COMMON IMPLEMENTATION STRATEGY FOR THE WATER FRAMEWORK DIRECTIVE AND THE FLOODS DIRECTIVE

Flood Risk Management in the EU and the Floods Directive's 1st Cycle of Implementation (2009-15)

A questionnaire based report

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The end of the 1\textsuperscript{st} cycle and the beginning of the 2\textsuperscript{nd} cycle of implementation (2016-21) of the "Floods" Directive gives an opportunity to improve the delivery of the requirements of the Directive and share 1\textsuperscript{st} cycle successes.

A questionnaire devised to spark a reflection of the past six years and a contemplation for the forthcoming six years was sent to EU Member States in January 2016. By mid-2016, all 28 Member States submitted a completed questionnaire – a fantastic achievement. A copy of the questionnaire is included in Appendix A of this report.

The results of the questionnaire are provided in this report. The results have been aggregated and summarised to a greater or lesser extent, depending on the consistency in responses and the complexity of the topic being discussed.

The main body of the report provides the responses to each section of the questionnaire and the conclusions that may or may not be drawn from the responses received.

Over the next five pages a horizontal assessment has been undertaken, using the questionnaire responses to discuss a number of cross-cutting topics, namely:

a) Governance: How the respondents differ with respect to how the implementation of the Directive is carried out in their countries
b) Drivers and enablers: How the Directive has improved flood risk management in the respondents' countries
c) Challenges and constraints
d) Climate change
e) Measures: How the respondents differ with respect to the implementation of measures
f) Issues related to stakeholder consultation and land use
a) Governance: How the respondents differ with respect to how the implementation of the Directive is carried out in their countries

Before the FD was adopted the methods used for flood risk management can be summarised as follows:

- **Various legislation, regulations and policies** both at municipal, regional and national levels
- **Various types of strategies and plans for different types of floods** (e.g. fluvial, coastal, surface water)
- **Various methods for prioritising flood defence measures** (e.g. cost-benefit analysis, areas where floods had occurred previously) and flood defence measures

Twenty-one respondents stated that responsibility for coordination of flood risk management was at a central level and seven stated that it was implemented at various levels. In terms of the level at which the overall responsibility for the implementation of the FD is held at the following levels:

- **Central level** – 20 respondents
- **Regional level** – five respondents
- **Central and regional levels** – three respondents
- **Central, regional and local levels** – two respondents
- **Central and local levels** – one respondent

Fifteen respondents stated that in terms of the implementation of the FD during the first cycle that it was advantageous to have one Competent Authority to implement the FD. Other positive issues related to governance as a result of the adoption of the FD included:

- **Improved coordination at different scales** (local, regional, national and transboundary) was also mentioned by ten respondents.
- **Integration of holistic flood risk assessment and flood risk management approaches** stated by five respondents.

Eight of the 31 respondents did not identify any disadvantages with respect to the organisational arrangements for the coordination and the implementation of the FD. Of those respondents which did identify disadvantages their points are summarised as follows:

- **Coordination** of responsible authorities communication and organisation of effort, in particular where objectives awareness and interest between authorities may vary and in some cases where authorities have dual roles. This was mentioned by 12 respondents;
- **Resource limitations**, both in terms of the administrative and technical burdens with respect to staffing and turnover of staff was stated by six respondents;
- **Communication from the EC**, for example lack of guidelines templates and resource documents provided in good time for implementation was mentioned by three respondents.

In terms of governance 22 respondents stated that they had legislation that goes beyond the requirements of the FD whilst nine respondents did not. Strengthened coordination and collaboration between different sectors (e.g. flood protection, emergency planning, water management, spatial planning), decision makers and other stakeholders at different spatial scales (including across borders) as a result of the adoption of the FD was mentioned by 15 respondents.

b) Drivers and enablers: How the Directive has improved flood risk management in the respondents’ countries

With regards to the positive impacts of implementing the FD 27 respondents stated that the preparation of flood maps and identification of flood-risk including APSFRs had been useful.

Improvements in and strengthening of coordination and collaboration between different sectors (e.g. flood protection, emergency planning spatial planning), decision makers and other stakeholders (e.g. public, local authorities) at different spatial scales were also noted as being areas where the FD had been beneficial by 15 respondents.
The production of FRMPs and strategies together with consolidation of plans in one document was seen as positive by 11 respondents as was the improvement in stakeholders’ awareness of flood risk (ten respondents). Another enabler mentioned by nine respondents was related to improvements in data sets including Digital Terrain Models (DTMs), data collection and management.

There were 22 respondents that stated that they have regulations or legislation that go well beyond the requirements of the FD. Many of these regulations related to the building of new developments in floodplains and/or the zoning of floodplain. There were nine respondents who said that they did not have legislation that goes beyond the FD.

There were 18 respondents who felt that the FD had positively influenced policy areas outside water. Areas that were mentioned including: spatial and land use planning (12 respondents), disaster/emergency planning and civil protection (12 respondents), insurance (seven respondents) and four respondents raised water resource and catchment management (including river restoration and the WFD).

c) Challenges and constraints

With regards to obstacles and constraints the time, human and financial resources required to implement the FD was mentioned by 15 respondents as being a constraint at a range of organisational levels. Sixteen respondents indicated that data (e.g. lack of information, collation of data, licensing issues) and/or issues developing supporting methodologies posed a challenge.

Coordination with the EC was mentioned by some respondents as an obstacle. For example, improvements in the coordination, timing and consistency of guidance and reporting requirements from the EC including earlier provision of the EC’s expectations and requirements was mentioned by nine countries as being useful in overcoming this. Other improvements were centred on changes and consistency in methods, including specific requirements for certain methods, such as for semi-arid climates. Budget support was raised by three respondents as a constraint. More information exchange on good practice, coordination and how the FD was implemented in different countries was mentioned by nine respondents.

Respondents were asked what improvements they would make at an country level to the implementation of the FD. Seven respondents cited improved coordination, cooperation between and communication with different authorities (e.g. regional organisations, implementing parties) and other stakeholders including the public.

Engagement with stakeholders also posed a challenge for many respondents. Challenges included the number of stakeholders that were required to be engaged with and coordination of the engagement and consultation between different types of stakeholders (e.g. national government, local authorities the public) respondents also raised the issues of the time allowed for public consultation and number of potential consultees involved.

With respect to further guidance on the FD, 20 respondents stated that further guidance would be useful. The most common areas in which respondents said that they were interested were: pluvial and flash flooding; climate change; impacts of floods on health, the environment and cultural heritage, natural water retention measures implementing the INSPIRE Directive.

In terms of requirements for clarification on terminology and concepts, the four main areas for clarification were the definition of flood significance, the concept of climate change and APSFRs.

d) Climate change

As a result of climate change it is likely that rising temperatures in Europe will intensify the hydrological cycle, leading to more frequent and intense floods in many regions. Recent research has shown that on average, in Europe, flood peaks with return periods above 1 in 100 years are projected
to double in frequency within three decades\textsuperscript{1}. However, quantitative projections for future flood frequencies and intensities are uncertain.

The responses to the survey highlighted one major challenge which is the gap between the need for considering effects of climate change on extreme floods, as stipulated in the FD, and the need for published guidelines for how to incorporate these effects in flood frequency estimation. For most respondents flood frequency estimation would appear to be being undertaken using methods based on a fundamental assumption of a stationary historical record, be it flood flows or rainfall.

Some respondents indicated that climate change is indirectly taken into account with the six year cycles of the FD and the use of current time series in modelling. However, such an analysis does not adequately account for climate change because the range of change in past climate is limited. The use of downscale results from Global Climate Models is the only way to capture the complexities of increased greenhouse gas concentrations on future flood frequencies\textsuperscript{2}.

Another challenge is the lack of a definition of a common/agreed future horizon for climate change scenarios. An agreed future horizon would enable a broadly consistent approach to compare future impacts.

In terms of successes 22 respondents had carried out research on climate change and its influence on the occurrence of significant floods had been undertaken in their country. A further six respondents stated that they will carry out studies on climate change in the second cycle of the FD. The respondents were asked what information on climate change and its influence on the occurrence of significant floods would be useful for the second cycle of the Floods Directive for both identifying APSFRs and the severity of potentially adverse consequences more accurately. The responses are summarised below:

- More detailed information about extreme precipitation including short duration intense rainfall.
- More accurate information on future sea level rise and storm surges.
- It would be useful to have an agreed time horizon e.g. 2050 or 2100.
- More accurate climate models and forecasts.

Many respondents stated that they would look at the impacts of climate change as part of their PFRAs in the second cycle. Another challenge is how the effect of climate change should be represented on flood maps. Nine respondents represented climate change on the maps they produced for the first cycle of the FD. Eight respondents had taken into consideration climate change in production of their flood maps for the first cycle of the FD, 12 respondents had not and three gave no/an unclear response. Most respondents who had not taken climate change into account in their maps in the first cycle of the FD were not clear about exactly how they would take it into account in the second cycle. Fourteen respondents thought that future climate change should be communicated on maps, because this would help to raise awareness with different stakeholders of the future flood risk. Other respondents thought that only present-day flood risk should be shown on maps or their statements were unclear.

With regards to future proofing measures against climate change ten respondents stated that they had and 18 had not.

\textsuperscript{1} Alfieri et al. (2015) Global warming increases the frequency of river floods in Europe, Hydrology and Earth System Science, 19, 2247–2260, 2015

e) Measures: How the respondents differ with respect to the implementation of measures

Under the FD each MS must produce a Flood Risk Management Plan (FRMP) that should include defined flood risk management objectives and a description of the prioritisation of measures aimed at achieving those objectives. Many respondents stated that the FD had had an influence on flood risk management resulting in a change in approach from flood protection towards a systematic, coordinated and holistic implementation of flood risk management plans and measures.

The primary responsibility for the implementation of measures is at a central level followed by multiple levels and then at a regional level.

There are challenges that need to be addressed in the next cycle with respect to the implementation of measures including transboundary measures and especially between neighbouring MSs and with non-MSs. There is also a need for further guidance on the assessment of the effects of non-structural measures and natural water retention measures on flood risk, as well as the valuation of measures and production of a catalogue of measures.

In terms of the financing for the measures most respondents (22) indicated that they are funded at multiple levels. Seven respondents indicated that they were funded at a central level and only one respondent indicated that funding took place at a regional level with another one indicating measures are funded at a local level.

Respondents take a variety of approaches to prioritising the measures in their flood risk management plans. One respondent intends to implement all measures and therefore deems prioritisation unnecessary. Seven respondents explicitly described that they included either multi-criteria analysis or cost/benefit assessment in their prioritisation approach. Eleven respondents briefly described an approach to prioritisation that are specific to their countries. Four respondents did not fully describe the prioritisation approach they undertake.

With regards to the prioritisation of measures multi-criteria analysis (MCA) and/or cost-benefit analysis is generally used. In some cases specific programmes are developed with the most urgent measures implemented first. Some respondents indicated that specific prioritisation criteria had been developed for measures. For example two respondents indicated that non-structural measures were prioritised over structural measures. Other respondents indicate that measures were prioritised taking into account the consequences of floods (e.g. in terms of loss of life). The extent to which political decisions influenced the prioritisation of measures varied across respondents was relatively low. Eleven respondents said there was virtually none and 16 respondents said that there was some limited influence related to political decisions in prioritising measures.

f) Issues related to stakeholder consultation and land use

The adoption of the FD has reinforced the rights of stakeholders to access information on flood hazards and risks and to have a say in the planning process. The FD subscribes to the positive potential of public participation. The implementation of the FD has strengthened cooperation, collaboration, between and consultation with various stakeholders responsible for emergency management and flood risk management and in some cases led to an increase awareness of flood risk by stakeholders.

Respondents stated that in terms of receiving feedback on FRMPs the stakeholders who had provided this fell into the following categories:

- **Central, regional and local government and associated agencies**: 23 respondents
- **Water, environmental, transport, agricultural, fisheries boards / Non-Governmental Organisations**: 22 respondents
- **Citizens, individuals or organisations representing them**: 13 respondents
- **Businesses**: 12 respondents
- **Research institutions**: 8 respondents
With regards to feedback from the public on the FRMPs some respondents stated that they had received no significant feedback, whilst some respondents indicated that the feedback from the public had influenced areas deemed to be at risk of flooding (e.g. with respect to threshold levels). Some respondents stated that the public consultation had helped to increase the public’s understanding of flood risk and some said that it led to misunderstandings. Respondents were asked what changes were made as a result of the public consultation. Some respondents said that they had made no or few changes. However, some respondents indicated that additional APSFRs had been identified as a result of consultations.

In terms of public consultation regarding the flood hazard and risk maps six respondents appear not to have undertaken any. Those respondents who did carry out consultation with the public indicated that the feedback ranged from very to mostly positive to them being difficult for the public to understand.

With respect to communicating the likelihood of a flood event happening to the general public and other non-experts respondents had mixed views on which was the best way to do this. Their views on this are summarised below:

- Nine respondents expressed an opinion that return period was the best way to communicate likelihood
- Eight respondents prefer to use percentage, percentage probability or frequency
- Some respondents felt that most people do not understand this expressions and prefer to use high, medium or low or found it difficult to make a judgement

In terms of land use 12 respondents indicated that the FD had a positive impact on spatial planning.
Abbreviations

APSFR Area of Potentially Significant Flood Risk
DTM Digital Terrain Model
EC European Commission
FD Floods Directive
FRMP Flood Risk Management Plan
MS Member State
PFRA Preliminary Flood Risk Assessment
RBMP River Basin Management Plan
WFD Water Framework Directive
Introduction

This report summarises the results of a survey distributed to Member States (MS) at the end of the first cycle of implementation of the Floods Directive (FD)\(^3\). The objective of the survey was to provide the Member States and the European Commission with an opportunity to improve (a) flood risk management in the EU and (b) the delivery of the requirements of the Directive in the next cycle and to share the successes of the first cycle. All 28 Member States responded to the survey. In total there were 31 completed questionnaires. This is because there were four replies submitted by the countries that comprise the United Kingdom (i.e. England, Northern Ireland, Scotland, Wales). Where possible the answers submitted by Belgium were broken down into the three regions (i.e. Brussels, Flanders and Wallonia).

The survey was split into seven sections as follows to reflect the survey:

1. Overarching questions
2. Context with respect to implementing the Floods Directive
3. Preliminary Flood Risk Assessments (PFRA)
4. Flood hazard and risk maps
5. Flood Risk Management Plans (FRMP)
6. Reporting
7. Other comments

Each of the sub-section numbers in this report relates directly to the question numbers in the survey, e.g. section 2.2 covers question 2.2.

\(^3\) 1st semester of 2016
1. Overarching questions

1.1 Positive impacts of the Floods Directive

Respondents were asked to briefly describe the three largest gains or positive impacts of implementing the Floods Directive. The adoption of the FD has led many respondents to develop tools and methods to undertake systematic assessments of the flood risk in their countries at a range of scales. The main positive impacts are summarised below:

- Preparation of flood hazard and risk maps and the identification of areas likely to be inundated
- Strengthened coordination and collaboration between different sectors (e.g. flood protection, emergency planning, water management, spatial planning), decision makers and other stakeholders at different spatial scales (including across borders)
- Improvements in identification, assessment and management of different types of flood risk including residual risks and Areas of Potentially Significant Flood Risk (APSFR)
- Production of Flood Risk Management Plans (FRMPs) and strategies together with consolidation of plans in one document
- Improved awareness of flood risk by stakeholders
- Development of databases and organisation of dispersed information in one place
- Development of new models and methods for assessing and/or managing flood risk
- Regular review of methods and plans
- Change philosophy for prioritisation of future investments for flood risk mitigation
- Closer links between floods, Water Framework Directive and River Basin Management Plans and/or other Directives

1.2 Obstacles to implementing the Floods Directive

Respondents were asked to describe the three largest obstacles to implementing the FD. The main points are summarised below:

- The resources required both time, human and financial relating to the implementation of the FD (e.g. development of new methods) was mentioned by many respondents as being a constraint at a range of organisation
- Interpretation of the term “significant” for the identification of “Areas of Potential Significant Flood Risk” (APSFRs) would be helpful
- Lack or accuracy of data or information on flood typ historical floods, damages and/or range of flood mitigation measures
- Lack of sufficiently accurate Digital Terrain Models (DTMs) or other issues relating to DTMs and other topographic data
- Public participation and communication including meeting the expectations of the public and other stakeholders
- Identification, coordination with and effective involvement of national, district and local authorities and other stakeholders especially where approaches differ.
- Coordination with the implementation of the Water Framework Directive (WFD)
- Uncertainties in modelling techniques and/or lack of data
- Coordination, awareness and agreement of methodologies to be used
• Aligning national legislation and approaches for flood risk management with the requirements of the FD
• Defining objectives
• Prioritisation of measures
• Deciding what level of detail to include within the FRMPs
• Licensing restrictions on data
• There were not available hazard maps for all the RBDs and their elaboration was laborious.
• Changing the prioritization methods for investments view and thinking at country level
• Lack of inclusion in the FD and difficulty in data collection for ephemeral flows and flooding.

1.3 Improvements to the implementation of the Floods Directive

1.3.1 Members State (MS) level improvements

Respondents were asked to describe three things that they would change to improve the implementation of the FD in their country. The main points that were mentioned were:

• Engagement and communication:
  o Improved coordination, cooperation between and communication with different authorities (e.g. regional organisations, implementing parties) and other stakeholders including the public
  o Reduce the time for public consultations
  o The number of municipalities involved
  o More emphasis on public consultations and advertising of flood related activities.
  o Better coordination of the participating governmental institutions.
  o More emphasis on active involvement of local community members.
  o Increase involvement of various stakeholders in the flood risk management, especially concerning certain types of floods.
  o The method used is very technical and mathematically sophisticated. The results are hard to explain and be understood. More description is needed for stakeholders and inhabitants.
  o More public involvement and acceptance
  o Further discussion on the key items to include in the preparation of FRMPs

• Legislative improvements:
  o Improvements in the integration and coordination of the FD with existing flood-related legislation
  o Update legislation to help to enforce of flood risk assessments
  o Clarify the way in which the FD is transposed into national legislation
  o Integration of measures into the planning regulation to reduce flood risk
  o Legal framework
  o The FD should allow a more flexible approach so that it can fit into the national systems better as this would improve the implementation of the FD

• Data:
  o Improve the initial data collection
  o Improvements to the DTM’s used for flood mapping
  o Improvements in the reliability of receptor data relating to people
  o Long-term harmonisation of data resources taking specific regional features into account
  o Collect higher quality topographic data
• Improve connections among different data platforms aimed at informing FRMP development.
• Improve the exchange of data between authorities.
• Improve information on coastal floods.
• Improve Digital Terrain Models.
• Central Data Base for registration of flood events and the damage that they have caused.
• A registration system for flood events and the damage that they have caused.
• Improved licensing to support the development, derivation and sharing of information and datasets.
• Consistent, national datasets (e.g. receptor datasets).

Methods
• When delineating APSFRs there should only be the option "polygon" to address the catchment scale better.
• A broader set of criteria for inundated areas (e.g. water depth, flow velocity).
• Further harmonisation at national level of approaches/methods for defining flood scenarios, significance criteria, risk areas, measures and prioritisation.
• The methodological approach for the PFRA and the appointment of the APSFRs.
• Focus on the implementation of measures.
• Develop new tools for the analysing flood risk.
• Develop consistent hydrologic methodology and estimates and perform more comprehensive assessment of risks to be able to develop higher-precision modelling-based flood hazard and flood risk maps for the 2nd FRMP.
• Perform comprehensive analysis of effectiveness of flood risk management measures at the river basin level based on technical, economic and environmental option analysis to be able to objectively prioritize measures for the second FRMP.
• The most advanced management information is available for fluvial issues. The focus in the next cycle should be moved to fluvial and groundwater (excess water) topics.
• In the recent five years remarkable developments have been carried out in the operational areas of the regional Directorates. All the geometric information should be implemented for the revision of the present results. This procedure needs to be done rapidly and the updates should be regular (annual?).
• More detailed scoping studies prior to the detailed work.
• More focus on dispersed risk and rural areas.
• Enhanced focus on infrastructure and cascade effects and other indirect/consequential effects.
• Improve climate proofing of mitigation measures (considering climate change scenarios with respect to the FD planning cycles).
• Include local flood hazard and risk caused by pluvial events.
• Increase local government involvement in flood forecasting and early warning system and self-monitoring.
• Improved monitoring of ephemeral water flows, thereby focusing on the specific conditions of the island.
• Identification and application of specific alternative indicators such as rainfall depth to classify flood events.
• Implementation of the FD would benefit if respondents could define what actions are useful for their national public.
• Enforcement of multi-sectoral planning measures.
• Establishing a system to assess the effectiveness of the planned measures.
• Having one plan to cover all sources of flooding.

Resourcing:
More human and financial resources
- Decrease in the administrative burden
- Simplify the workflow among different management levels.

Interaction with other directives
- Greater integration with RBMP and environment planning with the aim of maximising the multiple benefits that can be achieved

Interaction with EC:
- A timely critique by the EC of all of the first cycle deliverables to inform respondents what it considers to be good or bad practice for the next cycle
- More regular engagement directly with the European Commission (EC) and other respondents in terms of approaches methods and presentations

Transboundary issues:
- Having the ability to define plan boundaries along national boundaries within respondents if suitable
- Improved opportunities for collaboration between UK countries

Two respondents did not provide a response.

1.3.2 European Union level improvements

Respondents were asked how the implementation of the FD could be improved at an EU level. The suggestions are summarised as follows:

- Guidance manuals, information exchange between MSs and feedback from EC on good practice
- Improvements in coordination, timing and consistency of guidance and reporting requirements from the EC
- Budget support for the research and implementation of the FD including maintenance and operation
- Include the FD in the Sendai Framework for Disaster Risk Reduction 2015-2030 and the European Forum for Disaster Risk Reduction and produce a roadmap for implementation
- Improvements in less onerous methods and specific requirements to support transboundary cooperation, implementation of plans and measures semi-arid climates and differences between risk in defended versus undefended areas
- Allow for flexibility and lack of harmonisation between and within MSs
- Improve consistency of approaches and terminology
- Improve cooperation, data exchange and implementation of measures with neighbouring MSs and with non-MSs
- Clarify the role, level of detail and synergies between the FD and other legislation, European entities and projects
- Flood hazard and risk maps should not be obligatory components of flood risk management plans
- The six month public consultation period for the draft FRMPs period could possibly be reduced to three months if other respondents also felt it was beneficial

Four respondents did not provide a response. One respondent responded that “No significant problems have been identified”. 
1.4 Examples of Member States’ legislation that go beyond the requirements of the Floods Directive

Twenty-two countries stated that they had legislation that went beyond the requirements of the FD. This is shown in Figure 1-1. The examples that respondents gave are given below:

Building of new developments in floodplains and/or the zoning of floodplain

- Hazard zone plans have been carried out since 1976 and are more detailed than flood hazard maps in spatial resolution. This "tool" provides a stronger link to spatial planning, and has to be considered in the frame of zoning, as it delineates hazard zones (red and yellow) on a scale of 1:2000 to 1:5000.
- There is a regulation that concerns the determination of floodplain areas, which is applicable for all watercourses not just ones in APSFRs.
- The determination of floodplains is subject to special protection rules which in part extends beyond the at risk area.
- Federal building codes are used so that flooding is taken into account in urban development planning.
- Spatial planning is required on all rivers, not just APSFRs.
- There are flood risk prevention plans which provide a tool to prevent developments in flood risk areas.
- Yes. It sets requirements for preparing the Flood Defence Plans and specifies roles and responsibilities of various actors involved in the flood risk management. There is also Disaster Risk Reduction Management legislation.
- National Legislation sets out requirements regarding land use planning in areas at risk (high and very high risk) imposing safeguard measures.
- The national legislation gives guidance on developments in floodplains and the adaptation measures that have to be put in place (e.g. compensation of the lost retention volume and floodproof construction).
- There is a law that prohibits new developments, with some exceptions, in flood zones with a 1 in 10 year annual probability of flooding.
- The law requires flood risk management with a high level of sophistication, which is the result of 50 years of systematic improvements according to a plan-do-check-act cycle. For example there is legislation on: standards of flood protection, legislation on major flood management programmes; legislation on regular assessment of flood protection of infrastructure. The governance of flood management is defined by law.
- In 2008 a decree on the conditions and limitations for construction and activities in flood risk areas, based on using the flood hazard maps was adopted.
- There is an act on flood protection which provides a method for the integration of flood hazard maps in spatial plans and the consideration of the proposed flood protection measures in the plans.

Production of plans / implementation of flood protection measures

- Municipal authorities and owners of buildings which are located in flood plain areas need to produce flood protection plans under the Water Act.
- Flood Risk Management Act which describes management plans and participation more in detail than the FD.
A national Flood Risk Management Strategy was adopted in 2014 that gives a national framework for the district FRMPs.

In 2014 the legal background of the sustainable floodplain planning was established in the frame of the flood risk management planning. The legal act requires a management plan with measures that at least preserves but preferably decrease the level of the Q1% flood (design flood level) in all river sections where its defined. 2,300 km river stretches are involved in this action.

There are general recommendations for the development of flood hazard maps and flood risk maps included in regulations of various ministries.

Flood risk management plans are enacted as a regulation.

There is a regulation that concerns the determination of flood menace areas, with special protection rules for all municipalities.

Integration with other legislation

There is full legal integration of the FRMPs in the RBMPs.

A Flood and Water Management Act was adopted in 2010 together with a strategy that sets out in detail the roles and responsibilities of risk management authorities.

Land and drainage-based legislation has been in place since 1973 which has proved to be sufficiently flexible to provide a sound basis for the management of flood risk from rivers and the sea.

A Flood Risk Management Act 2009 transposed the FD into national law.

Integration with regulations/legislation on insurance

There is legislation on land insurance (i.e. leads to an increase of the insurance cost).

There is regulation that requires that account is taken for natural hazards when a licence is applied for.

Other

There are provisions on general duty of care requirements in accordance with the Federal Water Act.

There is a legal requirement for public consultation on the PFRA, flood maps and FRMPs.

The system is more holistic and includes looking at the protection of critical infrastructure and vital societal functions, disaster risk reduction, dependencies and increasing the resilience of society.

Nine respondents said that they did not have legislation that goes beyond the FD.
1.5 The influence of the Floods Directive on policy areas outside water

Respondents were asked if the introduction of the FD had influenced other areas of policy. Of the 31 responses received, 18 respondents stated that it had influenced policy areas outside water shown in Figure 1-2. The respondents who answered ‘yes’ stated the following areas of policy had been influenced:

- Building codes and spatial planning
- Disaster/emergency planning and civil protection
- Insurance
- Water resource and catchment management (including river restoration and the WFD)
Thirteen respondents said that the introduction of the FD had not influenced other areas of policy besides water.

One respondent said that this question was not applicable.

1.6 The utility and flexibility of the framework provided by the Floods Directive for carrying out preliminary assessments, drafting the flood maps and preparing risk management plans

Respondents were asked if the FD provides a suitable framework and enough time flexibility for conducting preliminary assessments, drafting the flood hazard and risk maps and preparing risk
management plans. Of the 31 responses received 19 respondents stated categorically “yes” to this question, shown in Figure 1-3. The main comments made by respondents in relation to these questions

- It was challenging to fit national policy into the framework of the FD.
- There could be an improvement in the flexibility of the framework.
- Mid-cycle deadlines and bureaucracy could reduce some stakeholders’ interest in getting involved.
- The flexibility in the FD can make harmonisation and coordination between Member States and in transboundary river basins challenging.
- Flexibility is limited outside of the main flood typologies.

Three respondents said ‘no’. Two respondents did not provide a response. Seven respondents provided a mixed response. These responses are summarised below:

- Yes but at the same time this means in terms of coordination with other neighbouring MS usually different scenarios which are applied.
- The FD provide a sufficient framework, the only requirements of reporting sheets for PFRA (historical floods) is more detailed than could it be. There could be latitude for PFRA due different conditions in MS.
- Timetable and six year cycle enables sufficient assessment and implementation. But at the same time, mid-cycle deadlines and bureaucracy might reduce some operators interest to get involved (e.g. naming significant pluvial flood risk areas and whole pluvial flood risk management is in on the municipalities’ responsibility. To avoid deadlines and bureaucracy some municipalities decided to manage pluvial flood risk outside the directive framework).
- Yes but the provision by European Commission of International data bases would make it easier.
- The FD provides a framework but at the same time it is possible to elaborate documents according to regional specification for example setting the probability scenarios, priorities and determining APSFR.
- It does give a sufficient and flexible framework but at the same time, it was difficult to "fit" the national policy (with its own plan-do-check-act cycle) into the framework of the FD.
The FD establishes a framework within which MS has sufficient flexibility, however it would be useful broader harmonisation documents of the Directive at the frames of transboundary river basins.

Figure 1-3 Number of Member States that said the Floods Directive provides a suitable framework and enough flexibility for conducting preliminary assessments, drafting the flood hazard and risk maps and preparing risk management plans.

1.7 The need for further guidance

Respondents were asked if further guidance on the FD would be useful and if so in what areas. Of the 31 responses received 20 respondents stated that further guidance would be useful, this is shown in Figure 1-4. Areas in which respondents stated that further guidance or further information exchange between MSs would be useful were as follows:

- Pluvial flood (i.e. flooding caused by rainfall) and flash flood events
- Methods to allow climate change to be taken into account, particularly for flash flooding
- Approaches to evaluate the impacts of floods on cultural heritage, human health, the environment, and economic activities
- Assessment of the effects of non-structural measures and natural water retention measures
- The implementation of the INSPIRE Directive
- Data and risk assessments
- Integration of Flood Risk Management Plans and River Basin Management Plans
- Valuation of measures and production of a catalogue of measures
- Safety standards of existing infrastructure
- Methods in transboundary areas

Figure 1-4 Number of Member States requiring further guidance
1.8 Requirements for clarifications on terminology and concepts

Respondents were asked in there were any concepts, terminology or language in the FD that need to be clarified. Of the 31 responses received ten respondents said no and three respondents provided no answer see Figure 1-5. Other respondents listed the following that are in need of clarification:

- Article 4.2 requires further clarification or simplification including factors other than “impacts of climate change on the occurrence of floods” or of “long-term development” mentioned in Article 4.2d
- Article 7.3 was understood by some respondents as an enumeration and not as an obligation
- The reference to specific flood types
- Areas of Potentially Significant Flood Risk (APSFR)
- The word “significant” needs to be clarified and defined
- Definition of the word flood
- Taking into account regional characteristics
- Prioritisation of flood risk measures
- The role of Natural Flood Management Measures
- Concept and impacts of climate change
- Concept of "return period" which is a concept based on a stationary climate
- The development of an alternative definition of flood return period based on rainfall depth
- Further clarification on the definition of "artificial water bearing structures"
- The definition of floods given in the FD is not the same as the one in the guidance notes.
- Further clarification is needed as to what constitute a measure and "interested parties"
Figure 1-5 Number of Member States requiring further guidance on terminology and concepts
Section 1 conclusions

With regards to the positive impacts of implementing the FD 27 respondents stated that the preparation of flood maps and identification of flood-risk including APSFRs had been useful.

Improvements in and strengthening of coordination and collaboration between different sectors (e.g. flood protection, emergency planning spatial planning), decision makers and other stakeholders (e.g. public, local authorities) at different spatial scales\(^4\) were also noted as being areas where the FD had been beneficial by 15 respondents

The production of FRMPs and strategies together with consolidation of plans in one document was seen as positive by 11 respondents as was the improvement in stakeholders’ awareness of flood risk (ten respondents).

With regards to obstacles the time, human and financial resources to the implement the FD was mentioned by 15 respondents as being a constraint at a range of organisational levels. Sixteen respondents related to data (e.g. lack of information, collation of data, licensing issues) and/or issues developing supporting methodologies.

Respondents were asked what improvements they would make at an MS level to the implementation of the FD. Seven respondents cited improved coordination, cooperation between and communication with different authorities (e.g. regional organisations, implementing parties) and other stakeholders including the public. With respect to engagement and communication, respondents also raised the issues of the time allowed for public consultation and number of potential consultees.

Another issue mentioned by nine respondents was related to improvements to data sets including DTM, data collection and management. At an EU level respondents mentioned that they following could have improve the implementation of the FD. More information exchange on good practice, coordination and how the FD was implemented in different countries was mentioned by nine respondents. Two respondents mentioned links to the Sendai Framework. Improvements in coordination, timing and consistency of guidance and reporting requirements from the EC including earlier provision of the EC’s expectations and requirements was mentioned by nine countries as being useful. Other improvements were centred on changes and consistency in methods, including specific requirements for certain methods, such as for semi-arid climates. Budget support was raised by three respondents and links to other legislation was also raised by three respondents.

There were 22 respondents that stated that they have regulations or legislation that go well beyond the requirements of the FD. Many of these regulations related to the building of new developments in floodplains and/or the zoning of floodplain. There were nine respondents who said that they did not have legislation that goes beyond the FD.

There were 18 respondents who felt that the FD had influenced policy areas outside water. Areas that were mentioned including: spatial and land use planning (12 respondents), disaster/emergency planning and civil protection (12 respondents), insurance (seven respondents) and four respondents raised water resource and catchment management (including river restoration and the WFD).

\(^4\) Local, regional, national and transboundary (i.e. international)
With respect to further guidance on the FD, 20 respondents stated that further guidance would be useful. The most common areas in which respondents said that they were interested were: pluvial and flash flooding; climate change; impacts of floods on health, the environment and cultural heritage, natural water retention measure implementing the INSPIRE Directive.

In terms of requirements for clarification on terminology and concepts the four main areas for clarification were the definition of flood, significant, the concept of climate change and APSFRs.
2. Context for the implementation of the Floods Directive

This section covers the context for the implementation of the Floods Directive.

2.1 Methods used for flood risk management in Member States before the adoption of the Floods Directive

This question covered the methods used for flood risk management by respondents before the FD was adopted. These can be summarised as follows:

- Various legislation, regulations and policies both at municipal, regional and national levels
- Various types of strategies and plans for different types of floods (e.g. fluvial, coastal, surface water)
- Various methods for prioritising flood defence measures (e.g. cost-benefit analysis, areas where floods had occurred previously) and flood defence measures.

2.2 Influence of the adoption of the Floods Directive on flood risk management in Member States

Respondents were asked what influence the adoption of the FD had had on their flood risk management. The influences can be summarised as follows:

- A change in approach from flood protection towards a systematic implementation of flood risk management measures (e.g. the use of cost-benefit analysis) and more comprehensive and holistic flood risk management
- A strengthening of cooperation, collaboration, between and consultation with various stakeholders responsible for emergency management and flood risk management
- A more coordinated approach is now taken to flood risk management
- An increase awareness of flood risk by stakeholders
- Flood risk management is now directly linked to spatial planning
- Improvement of flood warning data and information systems
- Moved the focus from flood hazard to flood risk
- Creation of new flood commission(s) / committee(s)
- Encouragement of sustainable flood risk management practices
- Allows flood risk to be re-evaluated at regular intervals (e.g. every six years)
- A consistent national flood risk baseline has been established with targeted action and the ability to measure “success”
- The FD has allowed different plans to be brought together into a single plan
- Establishment of local strategies covering each APSFRs within a local governance structure
- Meant that documents related to flood risk management are now in the public domain
- Focused flood risk management at a local level
- Implementation of flood risk legislation
- Change in investment philosophy

One MSs stated that there had been limited impact, owing to a national flood policy review approved in 2004 with similar requirements to those of the FD.
2.3 Possible constraints imposed by the Floods Directive on flood risk management in Member States

The Respondents were asked if the adoption of the FD had placed any constraints on flood risk management. Of the 31 responses 25 stated that it had not, albeit with some caveats which were related to the amount of resources that had to be committed to implement the FD, this is shown in Figure 2-1.

One respondent stated that if the EC asked all respondents to produce PFRAs for the second cycle, this would lead to additional work, with no added value, as for some respondents there plans to produce maps and plans covering the whole country. For two respondents the answers were not clear.

Of the four respondents who stated that it had placed a constraint on flood risk management the reasons given for this were:

- Two respondents indicated that the short deadlines for the reporting
- One respondent mentioned that the constraints were related to way of implementation of flood mitigation measures in and outside of APSFRs
- One respondent stated that it constrain the feasibility of flood protection measures financed from public funds before completion of the six year planning cycle
Figure 2-1 Number of respondents that felt the Floods Directives had imposed constraints on flood risk management
2.4 Responsibility for coordination of flood risk management

Respondents were asked if their organisation was responsible for flood risk management in their country at a central level. The percentage of respondents answering yes is shown in Figure 2-2.

If they were not the organisation responsible for flood risk management in their country at a central level they were asked to give the details of the organisation that is responsible. The following responses were given:

- There is no central level responsible. Flood risk management legislation is developed at the level of the regions and no hierarchical structure above it
- The coordination of flood risk management and establishment of flood risk management plans are in the responsibility of the responsible municipalities. At a central level a coastal authority is responsible for the PFRA, the appointment of the APSFRs and the establishment of flood hazard and risk maps
- The responsibilities are divided within the Ministry of Interior; however, the main coordinator is the Ministry of the Environment
There are several authorities; however, there is one ministry responsible for the coordination between them and the EC.

The Ministry of Agriculture and Forestry steers and follows the implementation of flood risk management together with other ministries. An environment institute helps the ministry and coordinates work of regional authorities.

The development of national flood and coastal erosion risk management policy is lead in a government department. There is an agency that provides a ‘strategic overview’ of flood and coastal erosion risk management from all sources as well as an operational role for managing risk from rivers and the sea. Planning and management of flood risk from local sources is the responsibility of local authorities.

Where no single organisation exists, respondents were asked how flood risk management responsibilities were assigned. The answers are detailed below:

- There is competent authority, but the implementation in the field is done by the different responsible water managers, spatial planners.
- The group responsible for the implementation of the directive comprises a university, regional and provincial water management organisations.
- There is a specific organisation for urban areas.
- Regional organisations are responsible for coordinating flood risk management. In two basins they coordinate their work in national and international river basin associations and commissions.
- Flood risk management responsibilities are assigned to local level involving appointed municipalities.
- There are several authorities.
- Ministry of Environment and its subordinate institutions are responsible for the preparation of APSFR FHRM and FRMP (including coordination of relevant activities). Ministry of the Interior of the Republic of Lithuania and its subordinate institutions are responsible for organization and coordination civil protection activities including those related to floods.
- The Sustainable Energy and Water Conservation Unit is responsible for the policy aspects related to the implementation of the FD. The Ministry for Transport and Infrastructure is responsible for the implementation of infrastructural works. The Civil Protection Department is responsible for the coordination of flood risk management at the operational level.
- The central government organisation for water management, including flood protection, is the president of the national water management organisation supervised by the minister responsible for water management, whose function is performed by the minister of the environment. The president of the national water management organisation supervises activities of the directors of the regional water authorities.
- A rivers agency is designated as the lead government department for flooding although this is not a statutory responsibility. There is shared responsibility for flooding as follows: fluvial and coastal flooding - rivers agency; flooding from road drainage network - transport organisation; flooding from sewerage systems - water company; flooding from surface water (joint responsibility of the various organisations).
2.5 Responsibility for implementing the FD

Respondents were asked if the same arrangements in terms of responsibility described above for Question 2.4 were also applicable for the implementation FD. The responses are shown in Figure 2-3.

