offs
- None
- Other, specify:

11.2. Are there formal provisions or legal frameworks fostering equity across policies, rural and urban areas, and generations, etc.?

- Transposition of international binding regulations
- Transposition of international non-binding regulations
- Soft law (e.g. sustainable development goals, new urban agenda)
- None
- Other, specify:

11.3. Is there an Ombudsman or institution(s) (not necessarily water-specific) to protect vulnerable groups (mediating disputes and managing trade-offs when necessary)?

- Yes. Please specify:
- No

IMPACTS

11.4. What are the distributional consequences of flood risk management strategies on citizens and places in your case study?

- Increased vulnerability of poor and marginalized populations
- Costs of flood risk management borne by some stakeholders only, leaving others aside (e.g. property developers)

- Upstream countries bearing the costs of infrastructure development
- None
- Other, specify:

MECHANISMS

11.5. Which mechanisms are in place in your case study to ensure that the main trade-offs are addressed?

	Multi-criteria decision analysis	Cost-benefit analysis	Public debate / stakeholder consultation	Other
Rural-urban trade-offs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Upstream-downstream trade-offs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Policy trade-offs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ecological trade-offs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Temporal trade-offs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Risk-risk trade-offs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flood-water trade-offs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Exposed pre-flood damage trade-offs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Principle 12: Monitoring and evaluation

Promote regular monitoring and evaluation of water policy and governance where appropriate, share the results with the public and make adjustments when needed, through:

- a) Promoting dedicated institutions for monitoring and evaluation that are endowed with sufficient capacity, appropriate degree of independence and resources as well as the necessary instruments;
- b) Developing reliable monitoring and reporting mechanisms to effectively guide decision-making;
- c) Assessing to what extent water policy fulfils the intended outcomes and water governance frameworks are fit for purpose; and
- d) Encouraging timely and transparent sharing of the evaluation results and adapting strategies as new information become available.

DIAGNOSTIC

12.1. What, in respect to flood risks management strategies and flood risk governance arrangements, is monitored and evaluated?

- Enforcement of rules and regulations
- Flood risk management policies and plans
- Effects and effectiveness of measures
- Roles and responsibilities of the various stakeholders involved in flood management
- Finances and budgeting
- Stakeholder engagement
- Operational management of flood-related infrastructure
- None
- Other, specify:

12.2. Who monitors and evaluates flood risks management strategies and flood risk governance arrangements in your case study?

- Court of Justice ruling for non-compliance
- Basin Organisations

-
- National authorities: controller and auditor general
 - Private stakeholders: auditing and consultancy firms
 - Independent experts (e.g. scientists and knowledge institutes specialised in flood management, consultants)
 - Citizens, inhabitants of flood-prone areas (e.g. online evaluation of flood policies)
 - No one
 - Other, specify:

12.3. In your case study, do reviews of flood risk management plans include:

- Any changes or updates since the publication of the previous version of the flood risk management plan
- An assessment of the progress made towards the achievement of the objectives
- A description of, and explanation for, any measures foreseen in the earlier version of the flood risk management plan which were planned to be undertaken and have not been taken forward
- A description of any additional measures since the publication of the previous version of the flood risk management plan
- None

12.4. Are there policy frameworks in place promoting regular monitoring and evaluation of flood policy and governance?

- Yes. Please specify:
- No

12.5. Are there agreed-upon performance indicators?

- Yes. Please specify:
- No

12.6. Are there provisions or incentives for monitoring by civil society?

- Yes. Please specify:
- No

12.7. Are there financial resources available to train civil society organisations in project monitoring?

- Yes. Please specify:
- No

12.8. Are the results of the monitoring and evaluation process shared with the wider public?

- Yes. Please specify how:
- No

IMPACTS

12.9. What are the main challenges to robust monitoring and evaluation in your case study?

- Lack of frameworks which are sufficiently generic to allow comparison and sufficiently specific to adapt to each case
- Lack of instruments
- Large amounts of data
- Disconnection between monitoring and evaluation procedures and policy-making and implementation
- Lack of resources allocated to monitoring and evaluation
- None
- Other, specify:

MECHANISMS

12.10. Which monitoring and reporting mechanisms effectively guiding decision-making are in place in your case study?

- Reviews of flood risk management plans
- Review of previous flood events
- Strategic meetings
- Online reporting platforms
- No mechanism is in place
- Other, specify:

