EN 2018

NO 25

Special Report

Floods Directive: progress in assessing risks, while planning and implementation need to improve

(pursuant to Article 287(4), second subparagraph, TFEU)

EUROPEAN
COURT
OF AUDITORS

AUDIT TEAM

The ECA's special reports set out the results of its audits of EU policies and programmes, or of management-related topics from specific budgetary areas. The ECA selects and designs these audit tasks to be of maximum impact by considering the risks to performance or compliance, the level of income or spending involved, forthcoming developments and political and public interest.

This performance audit was carried out by Audit Chamber I Sustainable use of natural resources, headed by ECA Member Nikolaos Milionis. The audit was led by ECA Member Phil Wynn Owen, supported by Gareth Roberts, Head of Private Office and Olivier Prigent, Private Office Attaché; Robert Markus, Principal Manager; Bertrand Tanguy, Head of Task; Marco Bridgford, Katharina Bryan, Ingrid Ciabatti, Laure Gatter, Victoria Gilson, Jan Kubat, Liia Laanes and Radostina Simeonova, Auditors. Hannah Critoph provided linguistic and Annette Zimmerman secretarial support.

From left to right: Ingrid Ciabatti, Phil Wynn Owen, Victoria Gilson, Laure Gatter, Bertrand Tanguy, Annette Zimmerman, Hannah Critoph, Olivier Prigent, Katharina Bryan, Gareth Roberts, Liia Laanes.

CONTENTS

GLOSSARY

Area of potentially significant flood risk (APSFR): Areas identified as being at potentially significant risk of flooding by rivers, rain, groundwater, sea and natural or artificial lakes.

Coastal flooding: Flooding of low-lying coastal land by water from the sea, estuaries or coastal lakes, resulting from phenomena such as extreme tidal levels, storm surges, or arising from wave action.

Flash flood: Flash floods are a subset of pluvial floods. A flash flood is a flood that rises and falls quite rapidly with little or no advance warning, usually because of intense rainfall over a relatively small area.

Flood: The Intergovernmental Panel on Climate Change (IPCC) defines a flood as "the overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas not normally submerged".

Flood hazard: The probability of a potentially damaging flood event occurring within a given period.

Flood risk management: The practices involved in identifying, analysing and mitigating flood risks in advance, focusing on:

- **Prevention:** preventing damage caused by floods, e.g. by prohibiting construction in flood-prone areas.
- **Protection:** taking measures to reduce the likelihood of floods or the impact of flooding in a specific location, such as restoring flood plains and wetlands.
- **Preparedness:** informing the public of what to do in the event of flooding.

Flood risk management plan (FRMP): A document setting out appropriate objectives and flood prevention, protection and preparedness measures. Member States establish the FRMPs and coordinate the planned action at the river basin level.

Fluvial flooding: Flooding occurring when a natural or artificial drainage system, such as a river, stream or drainage channel, exceeds its capacity.

Green infrastructure: A planned network of natural or semi-natural spaces, in an urban or rural setting, designed to tackle climatic challenges while supporting or restoring natural and ecological processes. An example of green infrastructure, in the context of this report, is the restoration of a floodplain to prevent flooding of vulnerable areas.

Pluvial flooding: Flooding caused by heavy rainfall that overwhelms saturated natural or urban drainage systems. The excess water cannot be absorbed and flows out over streets or runs off hillsides.

River basin: The portion of land from which all surface run-off flows through a network of streams, rivers and lakes into the sea at a single river mouth, estuary or delta.

River basin districts: The main units for the management of river basins. Most river basin districts under the Floods Directive mirror those for the Water Framework Directive.

Water Framework Directive: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for community action in the field of water policy (OJ L 327, 22.12.2000, p. 1).

EXECUTIVE SUMMARY

I. Floods can cause injury and loss of life, considerable economic costs, and damage to the environment and cultural heritage. Serious floods have become more frequent in Europe. In recent years, more than twice as many flash floods of medium to large magnitude have been registered as in the late eighties. Climate change is an aggravating factor, triggering changes in precipitation and weather patterns, sea level rises and, consequently, more frequent and severe floods. Several phenomena, such as coastal erosion, storms at sea, and high tides and winds pushing tides into the land, heighten the risk of flooding in coastal areas.

II. In response to the rising incidence of flooding, the EU adopted in 2007 the Floods Directive. Under this framework, we sought to determine whether flood prevention, protection and preparedness under the Floods Directive were based on sound analysis and whether the approach employed was likely to be effective.

III. We found that the Floods Directive had positive effects overall, but that the implementation of flood-related action suffers from weaknesses in allocating funding. All Member States have begun implementation of the Flood Risk Management Plans (FRMPs), but improvements are needed. We observed that major future challenges remain concerning the much fuller integration of climate change, flood insurance and spatial planning into flood risk management.

IV. We found that the Floods Directive had improved coordination between the Commission and the Member States, particularly through the supervisory and monitoring role of the Commission and the dedicated working group established as a forum for coordination and the sharing of knowledge and best practices. The Member States we visited acknowledge the positive role the Floods Directive has played in the standardisation of flood risk assessment and management. The Directive also built upon existing work, particularly long-standing cooperation between Member States, and required Member States to carry out activities to raise flood awareness among certain citizens.

V. The sources of financing in the FRMPs were only partially identified and secured, and funding for cross-border investments was limited. In addition, the ranking procedures

distributing these limited resources generally presented weaknesses and did not allocate money in accordance with the priorities established.

VI. Regarding the implementation of flood-related projects, most Member States used cost-benefit analysis in order to achieve the best value for money, but we found some weaknesses in their use. Attention was paid to ensure compliance of projects with the Water Framework Directive, but some Member States need to make further efforts in this regard. Green infrastructure projects are a cost-efficient means of reducing flood risk, but the plans of two thirds of the Member States visited did not focus on green infrastructure.

VII. Looking to the challenges for the future, we found that the Member States visited could not factor in the impact of climate change on the magnitude, frequency and location of floods. Member States generally used historical data, which carries the risk of not reflecting future weather conditions or potential changes in the frequency and severity of floods. In relation to non-structural flood-related measures, we found that, where Member States had opted for private flood insurance, coverage remained low. Some land use and spatial planning regulations to mitigate flood risk were in place, but Member States had more to do to improve them.

VIII. Based on these findings, we recommend to the Commission to:

- check that the Member States improve accountability through quantifiable and time-bound objectives for flood-related action in the FRMPs;
- assess and report on whether Member States identify sources of financing to cover the needs arising from the FRMPs and establish a relevant timeline; and to request Member States to consider together potential cross-border investment for flood measures on international river basins;
- only co-finance flood measures for which projects are prioritised based on objective and relevant criteria, such as a good-quality cost-benefit analysis, and, where relevant, a criterion considering the cross-border impact of projects;
- enforce the compliance with the Water Framework Directive of new floods infrastructure proposed in FMRPs by the Member States; and check that, whenever EU co-financing is requested, Member States have analysed the feasibility of implementing significant complementary green measures;

- check that FRMPs include measures to improve the knowledge and modelling of the impact of climate change on floods. In its review of the documents required for the second cycle, check that the Member States better integrate the effects of climate change into flood risk protection, prevention and preparedness; and check whether Member States have planned action to raise public awareness of the benefits of insurance coverage against flood risks and to increase coverage, e.g. via cooperation between public and private flood insurance sectors;
- check whether Member States have used their FRMPs to assess the extent to which land use planning rules in Member States are aligned with the Floods Directive, and provide good practices and guidance to Member States.

INTRODUCTION

Why floods matter

1. Floods can cause injury, loss of life, considerable economic costs, damage to the environment and cultural heritage, and resettlement of people. As an example, in less than two weeks in May and June 2016, floods killed at least 18 people and caused losses of more than €3.7 billion in nine Member States[1]. In May and June 2013, similar events killed at least 26 people and caused losses of more than €13 billion in seven Member States[2].