If the respondents said that they were not applicable they were asked for the arrangements. These arrangements are summarised below:

- The Competent Authority for the implementation of the FD is the Water Development Department of the Ministry of Agriculture, Environment and Rural Development. The Ministry of the Interior is responsible for the coordination and monitoring of the implementation of the FRMPs.
- The Federal Government is responsible for transposing the FD into national law. The provisions laid down in the FD were implemented through the Federal Water Act. The relevant regulations in the Federal Water Act were then laid down in water legislation at a Federal level. The transposition of the FD is legally prescribed in the Federal region responsible for flood risk management. Each Federal regional government is responsible for the overall implementation. The Federal region draws up the coordinated FRMPs, which the Federal Government then reports on to the European Commission.
The responsibility for the implementation of the FD rests with the Coastal Authority at a central level. Municipalities affected by the Directive, are not involved in reporting to EC.

The Ministry of Agriculture and Forestry approves the FRMPs for river basins and coastal areas while the Environment Institute is responsible for the reporting.

A central organisation is responsible for the implementation of the requirements of the FD for the majority of APSFRs and sources of flood risk. Owners, operators, managers of Artificial Water Bearing Infrastructure (e.g. reservoirs, raised canals, urban storm-water systems) are responsible for the implementation of the FD with regards to the infrastructure they own or manage.

The implementation is shared with regional authorities: i.e. regional water authorities provincial authorities regions and municipalities.

The responsibility for the implementation of the Directive is the National Institute for Hydrology and Water Management under coordination of the Ministry of Environment, Waters and Forests.
2.6 Level at which the overall responsibilities for implementation of the FD is generally held

Respondents were given three choices with respect to the level at which the overall responsibility for the implementation of the FD is generally held. The results are shown in Figure 2-4. Some respondents ticked more than one response.

Figure 2-4 Level at which the overall responsibilities for implementation of the FD is generally held

2.7 Level at which the primary responsibility for the evaluation of risk implementation of measures reducing adverse consequences

The respondents were then asked at what level the primary responsibility for the identification of flood risk is held. The answers are shown in Figure 2-5.
Figure 2-5 Level at which the primary responsibility for the identification of flood risk is held

Where the respondents has chosen multiple levels they were asked to explain this. Their responses are given below:

- Owing to a federal system an additional working process had been incorporated into the three steps of implementing the FD. The Competent Authority provides for PFRA and APSFRs, flood hazard and flood risk maps. Which acts as a “federal blueprint” to the federal provinces based on resolutions of the decision committee. Adding to this federal blueprint the federal provinces provide information, data and knowledge. After that the Competent Authority merges available information and publishes it as a draft. After the information undergoes public information and consultation the implementation steps are revised and published as well as reported to the EC.

- All responsible water managers (i.e. regional, local and municipal) decided together with the central organisation to identify significant flood risk for the whole territory.

- Watercourses are divided into categories: navigable watercourses managed by the region, first category managed by the region, second category managed by the province and third category managed by the municipalities.

- There is regional responsibility.

- There are river basin administrators.

- Federal regions are responsible for identifying flood risk the federal government then reports this information to the European Commission.

- The Water Directorates of the Decentralized Administrations carry out the preliminary flood risk assessment and – in collaboration with the devolved administrations of the Directorate of Civil Protection (Ministry of Public Order & Civil Protection) - prepare the flood hazard maps and the flood risk maps as well as the Flood Risk Management Plans. The exercise of such powers by the Water Directorates of the Decentralized Administrations should be compatible with the national programme for flood risk management set up by the Special Secretariat for Water (SSW) in cooperation with the General Secretariat of Civil Protection of the Ministry of Public Order & Citizen Protection as well as other concerned Ministries. In this cycle of implementation, the preliminary flood risk assessment, the elaboration of flood hazard maps and flood risk maps as well as the development of the Flood Risk
Management Plans for all water districts of the country have been compiled by the Special Secretariat for Water (SSW) at the request of the General Secretariats of the Decentralized Administrations.

- River basin authorities and the regional authorities identify fluvial and pluvial APSFRs
- Central government identifies the coastal APSFRs
- The central level is in charge of the coordination of the PFRA (e.g. the methodology and the databases) but most of the mapping is done at district level
- Most activity is carried out at a central level (e.g. rivers, coastal, groundwater, canals, hydropower). However, local authorities are responsible for urban storm water drainage
- Water authorities were mainly responsible for identifying the flood risks reported in the FD
- Central and river basin levels
- There is an organisation responsible for flood risk from rivers, sea and reservoirs. There are 152 local authorities are responsible for flood risk from local sources (e.g. small watercourses, surface water, groundwater)
- There is an organisation that acts as the national lead organisation for flood risk management and coordinates flood risk management activity. It identifies and assesses flood risk across the country; this is achieved with collaboration with local authorities which provide local evidence and information to support the national assessment

Respondents were asked at which level the primary responsibility for the evaluation of the significance of the risk is held. The answers are shown in Figure 2-6.

![Figure 2-6 Level at which the primary responsibility for the identification of the significance of the risk is held](image)

If Respondents chose to answer multiple levels then they were asked to provide further explanation. Their responses are given below.
• With the exception of one region all the responsible water managers (i.e. regional, local and municipal) decided with the central government not to perform a PFRA, and identify significant flood risk for the whole territory.
• The regional governments are responsible for evaluating the significance of risks, the federal government then reports this information to the European Commission.
• The central government approves the PFRA of each river basin district and checks that the significance of the risk have a similar approach in each different river basin district.
• The criteria for the significance of the risk was defined at central level but the selection of the APSFRs has been done at district level.
• Most activities are carried out centrally (e.g. rivers, coastal, groundwater, canals, hydropower). However, local authorities are responsible for urban storm water drainage.
• Evaluation is carried out at multiple levels.

Respondents were asked at which level the primary responsibility for the preparation of flood hazard and flood risk maps is held. The answers are shown in Figure 2-7.

![Figure 2-7](image)

**Figure 2-7** Level at which the primary responsibility for the identification of flood hazard and risk maps

If respondents stated that it was at multiple levels they were asked to explain. One respondent replied saying that flood hazard mapping is the responsibility of central level and that flood risk mapping is the responsibility at regional level at the water district level.

Respondents were asked at which level the primary responsibility for the **selection and prioritisation of measures** for reducing adverse consequences from significant floods is held. The answers are shown in Figure 2-8.
If respondents that stated that multiple levels were used for the selection and prioritisation of measures were asked to provide an explanation. These are given below:

- All responsible water managers (i.e. regional, local and municipal) selected and prioritised flood measures for their water bodies these were integrated at regional level
- A structure was created for the FRMP with different managers of watercourses
- Regional responsibility in coordination with the water actors
- River basin administrators and regional governments
- The regions are responsible for the selection and prioritisation of measures the Federal Government then reports this information to the European Commission. Selection and prioritisation is the responsibility of the respective stakeholders and is coordinated by the regions or their competent authority
- The FRMPs were done overall at a central level; however, local authorities were involved during public consultation to prioritize measures
- Every measure has its own authority responsible for its implementation. The FRMPs have a many measures with different responsible authority
- The regional Water Directorates have proposed actions and the General Directorate composes the nation-wide plan out of them.
- Most activity is central (i.e. rivers, coastal, groundwater, canals, hydropower). However, local authorities are responsible for urban storm water drainage
- Selection and prioritisation of measures is carried out at the river basin/regional level according to national criteria defined by National Guidelines and by ISPRA
The final selection and prioritisation of measures is done at the central level; however, previously the measures were discussed in workshops in local flood-partnerships and together with the authorities at the community level. There was also a bottom-up component in the procedure so that some communities could propose measures which were included in the process.

Measures may concern large new infrastructural measures or major maintenance of the existing flood protection system. For large new measures the ministry is the lead. Mayor maintenance of the existing flood protection system is carried out in a joint programme financed by the ministry and the regional water authorities after the 12-yearly assessment of the existing flood protection system. Day to day maintenance is carried out by the authority responsible for the specific infrastructure.

The president of the national water management authority prepares flood risk management plans at the level of river basins districts, the directors of regional water management boards prepare flood risk management plans at regional level.

It is done at the regional level in cooperation with the local level.

Selection and prioritisation of measures was done at multiple levels by the relevant authorities (i.e. central agency and local authorities).

A national agency leads on the selection of measures. However, local input is essential to agree outputs prior to the development of plans. The national agency leads and local authorities are engaged to enable a collective understanding of the outputs.

Respondents were asked at which level the primary responsibility for the commissioning and implementation of measures is held. The answers are shown in Figure 2-9.

![Figure 2-9 Level at which the primary responsibility for commissioning and implementation of measures is held](image)

If respondents chose multiple levels with respect to the responsibility for commissioning and implementation of measures they were asked to provide an explanation. These are provided below:
The implementation of the flood risk measures is done by the most appropriate actor (e.g. regional, local municipal water managers, spatial planners). At a national level there are legislative and administrative measures; at a regional level there are restrictive measures and measures connected with public information concerning flood hazard and risk; at a district level there is maintenance of the hydraulic conductivity of river beds and at a municipality level there is implementation of measures within the limits of an urbanised area.

Central level carries out preparation of subsidies in flood protection; At a regional level river basin administrators commission and implement structural measures at a municipal level there is implementation of non-structural measures (e.g. spatial planning, flood protection plans, local early warning system).

The responsibility for the commissioning and the implementation of measures varies depending on the legislation laid down at a national and federal level and also depending on the measure in question. For example, responsibility may lie with municipalities regional councils, state-owned companies of the region, the region themselves or with flood defence associations.

This depends on the measure. Measures that are related to overall regulation, risk communication and legislation are coordinated at a central level. Object specific measures shall be implemented by local authorities.

All main stakeholders representing public and private sector (Governmental central, regional and local authorities Public Power Corporation, private companies etc) participate in the implementation and commissioning of measures.

Every measure has its own authority responsible for the implementation. The FRMPs have a many measures with different responsible authority.

This depends on the measure, the implementation can be done at district, regional, departmental or local level.

The measures are carried out by projects, where in general the project manager is the General Directorate and the implementing body is the regional Water Directorate.

Implementation of measures is carried out at multiple levels according to the funding sources and the relevance of measures (e.g. big schemes are financed by national funds and measures are implemented at national level and other smaller schemes are financed and implemented at regional level).

Most activity is carried out centrally (e.g. rivers, coastal, groundwater, canals, hydropower). However, local authorities are responsible for urban storm water drainage. Local authorities can also implement flood relief schemes for fluvial, coastal and groundwater flood risk.

Implementation of measures is organized by same principles as coordination of flood risk management.

The implementation is guided and subsidised by the national water agency.

It depends on measure. Responsible for the implementation of measures are local government, central government institutions and enterprises (e.g. energy producers such as hydropower producers).

It depends on which authority is responsible for the specific measure.

Many administrative bodies are responsible for implementing measures that are described in FRMPs. These are government bodies at national and regional level as well as local authorities.

The commission and implementation of measures is at multiple levels by the relevant authorities (e.g. central agency local authorities other risk management authorities and partners).
This depends on the type of measure. Local authorities take significant responsibility for the delivery of measures at the local level while a national organisation has responsibility for national level actions.

Respondents were asked at which level the primary responsibility for the monitoring of the implementation of measures is held. The answers are shown in Figure 2-10.

![Figure 2-10 Level at which the primary responsibility for monitoring the implementation of measures is held](chart)

Where multiple levels had been identified the Respondents were asked to provide an explanation. These are provided below:

- The regional governor controls implementation at a municipal level the basin directorates at basin level and the relevant ministry at a national level
- At a central level there is a system of reports for national, regional and river basin organisations
- The responsibility for the monitoring of implementation of measures varies depending on the regional legislation
- Monitoring of the implementation of measures is at the responsibility of the Water Directorates of the Decentralized Administrations with an overall supervision by the SSW.
- The regional and central government are responsible for updating the FRMP and its implementation
- The central level will monitor the implementation of the national flood strategy and the district levels monitor the FRMPs and local strategies
- Due to the shared responsibility both levels are monitoring the implementation.
- As per the implementation, monitoring of measures is related to their relevance and funding sources and can range from the national to the local level.
- Each authority is responsible for monitoring the flood protection measures under its responsibility. Every 12 years, an assessment of all primary flood defences is carried out and the results are reported to the minister
- The environmental court may decide something else when giving permission
Monitoring of the implementation of measures is at multiple levels by the relevant authorities (e.g. central organisation, local authorities other risk management authorities and partners).

The monitoring is the responsibility of the local authorities but is done in a partnership approach via local plan district groups.

Respondents were asked to describe the situation if none of the situations in the questions above were relevant to their country. Only one respondent replied and they stated that municipalities are responsible for all above mentioned phases of pluvial flood risk management.
2.8 Advantages of Members States organisational arrangements for the coordination and the implementation of the Floods Directive

- Respondents were asked about what they found to be advantageous with respect to the organisational setup for the coordination and the implementation of the FD during the first cycle. The main point made by 15 respondents, was that coordination and implementation of the FD was improved by respondents having one Competent Authority to implement the FD.
- The other points made by respondents are summarised as: Improved coordination at different scales (local, regional, national and transboundary) was also mentioned by many respondents.
- Integration of holistic flood risk assessment and flood risk management approaches.
- A fixed programme but with flexibility integrated into it.
- Improvements in knowledge and information sharing.
- Water management at river basin level.

2.9 Disadvantages of Members States organisational arrangements for the coordination and the implementation of the Floods Directive

Respondents were asked if they found any disadvantages with respect to the organisational setup for the coordination and the implementation of the FD during the first implementation cycle. Eight of the 31 respondents did not identify any disadvantages and two provided obscure responses. Of those respondents which did identify disadvantages their points are summarised as follows:

- Coordination of responsible authorities communication and organisation of effort, in particular where objectives awareness and interest between authorities may vary and in some cases where authorities have dual roles
- Resource limitations, both in terms of the administrative and technical burdens with respect to staffing and turnover of staff
- Communication from EC: lack of guidelines templates and resource documents provided in good time for implementation
- Gaps in methodology and data
- More collaboration between nations would have been beneficial, due to the devolved nature of flood risk management and different approaches taken
2.10 Member States understanding of the use of the word “flood” as described in the Floods Directive

Respondents were asked how the meaning of the word “flood” in Article 2.1 of the FD was understood in their country. The choices provided were as follows:

- An event that is principally connected to a well-defined inundated geographical area
- A meteorological/hydrological event and all affected areas (geographically connected or not) that are allocated to that flood

Other responses are shown in Figure 2-11.

![Bar chart showing Member States understanding of the word “flood”](image)

**Figure 2-11 Members States understanding of the word flood**

Respondents who chose ‘other’ were asked to explain their choice. The reasons given can be summarised as follows:

- The definition of flooding used was in accordance with national legislation
- Flooding is defined as the temporary inundation with surface waters of land not normally covered by water, or the penetration of coastal areas by sea water
- A flood is considered as a hydrological event impacting specific areas
- A meteorological/hydrological event and all affected areas (well described in the Regulation on management emergency situations). A flood is defined as any case where land not normally covered by water becomes covered by water
- A flood is an event that can result in human victims or major economic damage (in a broad sense including nature and cultural heritage)
Different definitions apply depending on the size of the event.
Section 2 conclusions

Before the FD was adopted respondents had a variety of methods that were used for flood risk management. These fall into three categories:

1. Various legislation, regulations and policies both at municipal, regional and national levels
2. Various types of strategies and plans for different types of floods (e.g. fluvial, coastal, surface water)
3. Various methods for prioritising flood defence measures (e.g. cost-benefit analysis, areas where floods had occurred previously) and flood defence measures

In terms of the influence of the FD on flood risk management respondents stated that it had resulted in:

- A change in approach from flood protection towards a systematic, coordinated and holistic implementation of flood risk management plans and measures
- An increase in cooperation and collaboration between various stakeholders responsible for emergency management and flood risk management
- Other influences cited included: coordinated approach; moved focus from flood hazard to flood risk; increased awareness of flood risk; links to spatial planning; improvement of flood warning data and information systems; and, introduction of new commissions

Most respondents do not believe that the FD has imposed significant constraints on them with respect to flood risk management. Twenty-one respondents stated that their organisation was responsible for flood risk management at a central level. Those respondents who did not have a central organisation generally had multiple authorities sometimes at different spatial scales.

For 20 of the respondents, the overall responsibility for the implementation of the FD is held at a central level; however, responsibilities differ for the other parts of the question varied as follows:

<table>
<thead>
<tr>
<th>Identification of risk</th>
<th>Central level</th>
<th>Regional/sub-federal level</th>
<th>Local/municipal level</th>
<th>Multiple levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of significance</td>
<td>16</td>
<td>6</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Preparation of flood hazard and risk maps</td>
<td>17</td>
<td>5</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Selection and prioritisation of measures</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>Commissioning / implementation of measures</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>Monitoring the implementation of measures</td>
<td>12</td>
<td>3</td>
<td>2</td>
<td>14</td>
</tr>
</tbody>
</table>
As a general rule, identification of risk occurs at either central or multiple levels. Evaluation of significance and preparation of flood hazard and risk maps is slightly more centralised. Selection, commissioning, implementing and monitoring measures tends to occur more at multiple levels.

Respondents were asked what they found to be advantageous with respect to the organisational setup for the coordination of the FD during the first cycle of the FD. The main point made was that coordination of the FD was improved by having one competent authority to implement it. Improved coordination at different scales (local, regional, national and transboundary) was also mentioned by many respondents. Other points were raised regarding the integration of methods and flexibility in the programme of works.

Respondents were asked if they had found any disadvantages with respect to the organisational setup for the coordination and implementation of the FD. Eight respondents did not identify any disadvantages. The most common disadvantage raised was regarding the coordination of responsible authorities. Resource limitations and communication from the EC were also raised as disadvantages.
3 Preliminary Flood Risk Assessment

This section deals with the Preliminary Flood Risk Assessment (PFRA) for the FD.

3.1 Use of Article 13 by Member States

Figure 3-1 shows the percentage of respondents who made use of Article 13 for the whole country, part of the country or for some sources of flooding.
3.2 Database of historical floods

This section provides details the percentage of respondents who have a database of historic floods and when it was created. This is shown in Figure 3-2.

Figure 3-1 Percentage of respondents who utilised Article 13 for the whole country, part of the country or for some sources of flooding

Figure 3-2 Percentage of respondents who have a database of historic floods with details of when it was created
3.3 Details of information that are available in a centrally collated database

Respondents who have a database or collate data centrally were asked what information was available on past floods that was of assistance in carrying out the PFRA. This is shown in Figure 3-3. The Respondents were asked to provide other information with explanations. The other details provided were as follows:

- Data is variable depending on the significance of the flood (smaller ones have less information, larger ones have more); types of flood (lots on fluvial floods, less on flash floods; land affected (extent known for floods on agricultural land but not in urban areas);
- Data may include damage recurrence intervals, measures to be set, weather conditions, source, water levels, extents, photographs; defence work that was carried out
- More information is available for recent floods than for older floods.
- Two respondents developed a specific data repository for the purpose of implementation of Floods Directive and three did not specify what data was contained within it.
Figure 3-3 Types of information held in respondents’ databases on past floods
3.4 Details of information available on the consequences of floods

Respondents were asked what information that had available on the consequences of floods. The main information on consequences that available is summarised below:

- Number of fatalities and adverse impacts on human health
- Number and types of properties flooded; number of inhabitants flooded (derived from average occupancy in residential properties)
- Estimates of monetary losses/economic damage
- Insured loses
- Damage and interruptions to critical infrastructure, services and traffic (e.g. water supply, energy supply, communications, transport links)
- Damage to cultural heritage
- Damage to the environment
- Agricultural losses
- General descriptions of areas affected. May include descriptions of flood extent, depth and damages
- Data available depends on the significance of the flood
- There is no central database of detailed information.

One respondent provided details of two websites although it was not clear what information was collected.
3.5 Public availability of the centrally collated database

Respondents were asked if their centrally collated database is publicly available. The responses are shown in Figure 3-4.

Figure 3-4 Availability of a centrally collated database to the public
3.6 Gaps in the centrally collated database revealed by the first cycle of the FD

Respondents were asked if the first cycle of the FD had revealed any substantial gaps in the centrally collated data or database for the FD. These results are shown in Figure 3-5.

Figure 3-5 respondents who said that the first cycle of the FD had revealed substantial gaps in their centrally collated data or database of the FD
If respondents said that the first cycle of the FD had revealed substantial gaps they were asked if a decision had been made to improve the recording of flood data. This is shown in Figure 3-6.

**Figure 3-6** respondents who had found substantial gaps in their centrally collated data or database of the FD, who said that they were going to improve the recording of flood event data.
3.7 Development of guidance on how to collect and record flood event data

Respondents were asked if they had developed guidance on how to collect and record flood event data. The details of the responses are shown in Figure 3-7. Respondents were also asked to provide a link, if publicly available, to the guidance. These links are provided in Appendix B.
3.8 Other methods used in the Preliminary Flood Risk Assessment to identify areas of potentially significant flood risk

Respondents were asked what other additional methods had been used in undertaking the PFRA and/or identifying the APSFRs in addition to or instead of information on past floods. These are shown in Figure 3-8.

Respondents were asked to specify other methods in addition to those shown in Figure 3-8. These are detailed below:

- Use of other datasets. Spatial analysis using GIS using catchment areas over a certain threshold, and overlaying them with land use data
- Public engagement / local knowledge
- Geomorphological analysis
- Matrix analysis by consultants
Figure 3-8 Additional methods used by respondents in undertaking the PFRA and/or identifying the APSFRs in addition to or instead of information on past floods.
3.9 Use of modelling in the PFRA

Respondents were asked to indicate if modelling was used in the PFRA and if so to briefly describe the methods used. A summary of the responses is given below:

- Rainfall-runoff and other hydrological models
- One dimensional (1D) hydraulic models for rivers
- Two dimensional (2D) hydraulic models for rivers
- Rapid flood spreading models for pluvial flooding
- Broad scale modelling
- Extension of extreme coastal sea levels with a Digital Terrain Model (DTM) to determine coastal flooding
- Approximate estimates of floodplain extents made by engineer’s office
- Model to assess sea level rise
- Use of Digital Elevation Models (DEM), Geological Maps and Corine Land Cover 2000 and GIS analysis
- GIS-based methods with a DTM to estimate areas likely to flood
- Simplified GIS based assessments of flood extent.
- Inundation maps for the 1 in 100 and 1 in 1,000 year floods were generated in the 1970s with mathematical flood routing using available terrain information.
- Different approaches depending on the catchment
- Three dimensional (3D) hydraulic models for estuary
- Hydraulic modelling
- Advanced industry models
3.10 Adequacy of Digital Terrain Models (DTMs)

Respondents were asked if they currently have a sufficiently accurate DTM covering a large proportion of the country and when they were updated. Figure 3-9 shows if and when these were updated.

![Pie chart showing percentage of respondents with suitably accurate DTMs]

Figure 3-9 Percentage of respondents with a suitably accurate DTM covering a large proportion of the country

Respondents were asked if there was a plan to close the gap and what are the timescales foreseen for this. Six respondents answered this question and their responses can be summarised as that they either have a process to or are continually seeking to improve both the accuracy and coverage of their DTMs. Four respondents mentioned that they are making use of improvements and efficiencies in LIDAR technology to achieve this.
3.11 Extent of digital inundation maps

Respondents were asked if they have digital inundation maps covering a large proportion of water bodies in their country, five of the respondents who replied did not have one. The results are shown in Figure 3.10.

In Figure 3-10, the percentages of respondents who have digital inundation maps that cover a large proportion of the country are shown.

- Yes, maps created after 2007: 6
- Yes, maps significantly updated after 2007: 14
- No; 5
- No response; 1

Respondents were asked if there was a plan to close the gap and what were the timescales foreseen for this. The relevant answers are given below:

- If possible, they will be updated during the second cycle of the FD
- We currently have digital inundation maps covering 40% of the bodies of water in the country that have the potential to be a source of significant floods (6 RBDs) and up to the end of the year maps will be prepared covering the whole country.
- Updating will be a continuous process
- Flood hazard maps, which are digital inundation maps, created in the first cycle of the FD cover less than a half of the bodies of water in the country that have the potential to be a source of significant floods. In the PFRA, except the APSFRs, which were determined for 253 sections of
rivers and coast with a total length of 14,481 km, an additional 586 sections of rivers and coast with a total length of 12,680 km were identified to developed flood hazard and risk maps in the second cycle of the FD. Developing flood hazard and risk maps for all 839 sections of rivers or coast was not possible for technical reasons (i.e. mainly because of lack of data).

3.12 Knowledge of the hydrological characteristics of a Member State's water bodies that have the potential to flood

Respondents were asked about their knowledge of the hydrological characteristics of a large proportion of their water bodies that have the potential to be a significant source of floods. The results are shown in Figure 3-11. Respondents were asked if there was a plan to close the gap and what were the timescales foreseen for this. Six respondents answered this part of the question. Two respondents stated that they already had accumulated the hydrological knowledge, another stated that this was a process of continual improvement and a further one would like to improve during the second cycle of flood risk planning. The final two respondents specified the following:

- In the highly urbanised area of the capital there are no plans although rivers are almost fully characterised and modelled, it is not yet the case for most of the sewer network. As sewer modelling is not explicitly required by the FD, it is difficult to force the sewer managers to carry out full modelling of their networks.
- The plan is to improve hydrologic monitoring by installing additional stations and to improve hydrologic analyses by improving methodology and consistency of analyses of the existing data. This is planned to be accomplished through an EU-funded project aimed at comprehensive improvement of non-structural flood risk management measures by 2019.

3.13 Knowledge of the geomorphological characteristics of a Member States water bodies that have the potential to flood

Respondents were asked about their knowledge of the general geomorphological characteristics of a large proportion of their water bodies that have the potential to be a significant source of floods. The results are shown in Figure 3-12.

Respondents were asked if there was a plan to close the gap and what were the timescales foreseen for this. Two member states specified the existing coverage of knowledge but didn’t elaborate on the plans to close any gaps. The following answers were given:

- Except in the urbanised area of the capital city the inventory is ongoing and will be completed in 2017
- If possible, during the second cycle of flood risk planning
- We are working on coordination with WFD
- The plan is to improve data on cross-sections of relevant watercourses and to implement a system of regular monitoring of bathymetry and sediment transport. This is planned to be accomplished through an EU-funded project aimed at comprehensive improvement of non-structural flood risk management measures by 2019.
- In the second cycle of the FD it is planned to improve the knowledge of the geomorphological characteristics of bodies of water. In first cycle of the FD because of the insufficient quantity and quality of available data, analyses of the geomorphological characteristics were done to limited extent
- FRMP measures include LiDAR cover of part of the territory.
Only in areas related to the management of flood risks for the geographical area of the first cycle. There is no detailed plan at present although there is a need to better consider geo-morphological characteristics. However, a start has been made by considering erosion impacts on coastal flood risk.
Figure 3-11 Number of respondents who have a knowledge of the hydrological characteristics of a large proportion of their water bodies that have the potential to be a significant source of floods

Figure 3-12 Number of respondents who have a knowledge of the general geomorphological characteristics of a large proportion of their water bodies that have the potential to be a significant source of floods
3.14 Knowledge and the extent of respondents’ inventory of the extent of original floodplains

Respondents were asked to provide one of six responses (each with multiple parts) to the following statement: “We currently have knowledge/inventory of the extent of a large proportion of the original floodplains (i.e. without accounting for human interventions) of the country that could serve as natural water retention areas”. The responses to this statement are shown in Figure 3-13.
Figure 3-13 Knowledge and the extent of respondents' inventory of the extent of original floodplains
If the answer was no, the respondent was asked if they planned to accelerate this and what the proposed time scale was. Two respondents said that no such plan existed but one said that a plan should be established within six months. Another respondent specified that this question was not relevant for their country. The following responses were received:

- If possible, during the second cycle of flood risk planning
- We have estimates of original floodplain areas that are currently protected by flood defence systems, but there is very limited potential for restoring these flood plains. In areas that are not currently protected by flood defence systems, the natural flood plains are defined by our flood hazard maps and these will generally be protected.
- This work strongly depends on the DTM issue. A high quality DTM for the whole country will probably be prepared by the middle of 2019
- One MS stated that the question it is not clear as to whether it concerns “floodplains as a natural retention areas” or “potential significant floods” in general. PL has not commenced floodplain mapping but have mapped APSFRs. The MS plans to start work on a floodplain inventory in the second cycle of the FD
- Project "Danube Floodplain"

### 3.15 Information on the location and dimensions of flood defence infrastructure

Respondents were asked about the information they have on the location and dimensions of existing manmade flood defence infrastructure. They were given four choices of answer which, are summarised in Figure 3-14. One respondent gave an obscure response.

![Figure 3-14 respondents' information on the location and dimensions of existing man made flood defence infrastructure](image)

Respondents were also asked to give a limited description of the situation in their country. The five responses received to this question can be summarised as follows:
There is limited information at a central level but moderately good information at a provincial level.

- Information is only good in one region.
- No significant flood defences exist owing to the type of the catchment.
- Information on centrally-funded flood defence structures is contained in a central, national database.
- The completeness, quality and quantity of information on each scheme is variable.

3.16 Enhancement of information on the location of flood defence infrastructure as a result of the implementation of the FD

Respondents were asked if the information on the location of flood defences had been enhanced as a result of the implementation of the FD. The results of this question are shown in Figure 3-15.

Figure 3-15 Enhancement of respondents’ information on the location of flood defences since the implementation of the Floods Directive
3.17 Information on the effectiveness (level of protection) of existing man-made flood defence infrastructure

Respondents were asked about the information that they have available on the effectiveness, in terms of the level of protection, of existing manmade flood defence infrastructure in their country. They were given three choices of answer which, are summarised in Figure 3-16. It should be noted that one respondent stated gave two answers (i.e. information is “moderately good” in some regions and “good” in others).

![Figure 3-16 respondents’ information on the level of protection of existing man-made flood defence infrastructure](image)

The respondents were given the opportunity to respond if they felt that none of the answers in Figure 3-16 were representative of their situation. Four respondents answered this question. One stated that although generally the information in good there were regions were the quality of the information was variable. Another respondent stated that no significant manmade flood defences exists in their country. The other two responses were as follows:

- The level of protection is verified via flood hazard maps elaboration
- Subsoil information to be updated because new phenomena’s in 2013 were discovered underneath the dikes along the Danube. The resolution of the exploration generally should be extended all over the country.
3.18 Enhancement of information on flood defence infrastructure as a result of the implementation of the Floods Directive

Respondents were asked in the information on the effectiveness of flood defences had been enhanced as a result of the implementation of the FD. They were given three choices of answer which, are summarised in Figure 3-17.

![Figure 3-17 Enhancement of information on the effectiveness of flood defences as a result of the implementation of the Floods Directive](image)

3.19 Challenges in defining a “significant flood”

Respondents were asked to cite any difficulties that they had encountered in defining what is a significant flood. The relevant responses are summarised below.

- The definition of "significant" is somewhat subjective making it challenging to explain why some rivers are listed as at risk and others are not.
- It is more important to determine a methodology that identifies areas at “significant” risk of flooding than it is to define a “significant flood”
- Our methodology for the inundation probability calculation considers not just the hydrologic event's return period, but also the success of human defence and the condition of the defence structure. The significant flood event is different from cell to cell, because the calculation unit what the probability of inundation is related to.
- There is a need for greater flexibility in defining the term significant
- For some respondents it was challenging to translating the term “significant” because the term is already in a different context within respondents existing legislation
Some respondents mentioned the threshold for example that a threshold is set based on a number of criteria (e.g., probability of flooding, flood consequences) and this raised the question if a criteria-based threshold represented “significant floods”. In some respondents the use of a threshold implied that some low-lying areas where designated as areas of high risk and other areas were not.
3.20 Retention of the same definition of a “significant flood” in the second cycle of the Floods Directive

Respondents were asked if they were going to retain the same definition for a “significant flood” in the second cycle of the FD. Figure 3-18 shows respondents’ replies.

Figure 3-18 respondents who will retain the same definition of a “significant flood” in the second cycle of the Floods Directive
3.21 Reasons why respondents are content/not content with the definition of a “significant flood” in the second cycle of the Floods Directive

Respondents were asked to give reasons why they were “content/not content” with the present definition of “significant flood”. The answers are given below:

**Content respondents**
- Current definition is fit for purpose given the available information and legal requirements
- There is good flexibility in the concept
- We foresee that we will probably use the same definition though this is still subject to evaluation in the national coordination group of the FD. Because there is already an effective flood management system in place, the definition of "significant flood" is not an issue for discussion. We work continuously to reduce the risk of flooding to an acceptable level acceptable being defined by the safety standards in the Water Act
- To be discussed.
- We are content because there is a common understanding among competent authorities.
- We did not carry out a PFRA we used Article 13. Because there is no precise definition that would include rivers that are in reality not significantly at risk
- The definition is general and it is not a question of the incorrect application of the rules set up in view of the application

**Discontent respondents**
- Threshold indicators are presented in absolute values and do not take into account the specific features of the relevant categories (e.g. settlement size; first and second road classes) and do not allow comparison
- The definition is not satisfactory
- It is not know at this time how “significant” will be defined for the second cycle, but this matter will be reviewed
- One MS didn’t took into consideration in first cycle of Floods Directive the flash-floods. For defining the "significant flash-flood", the criteria might be lowered.
- We are seeking to review and refine the definition of "significant flood" in the second cycle. We want to take advantage of the development of more consistent data collection procedures new tools and the experience of the 1st cycle to develop the approach so that is more ‘natural’ and enables improved presentation, identification and reporting of such floods.

**Respondents that either did not answer the first part of the question or answered “yes/no”**

The majority of these respondents did not yet know whether the same definition for “significant flood” would continue to be used. Other responses were:
- It is our intention to create flood maps and flood management plans for the whole country in a second cycle again (according to Article 13.1b). Therefore no definition of significant flood is needed in that context
- The positive aspects were: significance criteria facilitates the identification of main areas for implementation at the regional level; experience (expert and local knowledge) tends to correspond with the results of the evaluation. The negative aspects was that the method is not suitable for heavy rainfall events
- The selection of the 122 APSFRs enabled us to identify the most flood exposed regions. For the first cycle, the definition of a "significant flood" was mostly based on the number of people and
employment in the approximate areas of extreme potential floods. Thus most of the APSFR identified are big cities on large rivers. This definition excluded rural or mountain areas with flash flooding that pose a risk to people. Some political considerations have however permitted us to adapt the definition for some APSFR.

3.22 Definition of “adverse impacts/consequences” to receptors

Respondents were asked to cite any difficulties that they encountered in defining “adverse impact/consequences” to receptors. The respondents' responses can be summarised as follows:

- For some receptors national datasets were not always available, or were not always accurate
- A range of different approaches used by different regions and respondents;
- Defining the areas of adverse impact and specifically whether areas behind flood defences (including all the receptors) were to be considered potentially at risk or not;
- Defining the different aspects of adverse impact in a consistent way;
- How to account for the interruption of critical services caused by flooding was challenging;
- Assessing the adverse impacts on environment and protected areas (e.g. Natura 2000 sites);
- Assessing the damage to cultural heritage receptors was challenging;
- Ten respondents raised no issues.

3.23 Retention of the definition of “adverse impacts/consequences” to receptors by respondents in the second cycle of the FD

Respondents were asked if they would retain the same definition for “adverse impacts/consequences” to receptors in the second cycle of the FD. The responses are shown in Figure 3-19.
3.24 Reasons why respondents are content/not content with the definition of “adverse impacts/consequences” to receptors

Respondents were asked to explain why they were not content with the present definition of “adverse impacts/consequences” to receptors. The reasons are given below:

**Content respondents**

- Current definition is fit for purpose given available information and understanding
- The significance of flood risk will enable to it to be evaluated repeatedly for all area often country using existing data
- Flexibility
- It is likely that the same definition will remain
- Legal background.
No PFRA was carried out. Article 13 was used. Because there is no strict definition that would include rivers that are in reality not significantly at risk

We are planning to review it

We foresee that we will probably use the same definition though this is still subject to evaluation in the national coordination group of the FD. The current interpretation shows what would happen without flood defences and that would be an argument for maintaining the definition.

It is better to define more precise the term.

**Discontent respondents**

- More detailed clarification on separate receptors is needed
- Which consequences are considered as adverse for each receptor should be identified, e.g. revision of threshold values
- We intend to extend the list of analysed receptors and damage types in the second cycle in order to broaden the vulnerability analysis in the appointed areas
- It is not known at this time how this will be defined for the second cycle, and in particular how this will be quantified, but this matter will be reviewed
- We are quite satisfied with the current definition but there is a willingness to improve it in the future.
- It is not a matter of definition, but the application in practice. In the future we will encounter similar problems with regard to the composition of the databases that are used for PFRA.

This will be reviewed alongside the definition of significant floods.

**respondents that either did not answer the first part of the question or answered “yes/no”**

- The definition will be subject to further discussion and ongoing work. It is our intention to create flood maps and flood management plans for the whole country in a second cycle again (according to Article 13.1b). Therefore no definition of adverse impact/consequences to receptors is needed in that context.
- The definition of “adverse impact/consequences” is broad and enables us to tackle most of the assets affected by flooding. However, at the same time, some clarification could help for the second cycle.

**3.25 Influence of climate change on the occurrence of significant floods**

- Respondents were asked about climate change and its influence on the occurrence of significant floods with respect to what information would be useful in the second cycle of the FD for identifying APSFRs and the severity of potential adverse consequences more accurately. Relevant responses are summarised below: Greater reliability and granularity of climate models to help reduce uncertainty in analyses particularly with regard to:
  - change in frequency and intensity of extremes in rainfall;
  - sea level rise storm surges;
  - sediment process coastal dynamics;
  - river flows and floods;
- Common/agreed future horizon would enable a broadly consistent approach to compare future impacts;
- Requirement for future receptor datasets and predicting future change in receptors and their vulnerability;
- Sharing of best practice based upon EC requirements;
- Regionalised projections based upon climate change and specific catchment response;
• More intensive data and information share with the upstream countries international common evaluation routines at sub-catchment level;
• No significant lack of the data has been identified.
3.26 Research on climate change and its influence on the occurrence of significant floods

Respondents were asked if research specifically on climate change and its influence on the occurrence of significant floods had been undertaken in their country. The results are shown in Figure 3-20.