12.11. In your case study, how are the monitoring and evaluation results shared?

- Traditional media (press release, newspaper inserts, reports, radio broadcasts and video presentations)
- Web-based technologies (flood risk information systems, fora, newsletters, social media, data banks, maps, websites)
- Other information and communication technology (SMS, information hotlines)
- Open public meetings (e.g. organized by public authorities or flood observatories)
- Closed meetings (meetings of the river basin organisation, of flood-related associations)
- Results are not shared
- Other, specify:

Conclusion

Overall, what were the main challenges your case study had to face for each of the OECD Principles? Please fill in the table to provide further details and concrete examples

Principle 1 Clear roles and responsibilities	
Principle 2 Appropriate scales within basin systems	
Principle 3 Policy coherence	
Principle 4 Capacity	
Principle 5 Data and information	
Principle 6 Financing	
Principle 7 Regulatory frameworks	
Principle 8 Innovative governance	
Principle 9 Integrity and transparency	
Principle 10 Stakeholder engagement	
Principle 11 Trade-offs	
Principle 12 Monitoring and evaluation	

Annex 1.A. Key terms used for the project

- **Flood Risk Governance Arrangements (FRGAs):** institutional constellations resulting from an 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 (Hegger et al., 2014).
- **Flood Risk Management Strategies (FRMSs):** approaches for dealing with flood risks which can be distinguished from one another by their focus on the probability of flooding, its consequences or on recovery after a flood has struck (Hegger et al., 2014).

The five stages of flood management considered in the Checklist are:

- **Flood anticipation or foresight:** Activities and measures to look at what might happen to flood risk and its management a long way in the future. Flood anticipation or foresight generally takes the form of quantitative and/or qualitative estimates of the impacts of various drivers and responses on flood risk under different future scenarios (adapted from Evans et al., 2008).
- **Flood prevention or mitigation:** Activities and measures to avoid existing and new disaster risks (UNISDR, 2015a). Flood mitigation is closely associated with 'prevention' except that it aims to *reduce* flooding rather than *eliminate* floods.
- **Flood preparation or preparedness:** The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current disasters (UNISDR, 2015a). Preparedness is sometimes incorporated into mitigation but as it is *behavioural* and *institutional* rather than physical it is considered here a separate stage. It relates to accessibility of flood information, public awareness of risk, knowledge of what to do in an emergency, and the measures individuals and emergency authorities take to ensure they are prepared, like drills, putting in place household, municipal, regional and national emergency plans (and regular updating), supporting legislation and arrangements.
- **Flood response:** Actions taken during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected (UNISDR, 2015a). Flood response relates to the capacity (e.g., staff numbers) and capability (e.g., quality of technology and systems) of emergency management organisations to deal with a flood during or immediately after it occurs.
- **Flood recovery:** Decisions and actions aimed at restoring or improving livelihoods, health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster-affected community or society, aligning with the principles of sustainable development, including building back better to avoid or reduce future disaster risk (UNISDR, 2015a).