2. The economic cost of hydrological events across the EU was about €166 billion from 1980 to 2017. This is around one-third of the losses from climatological events[3]. In a business-as-usual scenario[4], damages across the EU caused by floods, from the combined effect of climate and economic changes, are projected to rise from €7 billion a year in the control period 1981-2010 to €20 billion a year by the 2020s, €46 billion a year by the 2050s, and €98 billion a year by the 2080s[5].

---

[1] Belgium, Germany, France, Hungary, the Netherlands, Austria, Poland, Romania and the United Kingdom.

[2] Czech Republic, Germany, Spain, France, Hungary, Austria and Slovakia. Source: EM-DAT: The Emergency Events Database (https://www.emdat.be), Université catholique de Louvain - CRED, D. Guha-Sapir, Belgium, and articles from Dutch News and The Telegraph.

[3] Damage records from the NatCatSERVICE of Munich Re. Hydrological events include floods and mass movements. Climate-change events include storms, cold waves, heatwaves, droughts, forest fires.

[4] This assumes that current river flood defences will remain unchanged for as long as the probability of flood events occurring remains below 1 % in a given year.

[5] COM(2015) 120 final of 9.3.2015 "The Water Framework Directive and the Floods Directive: Actions towards the 'good status' of EU water and to reduce flood risks", p. 2; Rojas et al., "Climate change and river floods in the European Union: Socio-economic consequences and the costs and benefits of adaptation", *Global Environmental Change*, vol. 23, issue 6, December 2013, pp. 1737-1751 (http://publications.jrc.ec.europa.eu/repository/handle/JRC85624).

3. Floods events have become more frequent in Europe since 1985. In recent years the trend shows that more than twice as many flash floods of medium to large magnitude[6] have been registered as in the late eighties[7].

The significance of climate change

4. As the climate changes, the EU is experiencing heavier rainfall, harsher storms and rising sea levels. According to the European Environment Agency (EEA)[8], the consequences of fluvial, pluvial and coastal floods in Europe will overall worsen as a result of local and regional increases in intensity and frequency of flooding.

5. Observed climate trends and future climate projections show significant regional variations in rainfall across Europe. Projections show increases in yearly rain in northern Europe. Winter precipitation could increase by more than 25 % by the last 20 years of this century in some parts of Europe (see ***Figure 1***).

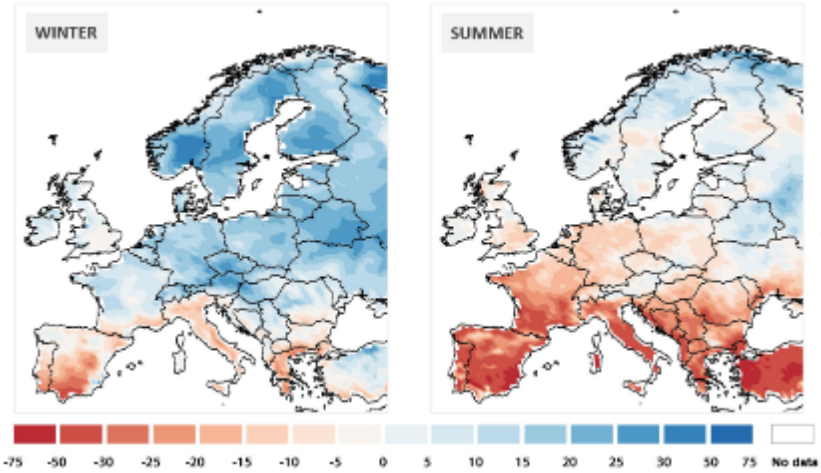
---

[6] Flood **magnitude** is the product of duration, severity and the area affected.

[7] Dartmouth Flood Observatory records for 1985-2009, updated up to 2016 in European Academies Science Advisory Council "Extreme weather events in Europe", March 2018.

[8] EEA report 1/2016, "Flood risks and environmental vulnerability", pp. 38-41.

Figure 1 – Change in seasonal precipitation, in %, for 2071-2100, compared with 1961-1990 (2°C global increase scenario)



Source: "Climate Impacts in Europe", the JRC PESETA II project, 2014. Data from Dosio and Paruolo 2011 and Dosio et al 2012.

6. If a river system lacks the drainage capacity to cope with the volume of water generated by rainfall, this results in fluvial floods. In large rivers such as the Danube, the Rhine or the Elbe, floods can occur a considerable time after the rainfall and may even last for months[9].

7. On the EU's Mediterranean coast, however, total annual rainfall could decrease by more than 50 %[10] by the last 20 years of this century. Longer and more frequent periods without rain could damage land cover, triggering erosion and increasing run-off during thunderstorms[11].

---

[9] SEC(2006) 66 of 18.01.2006 "Commission staff working document - Annex to the Proposal for a Directive of the European Parliament and of the Council on the assessment and management of floods - Impact Assessment - COM(2006) 15 final", p. 8.

[10] "Climate Impacts in Europe", the JRC PESETA II project, 2014. Data from Dosio and Paruolo 2011 and Dosio et al 2012.

[11] Trenberth, K., "Changes in precipitation with climate change", 2011.

8. Across Europe, rainfall events are likely to become more intense[12]. Highly localised and very intense rainfall can result in flash floods. They can cause deaths and widespread destruction[12], especially in towns and cities without adequate drainage. Flash floods are increasingly common, especially in the Mediterranean and in mountains[13]. Flash floods are more difficult to forecast as they are caused by specific meteorological dynamics due to local conditions, such as topography, winds and distance from sea. Specific research is needed to improve prediction of such events (see ***Box 1***).

Box 1 – Meteorological research about flash floods: the HyMeX programme

The HyMeX programme involves scientists from ten countries and aims to improve our understanding of the water cycle around the Mediterranean Sea, in a context of climate change. Researchers collect data from satellites, laser-equipped planes, weather balloons, and radars to build models that better predict extreme weather events, especially flash floods, and improve adaptation capacity.

9. Several phenomena, such as coastal erosion, storms at sea, high tides and winds pushing tides into the land heighten the risk of flooding in coastal areas in the EU. Climate change induced sea-level rises exacerbate this risk (see ***Box 2***).

---

[12] IPCC, "Managing the risks of extreme events and disasters to advance climate change adaption: special report of the Intergovernmental Panel on Climate Change", Cambridge University Press, New York, 2012.

[13] Marchi, L., Borga, M., Preciso, E., Gaume, E., "Characterisation of selected extreme flash floods in Europe and implications for flood risk management", Journal of Hydrology, 2010, volume 394, pp. 118-133.

Box 2 – Sea level and climate change

Sea levels are rising due to climate change[14] owing to the:

- thermal expansion of the water;
- melting of mountain glaciers;
- melting of ice in Greenland and Antarctica.

As a result, the annual global sea level rise since 1993 has averaged 2.6 to 3.4 mm/year. Sea level rise has accelerated over the past 25 years and is set to accelerate further[15]. Satellites show that the rate of melting from the Antarctic ice sheet has accelerated threefold in the last five years and the ice sheet is now vanishing faster than at any previously recorded time[16].

10. Sea levels will not rise uniformly across the EU, but the vast majority of coastlines are likely to experience, by the end of the century, a sea level rise of more than 30 cm compared with 1986-2005 in the IPCC's 1.8°C global temperature increase scenario[17] (see ***Figure 2***). In the high emissions scenario (3.7°C temperature increase by the end of the century compared with 1986-2005[18]), the rise could be between 45 and 82 cm.

---

[14] Levermann, A., Clark, P.U., Marzeion, B., Milne, G.A., Pollard, D., Radic, V., Robinson, A., "The multimillennial sea-level commitment of global warming", Potsdam Institute for Climate Impact Research, 2013.