Figure 3-20 respondents who have undertaken research specifically on climate change and its influence on the occurrence of significant floods and its outcome has been used
Respondents were asked about the outcomes of the research and how they had been used. The relevant responses can be summarised as follows:

- To evaluate future floods
- To communicate the impacts
- To support development of flood hazard maps
- To support flood risk management strategies and plans
- To support flood risk management investment
- To support the selection of measures
- To support flood defence design
- To support spatial planning
- Design flood level was recalculated using a discharge-based solution
- To select relevant flooding sources

Respondents were asked about climate change and its influence on the occurrence of significant floods and what the research estimates. The relevant responses are summarised as follows:

- **Changes in precipitation:**
  - In one northern Europe region: annual rainfall will stay the same but it will rain a bit more in the winter and a bit less in the summer. Storms (heavy rainfall over a short time period) might appear more frequently in the summer but there is no quantification yet.
  - By the moment, we do not have found a real rule for the increase of maximum daily precipitation rates
  - Flash floods are likely to increase; local intense precipitation will be more frequent in time and space; the melting cycles are going to be reduced therefore floods will occur more likely
  - More rainfall during the hydrological winter whereas less during the hydrological summer and more frequently heavy rainfall events in the summer.
  - The assessment of the effect of the climate change was developed in 2007 and was based on data obtained by a national research programme. Research estimates that milder winters and less snow and ice cover will reduce spring flood. However increase of storm frequency and intensity in the future could result in marine coastal erosion processes and extensive coastal flooding.

- **Conclusions were difficult to draw:**
  - Because the climate change models did not occur obvious results of changing extreme rainfalls, the evaluation of theoretical extreme flows could not be defined. Modification of hydrological characteristic due the climate change is not expected during next cycle.
  - Research on climate change influence on the occurrence of floods has been undertaken (not specifically on occurrence of significant floods). The Institute of Meteorology and Water Management - National Research Institute between 2009-2012 carried out the project The impact of climate change on society, environment and economy'. Unfortunately results of this project were available too late to use them in PFRA. Apart from this, results of this project provide general information. According to results concern precipitation rainfall change scenarios differ considerably depending on the scenarios used (A2, B2, A1B). On the basis of 'the results it is hard to draw conclusions how precipitation will change in period 2011-2030. In 2011-2081 period according to all scenarios (A2, B1, A1B) precipitation will decrease (from 5% do 10% depending on the region.

- **Changes in flood probability:** 100-year flood peak values may become 10-year flood peak values.
3.27 Main factors that would have improved the Preliminary Flood Risk Assessment (PFRA)

Respondents were asked what were the main factors that would have significantly improved the PFRA. A summary of respondents' responses is given below:

- Better datasets (e.g. better information in particular for cultural heritage and economic activities national, high quality receptor datasets)
- Improved information on significant historical floods and the impact that they have had (e.g. in terms of damage)
- A more detailed understanding of the performance of existing flood defence systems
- Database on flood protection measures and their level of protection
- Better records of historical floods from local sources particularly from surface water
- Sufficient time for defining the methodological approach and general guidance
- Improved knowledge of climate change impacts
- More accurate DTMs
- A database of mean sea levels
- Existing a specific guide establishing precise thresholds for term “significant floods”.

3.28 Main obstacles to producing the Preliminary Flood Risk Assessment

Respondents were asked what the main hindrances there were to them producing their PRFA. A number of responses were given. These are summarised below:

- Uncertainty and a lack of experience in defining terms and/or applying methods
- Lack of quantitative information on flood damage from previous floods
- Lack of a defined compatible catalogue of national datasets
- Lack of an accurate DTM
- Closer engagement with the EC
- Delay in the timing of the guidance on the earlier parts of the FD and reporting templates
- Information about the value of assets was only available at a local level
- Data availability (e.g. related to protection measures and risk)
- Lack of information on flood protection measures
- The very dispersed sources and the very different types and quality, of data and knowledge, as well as its unstructured nature and lack of data
- Transboundary PFRA designations

3.29 Based on lessons learnt the steps of the Preliminary Flood Risk Assessment to be reviewed in the second cycle of the Floods Directive

Respondents were asked to state, based on lessons learnt in the first cycle, as to which steps in their PFRA process would be reviewed in the second cycle. The responses are summarised below:

- Review or revision of the methods used
- Identification of the APSFRs based on the flood hazard mapping prepared for the first cycle of the FD
- More involvement of local communities
- Effects of climate change
- Assessment of the potential adverse consequences of future floods
- Pluvial flood risk assessment
- Quality control of the databases
- Improvement in the DTM

3.30 Based on the lesson learnt the steps of the Preliminary Flood Risk Assessment to be done differently in the second cycle of the Floods Directive

Respondents were asked to state, based on lessons learnt in the first cycle, as to which steps in their PFRA process would be done differently in the second cycle. Many respondents said this was still under review. The responses are summarised below:

- Impacts of climate change
- The identification of APSFRs
- Pluvial flood risk assessment
- Improvements in the consideration of rural impacts of flooding
- Consideration of flooding from other sources (e.g. tsunamis and Artificial Water Bearing Infrastructure)
- Improvements in the consideration of the impacts of floods on critical infrastructure impacts
- Enhancement of cooperation with local governments and civil protection organisations
- Methods of taking into consideration elements such as: geomorphological characteristics, including floodplains as natural retention areas
- Public consultation process was really helpful
- Changes in the designation of the groundwater hazard is foreseen
3.31 Level of satisfaction with the Preliminary Flood Risk Assessment for the first cycle of the Floods Directive

Respondents were asked if overall, they were satisfied with the PFRA for the first cycle of the FD. Their responses are shown in Figure 3-21.

![Figure 3-21](image)

Figure 3-21 Number of respondents who are satisfied with their PFRA from the first cycle
Respondents were able to provide further details which are summarised below.

- Not applicable
- PFRA might be widened, so some smaller stream will be checked
- APSFRs will be reviewed based on the results of FHRM.
- We are satisfied with the fluvial and coastal PFRA. The pluvial flood PFRA will be updated
- A national questionnaire was undertaken with lots of feedbacks about government institutions at national, regional, local levels, local authorities and other types of stakeholders (e.g. private companies insurance). The results of the 208 answers are quite positive
- Not relevant
- We will undertake review and update by 2018
- The PFRA in the first cycle was successful for engaging the 152 newly formed Lead Local Flood Authorities (LLFAs), who have responsibility for local sources of flooding (i.e. surface water, groundwater, ordinary watercourses). We are currently considering with LLFAs the approach to PFRA in the second cycle
- The main objective of the PFRA is to identify the APSFRs that will be the subject of future hazard/risk mapping and risk management planning. Since completion of the second cycle PFRA in December 2011 there have been no significant floods in areas outside of the APSFRs that have already been identified. The second cycle PFRA may not identify any new APSFRs. It is possible that we will be de-designating some APSFRs during the second cycle and the EC will need to consider how this change will be handled

3.32 If undertaken what was the feedback on the public consultation from the Preliminary Flood Risk Assessment for the first cycle of the Floods Directive

If it was undertaken Respondents were asked to summarise the main feedback from the public consultation on the PFRA. There were 22 relevant responses given which are given below:

- We received new information which influenced PFRA. Hearings on thresholds for significance and risk levels were conducted
- The methodology of Preliminary Flood Risks Assessment and results of designation were made available for the public. No comments were received
- Provided that such a consultation took place in the region: on the whole, approval
- The main feedback from the public consultation was that the threshold for appointing flood risk areas was seen as being set too high and a number of municipalities complained about not been appointed as potential flood risk area
- The topic was quite new, especially for locals and public authorities that have a very low frequency on flood hazard
- Historical past floods and vulnerable and problematic areas where reported by local authorities.
- Generally speaking, local authorities without flood event in the past years have underestimated the flood risk
- Public consultation was done, but no special feedback was received
- A large number of stakeholders consultations have been carried out on the preliminary flood risk assessment, even if most of the districts do not made a real public consultation. The main feedback was the surprise or even the misunderstanding of the conclusion because of the large number of people and employment exposed to flooding
- There were no significant feedback.
The most common issue raised in the submissions (that were relevant to the PFRA as opposed to some other aspect of flood risk and flood risk management) was recommendations for the inclusion of locations for designation as AFAs, and/or expressions of concern related to past flooding, or the potential for flooding, of a particular location. A small number of submissions made comment (positive and negative) on the PFRA process.

- Inputs on land use planning at local level.
- There was very little interest in preliminary flood risk assessment by public. No comments from public have been received.
- No PFRA was carried out.
- Increased public understanding and awareness of flood management issues, flood risk scenarios and Floods Directive implementation.
- Not relevant.
- We did not conduct public consultation on PFRA. The PFRA was submitted to regions for their opinions (according to the Water Act). Their comments concerned mainly extension of the PFRA list.
- The public consultation resulted to include another step in the analyse process. We also assessed the number of people living and working within the extent of a 1 in 100 year flood, not only for the highest estimated flood extent.
- The main feedback is a very positive reaction for realising these maps.
- That some of the areas were not included. At first there was some misunderstanding of what a flood risk was. Mostly only flood hazard was understood as the factor for local communities to send us negative feedback.
- Clearly and understandably classify APSFR with regard significant flood and adverse consequences.
- The national agency used the Article 13 exception from PFRA for rivers, sea and reservoirs. Individual local authorities were responsible for consultation on their PFRAs. Feedback was not collated centrally.
- We did not have a public consultation on the PFRA. The PFRA was made available to the public on 21 December 2011 and there were no substantive comments received.
- Generally positive feedback on APSFR designation. Some confusion over APSFRs as these cover the management area and not necessarily the area potentially at risk of flooding. Similarly due to the thresholds used to determine APSFRs, some dwellings/villages are not within APSFRs which caused concern.

### 3.33 What changes were made as a result of the public consultation

Respondents were asked what changes were made as a result of the public consultation. Their answers are given below and in Figure 3.22:

- Not applicable.
- On the grounds of a new information received, after analysis were identified new ASPFR-supplemented information for cadastre.
- There was no change.
- None.
- One area was appointed in addition to the nine pre-appointed flood risk areas.
- Much data was gathered and provided by local authorities all this was revised and when appropriate then taken into account flood extent and affected infrastructure, houses etc.
Interaction with stakeholders permitted to take into account all reported significant past floods and to include in the APSFRs all areas with significant historical flood events.

Not too many, we had to include some APSFR due to previous civil protection plans.

A couple of APSFRs were changed, but mostly due national harmonization than public consultation.

A couple of APSFRs were changed, but mostly due national harmonization than public consultation.

No major change was made some new data have been taken into account.

Based on the submissions made it was considered that there were no grounds given to amend the PFRA process. The APSFRs were hence designated as proposed, taking account of the public consultation.

Most important inputs regarded urban planning.

No comments from public have been received.

APSFR were clarified.

Not relevant.

As a result some areas (sections of rivers) were designated as a future APSFRs (for the second cycle).

Inclusion of some measures. As a result some areas (sections of rivers) were designated as a future APSFRs (for the second cycle).

The extra step in the analysis process.

Some of the areas, which were not covered with existing flood maps, were added as flooded, thus changing the final outcome of the APSFR identification.

Consistent presentation of reasons for selecting areas with a significant flood risk.

While no immediate changes were made as over 90% of flood risk in the country was captured by the definition of APSFRs. The responsible organisation has reviewed the definition of ‘significance’ in respect of more rural areas with a view to further consideration in the second cycle.
Figure 3.22 Respondents who made changes to their PFRAs as a result of their public consultations
3.34 Role of consulting services in the preparation of the Preliminary Flood Risk for the first cycle of the Floods Directive

Respondents were asked about the role of consulting services in the preparation of PFRAs. Sixteen respondents indicated that they made major use of consultants. Figure 3.33 shows the countries which did and did not use consultants. Where consultants were utilised, a summary of the responses are given below and in Figure 3.33:

- Consultants were used to: development of approaches and methods; data compilation; carry out hydrological and hydraulic modelling, verify modelling and calculations and support in preparing maps
- Consultants contributed knowledge and specific research
- Consultants carried out peer reviews

Figure 3.33  Role of consulting services in the preparation of the Preliminary Flood Risk for the first cycle of the Floods Directive
3.35 Areas of implementation of the Preliminary Flood Risk that could benefit from research

Respondents were asked which specific areas of implementation of the PFRA could benefit from research. These are given below:

- Hazard assessment as well as exposure assessment are quite good in our country, vulnerability and uncertainty assessment could benefit
- Not applicable / relevant or no research suggested
- Determination of more precise criteria for significance; more precise identification of number and delineation of ASPFR; integration of climate change impact
- Effect of climate change
- Methodology of the PFRA and the methodology for flood mapping was based on research of flood risk management
- Further development of damage functions/damage evaluations for the assessment of adverse effects, in particular for non-monetary damages (e.g. culture, environment, human health); improving knowledge on hydrology and climate change as foundations
- The assessment of the potential adverse consequences of future floods including the estimation of long-term developments in flood prone areas and the impacts of climate changes divided on the different flood sources
- There are two areas, where flood risk is further investigated. These areas are named as a flood risk areas, still no maps were compiled cause the characteristics of flooding is unclear, may be caused by improperly working stormwater systems. Further studies are ongoing there
- Climate change and the hydrological regime and probability of flooding
- Estimation of ice jam and frazil ice flood likelihood as well as other special flood risk scenarios
- All data and modelling parts of the PFRA would benefit from flood risk management research
- Research on indirect risks. Research on residual risks - improvements of data and methodology.
- Groundwater (excess water) area discretization.
- Impacts of flooding on social and cultural assets, and on infrastructural assets
- More accurate determination of APSFR
- The probability of occurrence of a flood event, and its correlation with rainfall depth and patterns.
- Data on past floods gathered within the PFRA can be used (and are used) by research institutions dealing with flood risk management, environmental protection, crisis management, public health and other fields
- Research on multi-criteria analysis
- Assessment method of attributes of the statement flood risk
- Assessment of vulnerability and susceptibility of society to floods.
- Insurance policies.
- Groundwater flood risk is less well understood, so might benefit
- It may be useful to collate existing, or undertake additional, research into the potential adverse impacts of floods and flood risk management on the natural environment

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5 Frazil ice is soft or amorphous ice formed by the accumulation of ice crystals in water that is too turbulent to freeze solid.
Section 3 conclusions

With regards to PFRAs 20 respondents stated that they had not applied Article 13. Seven respondents stated that they had applied Article 13 to the whole country, three respondents to part of the country and one to some sources of flooding.

With respect to having a database of historic floods only two respondents do not have one at either a national or sub-national scale. The databases generally contain information on the date of the flood (29 respondents), sources of the flood (27 respondents), information on the consequences (22 respondents) and extent/depth of the flood (19 respondents).

With respect to the information available on consequences the main ones recorded were: estimates of economic damage; number of deaths and impacts on human health and the number/types of properties flooded and number of inhabitants affected. Only nine respondents make their databases publically available. In the first cycle 19 respondents said that substantial gaps had been revealed in their databases. Thirteen of these respondents had made the decision to improve the way in which they record data related to floods in the next cycle. Sixteen respondents have developed guidance on how to collect and record data on floods.

With regards to additional methods used by respondents to undertake PFRAs and to identify APSFRs the following methods were used:

- Modelling - 21 respondents
- Expert judgement – 17 respondents
- Sources of historical information – 17 respondents
- Other sources of information – 12 respondents

Respondents were asked if modelling was used in the PFRAs. The main methods used were:

- One dimensional (1D) hydraulic models for rivers – eight respondents
- Two dimensional (2D) hydraulic models for rivers – seven respondents
- Rainfall-runoff and other hydrological models – six respondents
- Other methods used included: for example, broad scale modelling; rapid flood spreading models, 3D hydraulic models for estuary

With regards to DTMs only five respondents stated that they did not have a DTM covering a large proportion of their country and 14 had significantly updated their DTM since 2007. With respect to digital inundation maps the same five respondents do not have maps covering a large proportion of the water bodies in their country. Twenty respondents had created or significantly updated these maps since 2007. With regards to respondents knowledge of the hydrological characteristics of a large proportion of water bodies that have the potential to be a significant source of floods only two respondents stated that they had no knowledge of this, this contrasted with 7 respondents who stated that they had no knowledge of the geomorphological characteristics of a large proportion of water bodies that have the potential to be a significant source of flooding.

With regards to man-made flood defence and their location and dimensions 14 respondents said they had got good information and 13 respondents said that they had moderately good information. As a result of the FD 24 respondents said that they had partly or strongly improved the information on the location of flood defences.

The term “significant flood” was found to be somewhat subjective by two respondents. However, when asked 15 respondents said that they were going to retain the definition of significant flood for the second cycle of the FD with seven respondents say no and nine respondents either did not respond or gave an obscure response. Respondents were asked if they would retain the same definition of “adverse impacts/consequences” to receptors for the second cycle of the FD, 16
respondents stated that they would, six respondents said they would not and nine respondents did not reply or did not give a clear answer. Many respondents stated that they were reviewing the definition.

Respondents were asked about climate change and its influence on significant floods and what information would be useful for the second cycle of the FD for identifying APSFRs and adverse consequences. The most popular responses can be summarised as:

- Greater reliability and granularity of climate models to help reduce uncertainty in analyses particularly with regard to change in frequency and intensity of extremes in rainfall, sea level rise, storm surges and river flows and floods
- Requirement for future receptor datasets and predicting future change in receptors and their vulnerability
- Common/agreed future horizon would enable a broadly consistent approach to compare future impacts

Fifteen respondents said that they had carried out research into climate change and its influence on the occurrence of significant floods and that the outcome of this research was used. A further seven respondents had stated that they had carried out this research but that it had not been used.

The main factors that respondents said would have improved the PFRA included:

Better datasets (e.g. better information in particular for cultural heritage and economic activities national, high quality receptor datasets)

- Improved information on significant historical floods
- A more detailed understanding of the performance of existing flood defence systems
- Better records of historical floods from local sources particularly from surface water
- Sufficient time for defining the methodological approach and general guidance
- Improved knowledge of climate change impacts on hydrology
- More accurate DTMs
- A database of mean sea levels
- Sufficient financial resources for the assessment
- Improved transboundary coordination
- More active public participation
- Existence of a specific guide establishing precise thresholds for term "significant floods".

The main obstacles to producing the PFRA were seen by respondents as being:

- Uncertainty and a lack of experience in defining terms and/or applying methods
- Lack of a defined compatible catalogue of national datasets
- Lack of an accurate DTM
- Lack of a full understanding of data quality, coverage and consistency
- Closer engagement with the EC
- Delay in the timing of the guidance on the earlier parts of the FD
- Information about the value of assets was only available at a local level
- Data availability on protection measures
- The very dispersed sources and the very different types and quality, of data and knowledge
- Transboundary issues
Most respondents said that they were still reviewing the lessons learnt from the first cycle of the FD related to PFRA. However, some respondents said that they would carry out the following differently: impacts of climate change and the identification of APSFRs.

With regards to the level of satisfaction with the PFRA, 15 respondents said they would undertake a review by 2018 and a further 11 respondents will update their PFRA by 2018.

If it was undertaken respondents were asked to summarise the main feedback from the public consultation on the PFRA. The answers from respondents varied between some respondents stating that no significant feedback was received to some respondents stating that the feedback influenced areas deemed to be at risk of flooding (e.g. with respect to threshold levels). Some respondents stated that the public consultation had helped to increase the public’s understanding of flood risk and some said that it led to misunderstandings. Respondents were asked what changes were made as a result of the public consultation. Many respondents said that they had made no or few changes. Some respondents stated that they had additional APSFR had been identified.

Respondents were asked about the role of consulting services in the preparation of PFRAs. A summary of their responses are given below:

- Consultants were used to: development of approaches and methods; data compilation; carry out hydrological and hydraulic modelling, verify modelling and calculations and support in preparing maps
- Consultants contributed knowledge and specific research
- Consultants carried out peer reviews

Respondents were asked which specific areas of implementation of the PFRA could benefit from research. Some respondents stated that this was not applicable/relevant or did not provide a response. Five respondents mentioned climate change and its impacts. Four respondents stated that more research on the assessment of non-monetary damages (e.g. culture, environment, human health) should be carried out. Further research on flooding sources of flooding not resulting from rivers or the coast (e.g. groundwater, stormwater systems ice jams) was also stated as being useful by some respondents.
4  Flood hazard and risk maps

This section covers the flood hazard and flood risk maps produced as part of the first cycle of the FD.

4.1 Main challenges that affected flood hazard and risk mapping

The respondents were asked what the main difficulties affecting the production of the flood hazard and flood risk maps in the first cycle of the FD. The responses are summarised below:

- Producing maps for a range of different stakeholders (e.g. public, emergency planners, EU) and making them understandable/applicable to them
- Issues relating to lack of and quality/resolution of data (e.g. DTM, river surveys, sea levels, ephemeral flows)
- Dealing with uncertainties and how to communicate them
- Coordination with different stakeholders who have authority over different spatial scales including neighbouring countries and stakeholders who have different priorities in different areas
- Lack of a quantitative methodology for certain types of floods (e.g. flash floods, pluvial floods, groundwater floods, sewer flooding, ice jams) and also which is the most appropriate model or methodology to use
- Lack of data on receptors and their vulnerability and other relevant data sets
- The financial and human resources or extra work required to produce the maps and the programming of the work to fit in with national programmes
- Issues related to the hydraulic modelling of flooding
- Time-consuming computational modelling
- Licensing of key datasets often hindered sharing of information
- Development of web-GIS systems allowing dynamic consultation of maps.
- Hydrodynamic modelling of flows in complete rivers reaches or just in the APSFRs
- There was an insufficient number of experienced experts in the field of flood modelling
- What is needed and reasonable level of accuracy and reliability for such type of document? Is it possible, reasonable and feasible to develop one unique standard/manual/cook-book for development of flood hazard maps? Can existing data and maps be used?
- Regarding 'Flood Risk' at 5 (b) in the FD, reference is made to the 'type of economic activity of the area potentially affected'. This was interpreted as the impact in economic terms on the area; this could also have been interpreted as the simple highlighting of a map showing land use without considering the quantification of the impact
4.2 Availability of documented guidance on the production of flood hazard and flood risk maps

Respondents were asked if there is documented guidance, standards, procedures or manuals on the production of flood hazard and flood risk maps. The results of this question are shown in Figure 4-1. Respondents also provided a link to the guidance, standards, procedures or manuals if they are publicly available.

![Figure 4-1 Number of respondents where there is documented guidance, a procedure or manual for the production of flood hazard and risk maps](image-url)
4.3 Distinguishing between individual sources of flooding in APSFR

In some maps it was decided not to distinguish between individual sources of flooding in APSFRs. If this was the case respondents were asked why was this choice made and what were its advantages. The following responses were received:

- Mainly fluvial floods, (and some lake flooding), have been considered as significant, therefore, distinguishing was not necessary.
- It was kept simple for end users. They have no interest in what the source of flood is, they are mainly interested does it flood and if so how often. There is no real added value to distinguish this on a map.
- The various flood inventories do not integrate information on the source of flooding, so the applied observation-driven process could not distinguished the sources of flooding.
- According to the national methodology maps are prepared only for fluvial floods.
- Only fluvial flash flooding was considered to be a source and was mapped.
- Fluvial floods were used for the designation of APSFRs and preparation of flood hazard and risk maps. For pluvial flash floods other methodologies and maps of critical points exist which show places where flash flood affect urban areas.
- This was unnecessary, as only fluvial flooding and coastal flooding was considered.
- Not relevant.
- In closed drainage basins it was not possible to make the distinction between fluvial and pluvial flood.
- No distinction was made between different sources in order to make the maps more comprehensive.
- Only pluvial floods were considered as significant therefore distinguishing between different sources of flood was not necessary.
- For the public, it is not of interest what the source of flooding is. The source of flooding is relevant for professionals; however, the groups of professionals, interested in the maps, are very diverse and would in principle prefer different types of maps suited to their information needs.

4.4 Challenges in expressing the likelihood of flood scenarios

Respondents expressed the likelihoods associated with flood scenarios as return periods or percentage probabilities. Respondents were asked what difficulties they had encountered when defining the likelihood of the flood scenario and how were these overcome. The points below summarise the respondents’ responses:

- The method for overcoming the difficulty was not explicitly described.
- No significant difficulties.

Difficulties encountered:

- Coordination with other regions and/or neighbouring countries that work in a different way.
- Communicating return periods.
- Uncertainty in the return periods due to the short length of observed time series.
- Quality of hydrological data, analysis and models that underlie the mapping.
- Aligning definitions of high, medium and low probability events between the FD and national legislation.

Solutions specified:
• Improvement will be made in second cycle by reassessing hydrological analysis and using more consistent methods.
• Use of water run-off maps in ungauged catchments
• New standards have been legally adopted and are being implemented, that include both flooding return periods and flood defence strength
• Description of the probability was: "floods that could take place one in 100 years", giving also the frequency in percentage

4.5 Retention of the same flood probabilities or return periods for the second cycle of the Floods Directive

Respondents were asked if they would retain the same probabilities or return periods for the second cycle of the FD. The results are shown in Figure 4-2.

Figure 4-2 Number of respondents who will retain the same probabilities or return periods for flooding from various sources in the second cycle of the FD
If respondents answered no they were asked to provide an explanation why. The explanations provided below were given by MSs who answered no, provided a blank/obscure response but also some who answered yes.

- Probably. It has not been decided at the moment (T=50 years for the high probability could be limited to 20 years, also T=1000 years for the low probability is too high for the development of a strategic planning).
- To be discussed, but it is planned to reassess hydrologic analysis throughout the country.
- Return periods will be review during the 2nd cycle of implementation.
- It is possible. We have currently revised the flood standards (both in method as in the standards themselves). Therefore we should consider whether or not to use the new standards in the second cycle of the FD.
- Unless the evaluation does not say something else. The PFRA will be complemented also with other sources of floods (SE).
- We will consider what probabilities and return periods are appropriate to the second cycle of the FD. We do not envisage any major differences.
- We may change the pluvial low scenario (currently 1 in 200 years plus climate change and intended as 1 in 1,000 years ) if new information enables us to do so. However, there are no definite plans at present.

4.6 Expressions of likelihood understood by non-experts

Respondents were asked which expression of likelihood (return period, percentage or other) they considered to be best understood by non-experts. Their responses are given below.

- Return period is best.
- Percentage is best.
- Both are difficult.
- Another method is best.
  - For most people none of the above expressions of likelihoods are understandable. We presented our scenarios as 'low', 'medium' or 'high' probability.
  - During the flood mapping process and in the maps both (return period and yearly percentage) have been used together. Previously only return period was used. Currently it is felt that the yearly percentage of flooding might be better understood and not mixed to given flooding interval (i.e. next flood in 100 years’ time). Also verbal likelihood has been used because of uncertainties.
  - In our opinion “flood frequency” is better understood by non-experts. “Return period” and “percentage probability” are more specific and more difficult to understand.
  - For most people none of the above expressions of likelihoods are understandable. Presentation of likelihood as ‘low’, ‘medium’ or ‘high’ probability is more understandable by the general public.
  - We have found that relating flood standards to the average life span is useful for communication. For example, a flood standard of 1 in 10,000 years would be explained as “a flood that you would have a 1% chance of experiencing if you live to be 100”, and 1 in 100 would be “once in a lifetime”. Both imply a small chance of occurrence in a lifetime.
  - Return period can be misunderstood, and it is difficult to explain to the public / politicians why two 50 or 100 year floods can happen within the space of just a few years at the same place. Annual exceedance probability can convey the risk in a better way (as a percentage chance of a flood of a given magnitude happening), but this can be more readily understood in terms of ‘odds’, such as is used in betting, i.e., “There is a 1 in a 100 chance of that flood happening in any given year" (for a 1% AEP event)"
The Act on Flood Protection states “flood with the probability occurrence once per N years”, because the definition is sufficiently clear and explains both ways of expressing

- Cannot tell which method is best
- Question not answered explicitly

4.7 Change in way likelihood is expressed for the second cycle of the FD

Respondents were asked if they would change the way likelihood is expressed in the second cycle of the FD. The results are shown in Figure 4-3.

![Figure 4-3 Number of respondents who will change the way likelihood is expressed for the second cycle of the FD](image)

If respondents answered yes they were asked to explain why. The answers of respondents are given below:

- To be evaluated
- Maybe so that people can better understand the meaning of the flood maps. We have used return period in the first cycle of the FD
Possibly as the national flood standards will change. In 2015 the new standards were legally adopted, which include both flood return periods and strength of flood defences and dunes. These standards are being implemented now

- This is under consideration
- We will review the language used
4.8 Consideration by Member States of man-made flood defence infrastructure in modelling

Respondents were asked how they considered existing man-made flood defence infrastructure in their modelling. The answers are shown in Figure 4-4.

![Bar chart showing respondents' consideration of man-made flood defence infrastructure in their modelling](image)

Figure 4-4 respondents' consideration of man-made flood defence infrastructure in their modelling
If respondents stated that man-made flood defence infrastructure was “partly” or “not considered” in their modelling they were asked to explain why this was the case. The answers received are provided below.

- For some areas the Natural Hazard Risk Assessment and Overview was applied. This system neglects flood protection measures owing to the applied DTM. In principle residual risk areas are mapped up to 1 in 300 year return period floods, for areas with higher safety standards (e.g. bigger cities) there are no residual risk areas.
- Only considered it partly. If a protection has an influence on topography, it is taken into account where models are available
- There are no significant flood defences
- Hydrological data generally does not comprise impacts of flood protection measures. Dams or technical measures (flood defences.) are included to the hydraulic models
- Flood defence infrastructure has been considered in computer-modelling of the flood events. However, a reliability analysis of existing flood defences was not performed. Flood defences failed when the surge level was higher than the height of the defence
- We do not have infrastructure designed/defined just for flood defence. However, when compiling maps LIDAR data was used and higher ground and obstacles were taken into account
- In some flood protected areas it might have been useful to perform a more accurate flood inundation modelling for flood defence overtopping for low probability flood events
- The regulation regarding flood defence infrastructure was reinforced in December 2007 then revised in May 2015. We are still working on localisation, dimension and hazard assessment, for some man made flood defence infrastructure
- In our methodology the possibility of dike failure and the potential defence work are both taken in account
- Partly considered given that some of the flood defence infrastructure was put into place following the mapping of the APSFR.
- If we would have considered them, then the flood hazard and risk maps would have shown practically no risk of flooding. Now they show the risk of flooding in the case that a flood with the same return period as the design standard would cause flood defences to breach. Therefore it shows the potential flooding which would occur without flood defences
- Flood defence infrastructure has been considered in computer-modelling of the flood events.
- The municipalities at local level are asked to provide the information available for the flood hazard mapping. The existing flood defence infrastructure are included but not the planned infrastructure. This will change with time so there might be a need to update the maps during the second cycle
- They were evaluated but only to a limited extent because after applying the methodology of the preliminary assessment of the significance of flood risk were areas with existing flood defence infrastructure where the most significant flood risk is omitted due to a misapplication the methodology under the FD
- Fully considered, but with residual risk areas also mapped
- We have used the best available information to enable a consideration of the influence of defences. As noted, this information is incomplete and, given the scale of modelling, there are limitations/simplifications in the application to models. This is an area we are seeking to develop
4.9 Consideration by Member States of the failure of flood defence infrastructure

Respondents were asked if scenarios with flood defence failure were considered. The results are shown in Figure 4-5.

Figure 4-5 Respondents’ consideration of scenarios with flood defence failures
If respondents chose “yes but not for all significant risk areas” or “no” they were asked to provide a further explanation. The comments of those respondents who provided comments are given below:

- Areas with hazard zone plans applied usually consider failure scenarios
- For coastal area failure of sea defences were considered
- In the urban area flood defences are not dikes or walls but underground storm basins. There is no risk of failure
- In the approved methodology there is no scenario envisaged of flood defence failure, demolishing of dikes or river engineering works
- No significant flood defences exist
- Failure scenarios were not considered. Failure of dams is part of the crisis system. Failure of flood defences and mobile flood protection was not considered. The space behind these structures is conceptualised as a space with residual risk after a flow has achieved a higher value than design flow
- Failure scenarios were not considered owing to the lack of data and knowledge about the defences. Furthermore, an appropriate GIS-based application was missing to simulate defence failure of about 1,100 km of flood defences
- We do not have infrastructure designed/defined just for flood defence
- Flood defence failure was not considered as the failure of a dyke can happen anywhere (these scenarios are very theoretical). Dam breaks are considered in Dams Emergency Action Plan. The dam break likelihood is very low. Levees or longitudinal flood defences are small, and do not have an important effect on flooding for large return periods
- Flood defence failure scenarios are considered in separate dam safety legislation which covers approximately 500 dams. Special emergency action plans have been drawn up for important dams whose failure could endanger lives health, property or the environment
- Scenarios with flood defence failure were considered where hazard assessments of the flood defences were available
- Defence failure was only considered in areas where water levels are retained at a significant height above ground level in the vicinity of populated areas. Defence overtopping was however considered and modelled for all flood defences in all APSFRs (where defences exist)
- They were considered in areas where these events typically occur; where this is not the case monitoring will be implemented in order to identify possible critical situations.
- It was considered that it is not possible to predict where exactly flood defences will fail, so selecting some particular scenarios seemed as very incomprehensive approach. All flood defences in Lithuania are overtopped by floods with return period of 1000 years. Flood hazard maps prepared for floods with return period of 1000 years are used as a rough estimate for possible defence failure consequences.
- No because in this case two sets of maps would be needed to show the “failure scenarios” efficiently and because our flood defences are all lower than the 1 in 100 year event so this represents a situation comparable to one without any protection measures at all which comes close to a scenario in which the failure of flood defences was considered
- Scenarios with flood defence failure were considered, but not for all significant flood risk areas. It has been done for the areas, where the flood protection dams were not renovated after construction in the 1960s
- Failure scenarios were not considered. Failure of dams is part of the crisis system.
- Because of a low probability for producing and it is not required by the Directive.
- The new flood hazard maps are produced with a very accurate DTM. The residual risk should be known by the municipalities
- No, however modelling for our national flood risk assessment considers the probability of failure
• Flood defence failure was considered in terms of overtopping in extreme event scenarios only (i.e. no breach analysis was undertaken)

• We considered the influence of structures and the flood extent if not present. However, we have not explicitly considered a defence ‘failure’; this is an area for consideration and development in the second cycle

4.10 Missing information required by Members States to model flood conveyance routes and extent

Respondents were asked what data, information and tools were missing to overcome the challenges in modelling flood conveyance routes and extent and how the gap can be narrowed. The answers provided by the respondents are given below.

• Not applicable or relevant, or no specific missing information specified

• 2D modelling is required:
  • For modelling flood conveyance routes 2D modelling is needed. This requires too much computational power. At the moment this is only done for limited areas where it is known to play a significant role in the flooding problems
  • Development of hydrological and hydraulic model for the sewer network
  • Topographic survey should be older on minor waterbed; the cost of modelling
  • Lack of DTM with sufficient accuracy and lack of data on settlements cadastre
  • Stream flow measurements during flood events to be used for model calibration

• The following were missing in some cases: Basic hydrological data this was solved by using precipitation-runoff models; High-resolution and up to date digital terrain data which can be procured through aerial surveys in the coming years; Knowledge of the management of installations in the event of flooding; Investigation into the impacts of further causes of extensive water logging (e.g. heavy rainfall, high groundwater levels); Data in particular on catchment areas with artificial drainage systems

• Tools for modelling the flood conveyance routes and flood depth are available. Data and tools for simulating the failure of flood defences e.g. the process of a flood defence breach, is missing. In the second cycle GIS-based tools will be developed and applied

• More data could be always useful when modelling. Specific hydrological monitoring in flood risk areas is important to have for more accurate forecasting and compilation of maps. For the second cycle the aim is to investigate the impact of waves

• More detailed topographic data (Lidar) could be used at the 2nd cycle where the analysis would be more focused.

• Computer time of modelling in large rivers

• Modelling of fragile ice jams is challenging due to lack of initial data of suitable models and/or data (weather, ice, river topography) needed for the modelling. A method to cost-effectively model the ice jams with all the relevant uncertainties related to them is under development. As almost the whole country is being covered by a high quality, LIDAR-based elevation model for the second cycle, a restrictive thing is the lack of river bed topography information in some places (which is not possible to obtain as cost-effectively as the terrain data, as the methods are more expensive and the number of end users is much smaller). A cost effective way to obtain the river bed and coast topography is needed

• An accurate DTM, hydrological data from all river basins, and reliable models. The gap is already narrowed

• Higher quality DEM data is needed to begin with. But additional data on roads, culverts, local channels etc. will be needed to perform better modelling at micro-scale. These gaps will likely be
narrowed step by step - first by acquiring and using better DEM data and then by collecting additional data for micro-level modelling on a case-by-case basis, where it is most needed and/or required for projects.