Annex B. List of case study promoters

Table 4. Case study promoters

Name	Organisation/Company	Title
Thomas Thaler	Institute of Mountain Risk Engineering, University of Natural Resources and Life Sciences (Austria)	Research Fellow
Joana Guerrin	University of Nimes (France)	Researcher and Professor
Antonio Eduardo Giansante	School of Sociology and Politics of the State of Sao Paulo (Brazil)	Professor and Head of Research
Tomasz Walczykiewicz	Institute of Meteorology and Water Management - National Research Institute (Poland)	Deputy Director for National Hydrological and Meteorological Service
Jean-Marie Bordes	Syndicat Intercommunal pour l'Assainissement de la Vallée de la Bièvre (France)	Director General
Eline Botger	Ministry of Infrastructure and the Environment (Netherlands)	Political advisor
Kyujin Jung	Korea University (Korea)	Assistant Professor
Danielle MacKinnon	South Nation Conservation Authority (Canada)	Engineering Assistant
Andriy Demydenko	Ukrainian Centre of Environmental and Water Projects (Ukraine)	Head, IWRM Department
Wondafrash Wondmagegn Meshesha	Awash Basin Authority (Ethiopia)	Director for Integrated Watershed Management & River Training
Allah Bakhsh	Spate Irrigation Network (Pakistan)	Coordinator
Otto Schaaf	Cologne agency for sewage disposal and surface water + flood management (Germany)	CEO
Alba Ballester Eva Garcia Balaguer & César Pérez Martin	Autonomous University of Barcelona (Spain)	Researcher, Director-General of Environment, Director of Water Service
Jean-Pierre Arrondeau & Aldo Penasso	Institution d'aménagement de la Vilaine (France)	
Jonathan Hunter	Environment Agency (England & Wales, United Kingdom)	Senior Advisor - flood and coastal risk management.
Kate Marks	Environment Agency (England & Wales, United Kingdom)	Deputy Director
Kate Kipling	Environment Agency (England & Wales, United Kingdom)	Senior Scientist
Rob Uijterlinde	Rivierenland Water Authority, Dutch Water Authorities & Ministry of Infrastructure and the Environment (Netherlands)	Strategic advisor
Franck Hufschmitt	Syndicat des Eaux et de l'Assainissement Alsace-Moselle (France)	Head of water ecosystems and related risks
Gaia Checcucci	Ministry of the Environment Land and Sea Water (Italy)	General Manager of Water and Land Protection and Environmental Remediation Direction
Christopher J Spray	University of Dundee (Scotland, United Kingdom)	Professor of Water Science and Policy
Heriberto Galicia	Water Commission of the State of Morelos (Mexico)	General Directorate for Water Infrastructure and Flood Protection
Jaap M. de Heer	Twynstra Gudde Advisors & Managers (Netherlands)	Senior Partner / Director Bangladesh Delta Plan 2100
Asensio Navarro Ortega, Estanislao Arana Garcia & Sergio Iglesias Asenjo	University of Granada & Local Civil Protection Service of Granada (Spain)	Assistant Law Professor, Full Law Professor, Responsible for Planning and Managing Natural Hazards
Signe Marie Iversen	Municipality of Aarhus - Department of Environment and Energy (Denmark)	Landscape Manager

Jan Rasmussen

City of Copenhagen, Technical and environmental
Authority (Denmark)

Head of projects

**Victor Hugo Alcocer
Yamanaka**

National Water Commission (Mexico)

Deputy Technical Director

DRAFT

Annex C. Flood Governance Practices

The 27 profiles provide a snapshot of key information pertaining to flood governance to enhance the accessibility of data and analysis on floods. A template for flood governance practices has been developed for review. +26 pending

OVERVIEW

- ▶ Scale: River Basin
- ▶ Thematic focus: National research project

WHAT IS THIS CASE ABOUT?

It is a long-term Scottish Government study of the effect of Natural Flood Management techniques on reducing flood risk and improving river habitats. The project takes a science and stakeholder-led approach to flood risk governance and delivery in order to explore how changes in land management and river channel structure might reduce flood risk for downstream communities. The key and novel feature is the local governance and participative to reducing flood risk. A series of practical works have been undertaken throughout the catchment as part of an overall plan to restore the river and valley. These practical works are being closely monitored through a detailed network of hydrological, ecological and socio-economic measures and models.

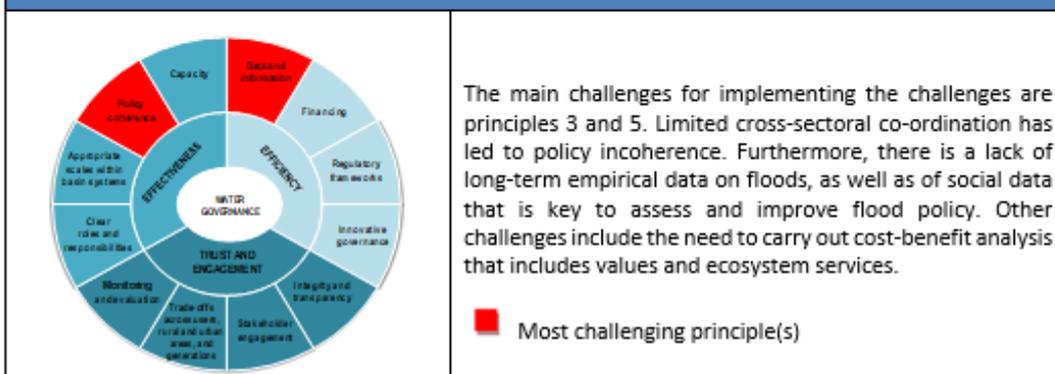
WHO DOES WHAT IN FLOOD GOVERNANCE?