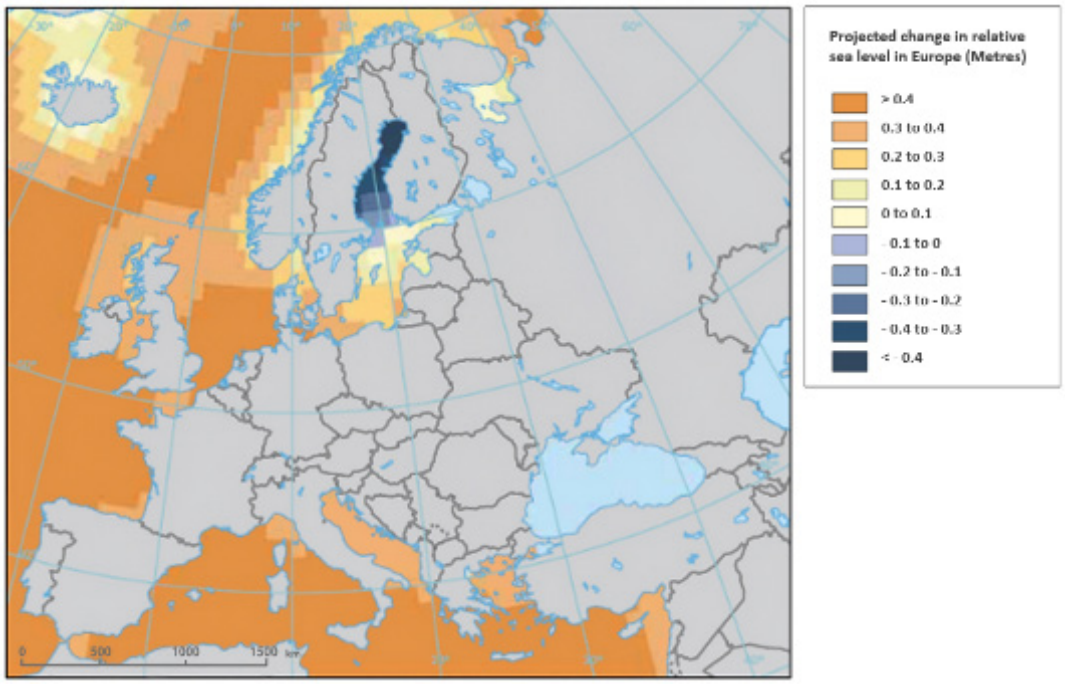
[15] Nerem, R.S., Beckley, B.D., Fasullo, J.T., Hamlington, B.D., Masters, D., Mitchum, G.T., "Climate-change-driven accelerated sea-level rise detected in the altimeter era", Proceedings of the National Academy of Sciences of the United States of America, 12.2.2018, p. 4.

[16] "Mass balance of the Antartic Ice Sheet from 1992 to 2007", *Nature*, June 2018.

[17] Temperature increase by the end of the century compared with 1986-2005. This represent an increase of 2.4°C compared to the pre-industrial period (1850-1900).

[18] This represent an increase of 4.3°C compared to the pre-industrial period (1850-1900).

Figure 2 – Projected change in relative sea level in the EU for 2081-2100 compared with 1986-2005 (1.8°C global increase scenario – RCP 4.5[19])



Note: No projections are available for the Black Sea.

Source: EEA No 1/2017, "Climate change, impacts and vulnerability in Europe 2016: An indicator-based report", adapted from IPCC, 2013 (Figure TS.23 (b)).

11. Projected sea level rise and changes in the frequency and intensity of storm surges are expected to cause significant damages in coastal areas across Europe[20]. These highly populated areas host a significant share of assets. Such a combination of climate risks and extensively utilised areas increases the magnitude of potential losses and adds an extra layer of complexity in risk and price uncertainty modelling[21].

---

[19] Representative Concentration Pathways (RCPs) are greenhouse gas concentration trajectories used by the IPCC. By 2081-2100, RCP 4.5 is projected to result in a surface air temperature increase, compared to 1986-2005, within a likely range of 1.1 to 2.6°C (mean 1.8°C). This translates in a likely range of 1.7 to 3.2°C (mean 2.4°C) compared to 1850-1900 (pre-industrial period).

[20] EEA report 1/2017, "Climate change, impacts and vulnerability in Europe 2016: An indicator-based report", p. 122.

[21] Moody's Investors Service, "Climate change risks outweigh opportunities for property and casualty (re)insurers", Sector In-Depth, March 2018.

12. More frequent, intense and enduring climate events of all types will also exacerbate all the above[22]. Glacier melting is likely to weaken major sea currents, including the Gulf Stream, and wind currents, including the Jet Stream, between America and Europe[23]. These changes could modify weather patterns in Europe, for example lengthening any periods of storms, rainfall or droughts.

13. ***Table 1*** below summarises the phenomena described in ***paragraphs 5 to 12*** and their impact on the various types of floods.

Table 1 – Overview of climate change-related phenomena and their impact on floods

	Impact on severity of …		
Climate change-related phenomenon	**Fluvial floods**	**Pluvial floods**	**Coastal floods**
More yearly rainfall in some parts of Europe, more intense rainfall events	↑	↑	
Less yearly rainfall in other places, but higher run-off and more intense events	↓	↑	
Sea level rise	↑ (estuaries)		↑
More frequent, intense and lasting extreme events of all sorts	↑	↑	↑

What has the EU been doing?

Which flood prevention, protection and preparedness solutions exist?

14. In response to severe floods in central Europe and southern France in 2002, the EU adopted the Floods Directive[24] of 2007, to coordinate flood prevention, protection and preparedness within and between Member States, at river basin level. Floods are best dealt with at basin level, with a range of measures limiting run-off, slowing river flow, letting floods expand into natural and agricultural land, protecting vulnerable assets (see measures

---

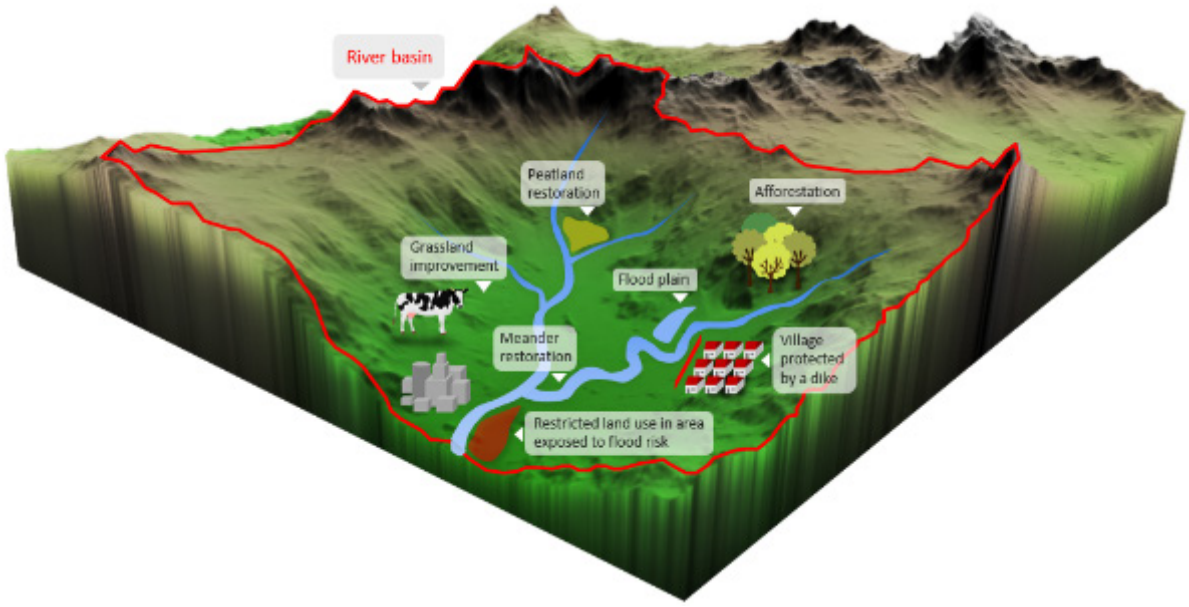
22 Behrens, A., Georgiev, A., Carraro, M., "Future Impacts of Climate Change across Europe", 2010.