- More subsoil information is necessary to improve the dike stability estimation.
- While there are well established hydraulic modelling packages and techniques for surveying and modelling topographical information relating to the river and floodplain hydraulics, the greatest data shortfall was in the area of hydrometric data, to inform both (a) hydrological flow estimations, and (b) hydraulic model calibration. Calibration data in general is always in short supply.
- Especially in our river systems, which are highly dynamic and characterized by a strong platform mobility, a denser coverage in terms of geometry of channels and floodplains, river discharges sediment loads are needed in order to inform modelling and have more reliable outcomes. EU remote sensing data, for rivers with a certain width, can be easily used for this purpose if EU investments are made to develop sounder and reliable interpretation tools.
- To do this it would be useful to have better models, better climate models, a more precise topography, more financial resources and more human resources in order to perform a better validation of the model on site.
- The flood caused by ice jams was not modelled due to lack of tools. For the second cycle we are planning to cover this field.
- Modelling floods is complex because of: uncertainties regarding the strength of flood defences; uncertainties regarding what combination of hydraulic loads will occur (this is a probabilistic problem); uncertainties in how a flood will propagate once a flood defence or dune has breached or is overtopped.
- While modelling the flood, we did not have information about mobile/temporary flood protection systems. In the second cycle we are going to inventory of these objects and use this for the construction of models.
- DTM with sufficient accuracy LiDAR. Development of hydrological and hydraulic model for coastal floods. More stream flow measurements. Improvement of the water resources monitoring network.
- Depending on the resolution of the DTM, some elevation details cannot be obtained and for flows with greater likelihood of producing the modelling results are imprecise. If the DTM is high detailed, it is a problem because the computer programmes are limited for huge number of data that can be processed. Another problem is the flooding limit in floodplain (or nearly flat area). Selection of the season of floods in terms of setting the resistance coefficients which it was resolved by setting maximum values of coefficients at full vegetation.
- Modelling of culverts, blockages and pumped catchments is challenging, as is sub-surface drainage.
- Initially models were 1D, but latterly our models are 1D/2D. Initially separate models were required to model rivers and culverts and latterly integrated models have become the norm. Challenges in modelling have largely been overcome by advances in technology.
- Extended LiDAR information would be useful and improved formal defence and other structures information would assist in improving understanding (currently being planned).
4.11 Modelling tools used to prepare the flood hazard maps

Respondents were asked to provide information on the modelling methods used to prepare the flood hazard maps. The options they were given are shown in Figure 4-6. If respondents chose “other” methods they were asked to describe these. The responses to this question are given below:

- 1D semi-automatic models in 42 of 122 of the APSFRs mainly for extreme events
- A broad range of different models has been used, depending on the geographical location and the authority carrying out the study
- Coastal GIS level projection
- Pluvial flooding with 2D and a quasi 2D combination
4.12 Representation of uncertainty in flood hazard maps

Respondents were asked if the uncertainty was modelled in the flood maps and if so how. Sixteen respondents indicated that uncertainty was not generally represented. Of those who did represent uncertainty in the flood maps they stated the following:

- In some cases uncertainties regarding results are presented as deviation of the hazard line
- It is explained in background document
- In order to overcome the uncertainty for the main rivers, a sensitivity analysis of the floodplain area and the runoff depth was conducted which quantifies and indicates the uncertainty in the flood hazard maps. The following cases regarding the hydrographs used in the development of the flood hazard maps were applied: the average-case hydrograph, resulting from average conditions for hydrological input and hydraulic parameters; the severe-case hydrograph, resulting from severe conditions for hydrological input and hydraulic parameters; and, the moderate-case hydrograph, resulting from moderate conditions for hydrological input and hydraulic parameters.
- The uncertainty is represented by the low probability events in the hydrological extrapolation.
- The upper and lower (or outer and inner) ranges of potential flood extents for a given flood event probability are determined and mapped using information from the sensitivity analysis (e.g. increased / decreased flood flows, roughness parameters)
- No, uncertainty is provided in the description (methodology) of the maps, but not directly represented in flood hazard maps. Estimated uncertainty for fluvial/pluvial flooding maps corresponding to 10 year return period +17 cm, 100 year +25 cm, 1000 year +30 cm. Estimated uncertainty for sea level rise flood maps corresponding to 10 year return period +5 cm, 100 year +8 cm, 1000 year +10 cm.
- Uncertainty is explained in the explanations accompanying the maps. Indirectly, the flood hazard maps represent uncertainty in several ways: 1. Providing a data layer (‘potential flood-prone area’) where the largest flood extent (lowest probability) is extended by expert knowledge. This layer expresses that there is a possibility (which does not result from the models because of modelling assumptions) that these locations can be flooded, 2. Choices in the legend classes; these are large enough, so that they do not show a false accuracy in flood depth (e.g. in cm); 3. As a user you are not able to zoom in further than what is advised as an appropriate application scale
- Yes. It has been resolved by expert judgement, by previous registered flood extent and levels.

4.13 Changes being considered to the methodology for the production of flood hazard maps for the second cycle of the Floods Directive

Respondents were asked based on their experience from the first cycle if they were considering changing the methodology used to produce flood maps and if so why. The answers provided are given below:

Except for three MSs, changes being considered to the methodology for the production of flood hazard maps for the second cycle of the Floods Directive include data augmentation, climate change consideration, more accurate DTM, employing 2D models, adding new sources of flooding or focusing on highly sensitive areas.

- No significant changes planned
- The data quality will be enhanced. Significant changes in methodology are not expected
- More standardisation over the different competent actors in the region
Including as much as possible the hydraulic model results, because it is the only way to get the flood depth
We should improve the precision of runoff with an amount of 1 m precision, we will adapt the 1 in 100 year flow scenario with a method to compare right riverside with left riverside we will continue the modelling on different rivers
Improving the accuracy when delineating flood hazard
A wider application of 2D modelling in floodplain areas
We are considering the use of 1D-2D dynamically linked modelling in densely developed areas with flat terrain in the floodplain in order to reduce the uncertainty which was evaluated to be high using 1D modelling in the first cycle
Methodology and preparation flood hazard and risk maps will be used in second cycle
Further harmonisation of modelling software, such as putting different models together at points of intersection requires a lot of work
Keeping methods in line with the latest technology
Further improvements to databases and DTM
If applicable, update the flood hazard maps as required, i.e. calculations submitted by project developers for approval by water management authorities must be based on the methods outlined in the flood hazard map
The assessment of the reliability of existing flood defences will be improved, since the assumptions made in the first cycle, are not sustainable for hazard mapping in the future.
Perhaps a more detailed analysis is preferable in urban areas. However this demands too much effort, time and resources. Of course such an analysis could be useful for the mechanism of civil protection agencies.
Improve the quality of DTM in coastal flooding
Climate change consideration in fluvial and pluvial flooding
No changes planned. Accuracy of some maps will improve because of the digital elevation model will be covering whole country by 2019. In complex flood risk areas, the use of 2D models could perhaps give more realistic information about the flood covered areas
Better association with local authorities will be needed for the next cycle in defining and producing flood hazard and risk maps. Databases will be purchased earlier and research on the best method will be done at the right time
Acquire better topographic data and cross sections, improve quality and consistency of hydrologic analysis, perform more accurate modelling (1D and/or 1D-2D, as needed).
Clearer processes in the consideration of localised structures such as culverts (and blockage), defences and hydraulically significant features on the floodplains
Clearer national standards on the treatment of buildings in the floodplains in the hydraulic modelling approach
More focus on accurate modelling of floodplain flow in urban environments (such as DTM resolution)
Improve data collection and data sharing and implement a dynamic data flow to update the input into models.
In the more critical areas we will use a 2D model because they result in a better accuracy
Flood hazard maps for one river basin district were developed in 2011. However, flood hazard maps for other three river basin districts were developed later and new (better) methodology were used. We are planning to follow this new methodology for next cycle
Keeping methods in line with the latest technology
Specific changes are being considered and discussed. These could include issues such as adapting the flood hazard and risk maps to the new flood standards
We are going to consider new source of flooding i.e. pluvial and ground water floods and unsteady flow for flood simulations

Further improvements to databases and DTM. More focus on accurate modelling of floodplain flow in urban environments (such as DTM resolution)

Through a better DTM (resolution).

In the PFRA we will select entire watercourses with flood risk and for such rivers make models and then presented on maps

We will consider this in conjunction with our business planning for mapping and modelling capability

We undertook new mapping across the whole country for the first cycle. We have no need to do the same so will be concentrating in improving the confidence in models (and maps) at key, strategic and priority areas. This will include a review and update of methods (e.g. wave overtopping for coastal)

4.14 Changes being considered to the appearance of flood hazard maps for the second cycle of the Floods Directive

Respondents were asked based on their experience from the first cycle what changes they were considering to the appearance of flood hazard maps for the second cycle of the FD and why. The responses can be summarised as follows:

- No changes planned or no response provided
- A decision has not be taken yet
- User friendliness improvements of the portal website
- Improvements regarding the representation of uncertainty
- Improving DTM and reflecting this in the hazard mapping
- Improving data collection for the APSFRs
- The areas behind protection measures will be coloured in a different colour in order to raise the awareness that the measures are limited to certain flows only
- Maybe it is necessary to put the hydraulic works on it.
- The number of flood-affected populations to determine with higher accuracy by address points
4.15 Situation relating to flood risk receptors in each Member State

Each respondent was asked to choose a statement on the knowledge or inventory of flood risk receptors that was relevant to their country. The answers are shown in Figure 4-7.

![Figure 4-7 Respondents' knowledge of flood risk receptors](image-url)
4.16 Representation of the uncertainty of the accuracy of data in flood risk maps

Respondents were asked how the uncertainty of the accuracy of data was represented in flood risk maps. Their responses are given below:

- Not applicable / no response provided
- The uncertainty in data accuracy was not explicitly considered in the flood risk mapping
- We only identified the location of the risk. We did not assess the actual risk they might undergo and we did not include the measure which may have been taken at the level of the building to reduce flood risk because there is no inventory of it
- Uncertainty depends on the receptor, some are very concrete, other are less so. For example the precision of the location of a school is over 400 metres and police station is very concrete
- Uncertainty from different sources (data accuracy, climate change, modelling limitations etc., initial and boundary conditions uncertainty) was not considered separately. Total uncertainty was considered by using the following method: Since observations and climate models show that climate change results in an increasing of intensity and frequency of extreme storm events in the country but this could not be accurately quantified, all assumptions and parameter estimations in the modelling were “conservative” (i.e. on the safety side to account of the uncertainties). Furthermore in cases where available data were not very accurate assumptions and simplifying estimation methodologies had to be used. (e.g. since the spatial distribution of population information was not available, affected population was estimated from town planning zoning housing density and aerial photos)
- Flood risk maps are based on spatial plans of the municipality. The spatial plans of some municipalities do not exist or are quite old. It could cause uncertainty. To 2020 municipality has to prepared new spatial plans
- Databases were explicitly cited, uncertainties were communicated and the expert administration was made aware of them. The scale of presentations is limited to ensure that uncertainties have no influence on interpretation; no presentations at plot-level precision
- Compared with similar areas and time series extrapolated. Specific uncertainty evaluation and methodology used is explained in background document
- To overcome uncertainty a new methodology has been developed for the assessment of flood risk (consequences to receptors) based on qualitative indicators
- For the most receptors different spatial information databases were used and were checked and corrected by regional centres. There were some inaccuracy in the databases (both in location and attribute information) that caused some extra work. Exact locations for single buildings or roads was not corrected. Basically locations of the receptors are correctly on the maps, but a lack of attribute information caused some uncertainty about the risk and its impact
- The maps scale was 1:25 000
- The best available information was used, with uncertainty reported where significant. Upper and lower (or outer and inner) flood extents are developed using sensitivity analysis to represent the uncertainty. Uncertainty in other data areas, e.g., receptor types or vulnerability to damage has been accepted but not explicitly provided for (in terms of defining upper / lower percentile bounds) in risk estimates (such as economic damages)
- Describing the level of reliability of the different layers used
- Uncertainty was not estimated directly for flood risk maps, uncertainty in source data was assess by expert judgement
- We scaled the affected population count to threshold values
Information was updated by the field measurements as much as possible, expert judgment was used in some complicated cases.

Uncertainty in data accuracy is explained in the explanations accompanying the maps. In the flood hazard maps, the “zoom level” is restricted and legend classes are chosen with appropriate care.

In order to estimate the number of people potentially affected the number of people registered for permanent residence in flood risk areas was used. This number is uncertain because it does not have geo-referenced address data in all records.

The uncertainties in data accuracy in case of flood risk maps has been treated by consulting the existing data about the flooded objectives from previous floods. Regarding the vulnerability of the exposed elements to flood, there have been consulted the existing approaches in the field.

The most up to date data was used and the data uncertainties were communicated and explained during the process. The risk maps were consulted and controlled by the affected municipality.

In determining the mapping scale the uncertainty of input data attributes of flood risk were taken account of.

Note response to the question of uncertainty and flood hazard maps. This was taken through to the impact/risk stage.

4.17 Changes being considered to the methodology for the production of flood risk maps for the second cycle of the Floods Directive

Respondents were asked what changes are being considered to the methodology for the production of flood risk maps for the second cycle of the FD based on their experience in the first cycle. Their responses are summarised:

- No significant changes are planned
- No decision has been made yet / no response
- Using newly up to date versions of data files. If possible take into account the elevation level of receptors
- A DTM with sufficient accuracy and actual geo-referenced data for un-urbanised and urbanised areas
- A risk ranking classification
- Determination of acceptable risk
- Use of most up to date databases
- In light of the integration of the IPPC Directive into the Industrial Emissions Directive, the selection of risk objects will need to be modified accordingly
- We will consider changes in the method of determining the flood damage based on depth-damage functions. Some of the depth-damage functions need to be further developed and verified. New damage types/categories will be introduced
- No major improvements. The second cycle will be easier since the first cycle's maps and corrected risk receptors could be used. Inaccuracy in building locations will be handled either by using different spatial database or requesting municipalities in the significant flood risk areas to correct data that they provide
- A homogenization of the mapping methods for all APSFR should be developed for the next cycle
- Our flood risk maps are displaying flood hazard maps on the land cover/land use maps plus locations of significant flood receptors. They are not displaying potential economic damages expressed as average annual damages which would be useful for quantitative assessment of the risks and analysis of potential measures. Most likely this information will not be added to the
national flood risk maps in the 2nd cycle but are planned to be developed for priority river basins and for project-level feasibility analysis.

- Inhabitant proportion
- Improve data flow to update the assessments
- The procedure will remain the same except that there will be changes in the methodology
- We have recently revised the flood standards for the primary defences (both in method as in the standards themselves). We should consider if and how to show the new standards for the primary defences in the hazard maps for the second cycle. The methodology for the risk maps will probably remain the same
- We are going to change the methodology of calculating the values of potential losses. Values of potential unit losses for a various land use classes must be updated because it is calculated on the basis of gross domestic product
- The resolution of DTM should be improved.

4.18 Changes being considered to the appearance of flood risk maps for the second cycle of the Floods Directive

Respondents were asked based on their experience from the first cycle what changes were being considered to the appearance of flood risk maps for the second cycle of the FD. The responses are summarised:

- No significant changes are planned
- No decision has been made yet
- No response
- Our flood risk maps exist in PDF and on internet. An “informatics” version is most useful. We will continue to develop this version
- Building environment for electronic publishing and providing web-based access to maps is planned
- We think that in general the appearance of the maps does not require major changes. When the time comes to do the work we may consider minor improvements, and also take into account the EC’s comments on the flood maps appearance
- Flood risk maps will only be produced at two grid sizes compared to five grid sizes now. The municipalities were only using maps of two grid sizes respectively 25x25 m and 100x100 m
- Perhaps, improve the coordination between WFD and FD
- It seems that it would be useful to develop additional "risk maps" for specific users. In some places a lot of overlapping happens.
- Representation of elements at risk
- Maybe it is necessary to put the hydraulic works on it
- Economic activity will be evaluated throughout the map window that is beyond the borders of cadastral area of APSFR
4.19 Role of consulting services in the preparation of the flood hazard and risk maps

Respondents were asked what the role of consulting services was in the preparation of the flood hazard and risk maps. The responses are summarised in Figure 4.7a and the bullet points below:

- Consultants were not used
- Consultants used to undertake/support data collection, modelling and data processing
- Consultants used to undertake/support map production
- Consultants were used to undertake/support hazard map production only
- Consultants were used to support method development
- For the first version in 2007, they had produced maps. In 2013 the administration had developed ArcGIS tools to automate the production
- Taking into account the specific work for maps when producing methodologies and maps
• Careful attention was paid to the INSPIRE Directive and to cooperation with the respective regional authorities responsible for spatial data infrastructure
• Contribution in terms of knowledge by the outcomes of specific research
• No consultancies were used for the risk maps
• Seminars hosted by Working Group F were useful in distilling ideas on how best to present flood risk information
• We engaged with a range of academic and industry representative bodies in the development of key principles and methods applied in the development of the maps. We engaged a range of consultants to deliver the necessary modelling given the extent required and timescale restrictions

4.20 Consideration of using webGIS in the second cycle of the Floods Directive

Respondents were asked if they are considering a move to primarily using webGIS in the second cycle of the FD. Their responses are shown in Figure 4-8.

Figure 4-8 Number of Member States considering using webGIS in the second cycle of the Floods Directive
If respondents answered no they were asked to explain their answers. Thirteen respondents answered the second part of this question, stating that they already had webGIS maps. One respondent said that this had been their intention for the 1st cycle of implementation of the FD.

4.21 Ability of Member States to provide INSPIRE compliant flood relevant spatial data for the second cycle of the Floods Directive

Respondents were asked if their country was prepared to provide INSPIRE compliant flood relevant spatial data for the second cycle of the FD. Their answers are shown in Figure 4-9.

![Pie chart showing number of Member States prepared to provide INSPIRE compliant flood relevant spatial data for the 2nd cycle of the FD]

Figure 4-9 Number of Member States prepared to provide INSPIRE compliant flood relevant spatial data for the 2nd cycle of the FD

If respondents replied “no” they were asked when this is expected to be the case. Four respondents said that INSPIRE compliant data would be ready by the second cycle. All of the other responses did not specify a timescale for the completion of this work.
4.22 Consideration of climate change scenarios in the maps produced for the first cycle of the Floods Directive

Respondents were asked if consideration had been given to climate change in the maps produced for the first cycle of the FD. The answers are given in Figure 4-10.

**Figure 4-10** Number of respondents who considered climate change scenarios in for flood maps produced as part of the first cycle
4.23 Consideration of the impact of climate change in flood hazard and risk maps in the second cycle of the Floods Directive

Respondents were asked how they will consider of climate change in flood hazard and risk maps in the second cycle of the FD. Their responses are summarised as follows:

- Have not decided how climate change will be considered in the flood hazard and risk map in the second cycle of the FD.
- Studies do not clearly indicate a climate driven trend in hazard yet, an anthropogenic driven trend in vulnerability is detectable
- It is our intention to produce climate flood maps
- In the second cycle of the FD the hypothesis used in the first cycle will be used i.e. that the 1 in 100 year peak flood flow will increase by 30% as a result of climate change
- The methodology for preparation of flood hazard and risk maps is envisaged to be revised, considering climate change impact and other flooding sources
- Impacts of climate change probably not to be taken into consideration in the review of flood hazard and risk maps. The climate change models did not provide obvious results of changing extreme rainfall
- On the coast: through additional flood defence height and maintenance of an extension reserve and it will be taken into consideration; however the approach has yet to be discussed in further detail
- Impact of climate change to be considered by updated climate change scenarios for the country.
- Same as first cycle, no changes planned
- Probably the effect of climate change will be presented only for one or two scenarios/maps per area. However, climate change will be taken into account for those catchments where climate change is estimated to rise flood risk (for some of the significant flood risk areas climate change is estimated to decrease flood risk because of less springtime snow melt flooding)
- Climate change can be taken into account if reliable hydro-meteorological data, common on the level of EU, are available.
- We shall take into consideration at least the estimated sea rise in 2100 as in the 1st cycle and try to develop regional model to estimate more accurately the expected consequences of climate change in flood events
- There is so much uncertainty in climate change scenarios that it will be impossible to quantitatively predict how the frequency and magnitudes of floods in the future will change. Therefore, it is not planned to update the mapping based on climate change scenarios. Rather, it should be understood/explained that the probabilities of certain events have a likely tendency to increase i.e. today's 100-year scenario will have a smaller return period in the future. This could be included in estimation of potential damages and in the cost-benefit analyses of the measures but not in the mapping. Perhaps the possibility of change of the nominal return period indicated on the maps should be indicated on the maps.
- Our drought strategy is currently under preparation and the ice phenomena is going to be investigated. Both extremities need to be considered in the next cycle implementation.
- Two potential future scenarios are mapped in the first cycle. These will be reviewed in the light of further national research, and (a) further, more extreme scenario(s) may be considered in the second cycle for flood mapping
- It will be accounted for in terms of controlling parameters for hazard assessment (e.g. peak flows, precipitation patterns, area with probable occurrence of flash floods) and increased vulnerability (e.g. soil permeability, landslide occurrence, sediment production).
After elaboration of climate change scenarios we are planning to integrate this new information in coastal flood hazard and risk maps.

Climate change shall be taken into account in the development of the sea water flood maps.

If the climate change regional models provide obvious results of changing extreme rainfall, the results will be included on the hydrologic model.

The climate change impact should be taken into consideration by increasing flows with approx. 10-30% depends on the river basin by adequate studies.

The climate change impact on the discharge of the 1 in 100 year flood will decrease at the end of this century. This means that it is a very delicate and important way of handling the information in a structured manner in the decision-making process.

By adding an additional scenario!

Climate change will be reflected in the design model boundary conditions forming the basis of flood risk and hazard maps.

We will consider climate change.

The latest guidance will be applied if there are substantial changes to predicted future rainfall/flow used in the development of the flood models for the preparation of the first cycle maps.

We are seeking to improve the understanding of climate change on flood risk. We will review the current information on regional impacts on flood peak changes consider any more specific-scale information and seek to have a broader range of scenarios from which to create maps.

4.24 Communication of future and current levels of flood risk to the public

Respondents were asked if they thought that flood maps should communicate information about the current levels or future levels of flood risk to the public and why. Their answers are given below:

Flood maps should present current levels of flood risk only because…..

- uncertainties presented (climate change, future land use change etc.) should be kept to a minimum.
- the messaging in the maps should be kept simpler for the general public to understand.
- the general public tend to not be interested in long-term future risk.
- did not specify a reason.

Flood maps should present current and future levels of flood risk because…..

- future risk is important to understand for spatial planning.
- current and future risk is important to understand for flood management and measures planning privately, as well as publicly.
- important to sensitise the public (and politicians) to potential future levels of risk.
- did not specify a reason.

Responses in which it was unclear which approach is preferred:

- Maps of flood danger show classification of danger for areas of inundation. The methodology for flood hazard and risk maps is written so that the location of some activity in areas with a high and medium category of danger could be classed as a new risk area. Proposals for land use from spatial plans are shown on flood risk maps.
- This has not been considered yet.
4.25 Most challenging elements to explain to the public in relation to the flood hazard and risk maps

Respondents were asked what the most challenging elements to explain to the public in relation to the flood hazard and risk maps were. In summary, the responses were:

- Consultation not yet finished.
- Difference between hazard and risk.
- Difference between flood hazard maps and the extent of past floods
- Definition of residual risk
- Probabilities
- Definition of return periods
- Definition of “risk”
- Uncertainty
- Modelling methods
- Risk assessment, especially where no floods in recent memory
- Difference and meaning of the maps in relation to other existing flood maps (maps for water assessment tool, maps for insurance risk zones)
- To explain the uncertainties of the hazard level of buildings in particular at the border of hazard scenarios
- The consequences associated with making the maps available: e.g. loss of land value, more difficult access to insurance outcomes of the maps being reflected in company balance sheets; thus some negative attitudes towards the maps
- If they are under hazard/risk of any probability, what are we going to do about it/why haven’t we done it already.
- Moreover, the dynamic character of maps, i.e. the fact that they reflect the situation related to a certain moment in time, is not that intuitive.
- The definition of APSFR
- The definition of a significant flood event.
- The meaning of the maps themselves because they show the result of many possible sources of flooding, which will not happen at the same time and should not happen at all if flood defences remain in place. Showing the potential flooding for each different source, would result in many maps which would not be informative for the public
- For some citizens and planners frequency of updates of maps every six years is not enough
- The most difficult was to explain to the public (especially mass-media) why the hazard maps covers only the APSFR and not all the rivers from the country; It is possible to have floods in areas that are not APSFR (without flood hazard and risk maps).
- Inundation area behind flood defence infrastructure
- Their relevance to an individual householder. It is important to consider the best way to communicate risk to people who live in risk areas. This requires both maps and other information and support
- Explaining the source separation; Explaining the representation of structures (as already noted); Ensuring the appropriate use of the maps

4.26 Feedback from the public consultation on the flood hazard and risk maps

If undertaken Respondents were asked what the main feedback from the public consultation on the flood hazard and risk maps was. This is summarised below.
• Positive comments (not specified)
• Comments raised regarding the accuracy of the maps
• Maps were difficult to understand, lots of information, difficult to read, further explanation needed
• The maps are not consistent with the public’s personal experience of flooding in their local area
• The maps are consistent with the public’s personal experience of flooding in their local area
• No significant feedback on the flood hazard and risk maps.
• Opposition to maps from local governments and land owners in APSFRs
• Receiving of additional data and overcoming gaps and clarifying flood reasons and measures proposals
• Data requests
• Queries regarding whether ‘at risk’ properties will lose their value
• The feedback provided was varied and was rather descriptive in nature.
• The public has not reacted to the flood hazard and risk maps. Professionals wanted other types of maps
• The main feedback is regarding the made efforts for making flood hazard and risk maps. The raising awareness about flooding.
• The general public thought in some cases that the extent of different return-periods seemed alarming
• Positive feedback on the appearance of the maps
• The requirement for a chart scale which would allow the practical use of residents

4.27 Changes made to the flood hazard and risk maps as a result of public consultation

Respondents were asked what changes were made as a result of the public consultation. Many responses specify that few, if any, changes were made. Examples of changes that were made are as follows:

• Overcoming gaps and defining more precisely the scope of flooding in flood hazard maps and receptors of flood risk
• Some information provided by participating interested bodies concerning plausibility was then included. If necessary, improved web access to the maps in future
• A small mistake due to DTM resolution
• Revision of some receptor’s location
• Included another region to the maps on request.
• Changes related to land use planning as a result of local authorities’ requests.
• Some details and functionality related mostly to user interface of the interactive online maps; improving user friendliness.
• Some comments were made in the flood risk management plans in order to make the flood risk management plan, maps and flooding extent easier to understand
• Adjusted cartography map view and map legend so that it is understandable for the general public
4.28 Effects of the publication of the flood maps on insurance premiums for properties inside mapped flood extents

Respondents were asked about the effects of the publication of the flood maps on insurance premiums for properties inside mapped flood extents. Their answers were as follows:

- No, there was no known effect from the publication of flood maps on insurance premiums inside flood zones
- Not known
- No available evidence
- There is a national disaster insurance system
- It is not possible to get an insurance against damaged caused by floods

Seven respondents provided a response that did not directly and specifically answer this question.
4.29 Features of flood hazard and risk maps that go beyond the requirements of the Floods Directive

Respondents were asked if there are features of flood hazard and risk maps that go beyond the requirements of the FD. These are given in Figure 4-11.

![Figure 4-11 Number of Member States who stated that their flood hazard and risk maps go beyond the requirements of the Floods Directive](image)

If respondents answered yes they were asked to state what additional features had been mapped and/or what additional maps had been produced and the added value of the features. Added features include:

- Additional receptors such as schools, police stations, cultural heritage sites retirement homes hospitals, potentially polluted sites
- Infrastructure networks (i.e. roads, rail, electric, gas, sewers, pumping stations)
- Wider range of return periods included
- Economic damages and risk
• Maps of flood danger / risk to life
• Details such as flood levels, duration and velocity
• Maps that combine multiple variables and summarise the flood hazard
• Location of flood defences
• Cost-benefit analysis
• Flood type
• Landslide prone areas
• Areas prone to debris flows and debris floods and ice jams

Few respondents gave detailed information on what the additional features were used for specifically, but spatial planning, crisis management, and to support professionals in the industry were all mentioned.

Section 4 conclusions

Respondents were asked what the main challenges were affecting the production of flood hazard and risk maps (FHRMs). The main issues were:

• Issues relating to lack of and quality/resolution of data (e.g. DTM, river surveys, sea levels, ephemeral flows) (16)
• Lack of a quantitative methodology for certain types of floods (e.g. flash floods, pluvial floods, groundwater floods, sewer flooding, ice jams) and also which is the most appropriate model or methodology to use (9)
• Dealing with uncertainties and how to communicate them (8)
• The financial and human resources or extra work required to produce the maps and the programming of the work to fit in with national programmes (8)
• Producing maps for a range of different stakeholders (e.g. public, emergency planners, EU) and making them understandable/applicable to them (7)
• Coordination with different stakeholders who have authority over different spatial scales including neighbouring countries and stakeholders who have different priorities in different areas (7)

Respondents were asked about the availability of documented guidance on the production of flood hazard and flood risk maps. Twenty-three respondents said that they were available and seven respondents said that they were not. One respondent did not respond.

Respondents were asked if a decision had been made not to distinguish between individual sources of flooding in APSFRs and if so why this choice had been made. The reasons given are summarised below:

• Four respondents felt it was not important to distinguish between different sources of flooding because end users did not have an interest in the source and it does not add value;
• Seven respondents only produced FHRMs for one or two sources of flooding.

Respondents were asked what difficulties they had encountered when defining the likelihood of the flood scenario and how were these overcome. Many respondents (11) stated that they had not encountered any significant difficulties with this. Issues related to communication and coordination were mentioned by some respondents. Uncertainties driven by the length of the observational record and/or data and modelling accuracy were also raised. Respondents were asked if they would retain the same probabilities or return periods for the second cycle of the FD. All the respondents said yes except three who did not respond and one that said no. Respondents were asked which expression of likelihood (return period, percentage or other) they considered to be best understood by non-experts. Their views on this are summarised below:
Eleven respondents expressed an opinion that return period was the best way to communicate likelihood.

Six respondents prefer to use percentage, percentage probability or frequency.

Some respondents felt that most people do not understand these expressions or found it difficult to make a judgement and prefer to use qualitative descriptions such as high, medium or low.

Respondents were asked if they would change the way likelihood is expressed in the second cycle of the FD. Only one respondent said yes and three gave no response.

Respondents were asked how they considered existing man-made flood defence infrastructure in their modelling. Seven respondents said that it was fully considered and the residual risk was mapped, 11 respondents said that it was fully considered and six respondents said that it was partly considered. Three respondents said it was not considered and four respondents either gave no response or a response was not clear.

Respondents were asked if scenarios with flood defence failure were considered. Sixteen respondents do not consider this, two respondents gave no response and the other respondents either consider failure of flood defences although some only in areas of the highest flood risk.

Respondents were asked what data, information and tools were missing to overcome the challenges in modelling flood conveyance routes and extent and how the gap can be narrowed. Respondents mentioned that to do this involved the use of a 2D hydraulic model that could be costly and that a sufficiently accurate DTM was needed, as well as suitable calibration data (i.e. in terms of hydrological data and information on historical floods, such as water levels). Some respondents stated that to do this it is important to model ice jams.

In terms of modelling methods to produce flood hazard maps 22 respondents used 1D-2D linked models and 18 respondents used 2D models. Nine respondents used rapid flood spreading (quasi 2D) models. Thirteen respondents used 1D models. Other methods used included simple GIS-based analysis and 3D modelling. Generally uncertainty is not represented by respondents on flood maps (16).

Respondents were asked based on their experience from the first cycle if they were considering changing the methodology used to produce flood maps. Some respondents were not considering any changes. Some respondents planned to improve their DTMs and/or improve the quality of the data used in the processes or use 2D models and take into account the failure of flood defences, new sources of flooding, as well as climate change. Some respondents are still considering what changes they will make.

With regards to changes being considered to the appearance of flood hazard maps for the second cycle of the FD, many respondents indicated that they were not considering any significant changes or had not considered this at present or are in the process of considering this. Some respondents are considering showing the uncertainty, the effects of climate change, producing different maps for different stakeholders and showing the areas defended by flood protection measures.

With regards to receptors 17 respondents said that they had knowledge of or an inventory of the receptors in the floodplain, two respondents said no and the rest did not provide a response.

With respect to the representation of uncertainty in the damage, respondents were asked how the uncertainty of the accuracy of data was represented in flood risk maps. Some respondents stated that this was not explicitly taken into account (7). For many respondents the uncertainty in the data was addressed through background and guidance/accompanying documents. Many respondents did not express clearly how uncertainty of the accuracy of the data was represented in the flood risk maps.

With regards to changes being considered to the methodology for the production of flood risk maps for the second cycle of the FD many respondents indicated that they were unlikely to make any major
changes. Many respondents indicated they were going to use more up to date data; however, this does not necessarily mean that they will update their methodology. Some respondents indicated that they would update the methodology. In terms of the appearance of the flood risk maps many respondents stated that they did not expect to make significant changes to this. Other respondents were still considering changes. Some respondents would continue to develop digital versions of these maps.

Only five respondents did not use consulting services at all during the preparation of the flood hazard and risk maps. Generally speaking, consulting services were employed to either undertake/support data collection, modelling and data processing (13) and/or to undertake/support map production (12). One respondent did not respond.

Seventeen respondents said that they are considering a move to primarily using webGIS in the second cycle of the FD. Three respondents are not considering it and three respondents gave no response.

Respondents were asked if they were prepared to provide INSPIRE compliant flood relevant spatial data for the second cycle of the FD. Twenty-four respondents said that they were four respondents said no and two provided no/an unclear response. There were four respondents who indicated that the INSPIRE compliant flood relevant spatial data would be available for the second cycle of the FD.

Respondents were asked if consideration had been given to climate change in production of the flood maps for the first cycle of the FD. Nine respondents confirmed that they had, 19 respondents said no and three gave no/an unclear response.

Respondents were asked how they will consider of climate change in flood hazard and risk maps in the second cycle of the FD in the second cycle. Some respondents had not decided yet or the matter was a subject for discussion (7). Most respondents were not clear about exactly how they would take into account climate change in their flood hazard and risk maps.

Respondents were asked if they thought that flood maps should communicate information about the current levels or future levels of flood risk to the public. Fourteen respondents thought that future climate change should be communicated on maps, because this would help to raise awareness with different stakeholders of the future flood risk and is important for spatial planning. Other respondents thought that only present-day flood risk should be shown on maps because the message is simpler and the uncertainties are smaller. The response from two respondents was unclear.

Respondents were asked what the most challenging elements to explain to the public in relation to the flood hazard and risk maps were. Their answers varied; however, many centred around the difference between hazard and risk or the definition of risk, the explanation of probabilities return periods and uncertainties.

If undertaken respondents were asked what the main feedback from the public consultation on the flood hazard and risk maps was. Where this consultation was carried out respondents either stated that there was little feedback although some respondents indicated that the public found the maps hard to understand or in some cases that the feedback was positive without providing much detail about this. Respondents were asked what changes were made to the flood hazard and risk maps as a result of the public consultation. Changes included some minor changes (e.g. corrections to DTM, revisions to receptor's locations), not nothing very significant. MSs were asked about the effects of the publication of the flood maps on insurance premiums for properties inside mapped flood extents. Nine respondents stated that there was no evidence it had had an effect, a further six respondents had no information on this or the effect is to be confirmed. In some respondents flooding is not insurable or there is a national disaster insurance system. Seven respondents provided a response that did not directly and specifically answer this question.
Respondents were asked if there are features of flood hazard and risk maps that go beyond the requirements of the FD. Seventeen respondents said yes, 13 respondents said no, and one respondent gave no response. If respondents answered yes they were asked to state what additional features had been mapped and/or what additional maps had been produced and the added value of the features. The most common response was that additional receptors, infrastructure networks and a wider range of return periods were added.
5 Flood Risk Management Plans

5.1 In what stage of preparation is the Flood Risk Management Plan(s) (FRMPs) in your country?

Respondents were asked at what stage of preparation their FRMPs are at. Figure 5-1 shows their responses.

![Bar chart showing stages of Flood Risk Management Plan preparation in Member States]

Figure 5-1 Stage of preparation of Flood Risk Management Plans in Member States
5.2 At what level was/were the flood risk management plan(s) prepared?

Respondents were at what level was/were the FRMPs prepared. Their responses are shown in Fig 5-2.

![Figure 5-2 Scale at which Flood Risk Management Plans were prepared](image-url)
5.3 What is the legal status of the flood risk management plan/s in your country? After its adoption, is there a legal requirement for its implementation?

Respondents were asked about the legal status of FRMPs in their country. FRMPs are a legal requirement through various national legislative procedures for 20 respondents.

Respondents were asked after the adoption of the FRMP if there is there a legal requirement for its implementation. The following responses were given:

- There is a regulation as part of the Water law. There is a legal requirement to consider it and its priorities.
- There is in one region of the country.
- The development of FRMP is legally defined in the Water Act.
- FRMPs were produced for the three parts of the international river basins. Objectives and measures were issued by the Ministry of the Environment as the "measures of general nature".
- Yes the management plans are legally binding and are at the highest level of the planning system. All relevant municipalities are required to implement flood management measures according to the representative flood risk management plans.
- Adopted by the government, FRMPs are mandatory and legal requirements indicated in legislation as well.
- FRMPs are established in accordance with Article 6 of the Joint Ministerial Decision 31822/1542/E103/2010 (OJ B 1108/21.07.2010) and their implementation is mandatory. Upon the completion of the formation of FRMPs, they are approved by Decision of Special Secretariat of Water with the agreement of the National Water Council.
- Yes the adoption is a decree from the central government.
- FRMPs are strategic tools decreed by the River Basin District Coordinator, they all have been published in the official journal on the 22 December 2015, in accordance with the FD. (There are opposable to all administrative decision in the field of water policy to flood risk prevention plan (PPRI) and local urban master plan in the river basin district. There are implemented by local strategies at APSFR level.
- On 9th a March in 2016 the Government adopted the "--a National Risk Management and it was published as a governmental decision. All the measures that are listed in the action plan are confirmed and supported by other official legislations.
- Plans were adopted and approved
- It is planned to adopt FRMP as the Government Strategy (Decree), there will be legal requirement for implementation.
- Yes it will be fixed in national legislation as a regulation rule.
- FRMP are adopted by Order of Minister of Environmental Protection and Regional Development, they are binding to all institutions subordinated to the Ministry of Environmental Protection and Regional Development and have to be taken into account when adopting internal legal acts. However, the plans are not binding to individuals.
- The FRMP describes the types of measures planned in the national flood risk management policy. The individual measures in themselves have legal status and will be implemented.
- Plans are approved by the Council of Ministers in the form of Regulation.
- Yes after adoption it is a legal requirement for its implementation.
- Yes it will be adopted by a decree.
- The FRMP was adopted by the Ministry of Environment as part of the Water Management Plan adopted by the Government.
Yes via local flood risk management plans which must be consulted with flood risk management strategies and are a statutory part of the national legislation.

FRMPs did **not** appear to be legal requirement judging from the answers received from 13 respondents. The answers provided by respondents are given below.

- Not directly. However, the implementation of the measure plan is included in the water management plan. For the Water Management plan there is a legal requirement that states “The management plan, the Government and the authorities are in charge of the application, with regard to reach the results. All studies or impact reports that are dedicated to the public or private draft plans in order of planning, urban or environmental, by or under any regional legislation, include the analysis of the effects of these draft or plans, within the meaning of each of these laws, the implementation of the management plan.
- No
- No. The only legal requirement is the requirement of the implementation of the transposed Directive into national law.
- No, there is no legal requirement for implementation except with regard to the measures already required under existing law
- No legal status for implementation of plan or measures described in it.
- The FRMP is a part of the RBMP, which is adopted by the Government of the Republic of Croatia. There is no formal legal requirement for implementation of the measures because it is dependent on the funding.
- The FRMPs are statutory plans under the statutory instruments that have transposed the FD, but there is not a legal obligation to implement the measures in the FRMP exactly as set out and within the timeframes in the FRMP. The local authorities may adopt the FRMPs.
- Flood risk management plan was adopted by Government as part of the River Basin Management Plan.
- It will be assumed as Government Decision (probably in late 2016)
- It is a guidance document.
- There is no specific legal requirement to implement the measures in the FRMPs as not all of the measures identified will be implemented over the six year lifetime of the FRMPs. Some measures will require further work, such as technical feasibility assessment, consultation with land owners, as well as assessing the impacts on other river functions. Some measures might prove to be disproportionately costly, or it might not prove possible to raise the necessary financial contributions from partner organisations, to enable them to go ahead at this time.
- There is no ‘legal requirement’ for the implementation of an FRMP. The FRMPs set out the measures that are proposed to reduce flood risk in the APSFRs within the life of the FRMPs. While government is committed to achieve the full implementation of the FRMPs, it is acknowledged that priorities may change or that the necessary resources to complete all measures may not be available.
- Non statutory and subject to resources.