Responsible authorities	Policymaking		Policy implementation	Operational management	Regulation & enforcement	Scale of management
	Flood anticipation & foresight	Scottish government	Local government SEPA	Local government	SEPA	National
Flood prevention & mitigation	Scottish Environment Protection Agency (SEPA)	Basin Regional/Provincial National				
Flood preparation	Scottish government Local government	Local government	Local government	SEPA	Local/Metropolitan	
Flood response					Regional/Provincial Local/Metropolitan	
Flood recovery					Local/Metropolitan	

Stakeholder engagement in flood decision-making	Government	Private Stakeholders	Experts	Citizens	Land users	Youth	Under-represented	Newcomers	NGOs
	YES	NO	YES	YES	YES	NO	NO	NO	YES

Source: Information provided by the University of Dundee - UNESCO-IHP Centre for Water Law, Science and Policy in the framework of the OECD project "Flood Risk Governance: A Shared Responsibility" (November 2016).

KEY CHALLENGES AGAINST THE OECD PRINCIPLES ON WATER GOVERNANCE

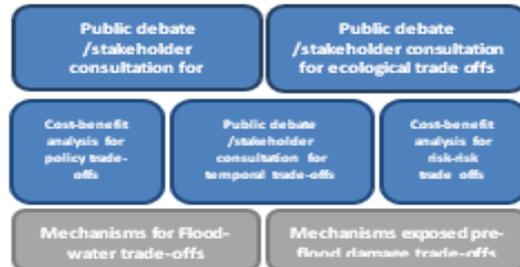


The main challenges for implementing the challenges are principles 3 and 5. Limited cross-sectoral co-ordination has led to policy incoherence. Furthermore, there is a lack of long-term empirical data on floods, as well as of social data that is key to assess and improve flood policy. Other challenges include the need to carry out cost-benefit analysis that includes values and ecosystem services.

AREAS SUBJECT TO REGULATION

- ✓ Areas subject to flood risk
- ✓ Management plans
- ✓ Flood risk management objectives
- ✓ Flood risks management measures
- ✓ Operation of flood protection measures
- ✓ Technical characteristic
- ✓ Conditions to implement measures
- ✓ Stakeholders' roles and missions
- ✓ Funding arrangements
- ✓ Projects increasing flood risk
- ✓ Project increasing environmental risk
- ✓ Public information & consultation measures
- ✗ Interface between water and other areas

MECHANISMS TO ADDRESS TRADE-OFFS



Mechanims in place and not in place

REPORTING & ACCOUNTABILITY MECHANISMS	
<p>ACCOUNTABILITY MECHANISMS IN PLACE</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Freedom of information YES </div> <div style="text-align: center;"> Conflict of interest YES </div> <div style="text-align: center;"> Financial disclosure of income, assets & interests YES </div> <div style="text-align: center;"> Immunity provisions NO </div> </div>	<p>REPORTING MECHANISMS</p> <ul style="list-style-type: none"> ✓ Review of flood risk management plans ✓ Review of previous flood events ✓ Strategic meetings ✓ Stakeholder discussions ✗ Online reporting platforms
DATA & INFORMATION COLLECTED	
<ul style="list-style-type: none"> ✓ Descriptions of past floods ✓ Consequences of future floods ✓ Potentially affected protected areas ✓ Environmental needs ✓ Land uses ✓ Scenarios of flood probability ✓ Vulnerable infrastructure and populations ✓ Maps of the river basins ✗ Flood conveyance routes ✗ Areas where floods with a high content of transported sediments and debris floods can occur 	<ul style="list-style-type: none"> ✗ Navigation ✗ Infrastructure ✗ Institutions ✗ Sources of finance ✗ Other significant sources of pollution ✗ Installations which might cause accidental pollution in case of flooding ✗ Potential adverse consequences of future floods ✗ Potential adverse consequences associated with flood scenarios
<p>TYPES OF CAPACITIES IN PLACE</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Governmental YES </div> <div style="text-align: center;"> Technical YES </div> <div style="text-align: center;"> Financial YES </div> <div style="text-align: center;"> Human YES </div> <div style="text-align: center;"> Infrastructural YES </div> <div style="text-align: center;"> Multilateral NO </div> </div>	<p>FLOOD MANAGEMENT AND SDG LINKAGES</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> 11 </div> <div style="text-align: center;"> 13 </div> <div style="text-align: center;"> 15 </div> </div>

TOP INNOVATIVE ARRANGEMENTS

Arrangements in place and not in place