23 Konrad, H., et al., "Net retreat of Antarctic glacier grounding lines", *Nature Geoscience* 11, p. 258-262, April 2018; Tilling, R.L., et al., "Estimating Arctic sea ice thickness and volume using CryoSat-2 radar altimeter data", *Advances In Space Research*, vol. 62, 2018.

24 Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (OJ L 288, 6.11.2007, p. 27).

at river basin level in ***Figure 3***) and not aggravating floods downstream as the Floods Directive requires (see an approach to avoid downstream flooding in ***Figure 4***).

Figure 3 – Example of coordinated flood management at river basin level



Source: ECA.

15. Green and grey infrastructure, as described below, can be used in combination to solve flood issues at river basin scale, as also illustrated in ***Figures 3 and 4***:

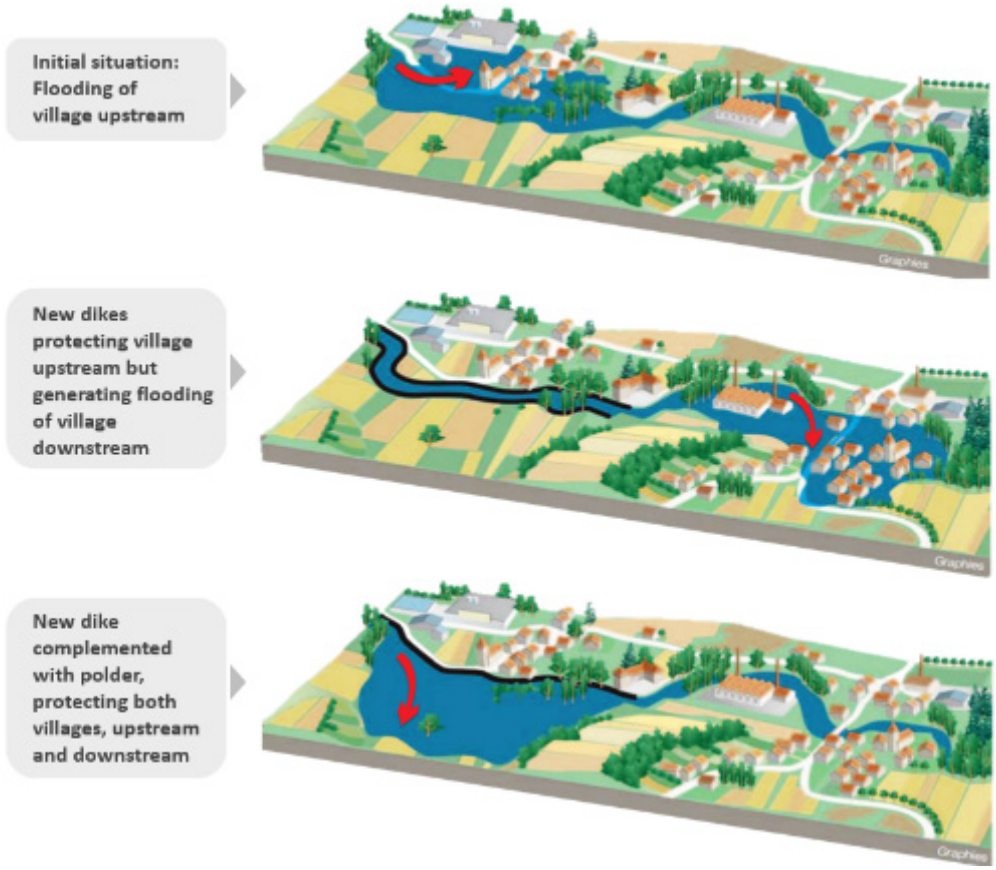
- Traditional flood protection solutions include dams, dikes, channels, storm surge defences and barriers in general[25]. Frequently made of concrete, such techniques are called **grey infrastructure**.
- Floodplains, wetlands or the remeandering of rivers can reduce flood impact. Such solutions are called **green infrastructure**. According to Article 7 of the Floods Directive, the FRMPs should take into account areas with the potential to retain floodwater, like natural floodplains.

---

[25] EEA report 14/2017, "Green Infrastructure and Flood Management - Promoting cost-efficient flood risk reduction via green infrastructure solutions".

16. On top of structural grey and green infrastructure (see ***Annex I***), other solutions can reduce the exposure of people and assets to floods. These include land use planning[26], awareness-raising activities[27] and insurance. We refer to these as **non-structural measures**.

Figure 4 – Illustration of an approach to avoid downstream flooding



Source: Agence française pour la biodiversité – Graphies.

Role of the European Commission and of the Member States

17. Within the Commission, the Directorate-General for Environment has a coordinating and supervisory role for the transposition and implementation of the Floods Directive. It has

---

[26] Article 7 of the Floods Directive requires flood risk management plans to take account of such aspects, where relevant.

[27] Article 10 of the Floods Directive requires that Member States make available to the public the key documents mentioned in ***Box 3***, and encourage the active involvement of interested parties in the production, review and updating of the flood risk management plans.

also the power to initiate infringement procedures in cases of non-compliance by Member States. Other Commission Directorates-General also intervene in the implementation of flood-related action, mainly the Directorates-General for Agriculture and Rural Development and for Regional and Urban Policy, through their responsibilities under the shared management of the European Structural and Investment Funds (ESIF[28]) (see ***paragraph 21***).

18. The Commission plans to finalise its evaluation of water-related legislation in 2019, in order to steer future developments in EU water policy, including flood risk management.

19. The Member States are responsible for the actual implementation of the Floods Directive to manage flood risk. To this end, the Member States have appointed river basin district authorities. The Directive requires Member States to assess the flood risk for all land not normally covered by water, plot the magnitude of past and likely future floods, map vulnerable assets and people, and take measures to reduce the flood risk (see ***Box 3***).

Box 3 – The Floods Directive requires Member States to produce the following:

1) **Preliminary flood risk assessments**, to be completed by December 2011, describing the significant floods that have occurred in the past and similar events that could happen in future;

2) **Flood hazard and risk maps**[29], to be completed by December 2013, showing where a given flood could have adverse consequences;

3) **Flood risk management plans** (FRMPs), to be completed by December 2015 and applicable for the period 2016-2021, defining measures to prevent, protect against and prepare for floods.

20. The Directive also requires Member States to coordinate their flood risk management practices in cross-national river basins and avoid measures that would increase flood risk in neighbouring countries. The first FRMPs implementation cycle of the Directive covers the period 2016-2021; the second cycle covers 2022-2027.

---

[28] They refer to the five main EU funds, including the European Regional Development Fund (ERDF), the Cohesion Fund and the European Agricultural Fund for Rural Development (EAFRD), which together support economic development across the EU.

[29] Reports assessing flood maps in each EU Member States are available on the Commission's website, DG ENV (http://ec.europa.eu/environment/water/flood_risk/overview.htm).

21. For the ESIF programmes, under shared management, the Member States prepare programming documents, which the Commission subsequently appraises and approves. The Member States design, implement and monitor the measures of the programmes. These programmes may co-finance flood-related action included in the FRMPs.

Available funds in the EU

22. Flood risk management expenditure is funded through both Member States' budgets and the EU budget. Data on flood-related spending is not systematically collected and reported either in the Member States or at the European Commission.