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6 Note that there were 33 responses to this question in total because BE provided a response for each of its three regions and the UK provided four responses for each of the countries that it comprises
5.4 What are the most important benefits that drafting the Flood Risk Management Plans has brought?

Respondents were asked to summarise the most important benefits of the drafting the FRMPs. These benefits can be summarised as follows:

- Provided a systematic overview and a consistent method for evaluating all the existing flood risk reduction activities
- Improved coordination and dialogue
- Helped respondents to understand their priorities with respect to flood risk management
- Placed a focus on flood risk and flood risk management in general and especially for spatial planning and risk management at regional and local level,
- The production of one document (i.e. the FRMP) made it easier to inform and discuss flood risk management and prevention measures with a range of stakeholders
- Improved dialogue on flood risks which has led to a better awareness of flood risks
- Engagement and development of partnerships with relevant stakeholders
- Acted as an impetus for municipal flood prevention
- Production of modern and extensive data basis for DTMs
- Production of high quality maps for flood hazards and flood risks
- Production of a programme of measures
- An integrated approach for flood risk management
- The establishment of a justified programme of measures compatible with the priorities of each RBD and the available resources
- Systematization of various flood risk management measures within the FRMP and the associated programme of structural measures
- In wider context the planned measures will be visual in the upstream countries and the effects could be predicted to the national territory.
- A better harmonization, at the RBD level of real time planning (Civil Protection) and deferred time (River Basin Authorities i.e. Competent Authorities)
- Production of high quality maps for flood hazards and flood risks.
- A better mapping and protection of historic and cultural heritage and enhanced dialogue with competent authorities (e.g. Cultural Heritage)
- Cost-benefit analysis of structural measures was performed for all territories where floods pose risk for buildings and inhabitants - no areas covered by the floods directive left unanalysed and questions unanswered wherever use of structural measures would be appropriate.
- Establishment of a strategic document based on which some measures can be promoted and financed through European funds.
- Better integration of WFD and FD measures which enable the consideration of measures targeting the reduction of flooding risk under an Integrated Water Resources Management (IWRM) framework and thus also address the mitigation of water scarcity impacts.
5.5 What were the most important difficulties or dilemmas when drafting the Flood Risk Management Plan/s?

Respondents were asked to summarise the largest difficulties or dilemmas they had when drafting FRMPs. These can be summarised as follows:

- Lack of awareness with regard to risks
- Competing interests (e.g. new housing developments versus risk minimisation)
- Challenges in managing unrealistic expectations from the public that FRMPs would contain “worked up” detailed structural measures for reducing the risks to communities within the AFSFRs
- Preparation for public consultations to ensure that they were concise comprehensible and complete in a way that would effectively manage expectations
- How to assess the benefits of the non-structural measures
- Achieving national consistency that worked to support subsequent local delivery
- Dealing with areas outside the APSFRs
- Establishing and managing links between FRMPs and central funding to local authorities
- Making a decision on the level of detail required in the FRMPs
- The level of integration the FRMPs should have with the RBMPs
- Coordination of the updating of RBMPs with the preparation of FRMPs
- Cross border working arrangements
- Deriving a method for prioritisation that was comparable, uniformly and transparent that was applicable to APSFRs with different physical characteristics as well as institutional and legal frameworks
- Delivering to the FRMPs to fixed timescales whilst balancing operational demands
- Lack of high quality data
- Ensuring the financial resources were available implementation
- Communication of the uncertainties in the FRMPs to the public
- Defining objectives according to the requirements of the FD.
- To define synergies with WF Directive
- Specification of measures - general measures vs. specific projects
- Lack of cost-benefit analyses for all projects to be able to perform economically-based prioritization.
- Programmes of measures for management of sources of flooding for which Croatian waters are not primarily responsible.
- Which measures can be included without having an infringement procedure later on.
- Identification of precise objective values for any indicators to determine where risk level is acceptable or too high.
- Managing unrealistic expectations from the public and political actors that FRMPs would contain “worked up” detailed structural measures for reducing the risks to communities within the AFSFRs.
- Dealing with areas outside the APSFRs.
- Ensuring financial resources are available for the implementation of the measures program.
- Involvement of all actors that have a role in flood risk management cycle
5.6 At what level are the objectives set?

Respondents were asked at what level the objectives are set. Their responses are shown in Fig 5-3.

Figure 5-3 Levels at which the objectives are set
Some respondents provided additional information:

- Four overarching objectives were listed at national level by regional (avoid new risks, minimise existing risks, lower adverse effects during and after floods); and, further objectives regarding objects of protection at regional level or within a river basin district, which could also be relevant at regional level (e.g. security areas for preventative flood protection in regional plans) and at municipal level (e.g. protection for individual properties). The objectives therefore span across all levels of activity of the responsible stakeholders.

- Objectives are set in partnership with the main agency and local authorities; and, objectives can have: a specific, defined target area; a APSFR level target; a local plan district target.

- Multiple level. River Basin District wide and catchment level. Also cross border plans can include country relevant objectives.

- River Basin level and local level.

- There are global objectives and specific objectives elaborated on sub basin level.

- Objectives at national level are to reduce flood risks, prevent and mitigate the adverse consequences caused by floods and promote the preparedness for floods. In addition, efforts must be made to minimise the adverse consequences caused by floods in the river basin as a whole. Regional flood risk management groups have during process decided more precise objectives for whole river basin and/or for significant flood risk areas.

- At national level - connected with law coordination; At basin level - to obey the solidarity principle; and, at local - implementation measures for protection in settlements - Ministry of Regional Development and Public Works (mayor) outside the settlements - MAF, governor.

- Objectives are firstly set on flood risk area level. This information can be driven from FRMP in local, municipality level as well.

- Some general objectives are set at central level. Most of the objectives are set at regional level in close cooperation with the local level.

- "Green" and "grey" measures are designed for specific areas. At the national level were proposed policy measures such as flood warning system etc.

- According to the vulnerability of areas at risk different objectives are being set. The main objectives are defined at the RBD level and then downscaled in details at the UoM/local level according to their specific characteristics.
5.7 Would you describe the flood risk reduction objective/s in the flood risk management plan/s as strategic (e.g. providing the framework and/or policies for a river basin) or operational (e.g. setting residual risk levels in individual communities)?

Respondents were asked if they would describe the flood risk reduction objective/s in their FRMPs as strategic (e.g. providing the framework and/or policies for a river basin) or operational (e.g. setting residual risk levels in individual communities). Their responses are shown in Figure 5-4.

![Figure 5-4 Levels at which the objectives are set](image-url)
5.8 What led to this approach to objective setting?

**Strategic approach**
- To clearly distinguish between objectives and measures. These will get mixed up if the objectives are too detailed.
- Flood protection of the main categories receptors; Reducing the hazard and risk floods; and, raising public awareness.
- Objectives mainly derived in accordance with the working group on water’s objectives (see answer to 5.6), further developed and coordinated when necessary at national and international level within river basin districts.
- Objective setting was in the responsibility of the involved municipalities. The objectives were therefore set depending on the local situation and local level of ambition to deal with the flood risk.
- Flexibility and budget needed to implement the measures.
- The definition of the objectives was done at district level with all the stakeholders.
- The purpose of the FMRPs is to manage and reduce risk and hence the objectives need to be set on these terms. A national approach was undertaken to ensure consistency as the objectives are part of the appraisal framework that determines what measures are suitable for a given location, but also the national prioritisation of the measures across all UoMs.
- Objectives were set at central level. Situation is similar in whole river basin district.
- This fits in our national approach of a continuous cycle of monitoring, assessment and improvement (plan-do-check-act).
- These objectives correspond to the stages of flood risk management (prevention, protection, preparedness, recovery and review) and refer to the components included in the definition of risk (hazard, exposure and vulnerability).
- Operational objectives are and have already been set in operational/detailed documents.
- It would be very onerous to undertake fully detailed assessments of the risks and develop potential solutions, for all of the flooding problems in the APSFRs highlighted in the Plans, over the whole of the 1st 6 year cycle.

**Operational approach**
- Small country and thus low capacity on local level for setting objectives on their own.
- Objectives should be measurable and it should be defined what and how measures promote achievement of objectives.

**Both strategic and operational approach**
- The continuity of the plan which has defined 5 strategic objectives already.
- Setting of objectives was based on existing planning document in flood protection strategic objectives from FD. The objectives also integrated long term principles from national flood legislation.
- It is more practical and operational level gives good basis for implementing authorities.
- Clearly evaluable specific goals.
- The flood risk management plans are drafted and decided at the regional level and it is the 1st cycle many of the plans focus on data-gathering and knowledge based objectives and measures. This will result in physical practical measures by time and during several cycles.
- In order to develop holistic plans, objectives were required at a variety of scales; Flexibility to respond to and recognise different scales of issue and delivery responsibilities; and, ability to communicate clearly with communities at risk (i.e. local objectives relevant to local communities).
- Building on what had already been developed.

No response/obscure response
• It was decided that FRMP must include all measures necessary to achieve significant risk reduction, which cover strategic and operational measures and also involvement of different levels of administration.
• Different scales of intervention and application.
• The adopted approach is in conformity with FD goals.
• The existing centralized system of river basin management.
• We decided the current approach, according to art. 7 of FD, because it suits better our institutional architecture.
• European context and country specific
• The limited size of the island

Two respondents did not provide a response.
5.9 Does/do the flood risk management plan/s include a method for monitoring and evaluating the plan's achievement of objective/s in six years' time?

If yes how will the degree of achievement of the flood risk management plan's objective/s be evaluated in six years?

- A framework is provided in the FRMP as it's outlined that datasets of implemented measures will be updated on a regular bases and, therefore, the progress will be monitored.
- Defined indicators (people at risk economic damages ecological tolerance) to evaluate the state of the flood risk. A re-evaluation in six years.
- It will be evaluated by indicators of realisation.
- According to the Water Act a national programmes for FRMPs implementation shall be elaborated.
• System of evaluation is written in FRMPs (Chapter 6.4) Evaluation of 8 indicators will be made. Some of indicators are based on flood mapping.
• FRMPs will be also monitored by SEA procedures as a public plan.
• Local implementing authorities will give a report 2 years before new plan. This information is used when reviewing FRMPs.
• Based on which measures has been implemented. Also defined indicators are given in order to more precisely evaluate implementation of both objectives and measures.
• It depends on the district. Some FRMP have a monitoring method including indicators.
• Review of implementation of specific measures listed in plan by competent authorities in line with EU reporting categories (not yet started, being implemented; implemented). Problem: review of impact of non-technical measures with regard to the objectives needs to be further improved.
• Progress in implementing the measures set out in the FRMPs. This, by extension, will demonstrate the reduction in risk as this is determined for each of the measures at design stage.
• The measures described in the plans have to be implemented and this will be monitored.
• Monitoring will be conducted on the basis of product and result indicators for assessing the effectiveness of measures taken, as well as data on the effect of the investment on the environment. The institutions responsible for the implementation of planned measures are required to report their state of progress. For example objective „Inhibition of growth of flood risks” and „reduction of existing flood risk” will be monitored using the following indicators of the product (PA) and the result (RA):
  1) The relative reduction in the value of average annual flood losses identified under flood hazard maps taking into account already implemented measures AAD [%];
  2) The relative reduction in the number of residents in special flood hazard areas specified on the basis of flood hazard maps taking into account already implemented measures (p = 1%) [%];
  3) The relative decline in the number of objects culturally valuable situated in special flood hazard areas (p1%) determined on the basis of flood hazard maps [%];
  4) The relative decline in the number of objects posing a threat to the environment located in the special flood hazard areas (p1%), determined on the basis of flood hazard maps [%];
  5) The relative decline in the number of water intakes located in the special flood hazard areas (p1%), determined on the basis of flood hazard maps [%];
  6) The relative reduction in the number of objects of social significance located in the special flood hazard areas (p1%) determined on the basis of flood hazard maps [%];
  7) The relative reduction in flood losses in the special flood hazard areas, determined on the basis of flood hazard maps [%];
  8) The relative reduction in potential special flood hazard areas (p1%) determined on the basis of flood hazard maps [%];
• A description of what measures/projects were actually implemented and which not and how they contributed to the reduction of the current risk level (less people at risk, less companies at risk, etc.)
• Implementation of measures to achieve the objectives expressed in terms of flood protection design level with a specified probability.
• We have more than 50 indicators of FRMP progress of implementation.
• The regions have to follow up the plan yearly and report the progress to the Civil Contingencies Agency. The evaluation will contain a summary of the work done, measures taken, together with information about changes in the plan and if the flood hazard maps and flood risk maps need to be updated. The Environmental Impact Assessment will be followed up yearly.
• All objectives have associated indicators (e.g. people/properties at risk economic damages at risk infrastructure, etc.); and, progress can be measured against these and reflect:
implementation of mitigation, improved understanding, methodological development, updated receptor data.

- An estimate of the timing for the implementation of each of the planned measures is contained in the FRMPs. Progress will be monitored by the Competent Authority and reported as required.
- Number of measures showing progression.
- Plan/s achievement of objectives will be monitored through the progress in the implementation of the measures.
- There will certainly be a progress towards the general objective set by the FRMP as there will be construction and reconstruction of structural measures and implementation of non-structural measures depending on the funding. Quantification of this progress will require sub-basin-level and project-level studies but rough estimate can be made based on the amount invested/amount needed to reach the overall objective.
- A complex risk parameter is pre-calculated for every measure. The planned interventions were built into the a system and the expected value is known. After the realisation/execution the final stage will be evaluated in the same way and the difference will be analysed.
- It is planned that all FRMP measures will be included in Government program, with pre-set reporting terms. Progress also will be analysed in second cycle of FRMP preparation.
- It will be evaluated by indicators of realisation based on which measures has been implemented.
- There are indicators for objectives achievement and we have also indicators regarding the implementation of certain measures.
- Yes – as part of the review process of the RBMP.

Four respondents did not provide a response.

If not, please explain why not:

- We are currently developing a system to evaluate the objectives of the FRMP.
- The achievement of objectives is difficult to quantify. On the other hand as objectives are achieved by the implementation of the programme of measures the progress and the effectiveness of the programme of measures implementation can be used as an indicator of achievement of the objectives.
- Defining a method for monitoring and evaluation lies in the responsibility of the municipalities. Some municipalities will monitor regularly, whereas other municipalities not have stated any method for monitoring and evaluation. However, it is expected that a method will be defined at national level to evaluate the fulfilment of the management plans by the end of the six years.
- Only a commitment to monitor achievement of measures implementation. The objectives were previously set in consultation with partners and can be modified for the next planning cycle if needed.
- The reporting sheet imposes only a monitoring of the measures but not for the objectives. The national strategy set up a working group to define indicators to assess the performance of the national policy through the FRMPs, the local strategies and the action programmes.
- There will be applied a similar method as in River Basin Management Plans.
- Actually, the approach exists in that when implementing measures the competent authorities have to follow their progress and efficiency in terms of administrative and technical compliance. The approach is not properly standardized as such but in terms of legal obligations.
5.10 The financing for the measures to reduce flood risk primarily comes from the...

In case of multiple levels please explain:

- Each authority at different levels (regional, local, municipal) is responsible to finance the measures where he/she is responsible for.
- EU funds (non-structural and some structural measures) OPE 2014-2020; national funds (Flood Prevention Programme III); and, private financing (municipalities River Basin Administrators) - co-financing of projects
- Multiple levels. Investment in measures is prioritised according to government policy and in line with the governments national strategy and guidance on economic appraisal. Schemes are normally funded with central funds, partnership funding (local) and local flood defence levy raised by regional committees.
- We are currently developing financial instrument to finance FRMP measures. Currently implementing measures lays on local authorities budget. We are planning to shift this burden in coming years, so that additional funds could be applied for.
Depending on measure. For most important flood risk measures and improvement of official duties central funding is expected. Local scale measures could be funded from municipalities. Some few measures could be funded via private sector.

Most of the measures to reduce flood risk are included in an action programme project or an actions approved by the Prime Minister. Up to 40% of financing comes from the central lev in some cases the European level participates and the remainder comes from regional and local level.

Flood protection and coastal protection measures are financed using funds from the EU, central and state governments and the municipalities. Certain projects have also been carried out as Public Private Partnerships (PPP projects).

Funding is likely to be primarily from the central level for flood protection measures. However, funding will likely be required at the municipal level for local measures and some non-structural measures.

It comes from government, from local municipalities EU funds, enterprises (hydropower producers).

Flood protection measures are subsidized by the state, by various amounts. FPM which are also listed in the catalogue of measures of the WFD (mostly natural retention measures) are subsidized by a larger amount.

Partly they will be financed through the central government and partly through the taxes levied by the regional water authorities.

Many administrative bodies are responsible for implementing measures to reduce flood risk. These are government bodies at national, regional level as well as local authorities. The financing comes from the national, EU and The World Bank funds.

The municipalities can apply for governmental subsidies for taking preventive measures within the municipality. The county administrations might finance some parts of the measures in the plans. And the local level the municipalities need to finance some other measures of the plans.

National government funds schemes to 80% of cost with remaining 20% of cost from the local authorities; additional risk distributed funding to local authorities to deliver other actions (but not ring-fenced); water company funds delivery of its own measures and jointly funds studies/actions with local authorities; national government funds a Flood Forecasting & Warning Service; and, other funding sources are available for surface water management plans and natural flood management actions.

Funding is providing from the national government.

The financing of the measures is covered by EU funds with the contribution of national funds.

The Ministry of Environment (MATTM) funds a relevant part of measures; Regional specific programmes finance other measures.

Each authority at different levels is responsible to finance the measures for which it is responsible. EU funds, national funds.

The measures can be financed mainly from the state budget but they are also taken into account EU regional funds.

Ten respondents did not provide a response to this part of the question.

In case of private sector please explain:

To some extent businesses are obliged, by insurance companies to implement objective oriented flood protection / mitigation measures.

Flanders region: In rare cases.

Individual protection of separate objects (for example resilience of individual houses is financing by its owner).
In the case of private sector funding, this can add to the total funding of the scheme by a partnership contribution e.g. local land owner, infrastructure owner or developer.

In general, section 5 of the Federal Water Act applies: Any individual who may be affected by flooding shall be obligated, within the boundaries of feasibility and reasonableness, to undertake suitable precautions against the adverse consequences of flooding and to minimize damage, and in particular, to adapt the use of land to the potential adverse consequences of flooding for man, the environment and property. Companies subject to specialist legislation, e.g. under the Seveso III Directive, are legally obliged to avoid flood risks in so far as possible. Measures taken to avoid such risks are to be taken independently.

Individual property owners / businesses do have a responsibility to take reasonable actions to protect themselves.

Only in insurance system.

The private sector does not currently play a major role (apart from measures that solely protect properties or assets; e.g. utility companies).
5.11 Funding for flood risk management has generally increased post 2007

Figure 5-7 shows the responses to the question as to whether funding for flood risk management has increased post 2007.
5.12 If your reply to the previous question was "yes", has the Floods Directive influenced this change?

If respondents stated that funding for flood risk management had increased since 2007 then they were asked if the Floods Directive had influenced this change. The responses are shown in Figure 5-8.

Figure 5-8 Respondents who stated that funding increases since 2007 had been influenced by the Floods Directive.

If in part, please describe

- Funding strongly depends on the occurrence of flood events. Usually after big events like in 2002 and 2013 budgets are increased and then constantly decline until the next event occurs.
- Allocation for flood protection projects has increased due to using EU funds since 2007.
- The FRMPs have just been approved. Though the selection of APSFR and FHRMs could have convinced some local authorities to engage actions for flood risk management, it is not the main reason of the increase.
• Additional funding has been allocated to the implementation of the Directive requirements, so far, however, the implementation of measures under the Directive has been carried out independently; and, considerable increase in funds due to flood events that had an impact on Germany (e.g. flooding in June 2013)
• The increase in funding.
• The Directive has influence a risk-based allocation to fund other actions. The FRM Strategies has, in part, informed current/future funding.
• After the 2013 Danube flood remarkable state budget financed measures took place, but their implementation was supported by the Directive as well.
• Because of easily accession of European funds due to EU admittance (2007).
• Partly - undertaking of the National Flood Relief Project to reduce risk

No other respondents provided a response.

5.13 If funding for flood risk management has generally increased post 2007, but the increase was not influenced by the Floods Directive, what was the reason/s for the increase?

• The main drivers are flood events. Better understanding of what and where is at risk. Allocation for flood protection projects has increased due to using EU funds since 2007.
• The increase in funding for flood risk management for the last decade (before the FD) has been mostly linked to the action programmes call for proposal and call for proposal for dykes securing.
• Not applicable
• The inclusion of flood risk management under Malta’s Operational Programme 2007-2013, thus opening the possibility of utilisation of Cohesion Funds.

No other respondents provided a response.

5.14 What was the total budget in EUR for flood risk reduction measures at the national level (including regional and local) over the previous 3 years (if the budget for the last 3 years is not known, please provide the budget that is known and please don’t forget to mention the period of years over which the budget extends!)

• Depending on big projects the annual budgets for flood protection varies between €300 and €400million
• 150Mio€ (nature development along watercourse and in floodplains included).
• Around 65 M€ for the last 3 years (this is mainly to finance the construction and maintenance of the covered storm basins)
• Budget of flood risk reduction measures according Annex 8.5 of FRMPs is 0.28 billion EUR. (2009 - 2015) (This budget not include cost of implementation of FD - designation of APSFR flood mapping and FRMPs and other measures outside APSFR non-structural measures early warning systems)
• At national level the budget over the previous 3 years accounts to approximately 36.8 Mio€. This does not include regional and local budgets.
At national level from July 2011 to July 2015, the total budget for flood risk reduction measures have been about €1,300 million euros, with €524 million coming from the State. Over the last 3 years (2013-2015) the State have contributed more than €202 million for flood risk reduction measures in a total amount of €505 million for flood reduction actions.

2008 238,4; 2009 222,3; The following numbers show the budget, which was reported by the regions to the federal government; budgets of some regions’ programmes might not be included: 2010 228,8 million EUR; 2011 236,9 million EUR; 2012 242,2 million EUR; 2013 200,6 million; EUR 2014 and 2015 not available yet.


17.4 million EUR in period 2010-2015 (from them 15.4 million EUR from ERDF, 1 million EUR form local government, 1 million from central government).

At national level the budgets are: Approximately 3 billion euros for the period 2016-2019. Approximately 1 billion euro for the period 2020-2028. Besides this the regional water authorities also levy taxes part of which are dedicated to flood protection.

The total value of investments into the flood protection during last three years: 171 million Euro (includes the cost of preventive flood protection measures forecasting and warning system and technical equipment for flood rescue work).

Around 800 Million Euros for 6 years. 17 River Basin District and 500,000 km² of surface

The national government has invested around 370 million EUR (£285m) during the lifetime of this current Government (2011-2016). This includes around 60 million EUR (£47m) from the European Regional Development Fund.

In the last 3 years (2013-2015) the funding was about 80 million euros for the investments in structural measures and about 200 million euros for the operation and maintenance of the existing infrastructure and for the operative flood defence.

Through specific Memoranda of Understanding, the Ministry of Environment has funded, since 2010, 1.5 billion euro for flood risk reduction interventions. In particular, in 2015, a special funding programme focused on risk reduction in metropolitan areas has allocated 654 million euro. Budget is allocated till interventions are completed.

2M€ - Flood warning system

In 2013 the total amount for flood risk reduction measures was approx. 65 million. euros, in 2014 was approx. 111 million. euros and in 2015 was approx. 290 million. euros.

The budget allocated for flood risk reduction over the past five years has been in the region of 42.9 million.

The total budget at the national level cannot be ascertained because…

FRMPs are not finalised yet.

The information is scattered among many agencies or local authorities each dealing with the flood risk reduction of its area of interest.

The responsibility of flood risk reduction measures lies mainly at the local level. Municipalities are not obliged to report budgets on flood risk reduction to the government.

No information on that no regional investments in that matter. There were investments concerning temporary flood defence systems, but currently this information is difficult to show on monetary terms.

No information available at the moment of answering.

Lack of data on financing all different type of flood risk reduction measures (especially non-structural) and because of different financing sources.
There are not such figures compiled in our country for the time being. The amount of governmental subsidies has both increased and decreased throughout the years without the influence of the FD. (SE)
Devolved government does not have access to total figures.
Devolved government does not have access to total figures.
Data is not readily available.
We cannot get all the data for all of the financed programs in short term.
Impossible to know there are a lot of actions at the different levels.
It is not yet confirmed

No other respondents provided a response.

5.15 Do you expect the budget for flood risk reduction measures at the national level in the next three years to…

![Budget changes over the next three years](image)

Figure 5-9 Budget changes over the next three years
If available, please provide information on future budgets for flood risk reduction measures in the following box

- Depending on the occurrence of flood events
- The budget is over 105 000 000 € for the next six years
- Not known, technical measures are being developed during implementation of FRMP’s, before that further studies on whether and which technical measure to implement.
- The budget of the Fund for the Prevention of Major Natural Disasters (FPRNM), from where the major part of State budget assigned to flood risk reduction measure comes (192.5M€ among the 202M€ over the previous 3 years), will continue to increase in the next years: 2016 (projections): 204M€; 2017 (projections): 215M€; 2018 (projections): 227M€; 2019 (projections): 227M€; and, 2020 (projections): 227M€.
- Capital budget: €195m (2017 - 2019). This excludes current expenditure, hydrometric monitoring and maintenance.
- We are planning to absorb 29 million EUR from ERDF from 2016 until 2020.
- The cost of the measures indicated in the list of strategic measures was determined on the level of previous years. One of the measures identified in the flood risk management plans is: “Creation of the system of financing activities structured and unstructured with particular emphasis on ensuring funding for the maintenance of the flood system at a constant level of functionality. Many years of practice of water management indicates the risk of a lack of funds for maintenance of flood protection infrastructure in a proper state of repair, providing the desired level of functionality.
- In terms of the plan there should be in the following period of three years implemented measures in the amount of 118 MEUR.
- It was supposed to be raised, but the refugee situation came in between, so the level is roughly the same probably for the near future. (SE)
- A current decrease and a promised increase to slightly higher than previous levels. There is a risk this won’t occur as the currently there is only a one-year settlement from government.
- Future budget figures for flood risk management remain to be agreed.
- As well as our core flood budget, from 2018-2021 the Coastal Risk Management Programme for Wales will provide an additional 194 million EUR (£150m) to lower the lower the flood risk of coastal communities.
- Data not available yet. The budget will be defined after the adoption of FRMP in cooperation with EU funding agencies in central and regional level.
- The budget is expected to increase because of expected funding from the EU structural funds and international loans.
- Funding from EIB. Funding from Cohesion and Development Funds.
- 32MEUR 2016-2021
- Flood risk management once more has been indicated as a priority under Malta’s Operational Programme 2014-2020. The budget allocated for the 2nd cycle of implementation of the FD will focus on the rehabilitation of the existing rainwater harvesting infrastructures and the development of upstream measures. These initiatives will be funded through Cohesion Funds.
5.16 Does your country have a way to keep track of the damage from floods at the central level (including national, regional and local)?

Figure 5-10 Existence of central flood damage records

If yes please provide below

(a) a short description of how this is done and

(b) the organisation/s collecting damage information:

- (a) repair costs for flood induced damages will only be funded if damage data is provided; and, (b) damage data is usually collected on the federal provincial/municipal level and to some extent by consultants
- Information of the damage from flood is collected in case of large flood fulfilling requirements of legislation. Regional government make this investigation at local level (individual municipalities).
- A national storm council is an independent council who handles cases concerning three types of natural catastrophes: storm surge, flooding from waterways and lakes and windfall. The Council handles cases involving compensation following flooding from the sea, waterways and lakes.
- Based on flood damage compensation: until 2014 state compensated flood damages (for floods 1-20a or less frequently) and that information is in database. From 2014 onwards insurance
companies have been responsible for compensation (1/50a floods or less frequently) and we get also that information.

- Based on observed floods: Since PFRA stage regional authorities (ELY-centres) have been able to save data from flooding to national flood information database also concerning consequences and damages that floods caused. This practice will maintain.

- A national natural hazards organisation was born from the shared vision of insurers and the state. From May 2012, the observatory addresses the following needs: improving and capitalising on knowledge of hazards and the challenges they present; providing the basis for an evaluation and prospecting system; contributing to risk prevention management and governance; supporting the economic analysis of crisis management and prevention; contributing to improving a risk management culture. It should therefore provide for: the pooling of information and studies derived from data produced by different stakeholders; the availability of national, reliable, homogeneous information both collected and monitored over time; the sharing of aggregate data or targeted processing operations, further to the public data already available; a common global approach to the different hazards present in the various regions, relayed on a local level; and, the national publication of studies and observations on hazards, the measures in place and results obtained.

- Only to a certain degree in the context of regeneration programmes after major flooding events.

- The number of properties flooded are recorded, through post-flood event data collection (through the local authorities and central government). The financial costs of damage to public infrastructure is also recorded in terms of repair costs.

- (a) Data on damages (mainly in municipal infrastructure) are collected by local authorities then passed on to regional authorities and finally to ministry in charge of administration. These data are also submitted to regional statistical offices and central statistical office. Data on damages in national property (except municipal infrastructure) are gathered by authorities which manage it. These data are passed on to ministers, which supervise them and finally to minister in charge of administration. These data are also submit to central statistical office. (b) Organizations involved in the process: local authorities; regional authorities; different ministers; minister in charge of administration; institutions, which manage national property; and, regional and central statistical offices.

- Organisation, responsible for the collecting of the damage information is the Administration for Civil Protection and Disaster Relief. Actual damage is listed after every significant flood. According to the Decree on damage evaluation methodology. Data on actual damage to buildings, streams and water infrastructure, roads, water supply and sewage network, companies agriculture and cultural heritage is recorded. Data on damage is included in the System for electronic and centralized management of damage assessment in case of natural disasters:

- Flood Commission of municipalities and districts ensure descriptive inventory of damages and quantifying total damages for flood as census of reports by settlements, divided into public and private property, industry, agriculture; b) During flood events at the municipal and district level flood damages are recorded and verified and after the flood damages are summarized of the Ministry of the Environment and submitted to the Government.

- In a way yes since the fire and rescue services have to report their incident reports to MSB. It is possible since 2005 to distinguish between natural disasters and to exclude all water incidents from flood events. The floods that occur and do not require a fire and rescue services incident is not collected. According to the FD we have provided guidelines for how to assess and collect data from significant floods that occur after 22 Dec 2011

- National - reporting during and post flood event / Flood Incident Management, national environmental agency. Regional and Local - local flood partnerships using flood report / register undertaken by risk management authority assigned to lead investigation.
Not formally. We are developing capacity, procedures and tools to enable the coordination of flood event information - that is, what flooded & when, a description of causes scale of impacts. Still to be considered whether this will include an assessment of economic damages. Local authorities will hold further information regarding impacts (e.g. cost of repairs, etc.)

Regionally, we have a financial assistance scheme to provide immediate support for post-flood clean-up to the owners of properties that are inundated by floodwater from all weather related floods. The data from this scheme can be used to estimate numbers of properties affected and to calculate a lower bound estimate of economic damages.

The civil service will collate damages at the devolved and national level.

An Agricultural Insurance Organization keeps a database with agricultural damages (data concerns information about the affected municipalities the date of the event, the amount of compensation, the area of rural land flooded, the number of trees and animals affected). The Ministry of Infrastructure, Transport and Networks keeps a database with households damages (data concerns information about affected municipalities the date of the event and amount for recovery for houses and households).

Croatian waters is collecting information and preparing reports after each flood event, but the data does not include accurate estimates of damages on private properties. Improvements to this process (improving the system for flood event analysis) are planned as a non-structural measure.

Through the regular way of reporting by the Water Directorates.

The National and regional departments of Civil Protection assess the damage after flood events and collect relevant data. Some regional authorities collect and store the same data in a standardised way.

Information is collected by FD coordinating institution from all available sources no specific rules or mechanism is set.

National Flood Information Database.

(a) by Report of Calamity made by a predetermined commission according to the legal framework (Rules for emergency situations management in case of dangerous hydro-meteorological phenomena, accidents at hydraulic structures and accidental pollutions on rivers and coastal area) (b) The Waters National Administration and General Inspectorate for Emergency Situations as members of Local Committee for Emergency Situations.

This is one of the measure of the FRMP. Now we have good information about insurance losses and fatalities.

Nine respondents did not provide a response.

The total damage at the national level cannot be ascertained because…

- The data is spread over the different insurance companies and regional disaster fund. No information about damage in public areas.
- There is not enough systematic information; and, collected information is mainly for public facilities and infrastructure.
- Methodology for assessment of damage costs from flood of Ministry of finance is used by large floods, when the emergency situation is declared in big areas.
- We have had few flooding events in past decades. For these occasions we have insurance data available and information in local municipality. There is no other system to collect data. Discussion ongoing whether guidance is needed for which data should be collected.
- Damage and level of damage to third parties (private households) is not recorded at national level using uniform criteria.
- We do not know amount of compensation paid by insurance companies to cover damages caused by floods.
- Most likely these numbers are gained via insurance companies and since in our country it is not possible to get an insurance for damages caused by floods, there are no such numbers.
- Scattered information available
- Information is held by multiple organisations. There is insufficient coordination. There is a time lag of data collection (although, tools and procedures to address this issue are being developed). The separation of economic damages is problematic - complicated in practice and difficult to reach an agreed figure.
- Data is required from insurers.
- It is difficult to determine and collect the economic damages.
5.17 Is flooding an insurable risk in your country?

Figure 5-11 Insurance requirements for flooding.

If the reply above is "Yes"…

See Figure 5-11 for the combined results of both parts of this question.
5.18 Do you have a methodology for future proofing of measures to enable flood risk managers to respond to the future as it unfolds (e.g. climate change), minimising regrets, in a purposeful and planned way?

Respondents were asked whether they already have future proofing measures to support flood risk management and if so, were asked to describe what these were. The responses are shown below and in Figure 5-12.

![Figure 5-12 Future proofing methods]

If yes please provide detail below:

Climate change and minimising regrets is explicitly considered:

- Cost-benefit calculations are done taking into account changes in benefits due to climate change. (Benefits are calculated as avoided risk).
Continuous adjustment/updating of flood risk management at all levels; For technical measures: extension reserves are planned in some cases; and, so state authorities prefer to implement more resilient and "no regret" measures.

Future scenario flood maps are produced, and this informs the identification and development of flood risk management measures to ensure they are adaptable, or provide for potential future changes now, as appropriate, using the managed adaptive approach.

The design of some types of measures is carried out in an adaptive way (e.g. Levees that can be elevated in time if needed, etc.)

The measures adopted in the FRMP were climate checked.

The most recent understanding of climate change (scenarios, sea level rise etc.) are included in our assessments.

The FRMPs include high level measures detailing how risk management authorities will incorporate climate change allowances into flood risk management works. Domestically the six year programme for investment is refreshed each year so that it can adapt to new risks or changing priorities.

The inclusion of a consideration of climate change in the delivery of actions is not mandatory but is desirable (and encouraged via guidance noted previously). The current approach generally considers development for climate change now rather than future adaptation. Some elementary scoring of adaptation potential has been done in strategic costing & action appraisal.

All structural measures (i.e. flood defence and underground drainage infrastructure) are designed to account for the predicted impacts of climate change on rainfall, river flows and sea levels.

Applying a sustainable approach to the maintenance and management of coastal and inland flood defence assets that allow managers to combat the current flood risk but also plan for the future.

An example of this is consideration of climate change predictions in designing new assets.

Climate change or minimising regrets is not explicitly included in the methods:

- Protection measures are designed for usually 80 year lifetime. Maintenance and repair costs/needs are considered. Due to the uncertainty in climate projections, climate change is not (yet) considered.
- Research on runoff is first set up to define the measure to reduce flooding from runoff; Some measures are first defined as ‘sensitization’ of action before they become ‘legislative’ measures.
- No separate methodology for that. It is possible to select variable measures from FRMP and implement the ones that are most effective (can be also climate effective) in that area.
- No certain methodology, but climate proofing has been one of the factors taken into account in prioritising measures. Also favour of non-structural measures and reassessing plans/measures in six years interval will help in this.

Unclear how response relates to the question:

- We use a multi-criteria analysis (AMC) method with specific methodology for the estimation of flood protection systems. We also use a cost/benefit analysis for smaller projects.

(a) Data on damages (mainly in municipal infrastructure) are collected by local authorities then passed on to regional authorities and finally to ministry in charge of administration. These data are also submitted to regional statistical offices and central statistical office. Data on damages in national property (except municipal infrastructure) are gathered by authorities which manage it. These data are passed on to ministers, which supervise them and finally to minister in charge of administration. These data are also submitted to central statistical office. (b) Organizations involved in the process: local authorities; regional authorities; different ministers; minister in charge of administration; institutions, which manage national property; and, regional and central statistical offices.
5.19 The approach to include flood risk reduction measures in the flood risk management plan/s was mainly…

Respondents were asked to describe their approach to the inclusion of flood risk reduction measures in their FRMPs. Most respondents opt for some combination of options A and B:

A) As broad types/groups of measures at the river basin/coast level

B) As mainly as individual projects at the APSFR level

Where respondents do not opt for options A or B, they were asked to explain their approach.
...otherwise please explain:

Four respondents opted for other, these are their responses:

- FRMPs contain both broad measures (river basin scale) and individual projects (at the catchment scale).
- Where it is determined that a scheme is, or may be viable there is a measure to progress the development of the scheme the 6yr term of the FRMPs. In addition to structural measures a broad range of additional measures are employed in relation to land-use planning, emergency planning, flood warning and informing, awareness raising and self-help.
- Mainly as individual projects either at the river basin scale or at the APSFR level.
- Specific objectives have been assigned with groups of non-technical and technical measures (71 groups of measures) that can be used in the process of flood risk management in the catchment area. Prioritisation of measures as well as their concrete proposals, has been made on the basis of the analysis and diagnosis of the problems of flood risk management in the most problematic areas in water regions and river basin districts (the greatest negative impact of floods on the health and lives of people, the environment, cultural heritage and economic activity). The technical and non-technical measures priorities have been given, from low to high depending on the specific problems identified in catchment areas. Selection of non-technical and technical measures pursuing specific and main objectives was based on multi-criteria analysis (MCA - the method AHP).

Other respondents also elaborated on their response. These are their responses:

- It is included as type of measure on APSFR and national level and if planning/implementation is advanced it can be incorporated in the programme of measures on APSFR level.
- Both, most at water body level.
- Broad types/groups of measures
- Mainly individual projects.
- Both levels
- In some regions: in the area of relevant waters, extensive measures were coordinated within the fields of responsibility of the relevant stakeholders. These measures are implemented by the stakeholders under their own responsibility. For reporting the measures were then aggregated at APSFR level.
- In addition some broad types.
- But further than 20 groups of measures we also listed a list of all the flood risk reduction projects for each of the particular river basin districts.
- Broad strategic measures covering the National & River Basin districts supported and implemented by community level operational measures.
- Both types of measures have been adopted.
- Both: non-structural measures are broad types/groups of measures mostly at the national level; structural measures are specific individual projects that were planned at the river basin level even before APSFR's were defined.
- Both levels, as we report FRMP measures as broad types or individual and we can link the individual projects to them through a dedicated data repository.
- Measures include national level measures and also individual projects for specific areas.
5.20 Further to the previous question, what led to the one or the other approach?

Respondents were asked to describe what led to the approach taken in question 5.19. It is difficult to group these responses but there are some general themes:

**Practicality: the approach fitted with existing resourcing requirements, legalisation, geography or management approach**

- As there are 391 APSFRs in our country with a total investment of €300-400 million year for only one type of measure we decided to put focus on a general overview (by means of resources and efficiency) with having in mind to institutionalising and facilitating the data acquisition on project level during the 2nd cycle of implementation - works are quite well advanced.
- Due to coordination with the WFD measure program, which already used that approach.
- The APSFR area covers the entire district.
- The specifics of the measures according to national catalogue of measures.
- Small country and small APSFRs
- Again, it is up to the involved municipalities to define appropriate flood risk reduction measures. Municipalities did either in relation to individual projects, some of them had already arose before the flood risk management plans, or in terms of broad groups of measures.
- Seemed more practical approach.
- We chose the multilevel approach as it suits better our situation.
- There were known already certain projects in APSFR.
- There are many hundreds of specific measures and it would be impossible to report them all. However because of laws and regulations, these measures can be categorised in broad groups.
- For a better approach due to the organisational (basin level) way of flood risk management in Romania.
- We have brought measures from existing plans and strategies (6 year programme, catchment floods management plans, shoreline management plans) many of which are catchment or community specific. Other measures represent activities that occur everywhere and are non-location specific (e.g. development planning, maintenance). Both broad and individual measures exist and we have represented this in the FRMPs.

**Guided by stakeholder engagement:**

- Greater likelihood of implementation by increasing acceptance using a bottom-up approach and involving stakeholders early on. Municipal responsibilities.
- The aim was to propose concrete set of actions for each area. Such a method is more understandable to the general public and local authority and is clearly evaluable.
- It was evident from our involvement with the stakeholder community, through a series of workshops, meetings and forums, that there was an expectation that FRMPs should explain what measures were being taken to reduce flood risk at the regional level and also would contain more detail on measures at an APSFR level.
- A combination of pro-active strategic direction through the national legislation and responses at local/regional levels to areas of highest flood risk.

**Other responses**

- Concertation during elaboration of plan had permit to identified very targeted project.
- Structural measures is mainly a regional project at APSFR level. Non-structural measures have mainly central impacts.
• Broad types/groups of measures includes mostly institutional/legal regulations for flood risk reduction, concerning mainly prevention, preparedness and recovery (land use management etc.). Individual projects at the APSFR level include mostly target protection measures.
• Assessment of measures should be done anyway at individual level to get as good as possible information about costs, benefits and feasibility. It would be unnecessary to do assessment for individual measures and the form measure groups for evaluation and prioritisation purposes.
• The FRMPs define both objectives and measures at district level and for the APSFR. Local strategies specify measures at APSFR. Action programme implementation, through a contractual program of action, the measures of the local strategies.
• Availability of information on planned structural projects and the specific way in which APSFR's in Croatia were defined (one project may influence many APSFR's). Also, considering that the objectives of the FRMP were set at the national level and that these objectives are such that risks in all APSFR's will be adequately addressed, the measures were not planned at the APSFR level. In the 2nd cycle, connection between the measures and the APSFR's should be further explored.
• Centralized selection from regional proposals.
• Measures are taken to outline design and are mostly APSFR-specific. Catchment-based measures such as storage, are however also identified, along with policy measures such as spatial planning and emergency planning.
• It was decided that FRMP must include all measures necessary to achieve significant risk reduction.
• Finally the flood risks are only reduced by precise flood protection measures at the local level that's the reason why we chose to include rather well defined measures at the local level than only to define types of measures at a larger scale.
• Not applicable
• The flood risk maps are at APSFR level mainly measures are to manage risk at APSFR level.
• This approach enables the identification of concrete measures deadlines for their implementation and the bodies responsible for their implementation. It also enables the implementation of monitoring the measures and their effectiveness.
• Systematic approach.
• We have a lot of different measures. For us the priority is to implement at the first stage the river basin level measures.
• Focus in the Flood Risk Management Plans is on measures for the respectively APSFR area. Most of the measures are specific for the identified area. Some of the measures that the County is responsible for might take the watershed area or the region into account.
• Both. Some are national scale, some are catchment scale and some are locally tracked. The approach provides flexibility and all are reported via FRM Strategies at a APSFR level. Those that are relevant are noted at the Local Plan District Level.
• In this way we can achieve national coverage of Strategies and not only on the APSFR.
5.21 If broad types/groups of measures at the river basin/coast level are mainly included in the flood risk management plan/s, how is the connection established to the APSFR level measures?

Some respondents address connections by evaluating the effects of measures at different scales

- For every measure (at river basin scale) effect should be described (e.g. influence area and how measure will effect APSFR and other areas up- or downstream from it).
- A set of types of measures was established at river basin level and specific projects (investments) framed into each measure are at APSFR level (impact).
- Local Plan Districts have been established as the unit of FRM Strategy reporting and engagement. These facilitate connections and consideration of local actions at a catchment level. Types of measures identified as a focus of further studies will output specific preferred options and feed into Cycle 2.

Other responses

- The types of measures are collected on APSFR level (including state of implementation, anticipated implementation during the next 6 years and priority for the APSFR). This collection of the state of implementation of measures was then summarised and prioritised from a general/strategic point of view on national level.
- Common measures - legislative, methodological, educational as well as other measures applicable in areas out of the limits of ASPFR are planned at national and river basin level. Concrete measures have been planned at ASPFR.
- Broad type and individual measures are included approximately equally in our flood risk management plans.
- Broad types/groups of measures are complementary to the individual projects at the APSFR level.
- For each APSFR we have their measures included.
- The connection is established through the local strategies and the action programmes at APSFR level.
- Our measures are referred to the Unit of Management level.
- No connection for the non-structural measures.
- This connection was addressed previously in the National Flood Relief Project.
- Specific measures for primary flood defences follow from the 12-year monitoring, assessment and reporting of flood protection measures and is compulsory by law. Measures for regional flood defences follow from the regional assessment and are established by provincial authorities.
- By adding the projects, which detail how each individual group of measures is to be actually performed.
- The measures that are taking place at the watershed or regional level will affect the APSFR area. Other municipalities in the region will also benefit from the measures at regional level such as coordination of information, comprehensive information for spatial planning, trainings, practices in crisis communication etc.

One respondent does not deem connection to be necessary as risk reduction starts at the level of APSFR in their country. Six respondents deemed this question not applicable to them. Eight respondents, did not provide a response.
5.22 If broad types/groups of measures at the river basin/coast level are mainly included in the flood risk management plan/s, how will progress in the implementation of the measures be evaluated at the level of the Plan?

Respondents were asked how progress of the implementation of the measures will be evaluated if broad types/groups of measures at the river basin/coast level are mainly included in the flood risk management plan/s, as opposed to individual projects.

Some respondents intend on using indicators to aid evaluation

- As FHRM have to be updated in the frame of setting/implementing measures the progress / risk reduction can be evaluated based on risk indicators (decrease of people exposed) and superposed by a descriptive interpretation of implementing non-structural / planning measures such as early warning, etc. Further, in the frame of structural measure planning/implementation a controlling number of protected inhabitants is assessed and will be also used for evaluation purposes.
- With indicators of realisation.
- Indicators determination is forthcoming.
- Through an indicator that follows each proposed measure.
- Event measures at a national level are represented at APSFR level with indicators; and, ultimately those actions which improve understanding or refine to a preferred action for the next cycle will not have a major impact on indicators but establish a system of development.

Two respondents intend to undertake annual evaluations

- The Counties will perform annual evaluations on the work performed by different stakeholders. The projects will be evaluated towards the goals and objectives for the plan according of reducing the risks.
- Domestically we plan to check progress of the measures annually and communicate this with Regional Flood and Coastal Committees (RFCCs). Measures will be fully reviewed and updated towards the end of the planning cycle.

Some respondents intend to undertake evaluation in line with the FD management cycle

- Evaluation will be done before new cycle. Local authorities/implementing authorities will give overview of implementation.
- The progress in the implementation of the measure will be done by the follow up of the local strategy and its action programmes.
- Progress is monitored by every pertinent authority. This will be summarised for the next cycle.

Other responses

- Flood risk reduction measures will be evaluated at the level of APSFR the same level where the plans have been established.
- Progress in the implementation of the measures will be evaluated through a system of monitoring which will be developed by Water Directorates of Decentralized Authorities.
- Following the level of implantation of them.
- The progress will be monitored by the responsible national agency who will also be implementing most of the measures.
The focus of the plan is to tackle flooding at the catchment scale by focusing on rainwater harvesting.

Flood risk reduction measures will be evaluated at the level of APSFR the same level where the plans have been established.

By checking the implementation of the foreseen projects, which are the detailed measures at particular basin level.

They are used in combination with more detailed community level measures that will be monitored for delivery.

This question was not applicable for five respondents

Eight respondents did not provide a response

5.23 Irrespective of the level of detail of the measures included in the flood risk management plan/s, what is the mechanism for ensuring that measures in one APSFR do not increase the flood risk in area?

Most respondents described that ensuring that measures do not increase flood risk elsewhere is an explicit part of the planning process.

- This has to be analysed during the planning phase. If there is an increase of flood risk for another area this has to be compensated (this is negotiated during the planning process).
- By selecting specific measures; and, the described measures in the draft FRMP are directed to particular APSFR and their implementation should not increase the risk downstream.
- Each APSFR is in a different river basin area. So the measures in one APSFR cannot increase flood risk in other APSFRs.
- The principle that measures did not increase flood risk downstream or upstream the river is observed. Impact of measures is individually considering by proposer. Flood protection of urban areas or selected object is carried out in the country. No systematic dykes along rivers are in our country.
- Measures were systematically analysed and coordinated during the coordination process at national and international level. This aspect is taken into consideration during plan development process.
- In the one cycle of the Directive APSFRs have been appointed without direct geographic connection. The question is, hence, not relevant with respect to APSFR. However, the question is more relevant for risk reduction measures defined in neighbouring municipalities being part of the same APSFR. Here, risk reduction measures had to be defined without having disadvantages for the neighbouring municipalities. Therefore, municipalities were asked to coordinate their measures among each other. In one APSFR three municipalities decided to establish a common flood risk management plan that passed afterwards all three municipal councils.
- Basic requirement are in national legislation - it is not allowed to increase the risk and cause new hazards. Additionally there are measures in FRMP to prevent formation of new flood risk areas and significant flood damages outside flood risk area.
- For every measure its estimated effect should be described (e.g. influence area and how measure will effect APSFR and other areas up- or downstream from it).
- The result of the multi-criteria analysis permit to ensure that the measure do not increase the flood risk in area.
- The models that have been developed are at river system level where appropriate, to ensure measures do not unintentionally increase flood risk elsewhere.
Before the transposition of a measure is started there has to be a study which proves that the transposition of a measure does not worsen the situation upstream or downstream.

This will be assessed in project design stage. Need of flood defences construction should be based on modelling data. There will be applied initial impact assessment procedure for all projects.

By law every measure is checked for this.

Sets of measures for a given problem area were analysed in detail. Hydraulic modelling was conducted to determine the effectiveness and efficiency of the proposed investment measures to reduce flood risk. Cost-benefit analysis were also conducted. The optimal variant was selected on the basis of multi-criteria analysis.

Measures proposed in the FRMP have taken this into account while proposing the measure. Cooperation between municipalities regions and within the water district will assure this. The aspects of the measure have been discussed with the involved stakeholders within the district or region. This aspect has also been a part of the performed Environmental Impact Assessments. All structural measures that include “building in water” need to be approved by the environmental court according to the environmental code in our country. This process will take all aspects into account.

A river basin level approach by checking/addressing the flood risk at level of the whole river basin and not at the level of APSFRs.

Each measure will be designed as a project that must demonstrate by calculation effect in reducing flood risk. Reduction can be quantified as a share of the transformation of flood discharges and to protect adjacent areas with no deterioration parameters of hydrological data for the design flood lower situated area.

When the measures are taken forward locally they go through project appraisal and environment assessment to ensure that they are fit for purpose and do not negatively impact the environment of flood risk.

There is a general awareness of this risk and of the importance of ensuring that this does not occur by modelling all potential solutions on a whole catchment basis.

Ongoing functioning and development of LPD partnerships as Actions move into delivery; the nature of our watercourses - many small and complex but without significant risk of adverse impacts elsewhere; and, as part of scheme development it will have to be demonstrated that there will not be any adverse impact on flood risk elsewhere.

Measures are established on the level of river basin taking into consideration upstream and downstream effects. Measures effectiveness and their impacts is hydraulically tested for high and medium probability. A basic criterion for measures evaluation is no flood risk increase downstream.

The design of the measures at the project level follows the general principle of not increasing the risk in other areas; if there would be an increase of the risk because of one measure, a countermeasure that would eliminate this increase of the risk would also be designed.

Almost all APSFR are in a different river basin area. So the measures in one APSFR cannot increase Flood risk in other APSFRs. For the few APSFR that are in the same river basin area the measures are carefully selected.

The measures are tailored and designed followed a strategy for flood risk mitigation at basin level (similar to rivers that cross a border, principle upstream measures does not affect downstream area).

Other responses are less explicit

The included measures are mostly structural ones and the effects will be investigated by numerical modelling.
Simulation of the impact of that measure on the upstream and downstream affected areas.
Possibly of increasing the flood risk in other areas was assessed for all proposed measures.
The size of the RBMP limits the potential increase of the APSFR given that all these areas are adjacent to coastal areas.

One respondent said that they do not have structural measures connected between different APSFRs.
One respondent responded ‘not applicable’. One respondent did not provide a response.

5.24 How will/are the measures in the flood risk management plan/s prioritised?

Respondents take a variety of approaches to prioritising the measures in their flood risk management plans. One respondent intends to implement all measures and therefore deems prioritisation unnecessary. Seven respondents explicitly described that they included either multi-criteria analysis or cost/benefit assessment in their prioritisation approach. Eleven respondents briefly describe an approach to prioritisation that are specific to their countries. Four respondents did not fully describe the prioritisation approach they undertake.

Prioritisation not required

- All measures will be implemented and budget is available for this. Within specific programmes (e.g. major dike strengthening program after every 12-yearly assessment) the most urgent measures will be carried out first.

Multi-criteria analysis or cost/benefit analysis is included

- We have elaborated a multi-criteria analysis. The result of this informatics analysis has been debated in local communities before to be approved by all.
- Priority: measures a RBD level national level before that APSFR level. Cost benefit for structural measures.
- Both prioritisation and selection of measures are done regionally in flood risk management groups with help of MCDA together with stakeholders. Prioritisation has been based on assessed effects of measures (e.g. flood risk reduction, other benefits, WFD win-win measures) costs, feasibility, adjustability and timetable.
- Structural measures are prioritised by the multi-criterial analysis in the Multiannual Programme that is referred to by the FRMP. A significant criterion is implementability of the measure in the near future based on the status of its preparation. For the 2nd cycle an improvement of the cost-benefit assessment of the measures that could result in prioritisation that is more economically-based is planned.
- Prioritisation will be based on the overall benefit to cost ratio (making use of the MCA outcomes rather than just the economic benefits), but this may be influenced by other factors, such as significant risk to life.
- They have been prioritised according to the following criteria: Multi-criteria approaches: DPCM of May 28, 2015. Note ISPRA 2016.
- Only structural measures are prioritized in FRMP. Prioritization is based on multi-criteria analysis (encompassing cost-benefit inhabitant information, evacuation possibly, cultural heritage and so on.). Prioritization was necessary due to insufficient funds for all the measures and no precise objective values for setting acceptable or not acceptable levels of risk.
The measures have been prioritised by “The Prioritisation Methodology measures for flood risk management based on Multi-criteria analysis with cost-benefit elements” elaborated by the Institute of Hydrology and Water Management and the Romanian Waters National Administration.

Prioritisation is made as the sum of the positions of measures per individual areas in order of each attribute namely the number of protected inhabitants, C/B ratio etc.

Prioritisation is managed locally according to risk management authority plans and Regional Flood and Coastal Committees. Government policy gives the highest priority to lives and homes. All flood risk management schemes should have a cost benefit ratio of greater than 1:1. In addition the FRMP measures are individually given an High/Medium/Low priority rating.

The construction of community level structural measures that are determined to be affordable, are prioritised taking in account their benefit cost ratio and programmed for delivery according to the estimated financial resources provided by central government over the term of the FRMP. Community engagement activities to improve preparedness are also prioritised.

**Specific prioritisation criteria have been developed**

- Overall prioritisation is 1) reliable planning as basis for efficient / effective implementation of measures; and, fostering retention and non-structural measures; 2) ecological oriented (structural) measures; 3) structural measures; on APSFR level by analysing the state of implementation of different measures and the local need for action - which means more or less expert judgement.
- The prioritisation of flood risk measures start from an already performed prioritisation within the scope of the WFD. The criteria used for the prioritisation within the WFD are cost efficiency, feasibility, economic analysis, and urgency. The prioritisation results in a classification in 2 classes. For the final flood risk prioritisation, all flood risk management measures were retained and a further prioritisation was performed using social flood risk as a criterion.
- The prioritisation was done as follows: (i) Taking into account of the intervention logic (exp. start with the awareness measures if the following measures are dependent on it); (ii) Taking into account the positive impact on achieving their purpose; (iii) Taking into account the evaluation of the previous “Rain Plan” (2013); (iv) Taking into account the expert judgment of water stakeholders.
- River Basin Administrators make prioritisation of structural flood measures. Many aspects (state of project preparation, land, effectiveness of the measures population benefiting from flood protection, total budget etc.) is taken into account. Non-structural measures have the highest priority.
- Guidelines are generally divided into three priority levels, taking into account their effectiveness in relation to the objectives of flood risk management and the Water Framework Directive, their feasibility, supportive effect or as a basis for other flood risk management measures. This ensures that the implementation of measures is distributed among the different stakeholders. Differentiated prioritisation is particularly important for stakeholders responsible for implementing several measures such as municipalities.
- Three levels of priority were used for prioritizing the actions of measures in the action plan of the FRMP: high-, medium- and low-priority. It is important to give high priority to actions, which directly contribute to the saving of human lives such as the evacuation of people and movable property, and the existence and installation of temporary barriers. High priority is also given to actions the implementation of which efficiently enables to prevent flood risks, such as the establishment of building regulations, considering flood risk during planning, and surveys that serve as the basis of the implementation of one or several further actions.
- The measures are grouped into three categories (short, medium and long term measures) according to their priority (high, medium, low) and the available resources.
Specific objectives have been assigned with groups of non-technical and technical measures (71 groups of measures) that can be used in the process of flood risk management in the catchment area. Selected measures have been given priority depends on the specifics of the problems that have been identified in the catchment | water region | river basin district. Prioritization at the level of water region (river basin district) is done by giving points for measures 1-3 depending on the degree of priority (low - medium - high) in individual catchments, and then calculating the weighted average of points for each set of measures in all catchments in the water region and river basin district. The priorities for measures have been determined based on the assessment scale: HIGH - measures that due to the nature of the catchment area and the predominant type of risk should be made in the first instance as quickly as possible to reduce the risk of flooding; MEDIUM - measures important in the long term, to execute immediately after the high-priority measures (actions middleweight can and should be run in parallel to those of the categories HIGH, as far as possible the time and financial); LOW - actions the least effective in relation to the nature of the risks or difficult to apply in a given catchment area, because of its nature; this category also covers measures not directly belonging in the competence of local authorities and institutions, which can also be relevant for flood protection in the water region or river basin district - as supporting measures at the basin level. The analyses showed the need to implement a very large number of measures for the next six years. However, the costs exceeding the financial capabilities. Therefore, the President of the National Water Management Authority ordered the movement of a large number of actions to be implemented at the second cycle of planning (buffer list).

- The measures have been prioritized: Very High - strategic measures located in problem areas (hot spots), High - buffer measures in problem areas, Critical - buffer and strategic measures outside problem areas /no influence on problem areas.

- The measures have been prioritized according to the risk for the objectives in the FD (human health, environment, cultural heritage and economic activity) and the importance for the local conditions that will be achieved. The value of the object, critical infrastructure and vital societal functions are variables that have been taken into account as well as the value and importance of the object that will be protected. Some objects are prioritized and need to be protected against the low probability flood risk scenarios while other objects with less importance on societal functionality may only need to be protected from more frequent recurring flood scenarios. The prioritization has been made in classes: critical, very high, high, moderate and low.

- Preparedness and effects of the flood protection structural projects; and, survey among the experts in the field of flood risk management.

- Prioritisation at both national and LPD levels; prioritisation is undertaken for Flood Protection Schemes and Flood Protection Studies; risk-based prioritisation driven by economic damages assessment and supplemented by wider impacts; identification of 'hot-spots' (to inform surface water management plans); flood warning prioritisation: split across cycles; and, NFM delivery - not prioritised but targeted in Cycle 2.

- As described above, our relevant agency use a community risk register for risk prioritisation for main rivers and the sea, while Local Lead Flood Authorities use their local Flood Risk Management Strategies.

**Approach not fully described**

- In accordance with approach accepted. According to the APSFRs specification and measures.
- They are prioritised individually by the municipalities.
- Most of FRMPs did not prioritize the measures. This position is mainly due to the opposed interest of some stakeholders. The only solution to satisfy every party was to consider all the measures as a priority for the FRMP.
Methodology is based on criteria. Point scale is applied for each criterion. Priority (high, medium and low) is given according to the number of points.

Measures were priorities based on risk to population, the environment and cultural heritage.

Prioritisation has been based on assessed effects of measures (e.g. flood risk reduction, other benefits, WFD win-win measures) costs, feasibility, adjustability, funding and timetable.

One respondent is still developing the prioritisation method.

One respondent did not provide a response.

One respondent said that all measures have equal priority.

5.25 What are the advantages and disadvantages of this method of prioritisation?

Advantages

Advantages described include objectivity, evidence driven and scientific rigour; benefits of including stakeholders and reaching consensus; improving the management of funds; and, advantages of a cyclical process that is repeated and allows for improvements over time.

This approach reflects the consensus being discussed in the decision committee

Everybody involved had a say in classification, final prioritisation was done on objective criteria, so a good mix of involvement and objectivity.

The advantage is that it was based on the experience of a previous plan (the Rain Plan, 2013), to better assess the impact and the urgency of new measures (FRMP)

There is a part of scientific analysis

With measures prioritisation would be achieved more purposeful and sustainable flood risk management. The advantages due to the fact that prioritisation is made like a complex assessment based on some criteria.

Advantages of this method of prioritisation is that the measures will be implemented in declared period of time.

Prioritisation is understandable and well substantiated. Prioritisation seeks to ensure that mutually dependent measures do not delay overall implementation or that lower priority measures are not implemented first. More efficient use of funds; better concentration on focal points.

The advantage is that the prioritisation originates in the particular local situation and the local political opinion.

Simple way and gives a good overview of measures that are crucial to implement and measures that can be implementation can be moved/postponed etc.

Advantage: flexibility.

Use of regional knowledge and right of decision are advantages.

It permits to treat equally all the different aspects of flood risk management (knowledge, forecast, protection, mitigation, urban planning)

It is a consistent, transparent and evidence-based method.

The advantage is that flood protection is subject to continuous improvement.

A simple and pragmatic method for prioritizing measures. For the time being most of the measures in the FRMPs are at increasing the knowledge level. In a later stage objects with very high importance for human health and societal functions can be prioritised at a higher level than objects with less value of protection

Use of the existing experience.
• This approach to the delivery of flood alleviation projects is compliant with government spending rules and ensures that we secure the greatest economic benefit for every pound spent on defences and drainage infrastructure improvements.
• Evidence driven approach reduces debate; and, applicable at national and local levels.
• Effective prioritisation of risk.
• The method is pragmatic and flexible; it will generally allow the measures to go forward (depending on the funding) as soon as their preparation is finished.
• The measures will be implemented until 2021 and there are an effective prioritisation of risk.
• Allows the incorporation of upstream measures within the catchment.

Disadvantages

Disadvantages described insinuate that public consultation may have led to some challenges. Some respondents raised issues associated with funding, or managing the number of high priorities.
• The disadvantage is that we not have set up a large consultation for the definition the measures.
• People had the last word.
• With measures prioritization would be achieved more purposeful and sustainable flood risk management. The disadvantage is that an expert judgement is applied on separate criteria.
• The disadvantages is that the government has less influences on the prioritisation.
• Disadvantage could be that most measures will prioritised high.
• Means that all parties and particularly State services will have to manage the implementation of lots of measures at the same time.
• It does not necessarily reflect expectations that may exist due to recent floods.
• The disadvantage is that the residual risk is so small that it becomes an abstract concept and public awareness to flooding decreases.
• Method does not distinguish between tangible/intangible indicators.
• Disadvantages: no comparison between different types of action; and, complexity in dealing with estimating optimisation in scheme development.
• Disadvantage - no funding guarantee.
• Measures will not be implemented in the order of decreasing cost-effectiveness, thereby the benefits that will be achieved by implementing a set of measures for the given amount of funding will not be maximized.
• No timing of the actions is possible, all have to go parallel.
• It is difficult to evaluate, in a consistent way, the level of prioritization of structural measures compared to non-structural, especially in terms of risk reduction.
• There’s not a clear link between funding and efficient reduction of food risk.

Other responses

• Not evaluated yet.
• Prioritization of structural measures was based on objective multi-criteria analysis.
• Through multi-criteria analysis evaluates based on a score, the benefit of each measure to the objectives of flood risk management, from economic, social, environmental and cultural perspective. The degree of prioritization of the measure is measured based on the ratio value benefit/cost score.

Six respondents, did not provide a response.
5.26 How do political decisions influence the prioritisation of measures? (excluding budgeting)

**Little or no political influence**

- No political influence (excluding budgeting).
- Prioritisation is based on relevance of the measure so political decision influence not.
- The prioritisation of measures is not influence by political decisions.
- Didn't influence directly.
- They have not influenced too
- Independently.
- It does not, to the contrary finally there is no prioritisation of measures.
- All measures have to be carried out by law. Politics can only influence small aspects such as slight shifts in planning or possible inclusion of multiple benefits.
- Factors relating to political drivers are not included within prioritisation procedures in our country.
- At this stage measures prioritisation is based on technical criteria and according to available resources
- No changes in prioritization of structural measures have been made due to the political reasons.
- There is no political influence for prioritisation of measures.

**Some political influence**

- Political decision might lead to ranking structural measures higher than its priority. However, the priority gives an indication and should not hinder the parallel implementation of measures.
- In the classification, local authorities were involved.
- Prioritisation can be influenced by politics, this is, however, not very common.
- The local political decisions at municipal level influence the prioritisation of measures.
- For most areas effect of political decisions has been very low. But political decision making could also cause problems for whole process and plan.
- The prioritisation method has been confirmed at a political level.
- Political decisions may accelerate preparation and implementation of certain measures.
- The measure list is written in a governmental decision.
- Political decisions influence the prioritization of measures as for example green infrastructures for risk mitigation are given a minimum budget allocation fixed by Law. Moreover, political decision taken in the last planning years of the first cycle influenced the transparency of the prioritization process since the latter is implemented through a national web platform (RENDIS) which contains all interventions programmed and financed also by the Ministry of Environment for the mitigation of risk including flood risk management measures.
- The analyses showed the need to implement a very large number of measures for the next six years. However, the costs exceeding the financial capabilities. Therefore, a large number of actions are to be implemented during the second cycle of planning (buffer list).
- The political decisions at municipal and central level influence the prioritisation of measures.
- At the municipality level political decisions may have influenced the prioritization in the plan. For measures at the regional level the link is less clear. (SE)
- By adopting the budget proposals. The situation regarding that has improved in the last few years.
- According to the law on flood protection can only be financed measures that demonstrate economic efficiency.
- Prioritisation done initially without political influence (but, objectives of actions developed in partnership with local government so not entirely free); presented to local government and
feedback collated where the local government (i.e. political) priority to deliver; risk-based prioritisation presented in publication; significant changes recorded in narrative and elsewhere within local FRMPs; and, a national advisory group for prioritisation was established to oversee the process is applied whilst acknowledging there may be imperative for local government to deviate in delivery

- Flood Risk Management is now set as a high priority for our government and budgets have been generally maintained over recent years. However, budgets are set on an annual basis and can be subject to change given a shift in political priorities. As yet, the overall flood risk management budget is not directly linked to an overall calculation of risk.

Other responses

- There is a generic support at the political level. In fact flood risk mitigation measures are also being included in the national water management plan.

Four respondents did not provide a response

5.27 How does public pressure or consultation influence the prioritisation of measures?

Nine respondents deemed that public pressure or consultation had little or no influence on the prioritisation of measures

Fifteen respondents described that the public may have at least some influence on prioritisation of measures

- If the argument is reasonable the prioritisation at APSFR level might be changed
- Not in the prioritisation of measures but the public pressure can influence the timing of execution of measures in the field.
- If during the public consultations some concrete comments and statements regarding prioritization of measures would be received, after analyse they would be reflected on FRMP.
- The prioritisation was influenced in two cases after public consultation.
- Using a systematic approach to flood risk management planning, stakeholders can show the public that they are taking carefully planned and comprehensive steps and setting out technical criteria for prioritising individual measures. This serves to counteract the pressure being put on changing the prioritisation of individual measures arising, for instance, from current flood events.
- Public consultation process influence mainly the content of the measures and secondly the prioritisation.
- Some measures have been reviewed after the consultation, especially after local authorities and farmers consultation.
- Public pressure or consultation may also accelerate preparation and implementation of certain measures.
- Significant relevant considerations may arise from consultation to inform prioritisation, such as a significant risk to life.
- Partly.
- Limited influence.
- Public and interest groups can influence measures. Usually this results in longer implementation periods and (within budget limits) compensation measures.
- Public pressure and public consultation influenced the movement of measures between the list of strategic and buffer measures.
• After every flood event which took place in particular area, measures for that area are being prioritised.
• Less influence at this time than political pressure; and, where other evidence from any source was presented it was incorporated and fed into revised prioritisation for final Strategies.

Three respondents confirmed that consultation had taken place, but not whether prioritisation of measures had been influenced.

Four respondents did not provide a response.

5.28 What was the main feedback from the public consultation on the flood risk management plan/s?

For four respondents, the feedback following public consultation is not known. This may be because the consultation is not yet complete or the information is not held in a central format that can be accessed.

Where feedback was described, these are summarised below

• The main feedbacks reflected on local problems and topics, which are, however, not covered in the quoted detail by the FRMP. Every feedback had been answered separately and, if necessary, persons responsible named or further information provided.
• Consultation during elaboration was appreciated.
• The comments from public consultation have been collected and evaluated by Ministry of Environment. The main feedback is focused in measures (some measures are proposed to add/cancel in summary of measures) and compliance with flood law.
• In general, mostly positive feedback; Follow-up questions on technical issues (e.g. making maps, risk assessments; In some cases remarks that the level of abstraction of the plans are very high.
• Coordination between implementing authorities is very important.
• Not too much, public participation has confirmed the necessity of the different measures
• Length and structure of the plans (too much methodology description), better incorporation of environmental impact assessment.
• The sensitiveness of the public to flooding and their willing to take measure has been highlighted. Security of man-made flood defence infrastructure, forecast system, crisis exercises and financial solidarity were the main topics merging from the public consultation on FRMPs.
• Positive feedback. Community understand and support development of FRMP. They support the fact that priorities have been assessed and set at central level to ensure financing investment firstly for implementation of most important measures.
• Very little. When the measures themselves are carried out by regional or local authorities public consultation is part of the planning process. This gives public and stakeholders a chance to give feedback on specific measures.
• The quantitative and qualitative research shows that local technical measures are the most important for the public. The public does not see but the correlation between investments in water region. Measures associated with increased retention were indicated as important by respondents. Respondents have indicated lack of adequate knowledge that would enable me to assess proposed measures. They informed about the need to extend educational activities. Local government bodies emphasized the inclusion of the technical measures planned within their municipalities which often only locally reduce the risk of flooding. A number of comments related to supplement the lists of investments in catchment areas and changes in the scope or cost of the investment. For respondents the environmental impact of the planned measures was not considered as the primary. Expectations of NGOs were related mainly to the nature protection
measures the second puts the health and safety of people. Their comments referred to the need to implement a large-scale non-technical measures. During the public consultation of the flood risk management plans, questions and comments were also focused on flood hazard and risk maps. Comments refer also to an underestimation of the level of integrated flood risk in a given municipality or village.

- **Mainly positive feedback from the public consultations.** Some feedback concerned prioritization and formulations to objectives and measures. And also some feedback concerning definitions, specific measures and some on the layout. (SE)
- **Better coordination of the FRMP with the financial programming should be done.** Especially the national budget. But this is not an easy task as national budget is a 2-year document, whereas FRMP is (at least) a six year document.
- **Cooperation with local authorities and NGOs to implement flood protection measures in the rivers basin out of river beds that increase retention potential.**
- **The key feedback themes were:** a desire for the information in FRMPs to be more accessible, for clearer terminology to be used, for the value of agriculture to be better represented, for clearer links between environmental projects and flood risk projects, for better representation of the coastal and tidal flood risk and for the objectives to be better presented and explained.
- **18 substantive issues were raised by consultees on the draft FRMPs.** A number of these referred to simple inaccuracies and updates necessary to keep pace with changes to new policy and governance arrangements that occurred during the 6 month consultation period. A number of respondents raised concerns that there wasn't sufficient detail within the Plans to fully explain government's proposals in relation to SuDS, Natural Flood Management (NFM), flood warning/informing activities and support for community resilience initiatives. There was also a request for the flood authorities to publish their capital works programmes and flood study programmes on the internet so that the public had a greater awareness of the plans for future alleviation projects and the possible timeframe for their implementation.
- **There was general support for the purpose of the plans; not enough local detail (i.e. exact delivery and funding plans -> to be included in LFRMPs); and, support for NFM-type actions**
- **The main feedback was (a) additional measures (b) the finalisation of the content of some measures (c) the setting of the responsible authorities for measures implementation and (d) available funds for the realisation of measures**
- **There were no significant feedback.**
- **Inputs related to land use planning.**
- **Most discussions were related to the structural measures their necessity, cost, exact locations and so on.**
- **The main feedback was to harmonise different ways for flood risk management (i.e. changing land use - agriculture versus green measures).** It is a very hard process for public acceptance of flood risks and in case of risk to take proper measures for risk mitigation (save their lives and goods).
- **The feedback received focused on the need for the development of upstream measures.**

One respondent provided a link to the summary document that describes the results of the consultation process, but did not provide a summary of the results.

Two respondents did not provide responses.

**Responses that were unclear**

- One respondent gave an unclear response stating “Mismatch with other regulations”.  

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5.29 What changes were made as a result of public consultation?

Unknown

- Not sure yet work is still in progress
- Consultation on the draft FRMP are not completed yet.
- There is no overview about all municipal public consultations available.
- Not currently available
- We are still working on it

None or minor

- Mostly editorial changes.
- Very few.

Changes made

- Programmes of measures for some APSFR have been adapted.
- A global measure was modified.
- Small clarifications in text (spatial planning terminology, storm water management in urban areas) some of measures were added/cancelled).
- Implementing authorities for some measures were changed, measures names and descriptions were complemented.
- Main changes included (a) additional measures (b) changes in the description of some measures (c) changes in the setting of the responsible authorities for measures implementation and (d) available funds for the realisation of measures
- Not too much, mainly, updating different data of the APSFR.
- For some areas, separate management plan summaries (ca. 20 pages) were made.
- Some corrections/adaptations/precisions have been made on quite a lot of measures as a result of public consultation in post of the FRMPs.
- Several additional measures were added.
- Changes related mainly to land use planning issues.
- Some structural measures were rejected due to objections by public.
- Additional measures were included in programme of measures. Information on past floods were updated.
- Following the public consultation exercise the changes proposed were in line with the recommendations of the plan. This since Malta’s 2nd RBMP focuses on the implementation of upstream mitigation measures reflecting closely the outcome of the public consultation exercise.
- Public consultations allowed to get to know the opinions of various social groups on the developed flood risk management plans, but also to verify some of the solutions on the basis of expert discussion due to the comments received. It was recognized as justified remark concerning the need to increase the natural retention, which is especially important in heavily urbanized areas. The issue of increasing retention has been repeatedly raised during the meeting on the implementation of FRMP, however, these actions received a higher status as a result of the consultations. As a result of the public consultation the range of measures has been modified, and new measures have been added to the list of measures which previously had not been identified.
- As result of public consultation it was a permanent change of catalogue of measures.
• Changes were made according to the level of the feedback as rewording of definitions and explanatory texts. Some changes in the layout of the plans were also made.
• Added a lot of local flood protection structural measures.
• Reorganization of the text and focus on the application of green measures when necessary enforcement measures with grey literature under Article 4.7 of the WFD.
• The main changes were: a re-structure of the FRMPs to break down the information into different parts aimed at different audiences the additional of explanation text on objectives new text on the agricultural policy of the government, and, additional on how FRMP measures contribute to RBMP measures.
• All of the issues raised by respondents were fully addressed within a published document titled ‘Response to the Consultation on Draft FRMPs (Nov 2015)’. Following this, the Plans were substantively revised to include greater detail on SuDS, NFM and flood warning/informing.
• The scope of some Actions altered (i.e. broadened); and, the descriptive content/characterisation updated.
• The consultation summary document is available online.

Two respondents did not provide responses.

5.30 Is there a process for feedback from interested parties during the whole implementation cycle? How is this process organised?