23. Following a survey[30] on flood-related spending among Member States, the Commission estimated that the 17 Member States which had available information had spent **€2.5 billion** per year[31], on average over a four-year period up to 2015, in total from national and EU sources.

24. The amounts dedicated to floods under the ERDF, Cohesion Fund and the EAFRD cannot be quantified. ERDF and Cohesion Fund spending in 2014-2020 for adapting to climate change and preventing and managing climate-related risks, covering floods as well as erosion, fires, storms and drought, amounted to around **€6.3 billion**[32] i.e. around €0.9 billion on average annually. Only an unknown part of this amount is then relevant to floods. Reliable estimates of amounts related to floods under the EAFRD are not available.

---

30 "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", p. 217.

31 Based on the information provided by Belgium, the Czech Republic, Denmark, Germany, Ireland, Spain, France, Croatia, Italy, Latvia, Malta, the Netherlands, Austria, Portugal, Romania, Slovakia and the United Kingdom, the Commission calculated that around €10 billion were invested in flood risk reduction over four years. The calculation was based on the replies to question 5.14 of the questionnaire, p. 146.

32 Data as extracted 31.5.2018 from Cohesiondata.ec.europa.eu/EU-Level/ESIF-2014-2020 (https://cohesiondata.ec.europa.eu/EU-Level/ESIF-2014-2020-categorisation-ERDF-ESF-CF-planned/9fpg-67a4).

AUDIT SCOPE AND APPROACH

25. We sought to determine whether flood prevention, protection and preparedness under the Floods Directive were based on a sound framework and whether the approach employed was likely to be effective.

26. More specifically, we examined whether the Floods Directive had positive overall effects in establishing a framework for flood-related action; whether Member States managed appropriately the financial resources used and implemented their FRMPs well; and if they adequately considered some of the major future challenges?

27. We established audit criteria based on EU policy papers, legislation, Commission guidelines, studies and other publications, meetings with Member State authorities[33], as well as from a pilot mission we conducted to the Netherlands in September 2017. We also reviewed existing literature and consulted experts in the domains of climate change and flood insurance.

28. Between October and December 2017, we conducted audit visits in selected river basins in the following eight Member States: Slovenia, Italy, Spain, Portugal, Romania, Bulgaria, Austria and the Czech Republic[34]. In those river basins[35], we also inspected 31 co-

---

[33] In Luxembourg and France.

[34] We have visited the following river basins:
- in Slovenia, the river basins of the Danube and North Adriatic (two projects visited);
- in Italy, the river basin of the East Alps (three projects visited);
- in Spain, the river basins of Miño-Sil and Galicia-Costa (three projects visited);
- in Portugal, the river basin of Minho and Lima (three projects visited);
- in Romania, the river basins of Arges-Vedea and of Dobrogea Litoral (four projects visited);
- in Bulgaria, the river basins of the Danube and the Black Sea (four projects visited);
- in Austria, the river basin of the Danube (five projects visited); and
- in the Czech Republic, the river basin of the Danube (four projects visited).

[35] Including the river basins in the Netherlands where we had our pilot mission (three projects visited).

financed flood-related projects[36] on site to assess their compliance with the Floods Directive and the FRMPs.

29. We also assessed whether the Commission[37] had ensured adequate implementation of the Floods Directive and of flood-related action taken in other policy areas.

30. With spending under the FRMPs in the period 2016-2021 still at an early stage, this report focuses on the planned expenditure included in these plans and ESIF programmes. Therefore, the report does not assess the overall effectiveness of the measures planned for the first cycle of the Floods Directive.

31. We excluded emergency and recovery action from the scope of our work, because we have already audited this area[38] and it is, in any case, not in the remit of the Floods Directive.

OBSERVATIONS

The Floods Directive has had positive effects overall …

32. This section assesses whether the Floods Directive has been successful in establishing a framework that, building on existing developments in the Member States and involving all relevant stakeholders, has advanced the assessment and management of flood risks.

---

[36] We selected the projects from lists compiled by the Member States. We aimed to visit recent projects implementing various measures addressing diverse flood types.

[37] We have interviewed officials from the following Commission Directorates-General (DGs): DG ENV, DG CLIMA, DG REGIO, DG AGRI, DG ECHO and DG FISMA.

[38] See, for instance, Special Report No 3/2008 The European Union Solidarity Fund: how rapid, efficient and flexible is it? (http://eca.europa.eu).

The Directive has improved coordination between the Commission and the Member States

33. The Commission has reviewed the preliminary flood risk assessments and the flood hazard and risk maps sent by the Member States[39]. The FRMPs are still under review. This work should feed into the Commission's report to the European Parliament and the Council, due by December 2018, on the implementation of the Floods Directive, taking into account also climate change.

34. The Commission checked[40] how the Member States had transposed the Floods Directive. As of July 2018, the Commission had closed all infringement procedures related to the transposition; two cases remained open, however, for the late submission of the FRMPs by Greece and Spain.

35. The implementation of the Floods Directive must be coordinated with the Water Framework Directive. The Commission mainly ensures this coordination through a common implementation strategy supporting the two directives and, in particular, through a Working Group on Floods, known as Working Group F, where Member States share their experiences.

36. We found the Working Group F to be a successful forum through which the Commission and Member States collaborate[41].

37. The Floods Directive required that risk assessment and planning responsibilities were at the discretion of Member States. Overall, we found that the responsible authorities in the Member States had ensured a clear division of roles and responsibilities among the various bodies involved at national, regional and local levels.

---

39 The reports resulting from the review made by the Commission are available online (http://ec.europa.eu/environment/water/flood_risk/overview.htm).

40 These checks the Commission performed are known as transposition and conformity checks.

41 For example, in this forum, the Commission and Member States exchanged information about good practices; policy, research and project developments; and new approaches to enhance flood risk management in the EU.

The Floods Directive resulted in progress in the assessment of flood risks

38. A key outcome of the Floods Directive has been the standardisation of the definition of flood risk. The flood risk is the probability of a flood event occurring, combined with its impact on people, the environment, cultural heritage and the economy. All Member States visited used this approach to determine the flood risk.

39. All the Member States we visited complied with the five-step approach (see ***Figure 5***) required by the Floods Directive for their assessment and management processes.

Figure 5 – The five-step approach to risk assessment and management required by the Floods Directive

Source: ECA.

40. Hazard maps show the magnitude of floods for various probability scenarios. All the Member States visited used the three probability scenarios required by the Floods Directive: low probability, medium probability and high probability. The Floods Directive also requires that, for each probability scenario, the hazard maps show, in addition to the flood extent, the water depth (see one example in ***Annex II***) and, where appropriate, the flow velocity. These parameters are crucial when assessing potential flood damage to assets and human life, in particular in the case of flash floods. Member States prepared maps using complex models, calibrated with field measurements (see also ***paragraphs 63 to 67***).

The Floods Directive built on previous work, including existing long-standing cooperation between Member States

41. To avoid duplication of work, the Floods Directive allows Member States to use existing risk assessment and planning documents. Italy and Portugal, for example, used

existing documents instead of conducting a new preliminary flood risk assessment, which ensured continuity of practices.

42. The Floods Directive obliges the responsible authorities to take account of cross-border aspects at each stage of the risk assessment and planning process (see ***Box 4***).

Box 4 – Cross-border cooperation: a constant focus of the Floods Directive

Preliminary flood risk assessments: in case of international river basin districts, Member States shall exchange relevant information.

Areas of potentially significant flood risk (APSFR): the Member States shall identify any APFSRs in international river basin districts.

Flood hazard maps and flood risk maps: the Member States shall exchange information prior to the preparation of flood hazard maps and flood risk maps for any cross-national APSFRs.

Flood risk management plans: these plans must not include measures which significantly increase flood risks upstream or downstream in other countries.

Source: ECA based on the Floods Directive.