Twenty respondents responded positively to this question, including a range of engagement activities including public meetings, use of electronic media, steering committees and dedicated groups:
• This process is organised together with the implementation of the WFD and is running on a regular basis (2 to 3 meetings a year) since 2005.
• On a yearly basis a ‘water execution program’ is drafted by a sub-basin secretariat. These yearly programs contain a progress report on the execution of measures of the past year and a recommendation for next year’s planned measures. Recommendations are given by the sub-basin advisory board, containing all stakeholders and the programs are approved by the sub-basin board, containing all actors in the field.
• Yes there is: 4 days of information in February 2014; creation of local committee : mars 2014 with reunion to discuss of measure; 19 round tables to discuss of over flooding, runoff, landscape planning, and crisis management; meeting of local community to approve prioritisation.
• Each stage of preparation of FRMP is published on the web sites of the basin directorates for public information and receiving feedback. On the websites there is a link to all documents published. The notice that information is made publically available is published in two national daily newspapers and in electronic mass communication media. Public hearing is hold for each stage of FRMP preparation trough public consultations where wild range of interested parties have been invited. Questionaries’ also were disseminated. For implementation of FRMP would be prepared National Programme for Implementation.
• Yes. There is a steering committee that involves all government agencies involved in Flood Risk Management (WDD, Civil Defence, Town Planning Department, Ministry of Interior, Environment Department, Forestry Department etc.) that monitors the preparation of the Flood Risk Management Plans.
• Workshop for experts, regional and local government, municipalities were organised during whole implementation cycle. FD and its implementation were presented on regional or international conferences. All information and documents is available on website of Flood Information System.
Yes. Constant feedback on measures possible due to active involvement of stakeholders. Different mechanisms are used for this in the different states e.g.: Stakeholder- or measure-specific events involving flood partnership; Communication platform; Measures data base; Events for the general public

Feedback is given during both public consultations, (1) the appointment of the APSFR at national level and (2) the establishment of flood risk management plans at local/municipal level. The first public consultation is organised by the government, the second by each municipality.

All cycles had public consultation and everyone were allowed to give recommendations and provide their questions. If there had been objections to previous works then this information could have looked over and improved when needed.

Yes for example, the National Council of Water and the National Committee of Civil Protection have to vote the FRMP before the adoption of the FRMP.

For some areas interested parties are included as members of flood risk management groups. There has been organised events for stakeholders in separate stages of the process.

The process was led by the regional coordinator. Depending on the size of the River Basin District the feedback process has been quite different like the number of interested parties. Some organized seminar, sent to letter to all the interested parties or organized little meeting and working groups in each town.

Yes. Presentations and publication of results of each step are organized by Croatian Waters. In addition, interested parties can participate through formal procedures of Strategic Environmental Impact Assessments.

National public consultation is undertaken at the PFRA, FHRM and FRMP stage and also in setting the Objectives. Local consultation is undertaken through Public Consultation Days in most of the 300 APSFRs for each of three stages of consultation, i.e., the preparation of the flood maps, identification of options and on the draft FRMPs.

There have been established four consultative River basin district boards as effective panel for the discussion of the river basin management plan and also flood risk management plan issues.

Yes feedback from stakeholders will be consistently taken into consideration and the plan continuously updated to provide the best response to the challenges faced as part of the implementation of the Floods Directive.

The FRMP includes measures that will be carried out. Each measure has its own consultation process.

Yes according to the Law 52/2003 on decisional transparency in public administration, which establishes the minimal procedural rules applicable to ensure decisional transparency within central and local public administration authorities as well as other public institutions, the relations established between they their citizens and their legally constituted associations.

Yes through follow up meetings with the municipalities and stakeholders. The plans will be discussed in the affected river coordination groups where the APSFR areas are located. Consultation will be made with most of the concerned organizations and also through advertised consultation and press releases.

By public presentations of the FRMP (and all its stages) in our river basins and by public workshops and by publishing all the materials for the Floods Directive implementation regularly on the ministry's homepage. Everybody can participate freely by giving feedback electronically or by mail commenting all stages of the FRMP preparation.

In the following responses it is not clear whether the engagement described constitutes a process for feedback during the whole implementation cycle.

No specific process is set, suggestions and comments can be sent to FD coordinating and other participating institutions during all preparation period. Several calls for comments to interested parties were sent.
Feedback focused on preliminary flood risk assessment and flood hazard and risk maps. In regard to PFRA comments concerned mainly extension of the PFRA list (addition of new APSFR). We collect comments on the uncertainty of flood hazard maps and flood risk maps and new anti-flood investments carried out after the development map. The comments are submitted mainly by local governments at various levels in official correspondence.

Hydrographic Region Committee.

It is anticipated that the opportunity for feedback will be facilitated through regular meetings of Local Flood Forums which are organised at the River Basin District level and attended by stakeholders with a broad range of interests.

As a standard part of the stakeholder engagement process.

There isn’t a dedicated feedback process but there are: a series of groups is available to enable feedback from interested parties (including the Lead Local Authority Forum (i.e. a forum for those LAs leading the development of LFRMPs)) and LPD partnerships.

The process is based on the combined implementation of FD art. 10 and SEA Directive.

Three respondents said that no such mechanism has been developed yet.

Two respondents did not provide responses.

5.31 Which interested parties have provided feedback in your country?

Respondents stated that they had received feedback from individuals and groups belonging to the following:

- **Central, regional and local government and associated agencies**: 25 respondents
- **Water, environmental, transport, agricultural, fisheries boards or NGOs**: 27 respondents
- **Citizens either individuals or organisations representing them**: 16 respondents
- **Businesses**: 14 respondents
- **Research institutions**: 8 respondents
One respondent did not provide a response.

Figure 5-14 shows the interested parties that have provided feedback.

![Figure 5-14 Interested parties that have provided feedback](image-url)
5.32 How is the management of flood risk coordinated with civil protection in your country?

Respondents were asked how flood risk is coordinated with civil protection in their countries. The approach differs for each respondent and the level of description provided also varies. The responses are provided below with some commentary.

Three respondents describe how the people involved in flood risk and civil defence response support each other:

- Water managers predict flood risk and are expert support of civil protection during a crisis. In one region civil protection was invited in round table.
- Civil Defence is a member of the community involved in the monitoring and preparation of the Flood Risk Management Plan.
- There is at least one member in every flood risk management group from local rescue authority. Also Ministry of the Interior has a member in national flood risk management coordination group.

Fourteen respondents describe the links between ministerial control of both flood risk and civil protection in their countries:

- On ministerial and provincial level (competence), as well as on APSFR level.
- The measures included in FRMP are part from the National Disaster protection Programme, covering the period 2014 - 2018, elaborated according to the Disaster Protection Act. Annually, an information for the assessment and flood risk mapping is submitted to the Ministry of interior in accordance with the regulation on the terms, procedure and bodies for carrying out the analyse assessment and risk disaster mapping. Representatives of chief directorate fire safety and civil protection and its regional structures participate at each stage of FRMP preparation process through public consultations.
- There was coordination with the relevant ministry and rescue board when compiling maps and plans. There is also a special committee that has approved the FRMPs.
- The national programme of flood risk management is formulated and coordinated by the Special Secretariat for Water in collaboration with the General Secretariat of Civil Protection (Ministerial level). Civil protection authorities are responsible for the development and the implementation of contingency plans in the case of flooding at all stages of risk management. All the aspects of flood risk management are covered by FRMP.
- A DG of the Ministry of Environment, is the inter-ministerial delegate for disaster risk he has to coordinate flood risk management with civil protection which depends on the Ministry of Interior and with other ministries like Housing, Agriculture. There is a national coordination through an advisory committee and a regional coordination through the FRMP that contains dispositions of the civil protection plans.
- The Water Directorates annually provide an updated resource management plan and possible inundation map for the county defence committee.
- In the operative flood defence, according to the National Flood Defence Plan. Water management is involved in Risk assessment for disaster management.
- It is coordinated by a national law (L. 100/2012) and implemented through the M4-M5 measures.
- Ministry of Environmental Protection and Regional Development is responsible for flood risk management but Ministry of the Interior and State Fire and Rescue Service are responsible for civil protection. State Fire and Rescue Service has signed interdepartmental agreements with Environment Meteorology and Geology Center for meteorological and hydrological forecasts. In Civil Protection Plan there are also assessed flood risk information and defined flood risk zones.
Through cooperation with the Ministry of Security and Justice, the security regions and the municipalities.

[abridged] Water management (including flood protection) and crisis management (including civil protection) are different ministries. The Council of Ministers is responsible for crisis management at the national level. In case of emergency the Crisis Management Team is appointed. In the case of flood hazard there is cooperation and exchange of information between government and regional water management authorities. FRMP contain only a reference to crisis management in general outline. Specific activities in the field of crisis management and civil protection are included in other plans, drawn up by the authorities with responsibilities in these matters. Preliminary flood risk assessment and flood hazard maps are submitted to the authorities responsible for crisis management in order to use them in their activities. Authorities responsible for crisis management participated in the work on the development of flood risk management plans.

The Civil Protection Authority is member of the National Commission for the Flood Risk Management. Civil Protection is a member of the community involved in the monitoring, preparation and implementation of the Flood Risk Management Plan.

Flood risk management is coordinated with civil protection according to (is specified) the legal framework (Rules for emergency situations in case of dangerous hydrological phenomena, accidents at hydraulic structures accidental pollution on rivers and coastal area.

During floods are part of the Flood Commission Ministry of Environment and the Ministry of Interior and organizations managed by them such Water Management Enterprise and Hydro-meteorological Institute, Fire and Rescue Corps, Police and so on.

Eleven respondents describe the process of coordination, involving different geographic scales and/or different organisations in their countries:

- A complex system of coordination between integrated rescue system, aggrieved ministries CHMI, River Basin Administrators, regions, municipalities and neighbour states exists. Municipalities have own flood protection plan, which consists of text and graphic parts and includes essential operational information for period of flood. One of references for these plans are also flood mapping and risk analysis.
- Approach in states: Participation of bodies responsible for emergency response in development of flood risk management plan by means of coordination and if necessary joint development of measure; Maps made available for emergency response; In many cases: emergency response/crisis management as field of action in flood risk management plans.
- Civil protection is organised at local level and is one of the municipal services/tasks. Civil protection has therefore been involved in the preparation of the risk management plans at municipal level.
- FRMP have been produced in total coordination with civil protection authorities there are several measures defined by civil protection authorities. The final adoption is a Royal Decree approved by the National Government.
- Provision of the flood maps to local authorities informs local emergency response plans. There is also coordination at a national level with the responsible authorities in preparation for, and during, flood events.
- Civil protection institutions were participating in preparation on FRMP.
- It is very much coordinated to Civil Protection since it is one of the tasks for the fire- and rescue services according to the Civil Protection Act - which is mentioned before. See above question 2.1.
- Risk management authorities each have defined duties and powers under the Flood and Water Management Act 2010. Emergency responders also serve the general public during flooding events.
The Civil Contingencies Group (CCG) provides strategic leadership in relation to civil contingencies policy and strategy on cross cutting issues on a multi-agency basis. In addition there are five Sub-Regional Civil Emergency Preparedness Group (EPGs). These multi-agency groups agree a joint approach to emergency preparedness and response.

The Civil Contingencies Act identifies the main ‘responders’ and responsibilities in respect of civil protection. Flood Risk Management flood maps and associated information are made available to support the establishment of emergency plans.

We have a strong integration with multi-level Civil Contingencies emergency and resilience plans, with flood risk being a significant risk in this plan. The National Government flood team are part of the national Government Resilience Steering Group.

One respondent stated that the situation had improved over the last few years, but did not describe the process of coordination. One respondent stated that the coordination was limited and would be established during the 2nd cycle of implementation. One respondent did not provide a response.

5.33 Is there a dedicated mechanism (e.g. at the municipal level) to monitor and record further "encroachment" of human activity (housing, production, services…) into floodplains?

![Figure 5-15 Monitoring encroachment of human activity](image-url)
If yes what is the experience from its functioning?

Seventeen respondents provided a positive response to this part of the question, this is not consistent with the answers (in terms of number of MSs) provided in the first part of the question. The responses to this question are provided below.

- In the frame spatial planning (zoning and building) information/data has to be added. There is some "time delay" but a very valuable tool for risk assessment. Further municipalities have to derive development plans looking 10 years into the future and delineate areas which might be most probably, developed.
- Designation of flood plain areas and flood plain area active zones approval of water authority for construction work at inundation areas according The Water Act. System of flood protection inspections according The Water Act. Flood protection inspections examine the defects on watercourses water management structures and flood plain areas or structures or facilities situated within such areas which may increase the danger of flood. Experiences with this mechanism are quite good
- Pursuant to relevant legislation construction projects are prohibited in designated flood plains. Exceptions must be approved by the competent authorities. Any retention areas lost during construction must be compensated for; and, must take spatial and urban planning requirements into account
- Since a long time ago, it is impossible to build houses without permission. Municipalities, regions and river basin authorities try to control this permission.
- The responsibility is up to the local authorities and includes monitoring, recording, waste removal and other. Besides existing licencing procedures for various activities (i.e. industry) help to the elimination of the phenomenon.
- The PFRA through the EAIP permit to monitor the eventual encroachment of human activity into floodplains.
- In accordance to the Water Act, State Water Inspection is established. It is organized at the national level under the umbrella of responsible ministry, and its activities cover whole country. One of main inspection task is to monitor and prohibit illegal human activities in floodplains. Mechanisms reinforced after 2007
- The related act is available but the adaptation is ongoing.
- Planning guidelines on the consideration of flood risk exist that should control land use zoning and development in floodplains. Land use zoning is monitored by review of development plans, but individual developments (if planning permissions are given) are not centrally recorded with regards to flood risk.
- Yes – the Planning Authority defines Outside Development Zone areas where development constraints are in place to limit the encroachment of the urban footprint outside the current built up areas. Watercourse protection and flood risk management are given consideration in this framework
- In principle it is forbidden to build in the floodplains (which are unprotected areas). Any activity in an area not protected by flood defences needs permits from pertinent water authorities (national or regional) which are not issued if the activity increases flood risk.
- National legislation for the "National Ecological Reserve", includes flood plain areas. All activities on such areas depend on the agreement of the Water Authority.
- Shoreline protection according to the Environmental Code. Permission to build in water according to the Environmental Code (SE)
- Good experience, which will show the results in the long term.
- Spatial planning.
Risk management authorities work together to avoid inappropriate development in the floodplain. The National Planning Policy Framework sets out government policy on new developments which must be applied by local planning authorities when making land use planning decisions.

The national Government keeps a record of new developments on the flood plain. One respondent responded “partly "yes", partly "no"”. They elaborate by stating that “encroachment of buildings into floodplains could be monitored with overlay analysis of spatial information from national building register and from flood maps. These indicators have been and will be calculated yearly. However, changes in the flood maps and inaccuracy in the building register makes it difficult to monitor in a short timeframe.”

Twelve respondents did not provide a response.

Respondents who stated that there was a dedicated mechanism to monitor and record further "encroachment" of human activity into floodplains were asked if this mechanism had been introduced or reinforced after 2007. Four respondents stated that a mechanism had been introduced after 2007 and two respondents said that the mechanism has been reinforced after 2007.
5.34 Are there urban planning and building regulations to control encroachment of human activity (housing, infrastructure, production, services…) into floodplains?

Figure 5-16 Existence of urban planning regulations

How effective are the urban planning and building regulations in actually controlling encroachment? How can they be reinforced?

**Effective**

- Water assessment tool, evaluates each new development on its impact on the water system, as well as the impact of the water system on the development. Very effective, to prevent unwanted developments. Was already in use before 2007, but improved during first cycle.
- They are quite effective. They can be reinforced by more strict enforcement of the law.
- The most effective is system of designation of flood plain area active zones according The Water Act (§67). FRHMs are one of land use limit for urban planning.
- Yes They can be reinforced by building local authorities know-how and training.
Physical planning process takes into account information on potential flooding that is provided by Croatian Waters. Construction in flood-prone areas is generally not allowed. Illegal construction in flood-prone areas has not been sanctioned in the past, and some of these assets have been legalized.

- Generally they are effective, but there is always room for improvement
- Quite good but in some cases local municipality itself try to break regulations.
- Effective because of the permits needed.
- Very effective.

**Not effective**

- The practice shows that they are not sufficient enough. It is being planned a control of the activities in the river beds to be strengthened, encl. strengthening of the control over new permits in the river beds.
- They are minor effective in controlling encroachment with respect to flooding.
- Currently there are vague regulations that forbid building in flood prone areas, but they had only theoretical effect.

**Effectiveness not provided in the response**

- They are generally related to inundation areas (as spatial planning is in the competence of federal provinces there are different regulations in place) and from case to case slightly different in e.g. defining exceptions, etc. They can be reinforced by clear links to hazard zone plans and avoidance of exceptions
- Circular of the Minister of Forestry is the legislation who approach this theme. Nevertheless, the opinion of the river manager is asked during the application for planning permission. Art 136 of CWATUP is also of application. The execution of acts and works can be either forbidden, or subordinate to particular conditions when they relate to the goods situated in flood-risk area.
- Water legislation, building law, regional planning law; Recommendations (guidance documents, information brochures)
- There are several regional acts and national acts, regarding the spatial planning act and water act. We are in the last phase for adoption of a new Royal Decree for defining very well what can be built in the flood prone areas.
- Regulations are more like suggestions and it is up to every municipality to supervise how these regulations have been taken into account when giving building permits. Flood prone areas are also presented on the land use plans. There are no sanctions when building to flood plains.
- The flood and coastal risk prevention plan forbid new constructions in floodplains but also to control land use activities and order measures to reduce the vulnerability of exciting assets (houses building, factories...). Urban plans need to be compatible with the FRMPs and its FHRMs. The Prefect can also examine the legality of all urban plans, building permit in its department. Thus the increase in the number of officer to monitor the legality of plans and permits would reinforce the regulation and prevent encroachment.
- The new hazards and risk maps form a part in the spatial planning maps. Each construction inside a flood prone area needs a permit from the national water agency. The national water agency can deny a construction project inside the flood prone areas or impose conditions/restrictions. Furthermore, the local authorities can express conditions which are stricter than those expressed by the national water agency but they cannot override the prohibition or restriction expressed by the national water agency.
- The Act Water Law specifies the significant flood risk areas: area where the likelihood of flood event is 10% and 1% included on flood hazard maps and flood protection studies; area between
the bank line and the levee or a natural high bank with built-in levee course as well as islands and alluviums; technical zone of the sea coast. Construction of facilities planting trees and bushes changing terrain, storage materials in significant flood risk areas is prohibited. The municipalities are taken into account these prohibitions in the development of spatial plans and the decisions determining the building conditions in the agreement with directors of regional water management authorities. Director of regional water management authority may exempt from the prohibition if it doesn't hinder the flood risk management. Controlling encroachment of human activity into flood plains is more effective if spatial plans consider the significant flood risk areas present a current range of flood risk. A more frequent flood hazard maps and spatial plans updating shall be taken into consideration when flood risk change in a given area.

- Law on Flood Protection sets prohibited activities on floodplains which must accept the spatial planning documents and construction regulations of municipalities. It would be necessary to extend this obligation to the spatial planning documents of Self-Governing region, that is superordinated to municipalities.
- Planning and building control follow agreed tests for permitting development, in consultation with partners including the Environment Agency. Alternative sites or modified designs can be recommended / requested by the local planning authority to direct development away from the flood plain or make new development resilient.
- A Planning Policy Statement – on Planning and Flood Risk (PPS15) ensures that flood risk is fully taken into account in preparing development plans and is also material to decisions on individual planning applications and appeals. The aim of PPS15 is to prevent development that may be at risk from flooding or that may increase the risk of flooding elsewhere.
- Land use planning policy seeks to limit encroachment (via development planning & management) but does not monitor it consistently or nationally (a pilot project is investigating this issue and will inform future development in this regard): the effectiveness of regulations/guidance is not comprehensively assessed; and, while there is national policy and guidance there is room for interpretation depending on, for example, more extensive, local priorities.
- We have Planning Policy and guidance under Technical Advice Note 15 which sets out a strict planning regime for Local Planning Authorities. It can be enforced through planning permissions and consents.
- The sustainable floodplain management plans have been created in 2014-2015. One of the result of the plan is the designation of the different flood conveyance lines in the floodplain: there are 4 categories based on the unit flux of the mesh in the models. In the cat.1-2 no building is allowed, in cat.3-4 only if the permission is given by the water Directorate. Having the legislation in force, all the future settlements in the floodplain is possible to identify.
- Urban planning and building regulations are constrained by the limitations given by the flood risk maps.
- One measure of the FRMP is to prohibited construction projects for flood areas with $T=20$ years.
- According to the legal framework, the actual hazard and risk maps are part of the county development plan and/or regional and of the general local development plans and related local planning regulations.
- The Planning Authority defines Outside Development Zone areas where development constraints are in place to limit the encroachment of the urban footprint outside the current built up areas. Watercourse protection and flood risk management are given consideration in this framework.

Two respondents did not provide responses.
5.35 Are there controls other than urban planning and building regulations to limit encroachment of human activity (housing, production, services…) into floodplains?

The responses to the second part of this question do not necessarily correlate with the responses to the first part of this question. Respondents to the questionnaire were asked if controls other than urban planning and building regulations to limit encroachment of human activity into floodplains had been introduced or reinforced after 2007. One respondent stated that controls had been introduced and reinforced after 2007. Four other respondents stated that controls had been reinforced after 2007.
Yes there are, we control and monitor successfully socioeconomic development within floodplains by means of…

- In flood plain area active zones only water management structure can be located, other restrictions are stipulated in The Water Act. Water authority may also stipulate restrictive for flood plain areas outside active zones. It is checked by flood protection inspections.
- Municipalities regions and river basin authorities try to control this permission.
- The dictate of various spatial planning could have an impact on socioeconomic development within floodplains due to the cost of the measures like a level for the first floor, cofferdams.
- Natural Resources Wales are a statutory consultee for planning applications and can object to inappropriate development in the floodplain. Ministers can also determine high-risk applications, for example homes in undefended flood plain are automatically called-in for determination.
- Water Law, "National Ecological Reserve", "National Agriculture Reserve"
- Legal framework, public administration and justice.
- Urban planning and building regulations for us include also socio-economic development in terms of industries etc.
- There is a new process for streams delimitation. Means introduced after 2007

Two respondents provided a negative response to this part of the question:

- No, here are no special monitoring/controls. There are basic requirements in legislation and measures in FRMPs.
- No, other than Statutory Requirements on Local Authorities with respect to structures on, in or over river channels and, in some locations, environmental protection (e.g., for Natura 2000 Sites).

If not, is there provision for establishing other controls?

Sixteen respondents answered “no” to this part of the question.

5.36 Have there been difficulties in reconciling the needs of local communities with the longer term planning of measures for flood risk reduction? Please describe:

None or few/minor difficulties

- No substantial difficulties.
- No such difficulties occurred.
- Generally no, as local communities are involved in the planning of measures and measures are adopted by mutual agreement. Sometimes there are restrictions on construction within residential areas because of designated flood plains (usually HQ100 areas) and this is contrary to the objective of the local community to strengthen such areas in particular.
- Mostly no difficulties. Our country is sparsely populated country with lots of free space for flood risk management measures. Usually alternative place for other land use has been easily found in order to implement flood risk management measures. In some cases public opposition has been challenge. Also long term flood risk management and especially taking into account climate changes effects could be hard to get through at communal four-years administration term.
- Not yet.
- No there haven’t been.
- No
No difficulties were encountered.
No
Not in most of the areas. In some cases there are different interests for the municipality to promote constructions in attractive areas. It might be generally difficult to obtain financing for long-term measures.
Not really. Only the financing part of it is always a problem.
Such problems have not been registered.

Some difficulties

Yes some buildings fields (land) are actually with a high risk of flooding and local communities want to develop these zones.
It is hard to write general comments. The difficulties were identified during preparation of references (designation of active zone and flood plain areas and flood plain areas.) Local communities want to minimised size of this zones or not to determined them due to new development in area.
Some areas may have flood defence systems in future, before these technical measures could be implemented, further studies should be conducted to plan the most effective solution.
Yes It is one of the reason to develop a new Royal Decree. It is important to have a fixed general rules and some exceptions in urban areas or in municipalities that have an important percentage as flood prone area.
Yes there have been such difficulties e.g. local communities are pushing for the immediate implementation of protection measures rather than the development of a strategic planning for flood risk reduction. There is an effort to synchronize these different types of needs via coordination.
It can be difficult sometimes to conciliate the short term vision of local communities and their willing to develop their territory with the long term and expensive strategies for flood risk reduction. The construction of a shared sustainable development plan is the key.
Yes there are difficulties in relating the concepts that flood risks cannot be fully eliminated and that they can only be managed in economically feasible and sustainable ways.
There aren't always clear examples of such difficulties but the conflicting objectives of agricultural practices housing and infrastructural development, and commercial interests, with those of sustainable planning in respect of flood risk management, always have the potential to be in conflict. (ii) There is also clearly the conflict between the need for community-focused flood relief works, and environmental constraints.
The main difficulty lies in making communities aware of the necessity of long term land use planning as a mean to control increase in vulnerability and risk. The concept of structural protection is still easier to be understood with respect to the concept of risk management.
Yes when these are intrusive they will meet with resistance from local inhabitants (for example Room for the River program).
Local government bodies emphasized the inclusion of the technical measures planned within their municipalities which often only locally reduce the risk of flooding. The correlation between investments in water region wasn't important for them. They focused on the actuality flood hazard and risk maps and apply for updating maps in cases of construction of new investment, regardless of the dates indicated in the Floods Directive. Updating maps becomes condition for approval of plans by local governments.
There are some difficulties regarding new green and non-structural measures implying new land acquisitions from the owners.
Some consider that more could be done, and at a quicker pace, to prevent flooding in their areas. However, most communities understand that structural measures to prevent/reduce flooding at
the community level can only be funded by government if they are economically viable and affordable.

- Local communities want action rather than the further development of options; realising and understanding the comparative scale of local risk/actions on a national spectrum is contentious; and, community size is an issue (i.e. disparate rural communities which are not in APSFR).
- We do have a number of coastal communities identified through the Shoreline Management Plans that are at risk from rising sea levels over the next 30, 50 or 100 years. This has lead in the short term to an issue with property values which to some extent are unavoidable if we are to be open about risk and long term planning.

One respondent did not think this question relevant to them. Three respondents did not provide a response.

5.37 What was the role of consulting services in the elaboration of the flood risk management plan/s?

With respect to the use of consulting services ten respondents did not use any consulting services. Although one respondent did say they used consulting services for the Strategic Environmental Assessment. One respondent provided a response that did not specify whether consultants were used or not. One respondent did not provide a response.

Three respondents used consulting services a little, for specific tasks such as cost-benefit analysis, for feedback or for particular regions:

- Consulting services have not been used in general for producing the FRMPs.
- Consulting services were used for limited parts in some cases for some environmental impact assessments and cost-benefit analysis.
- There was limited use of consultant services in the production of FRMPs. The 10 FRMPs in were produced in house by the central agency responsible for flood risk management or local authority staff. Some consultant services were used in the development of Welsh local authority FRMPs.

Constructive feedback

Nineteen respondents relied heavily on consulting services for tasks such as surveying and piloting methodologies, developing methods, undertaking FRMPs, evaluating work done, developing measures and manage public consultation.

- To some extent consultants supported the federal provinces by surveying the state of implementation of different measures and coordinating with municipalities. In the frame of method derivation five pilot projects were conducted by consortia consisting of administration, stakeholders, research and consultancy.
- They were involved in different levels. Some of them were invited to inform meetings and other were involved to propose some local measures.
- Consulting services have been used at each stage of preparing FRMP, incl. methodologies for PFRA, ASPFR maps, cost-recovery analyse catalogue of measures.
- Consultants were hired to support the preparation of the Flood Risk Management Plans and prepare the reporting. The work of the consultants is monitored by a steering committee involving all Government Agencies that have a role to play in Flood Risk Management.
- Methodology for production of FRMPs, some references (affected inhabitants); River Basin Administrators - preparation of Documentation of APSFR including draft of proposed measures for sub-basins (references for FRMPs) and Ministry of Environment - production of FRMPs.
Consultants also played a role in the development of flood risk management plans, e.g. project management, support for strategic environmental assessment, development of methods and creation of web-based query tools.

Some municipalities hired consulting services whereas other municipalities did not and prepared their risk management plans by themselves.

Team of external experts were used to compile FRMPs.

The preparation of the FRMP is made by private companies (5 separated projects awarded by the Special Secretariat for Water). The projects are coordinated by the SSW supported by a technical consultant.

Consulting services have been very important in the elaboration. Almost all FRMP have been drafted by consulting services.

In a couple of plans consulting firms were writing and gathering information to the plan. For most of the plans consultation firms did the environmental report.

Consulting services have been mostly used to realize the environmental evaluation of the FRMPs and for the public consultation exploitation. Some district have used consulting services to assist the State service to write down the FRMP or to organize the governance.

All the calculation of hazard and risk maps were carried out by contractors. Main consultancy was introduced in CBA.

Some work was undertaken 'in-house' (to ensure and maintain in-house capabilities), but due to resource limitations the significant majority of the work involved was undertaken by contracted services.

A consultancy was contracted to write the plans under direction of the ministry.

FRMP has been prepared by a consortium of international companies and the national Institute of Meteorology and Water Management - National Research Institute. Representatives of the local, regional and national public administration also participated in the work in the form of working groups.

Consultants played a significant role in the characterisation, objective setting and appraisal stages. Prioritisation and Strategy preparation was undertaken in-house.

While government agencies let and actively managed the contracts the role of Consultants solved some of the resource issues present.

Consultants were engaged in the development of FRMPs due to the limits on resources in the public sector, although the majority of FRMPs were developed in house.
5.38 Is there a role for the private sector (particularly Small and Medium Enterprises if relevant) in the management of flood risk?

If yes what is the role of the private sector?

**Private property owners have responsibility for their own risk (individuals and companies)**

- They have to check if they are prone to floods and set object oriented measures if relevant.
- Adaptation of houses to flooding.
- They have to reduce the vulnerability of their building/factories and to work on a business continuity plan.
- Property owners / businesses have a responsibility for their own preparedness, resilience, individual property protection, etc.
Enterprises (energy producers) are responsible for maintenance and safety of their hydraulic structures and development of harmonised HPP cascade operating rules.

Private sector (house owners, stakeholders, operator etc.) has to take their own responsibility to protect themselves towards floods and other disasters that can happen (principle of responsibility).

Developers, infrastructure providers or private landowners can all play a role in flood risk management and contribute towards reducing risk to their own assets and elsewhere.

Where SMEs have premises at flood risk and are informed of this risk there is a presumption that they take all reasonable steps to make their property resistant and/or resilient to flooding.

Hydropower enterprises are responsible for maintenance and safety of their hydraulic structures and development operating rules. National legislation for the "National Ecological Reserve", includes flood plain areas. All activities on such areas depend on the agreement of the Water Authority. Business and factories are responsible for implement measures of the FRMP to reduce vulnerability and increase resilience to floods.

To assist in wider flood risk management

- Private sector could prepared some individual flood protection. They also could have agreement with municipalities to give help in time of flood
- The private sector is generally involved in measures: public and company information and awareness raising. In some cases comprehensive legislative requirements e.g. for handling substances hazardous to water, for avoiding major accidents in establishments covered by relevant directives owners of critical infrastructures
- Partnership funding allows the private sector to contribute and benefit from flood defence schemes. Developers, infrastructure providers or private landowners can all play a role in flood risk management and contribute towards reducing risk to their own assets and elsewhere.
- Development of locally adapted innovative solutions such as Sustainable Urban Drainage Systems and Nature Based Solutions.

As technical consultants and engineers

- E.g. design and establishment of flood protection measures.
- Some SME are also leading-edge technology for flood risk management like forecasting and early warning systems, flood protection tools or system, data bases and models, crisis management smartphone application, communication and risk awareness tools, etc.
- Different parts of the private sector will be contracted at different phases of the implementation, both to plan, design, execute, but also in communication management, ITC etc.
- Construction of the measures preparation of the documentation, etc.
- Government does use private sector consultants, which may be SMEs to develop schemes to address flood risk management problems.
- SME can, with the relevant technical expertise manage or deliver actions on behalf of local authorities; Local authorities do not have the capacity to deliver studies and design in-house; and, the actions set in the strategies cannot be delivered without SMEs contributing significantly. Implementation of both non-structural and structural measures will be carried out by qualified consultants and contractors.

One respondent provided a negative response to this question.

Thirteen respondents did not provide a detailed response.
5.39 What are the main obstacles in cross-border cooperation in the preparation of your flood risk management plans for shared APSFR?

Five respondents did not think that this question was applicable to them.

None or few/minor obstacles identified

- No serious obstacles; different stages of FD implementation; and, different methodologies and approaches have been used
- No obstacles were identified. Period of cross border-cooperation in flood protection has started before 2007. Every state have own methodology. Preparation of Flood Risk Management Plan in the Elbe River Basin, Flood Risk Management Plan in the Odra River Basin and Flood Risk Management Plan in the Danube River Basin was made uniformly according methodology. No shared APSFR were designated on border streams.
- No main obstacles. Annual cross-border meetings were held to exchange experiences in implementing the Directive.
- Not too much. There is a convection for coordination with the WFD, FD, etc, with neighbouring countries, we have a similar convection, but the rivers shared with our neighbours are a lot less important.
- No major obstacles in Torne River (only cross-border plan). Objectives for flood risk management have been decided individually in both countries but are mostly the same. Public consultation time for draft plans was 6 months in Finland (and 2 months in Sweden), which meant preparing plans in bit tighter (different) schedule. Due to national instructions, some differences in naming and grouping of measures exist.
- No shared APSFR. The cross-border cooperation in flood protection has started before 2007.
- Some minor problems according to different timetables and national regulations.
- There were no significant obstacles to cross-border cooperation as the respective flood authorities in the neighbouring countries have a long history of working together on matters of common interest.

Obstacles identified

- There are no shared APSFR but neighbouring APSFR as legislation, methods, priorities etc. cannot be applied in other MS. On the international level it was no problem to agree upon a basin wide management plan. Cross border cooperation consisted of information, data sharing and wherever needed harmonisation (checking if there is influence on upstream/downstream parts)
- Difference in degree of detail in which the flood risk management plans are worked out; Differences in priorities; and the language.
- Determining uniform methods; Different legal and planning systems; Differently scaled risk areas as a consequence of different methods that applied
- Differences in goals and interests due to mentality and geographical position (e.g. upstream-downstream). A main obstacle may also be the absence of identification of an APSFR at the upstream border. In that case the upstream country has not obligation to implement the FD because it is non-EU.
- The main obstacle in cross-border cooperation could be the language, the different national flood risk management policies and more simply the current situation on both sides of a border river, with different level of protection, different planning.
- Differences in definition of APSFR's, lack of joint tools (databases studies), models and maps for the flood risk management. Bi-lateral and international projects aimed at development of joint
tools, models and maps should be strongly supported and funded from EU INTERREG programme.

- Different methods and historical background. It was not possible to reach harmonization along the borders.
- Difficulties vary on the basis of the diverse local situations. However, they can be summarized as follows: Lack of specific agreements to carry out transboundary management; Different approach to hydrological and hydraulic modelling and to the identification of flood prone areas.
- Different preparation schedules and financing models.
- The shared management plans on the A and B level were elaborated in international river commissions where the cooperation between neighbouring states is very good.
- Difference in methodologies of APSFR definition and modelling.
- Through the river basin organizations there is a good cross-border cooperation, though approaches to flood protection can change when crossing the border and there may be different perceptions as to what we need to share cross border.
- Diversity in water regions in terms of characteristics and sources of flood risk; methodological approach differences
- The main obstacle is represented by different methodologies used for prioritisation of the measures.
- Harmonised mapping of the shared APSFRs.
- We have a strong working relationship with the devolved authorities. The main obstacles have been language translation, differing regulations and interpretation of the Floods Directive, timelines / delays caused by flooding events. However we have successfully worked together to produce coordinated cross border plans.
- Note that the comments below do not relate to an international boundary but a clear national administrative boundary. There were no barriers and a good working relationship was established although there are different approaches and risk which limited the scope for collaboration

5.40 How do different standards and/or regulations influence cross-border cooperation? How can such differences be reconciled?

- Cross-border cooperation is very well institutionalised with neighbouring countries by bilateral borderer commissions as well as basin wide international commissions for the protection of the major international rivers.
- For a major international river common standards for preparation of flood hazard and risk maps have been coordinated
- Every state has own methodology and rules. For example floods with a low probability is 1 in 500 year flood in one respondents, and 1 in 200 years in the adjacent one. All the approaches were discussed with international river basin commissions during the preparation of international FRMPs for basin districts on international rivers.
- Depending on situation in cross-border water bodies: In some cases standards extensively adapted; In some cases the coordination process is very complex due to different legal requirements; not always possible or necessary to achieve complete consensus/harmonisation
- Each country have to be flexible with their FRMP and with the risk without damage to the other countries.
- For the next cycle discharge models and flood maps could be produced together with Sweden (only country where Finland has a cross-border flood risk management). It makes also easier to define similar objectives for flood risk management.
A policy based on close protection facing a policy based on space for the river could have difficulties to manage a cross-border cooperation, but building international or European standards could be a good solution to enhance cross-border cooperation.

No significant obstacles encountered due to standards or regulations.

All differences were discussed and handled in international river commissions where one agreed on a common consensus.

Different methodology can lead to different results.

The standards are different and do not limit cross-border cooperation. Standards should not be harmonized because these are in great part the result of socio-economic development in the region and this changes from country to country.

Separate plan for international river basin district includes harmonized international methodological approach

Some minor problems according to different timetables and national regulations. Right now work is being done to prepare a plan for the future (2021-2027) to harmonize and improve the Torne river basin management planning and flood risk management planning.

By creating common projects.

The basic principle is the negotiation of specific measures.

Different regulations have meant some differences to the risk areas between the devolved authorities however this has been adequate explained in the FRMPs. Cross border coordination has benefited from cross border working groups, both at National and local level so that work is well coordinated.

There are no substantive differences in our respective approaches that need to be reconciled.

Note as above: cannot change risk composition and relative priorities; opportunities for achieving wider benefits through delivery; engagement with Environment Agency via relevant stakeholder groups; maintenance of the Cross-Border Advisory Group

Differences may be reconciled through cooperation and the setting up of a common body/agency for the implementation of FD. That needs time and effort.

Different standards and/or regulations can pose difficulties in cross-border cooperation, but this can be resolved by developing joint tools, models and maps by commonly-agreed methodology that does not need to be identical to those that are used at national levels.

Maybe via basin-wide plans such as the DFRMP by ICPDR FP-EG.

To properly carry out flood risk management in transboundary basin different approaches were adopted at river basin level. For example: common measures were defined, as in the certain basins, that regard data collection and sharing to develop a shared Early Warning System and the small pilot basin was identified having the function of a common experimental laboratory;

Cross-border cooperation is institutionalised by a convention.

In the frame of bilateral commissions (agreements) or common cross-border projects.

Four respondents considered this question as not applicable. One respondent gave the reason as being because “There are no flood risk zones in border areas”.

Three respondents did not provide responses.
5.41 How much of an obstacle is the language barrier when coordinating flood risk management at cross-border areas? How is this obstacle overcome?

Language is not an issue (or is managed successfully) for 26 respondents. Language is an issue for five respondents. The use of translators and/or a common language, such as English is used to mitigate the issue, but technical discussions are still sometimes challenging.

Detailed responses

- In our country the water engineers in the sector are usually over 50 or under 35 years old. A whole generation is missing. The communication has to be in our local language using interpretation. Using English language could be the solution. Unfortunately the public administration cannot compete with the market salaries at all and the water directorates are not attractive for young engineers to involve them with presumable English language skills.
- English was used as a common language and in some cases interpreters were involved to overcome comprehension barriers.

5.42 Is exchange of information with regards to planned measures taking place in cross-border river basins/sub-river basins? If so, at which stage of the project lifecycle, and does this exchange of information ever lead to redesigned projects? Please mention examples.

Six respondents answered ‘No’ or ‘not applicable’ to this question.

Twenty-two respondents responded positively to this question. Ten respondents mentioned that information exchange begins early on in the planning process or may even be subject to routine discussions and/or specific legislation.

Many responses gave specific answers and so are summarised here:

- Yes if relevant for the neighbouring country at the very beginning
- All information on planned measures is exchanged. At moment where the cross-border impact is clear more detailed information exchange takes place.
- It is being planned a general information for draft programme of measures to be exchanged, incl. in the process of environmental assessment.
- Exchange of information with regards to planned measures taking place through border commission. Communication started in case of big projects in early phase of design (e.g. a large reservoir).
- Yes there is a continuous exchange of information in the international commissions; For example on major trans-boundary rivers essential construction measures are usually agreed via through international treaties or comparable regulations and in some cases trans-national agreements in place for flood forecasting.
- Yes an exchange of information on planned protection measures takes place at national level. Information exchange is normally performed at early stage in the project. There are no examples where the exchange of information has led to redesign of the project.
- There is an exchange of information. A summary of the FRMPs and the programme of measures is translated in English and communicated to the riparian countries.
Yes. Most of the objectives and measures for a transboundary river are the same in both cross-border countries. Information exchange will be done in the cross-border river commission during the first cycle of FD. Agreed measures to implement together are e.g. common flood maps, developing flood forecasts and elevation of levees.

Some projects should be discussed in the international river commissions.

Yes exchange of information at the planning level is taking place as required by the Directive. At the project level detailed review is taking place according to relevant international laws and regulations, and this could lead to redesigned projects.

There has been exchange throughout the process, including the use of a common model where appropriate for the consideration of flood mapping (and if necessary flood risk management measures).

Sometimes the exchange of information has started before the FD planning cycle due to research projects funded by the EU which had the main aim of harmonizing workflow procedures. (see 5.40)

Information exchange was carried during all FRMP preparation period, no changes for measures have been necessary.

In the international river commissions we agreed to inform the affected member states (downstream and upstream) on all measures which might have an effect upon them. This will happen at the earliest stage of the project.

Yes exchange of information does occur within the River Commissions, but this does not lead to adaptation of measures. The exchange is directed to prevent measures that have a potentially negative effect downstream. An example is the Action Plan on Floods of the International Commission for Protection of the Rhine (although approved in 1998, well before the FD) is an example of an internationally coordinated package of measures which have been included in the FD. Important elements are the execution of the measures coupled with quantifying the effects on flood levels and flood risk.

During the work on FRMP it adopted a rule assign the flood risk to adjacent water regions or areas of international river basin districts. As part of FRMP an analysis of planned projects taking into account the possibility of influencing the basin of neighbouring countries including outside the EU. Three river basins not expected to engage in investment activity that could have transboundary impact. The progress of work on FRMP countries lying in the three basins were informed in meetings of the Bilateral Commission.

Under procedure of strategic environmental assessment of flood risk management plans (FRMP) have not been identified cross-border impact of planned measure recommended for implementation under FRMP, including any significant adverse environmental effects on the territory of a neighbouring state (social costs).

Exchange of information regarding planned measures with cross-border influence are developed in the frame of bilateral cooperation (agreements). For the moment isn't case for redesigning projects.

Yes of course during the development of the flood risk management plans. The measures presented in the management plans are substantively the same. Due to national regulations, there are small differences in terms and also measures are categorized in different categories. Not all measures needs to be implemented on both sides of the river since the flood risks differ on the different sides.

All of the flood risk reduction activities in the cross border river basins are continuously and regularly communicated through bilateral water management commissions with the neighbouring countries.

During the preparation of flood risk management plans we kept neighbouring countries informed about the state of preparation, and their content. The information was provided during the
deliberations of the commissions of boundary waters. On the basis of the information was not necessary to make adjustments in the plans.

- Although information is routinely shared with our counterparts in our one neighbouring country, there are no significant flooding issues within our cross border catchments that would justify cooperation in regard to planned flood mitigation measures.

Four respondents did not provide a response.

5.43 Cooperation at cross-border basins/coasts has improved after the introduction of the Floods Directive…

![Figure 5-19 Cross-border basin cooperation improvements after the introduction of the Floods Directive](image)
5.44 What features have been included in your flood risk management plan/s that go beyond the requirements of the Floods Directive, and what is the added value of these additional features?

Ten respondents indicated that no additional features had been added.

Included features

Three respondents indicated some coordination or integration with the WFD:

- Coordination with WFD, FRMP are completely integrated in the RBMP; and, defining indicators (people at risk economic damages ecological tolerance,...) to evaluate the state of the flood risk.
- Plans include direct evaluation of measures according article 4.7 of the Water Framework Directive.
- We have encouraged inclusion of local flood risk projects outside of flood risk areas to give a more complete picture of flood risk projects across the country. We have encouraged fuller integration with RBMPs, using the same boundaries timelines and identifying collaborative measures. We have used an online database to coordinate the measures across risk management authorities for our internal benefit and collected detailed information on each of the measures in the FRMPs.

Other responses were more specific:

- The whole region was studied.
- Requirements are in compliance of Flood Directive. There are additional natural water retention measures (recommended measures that should be taken into account). Helps to reduce the risk on flood hazard and adapt with climate changes. Requirements are in compliance of Flood Directive. There are additional natural water retention measures (recommended measures that should be taken into account). Helps to reduce the risk on flood hazard and adapt with climate changes.
- A cost benefit analysis of main measures in monetary terms will be conducted.
- Description of action in flood risk situation. This way management plans could be used as the only river basin wide flood related document and flood action program with responsibilities will be updated in every sixth year.
- The key difference between the core requirements and what we have included relate to the level of detail of both the analysis (hydrological, hydraulic modelling and mapping, and optioneering).
- Basin Water approach for the implementation of measures and not just APSFR.
- 1. Introducing measures regarding significant floods produced after PFRA reporting time and for flash-flood zones; 2. Tailoring integrated projects at basin/APSFR level; 3. Creating a matrix measuring efficacy of the measures at APSFR level.
- Focus on protection of critical infrastructure and vital societal functions and the severe consequences of floods for the society. This seems to be beyond the objectives in the FD. Can also be the case for some enlargement of the environment objective to include natural resources in general.
- Adding the potential sources of financing for particular flood risk reduction measures/projects.
- The Strategies are applicable to all areas and not just APSFR; and, the pairing of FRMP and LFRMPs are statutory but not in the Directive - this strengthens the partnership approach.
- The FRMPs incorporate policy units from previous plans that set the strategic policy direction.

One response was unclear.
We think Floods Directive is flexible, and every measure included in FRMP can be include as a measure of the FD.

One respondent considered this question not applicable.

Four respondents did not provide a response.

5.45 Based on the experience from the 1st cycle, what changes are you considering for the production of flood risk management plan/s?

Five respondents have no plans to significantly alter FRMP for the second cycle.

Eight respondents need to complete an evaluation before this question can be answered.

Seventeen respondents are considering changes

- A better integration and coordination with other directives (WFD, Natura 2000). There was no hydraulic model available to cover all the flood zones. Most of the flooding in the capital concern sewer overflows. Considering experience of other districts/MSs.
- Increase implication for local community.
- All the main documents to be updated - methodologies catalogue of measures etc., based on experience gained and at the same time also to be taken into account climate change impact and other types of flooding (e.g. torrential).
- Higher involvement of local authorities.
- The production of FRMPs will be discussed in working group.
- Perhaps, to have more time and more budget to produce them.
- Shortening and restructuring national example plan, preparing separate summary from plans, better usage of national flood information database and measure information included in it. Better environmental impact assessment already at evaluation phase of measures and objectives. Better usage of regional examples and knowledge sharing.
- Increase the public participation and the exchange between district and across the borders.
- Collect additional data, develop more precise models and maps, carry out more detailed river basin studies and feasibility studies to be able to perform economics-based prioritization of the measures. We consider these activities to be non-structural measures to be implemented in the 1st cycle, and these activities should lead to an improved FRMP for the 2nd cycle.
- Coordination between parties participating in preparation of the FRMP must be improved.
- To carry out a more detailed study, use cost benefit analysis.
- Improved monitoring system through the monitoring of the actual flood levels.
- We are considering carrying whether to carry out a PFRA. We are exploring the possibilities for an improved coordination with measures from the WFD
- Study a methodology to integrate social vulnerability to flooding.
- 1. Introducing new measures (e.g. for climate change impact); 2. More events during public consultation; 3. Closer measures to RBMP plans
- Both flood risk management and river basin planning form an important part of a collaborative and integrated approach to catchment planning for water which we are seeking to develop further in the second cycle.
- Better collaboration across all sources of flood risk.

Three respondents did not provide a response.
Section 5 conclusions

Respondents were asked about the stage of preparation of their FRMPs; 19 respondents have adopted their plan and eight respondents are still in the process of producing it. Four respondents either did not provide a response or the response they provided was unclear. Thirteen respondents, who adopted plans, prepared their FRMPs at a River Basin District level.

FRMPs are a legal requirement through various national legislative procedures for 15 respondents but not for nine respondents. A number of the benefits of drafting FRMPs were of relevance to engaging stakeholders and raising awareness of flood risk. In additional, having a systematic and consistent method to follow helped respondents to better understand their flood risk and associated management priorities.

Many difficulties and dilemmas for drafting FRMPs were listed by respondents. There were no clear trends in the difficulties listed; different respondents raised different difficulties.

It was most common for respondents to set objectives at multiple levels (13) followed by setting objectives at the central level (12). Most objectives are strategic (13) as opposed to operational (2), although 11 respondents set both strategic and operational objectives (11). There were no patterns in the reasons why respondents chose one approach over another.

Twenty-four respondents responded positively to whether their FRMPs included a method for monitoring and evaluation of the plan's objectives (24). Where respondents do not have such methods, the reason for this varies. One respondent quoted a difficulty in measurement; another states that monitoring is the responsibility of another organisation. Two respondents stated that objectives do not need to be monitored, only measures must be monitored.

Funding for measures tends to be sourced at multiple levels for the majority of respondents (22). The amount varies widely, from approximately €100 million per year up to €1 billion per year. Funding has increased since 2007 for 16 respondents. Seven respondents thought that the FD had significantly influenced this increase. Additional reasons for an increase in funding was flood events, quoted by ten out of eighteen respondents that responded in detail to this part of the question. Respondents expect their budgets to either remain approximately the same (12) or to rise in the future (16).

Two-thirds of the respondents that responded stated that damages from flooding were centrally recorded in their countries (20). Twenty-two respondents confirmed that flooding is an insurable risk in their country, although it is only compulsory for all properties in five respondents and compulsory for properties located in area that floods for four respondents.

The majority of respondents do not have explicit methods for future proofing methods (i.e. for climate change or to minimise regrets); ten respondents responded positively to this question. However, for ten respondents, some considerations of climate change, resilience or the lifetime of measures were taken into account.

Respondents were asked to describe their approach to the inclusion of flood risk reduction measures in their FRMPs. Most respondents opted for some combination of options A and B:

A. As broad types/groups of measures at the river basin/coast level
B. As mainly as individual projects at the APSFR level

Although four respondents chose the third option ‘other’, when elaborating on their approach, the approaches did seem to also conform to either options A and/or B. Practicality, i.e. the approach fitted with existing resourcing requirements, legalisation, geography or management approaches (11) and
guidance or steer by stakeholders, be that the public or the government (4), guided the approaches to measures that many respondents took.

Four respondents addressed the connections between FRMP/high level measures and APSFR level measures by evaluating the effects of measures at different scales. Twelve respondents gave other mechanisms for establishing the connections; however, the other 15 respondents either did not provide a response or didn’t think that this question was applicable to them.

With respect to evaluating the progress of the implementation of broad measures four respondents intend to use indicators to aid evaluation. Two respondents intend on undertaking annual evaluations. Three respondents intend to undertake evaluation in line with the FD management cycle.

Irrespective of the level of detail of the measures included in the FRMPs all except three respondents described that ensuring that measures do not increase flood risk elsewhere is an explicit part of their planning process.

In terms of the prioritisation process, one respondent will not undertake prioritisation because all the measures identified will be implemented. Eleven respondents explicitly said that they would include either multi-criteria analysis or cost-benefit analysis during the prioritisation process. Other respondents described specific prioritisation processes. Whilst there may be aspects of these processes that are similar in concept different methods were described and commonalities are not obvious. Advantages of the methods described include objectivity, evidence driven and scientific rigour; benefits of including stakeholders and reaching consensus; improving the management of funds; and, advantages of a cyclical process that is repeated and allows for improvements over time. Disadvantages of the methods described insinuate that public consultation may have led to some challenges. Some respondents raised issues associated with funding, or managing the number of high priorities.

Excluding budgeting, twelve respondents felt that there was little or no political influence on the prioritisation of measures. Fifteen respondents indicated that at least a small amount of political influence was possible, but responses insinuated that the relationship to budgets was important in this influence. Similarly, nine respondents felt that public pressure or consultation had little or no influence on the prioritisation of measures. Fifteen respondents described that the public may have at least some influence on prioritisation of measures.

In five responses the feedback following public consultation is not known. This may be because the consultation is not yet complete or the information is not held in a central format that can be accessed. In those respondents that have received feedback, the variety of responses is wide. As a result of the consultation, 22 respondents stated that some changes had been made. Changes ranged from rewording definitions to modifying the range of measures.

The respondents were asked whether there was a process for feedback from interested parties during the whole implementation cycle. Twenty respondents responded positively to this question, stating that they include a range of engagement activities including public meetings, use of electronic media, steering committees and dedicated groups.

During the consultation process, respondents have consulted a wide range of organisations and individuals, drawing on central, regional and local government and associated agencies; water, environmental, transport, agricultural, fisheries boards / groups / NGOs; citizens individuals / groups; businesses; and, research institutions.

Respondents were asked how flood risk is coordinated with civil protection in their countries. The approach differs for each respondent and the level of description provided also varies. Three respondents describe how the people involved in flood risk and civil defence response support each other. Fourteen respondents describe the links between ministerial control of both flood risk and civil
protection in their countries. Eleven respondents describe the process of coordination, involving different geographic scales and/or different organisations in their countries.

Thirty respondents stated that their countries have urban planning and/or building regulation to control encroachment of human activity into floodplains. Nine respondents deemed that these regulations are effective. Three respondents deemed that their regulations are not effective. The rest of the responses did not describe the level of effectiveness.

With respect to the existence and success of dedicated mechanisms to monitor and record encroachment of human activity into floodplains, 14 respondents indicated that they did not have such a mechanism and 15 indicated that they do have such a mechanism. The majority of respondents (18) only have controls on encroachment of human activity via urban planning and building regulations. Reconciling the needs of local communities with the longer term planning of measures for flood risk reduction causes difficulties for 15 of the respondents.

Consulting services were used in some capacity by the majority of respondents, only four respondents said that they did not use consulting services at all. Nineteen respondents relied heavily on consulting services for tasks such as surveying and piloting methodologies, developing methods, undertaking FRMPs, evaluating work done, developing measures and manage public consultation.

When asked about the role of the private sector in the management of flood risk 13 respondents thought that there was no role for the private sector. Some respondents thought that the private sector did have a role to play. The role might include responsibilities such as:

- Private property owners have responsibility for their own risk (individuals and companies)
- To assist in wider flood risk management
- As technical consultants and engineers

Where applicable, 18 respondents identified obstacles to cross-border cooperation in the preparation of FRMPs. Harmonising methods and approaches was a particular issue raised by several respondents. For the majority of respondents, language is not a barrier to working. Information is exchanged in cross-border river basins: 22 respondents responded positively to this question. Ten respondents mentioned that information exchange begins early on in the planning process or may even be subject to routine discussions and/or specific legislation. The rest of the responses were very specific to the respondent's own experience. The majority of respondents (24) have seen at least some improvement in cooperation at cross-border basins/coasts since the introduction of the FD.

In addition to the requirements of the flood directive, three respondents indicated that some coordination or integration with the WFD had been added to their FRMPs. Twelve respondents gave more specific responses tailored to their country. Following their experience this time around, 17 respondents are considering changes to the way in which they produce their FRMPs. These include: a better integration and coordination with other directives, increase the public participation and, better collaboration across all sources of flood risk.
6 Reporting

6.1 What were the most important obstacles in data collection for the purposes of reporting (up to three for each of the three stages of the 1st cycle)? Please mention in which step of the data collection process these obstacles were encountered:

No significant issues:

- No important obstacles in data collection for the purposes of reporting. Reporting resources under the Floods Directive (e.g. guidance documents and reporting schema) were finalised well in advance. So national methodologies of data collection, aggregation and the structure of national documents could be correlated with reporting requirements.
- No significant obstacles.
- No really significant problems or obstacles.
- For the reporting of mandatory data, not important obstacles were encountered.
- No significant obstacles.
- No specific significant obstacles can be identified.

Lack of data and difficulty in processing

- Collecting and analysing the information for PFRA.
- Lack of data, and scattered data mostly related to the damages and other consequences of floods (had to dig in newspaper archives to find information) that affected both the PFRA and the FRMP stage of the cycle.
- Reporting of PFRA - information about historical floods is too detailed; Reporting of FHRMs - problems with diversity of flood mapping data from different companies; and, reporting of FRMPs - nothing fundamental.
- PFRA: Data collection from the municipalities about PFRA for pluvial floods; FRMP: Plans made for river basins, but units of management are river basin districts. Maintenance and instruction of flood information system from where reporting is done based on the information regional authorities have provided (some discontinuity).
- The most important obstacle was to collect data on time from some regional offices so we had to make several reporting phases especially for the APSFR and the Flood Hazard and Risk Maps.
- PFRA: The absence of impact / consequence data for flood events prior to 2006 impeded the identification of past significant floods. Developing a structured approach to consolidating data from different sources to identify significant risk (e.g., occurrence of past floods, outcomes of predictive assessments, expert opinion, local anecdotal information, etc.) Flood Maps: Standardising the format of GIS data for mapping from a range of sources; FMRPs: Not yet reported
- Statistical information (population) for FHRM.
- Reporting of data requirements such as water levels for rivers (watercourse) with ephemeral flows is an important challenge in the compilation of Malta's FD reports.
- Development of alternative indicators on a national level to be used in the absence of data for the indicators established under the FD.
- PFRA: Information about economic impact of flood events. Flood Hazard and Risk Maps: No important obstacles in data collection for the purposes of reporting.
The most important obstacles in data collection were: statistical information in GIS format (needed for risk analysis); monitoring evaluation of damages; collection of measures (as proposals) from local authorities.

Data collection and breakdown of data into groups flood and flood event location in the preliminary flood risk.

Coordinating FRMP data from different organisations while ensuring data quality and keeping to deadlines.

All Member States collect and report data on floods post 2007 in a consistent manner so that comparative 'significance' of flooding that is occurring within each of the EC countries can take place.

Collecting the volume of data and obtaining the data from external sources.

Other issues

FHRM: Textual information is not always available, so had to be written. Agreement of all involved parties took time; and, FRMP: A lot of information is available, so important to find the right bits to put into the different reporting boxes.

Designating areas of severe flooding and subsequent reporting on individual APSFR areas. Considerable specialist knowledge required for the classification of areas of severe flooding (HQExtreme) for individual APFSR (waters), in particular for estuaries. This classification is required exclusively in reporting and is very complicated.

Perhaps PFRA has been the worst stage for the reporting exercise.

While elaborating the FRMP, the reporting was taken into account. The final production of the reporting could easily be collated from the FRMP.

During the development of these three documents, databases have been developed taking into account the guidelines for reporting. At the stage of preparing the report, the problems were not identified. Only in the case of preliminary assessment of flood risks. The MS had a problem with relationship between flood location codes and flood event codes. The Schema does not allow to have the same flood event code for different flood location. This affected the statistics of the number of flood events, because one flood event is divided in several different flood locations (in case of 2010 flooding – one flood is divided in more than 1000 different flood location). The flood event code should be used for more than one (multiple) flood location.

The complexity of the combined GIS-layer with flood scenarios extents from both the rivers and the big lakes. This resulted in some APSFR areas that have a combined source of floods - but that was not possible to report. We had many discussions both with the COM and the consultant before reporting - but it could not be performed despite they said it was possible.

Across all three stages there was not really an issue with data collection rather the internal organisation processes/formatting to facilitate reporting.

Harmonization of Unit of Management has been an issue as we had to ensure consistency among 47 entities.

Two respondents did not provide a response.
6.2 What were the most important reporting obstacles (up to three for each of the three stages of the 1st cycle)? Please mention in which step of the reporting process these obstacles were encountered:

No significant issues:

- No important reporting obstacles due to active involvement in the preparation works of EU reporting requirements (e.g. Guidance documents and reporting schema) and test runs.
- No significant obstacles in reporting were encountered.
- No significant obstacles.
- Not important obstacles were encountered.
- No specific significant obstacles can be identified.
- No significant obstacles in reporting.

Form, format and timing of reporting system

- FHRM: lack of clarity on spatial data to be reported, also a lot confusion on what was allowed to report the maps (pdf, wms), Optional/... not always easy to understand. FRMP: strange division of art. 7.3(summary aspects and summary flood extent), link with WFD reporting, used terminology wasn't all the time explicit (MeasureAspect), table summary wasn't useful. We should send long text without bullet and formatting.
- The reporting schemas are long and unclear. The same information has to be reported repeatedly in the schemas.
- Problems with XML; Undefined reporting documents and formats; Changes in the reporting of FRMP in 2016.
- The most important reporting obstacle was that the reporting tools (databases schema, conversion and validation tools) were ready not much time before reporting, especially for PFRA and FHRM: six months or less. Indeed the expected reported data influence the data to be produced.
- Flood Risk Management Plan: Guidance on Reporting as well as reporting infrastructure was finished quite late; We are still in the process of reporting.
- For all - particularly PFRA: Formatting of data to the required database tables in the database / conversion tool. For example, it would be much easier to report multiple parameters on a single row for a given APSFR rather than have to enter multiple rows for the same APSFR for different parameters.
- Technical problem with uploading the report on flood hazard and risk maps, probably related to the volume of the files (solved by The Eionet Helpdesk Team).
- Space limitations of some reporting boxes.
- The EOINET reporting systems established by the EC are a particular obstacle to reporting. They are complex, they are not intuitive and the accompanying guidance documents are lengthy and arduous to use.
- 1) Understanding the structure and requirements of the schema (PFRA) 2) Understanding the requirements of member state's sub-sections regarding reporting cross border areas and tagging records within those; 3) The Flood Hazard and Flood Risk Maps schemas were the most complicated to understand and resulted in many requests for clarification to the WISE helpdesk; 4) The character limit imposed on the summary documents meant detailed methodologies had to be consolidated; and, 5) We will not be able to fully comment on aspects of the mechanisms and content of the Flood Risk Management Plans until we have submitted the data.
Other issues

- PFRA - the connection between flood event- flood location- associated flood locations
- Reporting of FRHMs - There exist several documents for reporting. Information is mentioned in some is also another one. Some of them are probably not finished. Is not so practical to use several documents for one procedure. Many optional information is part of reporting sheet for FRHMs. (Some of these information hardly be ever known - for example number of affected people at night). Reporting sheet for FRHMs could be simplified for the next cycle. Reporting of FRMPs - nothing fundamental, but reporting are not finished
- In general: The data templates and text requirements were only set after the work had already begun which was a disadvantage at every stage. The field definitions in the report templates were not always easy to understand.
- Preliminary assessment: Clarification of notification and localisation of risk area/intersections (point, area or line); Coordination and establishment of APSFR codes.
- Flood Hazard Maps and Flood Risk Maps; Development of mechanisms for automatic reporting preparation; Different spatial information systems with different accuracy requirements in the uploading process
- Preparing flood risk management plans (including measures and strategic environmental assessment). Aggregate measures according to template requirements; Assigning measures with different legal foundations in the regions to national and European categories was very difficult.
- FRMP: Plans made for river basins, but units of management are river basin districts. Round-up of summary texts.
- The insertion of EUUOMCode in the table FRMP_SummaryReview was not understandable and intuitive. The convalidation tool is too severe with not relevant issues e.g. if capital instead of lower-case characters used or vice-versa. Connection to EEA CDR Eionet servers not functioning at times even for prolonged periods (e.g. half an hour)
- Data collection and breakdown of data into groups of floods and flood event location during the PFRA
- Data collection for the FHRM because of the many different data providers. To create national maps, methodologies had to be harmonized. Therefore specific reporting resources were needed and available in time.
- Scarce information available regarding the errors that occur in the database validation process.
- There is lot of information on how the reporting should be done and a lot of the information can be interpreted differently depending on who reads it. There is a need of a new document about the reporting which focuses on the parts of the reporting which are mandatory. Here the information should be more detailed and not as open to interpretation. This could be a good focus for the newly formed drafting group on reporting.
- 1. Sort out geographic areas of flood risk maps by APSFR. 2. Categorisation of measures flood risk management plans to pre-defined groups
- 1) coordinating the merging of our data cross border; 2) ensuring all risk management authorities have used the database correctly when inputting measure data; 3) Other work pressures including recent flooding making deadlines more challenging to meet

Three respondents did not provide a response.
6.3 Please set out any proposals on how the reporting process can be improved?

- The development of reporting requirements for the Floods Directive in cooperation of EC and Member States on an informal level but with high political support of all partners using the well-established WFD CIS process is a good practice example for other sectors. Progress is still possible in a better use and integration into the FD reporting process of already provided relevant data under other reporting streams on EU level e.g. spatial data under the INSPIRE Directive, in means of “report once, use many times”.

- More user friendly reporting system, one you can fill in online. Coordinated responses from supporting organisations (e.g. consultants) and Commission. Improve the quality of “guidance document n°29”. It'll be interesting to have direct link with this document and the attributes of table in reporting.

- One guidance reporting document for each phase of implementation will be useful. Reporting sheet for FRHMs could be simplified for the next cycle. Information about historical flood not require for 2nd cycle.

- Setting and communicating data and text templates earlier. Directive should set framework for flood risk management plans and publication of outcomes. Reporting for regions should be limited to a link to the corresponding website of the Federal Land. A large number of the measures are implemented by stakeholders within their scope of responsibility (e.g. urban development planning within local community borders, regional planning in designated areas of the local community). Distinguishing measures of individual APSFRs is often not useful. Perhaps it may be worth considering reporting on these measures according to administrative units (e.g. using NUTS 3 level = urban and rural district administrations).

- Include examples of files well prepared. Produce detailed guidelines

- Would help a lot for planning of reporting if the reporting requirements will be known at the beginning of management cycle. Guess is that this will be already easier for second cycle.

- To check the consistency between the database the schema and the validation tool before producing the first version to be tested by the Member states. To fix the reporting tools one year before reporting.

- More flexibility in reporting would be welcomed. Unification of reporting schemas (Inspire, FD, River Basin Commissions.).

- Better explanation of the errors in the XML Validation Tool - These can be very difficult to understand in terms of what the reported error is.

- Standardization of measure location/coverage. Links between WFD and FD measures code/information. Minimum set of information (e.g. examples types of information needed) for having a simple but sufficiently informative Summary.

- Should be designed the test panel like existing “sandbox” for EIONET reporting to control the errors in Codes etc.

- 1) A better structured reporting guidance. Preferably similar structured reporting guidance’s for different directives. 2) Reporting resources and guidelines should be well on time available. 3) As many as possible harmonization with other directives: especially concerning enumeration-lists.

- By creating a reporting process that will last. By doing this it will be easier to automate the reporting. The process for uploading data to Eionet could be improved. During the 2nd step it was only possible to upload one file at a time. The possibility to upload multiple files at a time would speed up this process. As of now member states have to report shapefiles. Would instead be possible to report WMS or WFS? This of course depends on how the commission will use the data. This would mean it would be easier to make changes in the reported data. If the MS hosts
the WMS they can make changes in the WMS/WFS and the changes would show right away. And then the MS only has to report to the commission which changes that have been made.

- Establish the preliminary reporting, for example, on a sample of data that the EC will take the preliminary recommendations and so reporting of MS will be clear, correct and especially will be useful.
- The EC should review the reporting requirements and adopt a minimalist approach.
- 1) Increase the amount of characters allowed for the summary text or allow member states to submit their methodologies for the assessments in full; 2) Consider the removal of some optional fields if very few completed returns are received to streamline.
- Clearer guidance and templates.

Six respondents did not provide any suggestions.

6.4 Please set out any proposals on how the schemas can be improved?

- See also 6.3: “The development of reporting requirements for the Floods Directive in cooperation of EC and Member States on an informal level but with high political support of all partners using the well-established WFD CIS process is a good practice example for other sectors. Progress is still possible in a better use and integration into the FD reporting process of already provided relevant data under other reporting streams on EU level e.g. spatial data under the INSPIRE Directive, in means of “report once, use many times”.
- When you were not involved in design it takes some time to get used to the way they look and to understand what they are standing for. The division of art. 7.3 into 'summary aspects' and 'summary flood extent'. A lot of information is applicable to both, difficult to split up. Same as 6.3, these can be put in more user friendly online reporting systems.
- An analysis of filling in optional item can be done for reduction of reporting sheets.
- Template explanations should be more detailed and refer more to the reporting sheets directly.
- Rather than reporting on the shape form it would be more advantageous and failsafe to report on geodatabases (ESRI File Geodatabase). It would be advantageous to have uniform systems for the reporting process (e.g. such as in ESRI). There should no longer be optional fields in the reporting template. Different quantifications used for measures (usually numbers, in some cases also hectares) considerably distort the picture for assessment purposes – area measurements are subsequently “oversized” in comparison to other measurements with numbers. Measures should therefore no longer be quantified.
- Reduction of the number of questions/cells that have to be filled out. The reporting should be divided on more files/sites.
- Simplify them. The EC have to think what are the data that they really need. Reporting of WFD is very difficult we need to have easy reporting in FD.
- Would be simpler if schemas wouldn't change too much during the process or for the next cycles.
- It would be interesting to give an overall view of the tables and their connections in the access database the schemas are too fragmented.
- To enable more flexibility in reporting.
- Table structure in database i.e. for all - particularly PFRA: Formatting of data to the required database tables in the database / conversion tool. For example, it would be much easier to report multiple parameters on a single row for a given APSFR rather than have to enter multiple rows for the same APSFR for different parameters.
- Excel format is the easy way for reporting the repeated data.
- 1) One question per element. Now some of the elements for example ‘SummaryObjectives’ and ‘SummaryFloodExtent’ have several sub-questions. 2) More specific descriptions for elements.
• In preliminary flood risk assessment schema - described in 6.1
• There should be a way of more easily find the connections for those objects that are mandatory to report. Now it's very easy to get lost in the schemas. (SE)
• Make reporting schemes and instruments well in advance so that the processing of database from the beginning could manage under those schemes and information was not necessary to reconfigure the last minute before the deadline reporting.
• Look at the reporting information that has been provided by respondents in the 1st cycle, identify the best elements of the various submissions and develop new guidance for 2nd cycle reporting, with clear examples for respondents to follow.
• Clarification of optional/mandatory/conditional fields. Expansion or review to reduce any ambiguity over certain criteria. Provide a thorough guide for using the schemas which references the style of the schemas and the symbology (i.e. clarify which are mandatory and which are optional)

Fourteen respondents provided no suggestions.
6.5 Is your organisation responsible for reporting under the Directive? If not, please provide below the organisation that carries out the reporting:

![Figure 6-1 Number of respondents that are the organisation responsible for reporting under the Directive](image)

The number of respondents that are the responsible organisation for reporting under the FD in their country are summarised in Figure 6-1. One respondent was not part of the reporting organisation. Another respondent did not provide a response.
7. Finally……

7.1 Which organisations, outside your own, have you consulted with prior to or during filling in this questionnaire? Please provide details:

National government
- Federal Province of Styria
- Filling of this questionnaire has been done in a co-operation of Finnish Environment Institute (SYKE) and ministry for Agriculture and Forestry. This has been done after organising feedback and assessment meeting on 1st cycle where all members of regional flood risk management groups were involved.
- Agriculture administration, environmental administration, administration of emergency services and the administration of maps and topography (cadastre office)
- Ministry of Environment
- Department for Environment, Food and Rural Affairs (Defra) - central government
- Natural Resources Wales (the Welsh Statutory Environmental Authority) and Local Lead Flood Authorities.

Government agency(ies)
- Environmental Agency
- Civil Protection National Agency, River Basin Authorities
- Environmental Meteorology and Geology Centre
- Waters National Administration and National Institute of Hydrology and Water Management.
- Cooperation with the Hydrometeorological Institute and the Water Research Institute and under the auspices of the Ministry of Environment

Regional government and agencies
- Public bodies at regional level
- Basin directorates
- The questionnaire was elaborated by and coordinated with the 16 regions as they are responsible for flood risk management. The Ministry for the Environment only organized, coordinated and supported this process.
- District services and a centre for risk management
- The County Administrative Boards for questions regarding Flood Risk Maps and Flood Risk Management Plans since it's the responsibility of them.

National and regional government and agencies
- Members of working group “Implementation of Flood Directive” e.g. Water Research Institute, (Hydro-meteorological Institute, Ministry of Agriculture, River Basin Administrators
- River Basin District and National Civil Protection Authorities
- The filled questionnaire was commented by the expert involved in making the FHRM. Furthermore we drew on the experience of frequent meetings with the coordination group of the FD, which included representatives from regional and local authorities. One of these meetings
included an evaluation. Finally the filled questionnaire was sent to the coordination group of the FD.

Twelve respondents did not provide a response.

7.2 Following the completion of the questionnaire, please list possible areas of cooperation, coordination or further work through the Working Group on Floods that became evident to you when contemplating your responses:

General

- Following the completion of the questionnaire show to concerning reporting task. The respondent said that they were establishing of ad-hoc group for reporting.
- All potential areas are included in the WGF work programme.
- We think that work programme for 2016-2018 is ok.
- Means to involve stakeholders and public in order to pay more attention to flood risk management planning (i.e. how to make FRM interesting in general). How to combine public hearings based on the legislation (where hearing topics might feel boring to general public) to general information about flood risk?
- Methodology for flood area assessment, developing European models, European data bases work on a common feedback on the 1st cycle, exchange on examples of FRMPs, examples of measure work on cross-border cooperation, develop peer review on the 1st cycle.
- Estimation of non-monetary impacts of flooding (e.g., on cultural heritage, infrastructure, etc.); (ii) Impacts on Critical Infrastructure and Cascade Effects; (iii) Hydrological Estimation Techniques; (iv) Joint Probability; (v) Urban Flood Modelling; (vi) Model Calibration Techniques; and, (vii) Use of GIS in flood mapping Presentation & Visualisation
- The rain-floods in urban areas issues; Natural water retention measures; and, RBMP and FRMP integrations issues.
- Preparation of detailed list of what NWRM and green infrastructure in the field of flood risk reduction measures is.
- Some areas of note are: 1) climate change - guidance on common horizons to aid further analysis across the EU; 2) tracking and communicating modelling uncertainty; 3) encouraging delivery beyond the minimum (i.e. aspirational delivery); and, 4) embedding/appraising NFM

Information exchange

- Sharing know-how and experience on different topics related to FD implementation.
- Exchange of information between national experts so that the measures proposed by plans based on flood hazard and risk maps and preliminary flood risk assessment will be mutually evaluable between Member States.

Focus on more specific/detailed issues

- WGF workshops provide useful and informative opportunities to share information and learn from others involved in flood risk management. A narrower focus on specific issues in future workshop might be fruitful for finding ways of dealing with the most common issues and/or gaps in knowledge.
- Workshops having now dealt with the 1st cycle should now focus on more detailed implementation issues.
• Workshops held over the last eight years have been very useful but broad in the discussion. Perhaps future workshops could focus on specific issues.

Eight respondents provided no response. One response was ‘not relevant’.

7.3 Was a question omitted from this questionnaire? Please add it below:

• No
• 5.17: in one MS businesses have to insure against floods, when in flood prone areas, for the private sector it is part of the compulsory insurance with capped, low, pay-outs
• How will you link the implementation of the Sendai Framework for Disaster Risk Reduction and the Flood Directive?

Seventeen respondents did not provide a response.

7.4 Beyond these questions, we are very interested in hearing your specific examples anecdotes and stories around all these issues where additional information seems relevant. In addition, if you think important issues are missing from the above, please

• The MS led a first feedback on the first cycle of the directive implementation:. The issues of databases particularly on assets, stake and exposure seems to be missing.
• ICPDR basin wide reporting, www.icpdr.org

No other respondent provided any additional information.
Appendix A The Floods Directive, First cycle questionnaire

PLEASE SEE SEPARATE FILE DUE TO SIZE
Appendix B  Link to Member States’ guidance on how to collect and record flood event data

AT  
https://www.bmlfuw.gv.at/wasser/wasser-oesterreich/foerderng/foerd_hochwasserschutz/leitf_HW.html

BE  
"Flanders:  

BG  
http://www.moew.government.bg/?show=top&cid=67

DE  
Different responses from all Federal Länder, e.g. records of water levels (April 2014)  

EL  
A guidance to the Water Directorates of the Decentralized Administrations for collecting data in a compatible form to the WISE information for the PFRA has been developed by the SSW. This guidance is not available to the public but the database that was created for the PFRA is available at the link:  

ES  
p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-3&p_p_col_pos=1&p_p_col_count=2&p_r_p_564233524_categoryId=445903

FI  
Only in internal u not in internet

FR  

IE  

IT  
It is in progress and not available.

SE  
https://www.msb.se/sv/Kunskapsbank/Erfarenheter-fran-olyckor--kriser/Olycksundersokningar/Vagledningar/Oversvamning/  
The guidance is based on the mandatory incident reporting according to the Swedish civil protection act and on the information asked for according to the 1st step (PFRA) in the FD.

SI  
It is part of the Water Management Act by-law.

UK-SC  
This is subject to ongoing development at present, including the development of a flood data capture app. It is intended to make available guidance and to share the app more widely to increase the number of collectors. We would be happy to share further details via WG F.