43. Cross-border flood-related action is based on existing long-standing cooperation between the Member States and it mainly involved the exchange of information through bilateral meetings, the communication of hydrological forecasts and the harmonisation of technical standards. The Member States visited have not yet established international FRMPs at the level of international basin districts, as recommended in the Floods Directive[42].

Member States carried out activities to raise flood awareness among citizens

44. Public information and consultation improve citizens' awareness of flood risks. The Floods Directive requires Member States to make public the preliminary flood risk

[42] Recent developments are registered in this regard, for example between Austria and Slovenia, where the project DAMWARM (Drava And Mura WAter and Risk Management) aims to develop transnational and common flow forecasting system. This project also builds on the lessons learnt following a 100-year flood event occurred in November 2012, which produced total damages estimated at €373 million in the entire Slovenian territory.

assessment, the flood hazard and risk maps and the FRMPs. We found that all Member States satisfied this requirement by making them available online.

45. The Netherlands and Portugal had actually analysed the level of flood risk awareness, which was a good practice. However, they found that this level of awareness remained low.

… but there were weaknesses in allocating funding

46. We review, in this section, the procedures used by Member States to allocate funds to flood risk management.

Objectives in the Flood Risk Management Plans are generally not quantified or time-bound

47. The principles of sound financial management require policy objectives to be formulated in a specific, measurable, achievable, relevant and timed manner. Article 7 of the Floods Directive obliges Member States to set appropriate objectives for the management of flood risks and to include measures for achieving these in their FRMPs.

48. In Austria, objectives were time-bound and the authorities were using seven categories to track measures' progress. In the Netherlands, we found quantified objectives for the programme "Room for the River" (see ***paragraph 67***).

49. However, in the seven other Member States visited, the policy objectives in the FRMPs were generally too broad. For example, the plan for the East Alps in Italy did not tailor the objectives of the Floods Directive to the basin, leaving them in general terms: to reduce the negative impact of floods on i) human health, ii) the environment, iii) cultural heritage and iv) economic activity. This plan did not set quantifiable objectives with time-bound targets. In 2015, the Commission identified a similar finding in its assessment of the draft FRMPs.

Insufficient funds were identified and secured for planned flood-related action, and funding for cross-border investments was limited

50. The FRMPs should identify funding sources for flood-related action and the Member State authorities should secure the necessary funding. We assessed to what extent the FRMPs identified the national and EU funds actually available for flood-related action, including for cross-border investments.

Funding sources only partially identified and secured

51. The FRMPs of six of the nine Member States visited did not clearly identify the source and amount of funds required for their financing (see ***Box 5***). The Commission's assessment referred to in ***paragraph 49*** said that only a minority of the draft plans reviewed provided clear information on the budget available.

Box 5 – Weaknesses in the FRMPs' identification of the amounts needed and the corresponding sources of financing

Austria: the national FRMP states the source of funds, but not the cost, for about 30 % of measures.

The Czech Republic: the national FRMP determines only the cost of the prevention measures, not the sources of funds.

Italy: the audited regional FRMP did not identify the available sources of financing.

Portugal: Mainland Portugal's FRMP omits the possible sources of funding for 25 % of measures.

Romania: the two audited regional FRMPs omit the financing sources for about 35 % of measures.

Spain: either the amounts required or a clear indication of the budget sources were missing for 15 measures.

52. FRMPs are not funding programmes. An amount recorded in a plan is not necessarily available. The river basin authorities managing the plans do not generally have any financing powers. Multiple authorities are financing the plans and take decisions according to their own procedures. This situation increases the insecurity of funding of flood-related action. For example, in the river basin district of the East Alps in Italy, we estimated a gap of over €1.1 billion, i.e. 80 %, between planned expenditure and available financing.

53. However, we did find evidence of efforts to secure funding for flood-related action. The Dutch Delta Fund has earmarked around €7 billion for flood-related investments up to 2030 and identified its financial needs up to 2050. Slovenia has clearly identified financing sources for around 75 % of the €540 million needed for the period 2017-2021.

EU funding helped finance some FRMPs

54. In four of the Member States we visited, EU funds formed a significant share of financing (see ***Box 6***).

Box 6 – EU funding: an important source of financing for the FRMPs

The Czech Republic uses EU funds extensively to finance investments in flood protection. The 2014-2020 "Environment" operational programme co-financed by Cohesion Fund covers the equivalent of around 35 % of the estimated costs of €545 million.

In **Portugal**, EU funds, mainly Cohesion Fund[43], are indicated as a possible source of financing for around 96 % of the measures located in APSFRs and therefore eligible for EU co-financing.

The **Romanian** large infrastructure operational programme explicitly refers to the regional FRMPs and allocates €364 million co-financed by Cohesion Fund to action against floods and coastal erosion.

In **Slovenia**, the operational programme co-financed by ERDF and Cohesion Fund corresponds to 25 % of the annual financing needs.

55. In Spain, the two basin authorities we visited had unequal access to EU funding: flood measures in one river basin were not eligible for ERDF co-financing, while at the same time national funding had not been secured[44]. This led to budget shortages for two projects we visited. By contrast, in the other river basin, the ERDF operational programme financed 15 % of the FRMP.

56. Romania earmarked 44 % of the large infrastructure operational programme's specific objective within priority axis "Promoting adaptation to climate change, risk prevention and management" (see ***Box 6***) for a coast protection project to restore 13 km of beaches on the Black Sea. This project will benefit the local real estate and the tourism markets. This means that the remaining €239 million EU funds under this operational programme could cover the

[43] For the Azores, support for this type of action is available through the regional operational programme under the ERDF.

[44] The relevant ministry's investment budget for water had been reduced by around 60 % between 2009 and 2017.

costs of around two thirds of the identified high-priority floods prevention and protection projects.

Flood-related spending on cross-border investments was limited

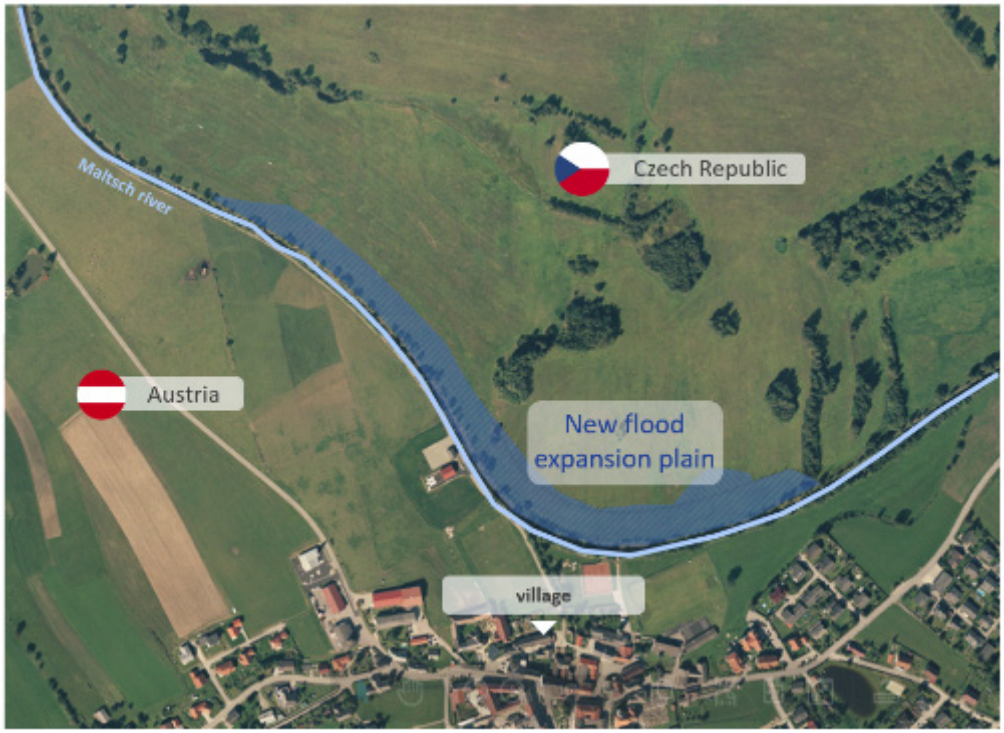
57. Cross-border projects consisted mainly of exchanges of information (see ***paragraphs 20, 42 and 43***). Funding was limited for flood related infrastructure with a potential international impact. However, we found positive examples such as the one in ***Box 7***.

Box 7 – Cross-border investment where EU funds brought added value

One project aimed to protect an Austrian village from fluvial flooding at the border with the Czech Republic (see ***picture*** below). It involved enlarging the flood plain on farmland on the Czech side. Austria did not have sufficient space for such a flood plain. Austria paid for the operation, with the aid of a 75 % co-financing from Interreg[45]. Austria would not have implemented this project without EU funding.

[45] A framework for joint cohesion policy action and exchanges among national, regional and local stakeholders from different Member States.

Cross-border investment between Austria and the Czech Republic



Source: Adapted by ECA from the project design sent by the Austrian authorities.

Project ranking procedures should be more strongly linked to the priorities in the FRMPs

58. The Floods Directive requires that the FRMPs prioritise measures in accordance with objectives. We examined whether Member States used such procedures to rank and select projects.

59. We found cases of prioritisation based on objective criteria (see ***Box 8***).

Box 8 – Cases of ranking based on objective criteria

The Netherlands ranks projects using a matrix reflecting the severity of potential damage and the probability of infrastructure failure.

One Spanish plan categorised APSFRs on the basis of risks rather than hazards alone, meaning that the vulnerability of exposed areas was also taken into account.

60. The FRMPs we examined included ranking procedures. However, in seven of the nine Member States visited, these procedures presented weaknesses. For example, in the Czech Republic, Portugal, Romania and Slovenia, the readiness of a project for implementation, rather than its potential effectiveness, was a key consideration for ranking. In Romania, a

project which did not rank among the priority projects in accordance with the approved methodology, was nevertheless proposed for financing in the operational programme because the feasibility study was ready.

Although Member States have begun implementation of their Flood Risk Management Plans, improvements are needed

61. The Floods Directive stipulates that the FRMPs take into account project costs and benefits. This section assesses the extent to which the Member States have considered such aspects in implementing their FRMPs, via technologies and good quality data, cost-benefit analysis and models.

62. It also assesses to what extent Member States have coordinated the implementation of the Floods Directive with the Water Framework Directive and, accordingly, considered green infrastructure to tackle flood risk[46].

Data: a key input for managing flood risks

63. Managing flood risks requires good quality data on weather and precipitations, topography and land cover, river and hydrological regimes and human activities. We found hazard and risk inputs to be gathered from a variety of sources, such as CORINE Land Cover[47], population censuses, topographical data and information from registers of commerce, meteorological and hydrological data. Flood forecasts and early warning systems (see also ***paragraph 43***) generally proved crucial to increasing preparedness.

64. In Romania, we found weaknesses in topographical and land use data, which is crucial to model run-off and the resulting river flows. We also noted that Romania took recent initiatives to improve the data quality.

---

[46] The Water Framework Directive requires all water bodies to achieve a good "ecological status". Concrete channels, for example, are allowed only under certain conditions and only after all possible steps to mitigate the negative impact on plants and animals have been taken.

[47] A programme under the authority of the EEA, consisting of an inventory of land cover in 44 classes, and presented as a cartographic product, at a scale of 1:100 000.

65. We found that all the Member States visited were convinced of the benefits of investing in technology and data to run models helping to manage flood risks. For instance, Spain, Portugal, Romania and Slovenia invested in the installation and upgrade of pluvial and fluvial measuring stations (see ***Box 9***). These stations can better inform meteorological and hydrological forecasts, especially for short-term events such as flash floods (see ***paragraph 8*** and ***Box 1***).

Box 9 – Hydrological and meteorological-related action visited

The ***picture*** shows an example of fluvial measuring station visited in Romania, collecting data on water levels on the Danube.

In Spain, we visited a flood control centre of 186 stations spread over the river basin. The centre processes the data through hydrological and meteorological models, to monitor flood risk in real time and to forecast precipitations 72 hours in advance.

In Slovenia, we visited the monitoring centre built as part of the project aiming to produce reliable and accurate weather and river flow information. This project also included:

- a new radar and 90 new automated weather stations throughout the country;
- two new oceanographic devices for marine monitoring network, measuring wave height and direction, sea currents and sea surface temperature;
- a hydrological forecasting system based on models.

Fluvial measuring station on the Danube, Romania

Source: ECA.

66. Data collected from monitoring stations may be supplemented with information from other sources. For example, in the river basin district visited in Italy, the innovative pilot project "WeSenseIT" allows citizens to share information via social media or smartphone applications. This data is added to data collected via monitoring stations. This two-way communication between citizens and authorities aims to improve responsiveness. The FRMP includes a measure to extend this project to the entire river basin.

Although most Member States visited used cost-benefit analysis and models to design projects, improvements are needed

67. In all the Member States visited, the authorities used modelling and an evidence-based approach to map the flood risks (see ***paragraph 40***). Modelling also aided the design of flood-related projects. For instance, hydraulic models helped the authorities to identify what action was needed (see, for example, ***Box 10***).

Box 10 – Objective to reduce water levels in the Dutch programme "Room for the River"

"Room for the River" is an infrastructure programme completed in 2015 for €2.3 billion. It aimed to manage peak discharge where the river Rhine meets the Netherlands to reduce water levels downstream. A model developed by a research institute determined the different water levels to be reached along tributaries to set targets for individual projects.

68. With the exception of Italy and Portugal, all the Member States visited used cost-benefit analysis, when designing or selecting projects. However, these analyses suffered from various weaknesses. For example, in Spain, cost-benefit analysis was still being developed and not systematically and adequately used.

Coordinating implementation of the Floods and Water Framework Directives generally resulted in synergies

69. The FRMPs in Italy, Slovenia and one Spanish river basin focused also on complying with the Water Framework Directive. The Italian and Slovenian FRMPs identified measures in synergy, and those in potential conflict, with the objectives of the two Directives. In Italy, approximately 25 % of the measures were labelled measures in synergy, with only 1 % in potential conflict with the Water Framework Directive.

70. However, we examined projects in Bulgaria and Romania where flood action was not compliant with the Water Framework Directive. The Bulgarian authorities had not considered green infrastructure (see ***paragraphs 71 to 76***) as an alternative means of

retaining water upstream in all projects visited[48] (see ***Box 11***). In Romania, the authorities planned to use concrete and stone to reinforce 6 km of a riverbank, without considering green infrastructure solutions.

Box 11 –Flood-related projects jeopardising compliance with the Water Framework Directive in Bulgaria

No environmental impact assessments were carried out for the three river projects visited.

In one project, nearly 8 km of a riverbed was covered in concrete. This change to the riverbed affected the river's "good status" required by the Water Framework Directive. We identified a field upstream of the nearby town that could have been considered as a natural retention measure.

River in natural state

River after the project

Source: ECA.

Green infrastructure projects have multiple benefits but can be difficult to put in practice

71. A recent EEA report[49] argues that green infrastructure is a cost-efficient means of reducing flood risk. The Commission has taken action, particularly through Working Group F, to promote green solutions, mainly by issuing guidance papers[50]. We reviewed to what

---

48 The visited coast protection project is not included in this assessment.

49 EEA report 14/2017 "Green Infrastructure and Flood Management - Promoting cost-efficient flood risk reduction via green infrastructure solutions". See also EEA report 1/2016 "Flood risks and environmental vulnerability - Exploring the synergies between floodplain restoration, water policies and thematic policies".

50 See, for example, EU policy document by the Working Group of the Common Implementation Strategy "Natural Water Retention Measures", Technical Report - 2014 – 082; European Commission, "A guide to support the selection, design and implementation of Natural Water Retention Measures in Europe - Capturing the multiple benefits of nature-based solutions", 2015. There is also a dedicated website (http://nwrm.eu).

extent the FRMPs focused on green infrastructure as a flood management tool and analysed how green infrastructure was implemented.

Few plans focus on green infrastructure…

72. Portugal and Spain's FRMPs focused on green infrastructure. For example, all protection measures in one Spanish FRMP were green infrastructure. In a project in the other Spanish river basin we visited, we saw a combination of grey and green techniques (see ***Box 12***).

Box 12 – Combination of grey and green techniques in Spain

Phase I of the project we visited started in the 2007-2013 period with the channelling of a river using a traditional rectangular canalisation made of concrete.
In phase II of the project (2014-2020), the authorities widened the riverbed using bioengineering techniques. While maintaining the same hydraulic capacity, the section was brought closer to the natural morphology of the river, reducing the need to clean the channel and allowing the water to flow more easily to natural water retention areas. The project is helping to restore the riparian vegetation in compliance with the Water Framework Directive. It includes a river section that is easily accessible to the population, which can thus see the solution's merits.

Source: ECA.

73. However, green infrastructure did not constitute a significant part of the FRMPs we reviewed in the six other Member States. In the Czech Republic, only 15 % of the protection measures consisted of green infrastructure. In Italy, less than 2 % of the 469 applicable measures concerned green infrastructure.

… and there are obstacles to its implementation

74. In at least three Member States, some stakeholders did not support green infrastructure. Slovenia's plan intended to promote green infrastructure, despite citizens and local decision-makers expressing a preference for grey infrastructure, deeming it more effective in protecting against floods. We also found this scepticism in Bulgaria, where no green infrastructure had yet been created, despite its inclusion in the national catalogue of measures.

75. We also identified practical obstacles to the implementation of green infrastructure. For instance, the Romanian authorities claimed that the absence of a land registry, which is key to identify owners of land, constitutes an important impediment for the implementation of green infrastructure. In Bulgaria, the authorities do not have a methodology to identify potentially suitable parcels of land on which green infrastructure could be implemented. The Italian and Spanish authorities explained that the scarcity of green infrastructure is due to the complex administrative and legal procedures or the lack of available land.

76. The EAFRD could also potentially fund green action against flooding[51]. Yet we found the limited role currently played by the EAFRD to be another barrier to green infrastructure (see ***paragraph 24***). For instance, the FRMPs we reviewed in Bulgaria, Italy, Portugal, Slovenia and Romania did not include EAFRD co-financing for flood measures. The European Commission also concluded in 2016[52]: "There is a missed opportunity in most RDPs to promote Natural Water Retention Measures […], which can act as effective remedial measures."

---

[51] EAFRD is actually the main contributor to the objective of promoting climate change adaptation, risk prevention and management defined under the ESIF framework, providing around 76 % of the budget allocated to this objective: https://cohesiondata.ec.europa.eu/themes/5.

[52] WRC, "European level report: Key descriptive statistics on the consideration of water issues in the Rural Development Programmes 2014-2020", 2016. This report assessed how the 2014-2020 rural development programmes had considered water issues.

Some major challenges remain for the future

77. One key justification for introducing the Floods Directive was to take account of the evolving risk of flooding as a result of climate change. Indeed, the Floods Directive states that climate change makes severe floods more frequent.

78. The preliminary flood risk assessments in the first cycle had to consider the impact of climate change based on available or readily derivable information[53]. For the second cycle starting in 2022, "the likely impact of climate change on the occurrence of floods shall be taken in account in the reviews"[54] of these assessments and of the FRMPs, conducted by the Member States.

79. The Floods Directive also recommends using non-structural measures (see ***paragraph 16***), where appropriate. We also assessed to what extent the authorities had used measures such as flood insurance and land use planning in flood management.

Lack of up-to-date knowledge on the likely impact of climate change on the incidence of floods

80. The Member States visited were not able to factor in the impact of climate change on the magnitude, frequency and location of floods. Some trends, such as more flash floods, were recognised, but not taken into account in floods models yet.

Lack of knowledge of the impact of climate change on pluvial floods and rainfall regime

81. Bulgaria, Romania and Slovenia do not have sufficient information on the impact of climate change on rainfall patterns and related floods and plan to undertake studies in this regard for the second cycle of the Floods Directive, due to start in 2022. The Czech

---

[53] Article 4.2 of the Floods Directive states "Based on available or readily derivable information, such as records and studies on long term developments, in particular impacts of climate change on the occurrence of floods, a preliminary flood risk assessment shall be undertaken to provide an assessment of potential risks."

[54] As stated in Article 14.4 of the Floods Directive.

authorities have forecast more precipitation in the spring and autumn and less in summer and winter. The Czech national meteorological institute did not intend to increase the probability of floods due to climate change in their models.

82. In southern Europe, the EEA has reported that annual rainfall decreased in the Iberian Peninsula between 1960 and 2015[55]. In the same report, it also warns of an increase in damages resulting from shorter and more localised flash floods. However, the Italian, Portuguese and Spanish authorities did not quantify the impact of climate change on the probability of pluvial and fluvial floods.

Sea level rise not fully taken into account

83. The rising sea level, triggered by climate change, increases the risk of coastal flooding (see ***paragraphs 9, 10 and 13***). In the first implementation cycle of the Floods Directive, the visited Member States with a seacoast (Bulgaria, Spain, Italy, The Netherlands, Romania and Slovenia) had generally defined specific APSFRs in coastal areas, with the exception of Portugal.

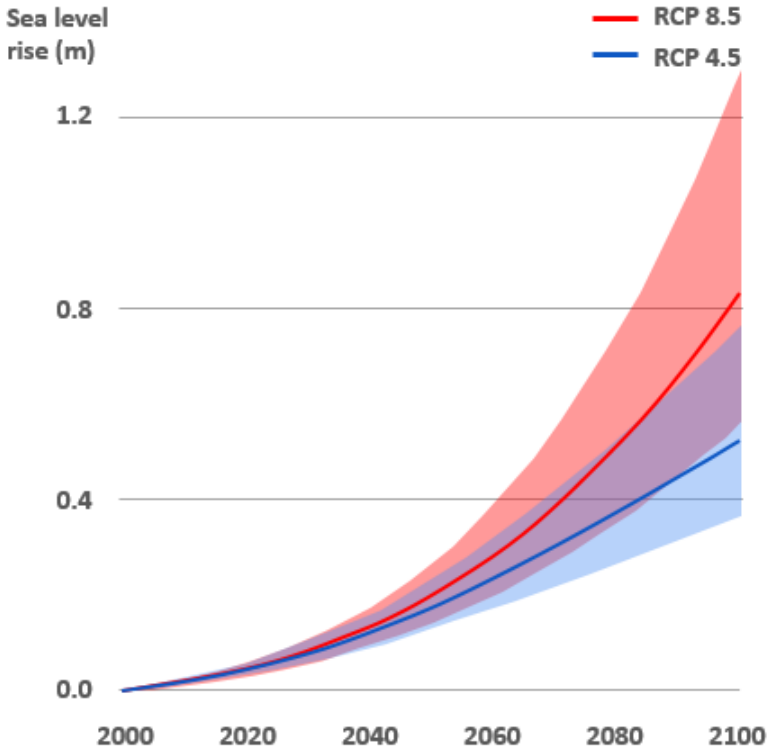
84. A key conclusion of Working Group F's workshop on climate change in March 2017 was that most Member States considered climate change only when establishing APSFRs in coastal areas, but not inland. Moreover, we found it to be mostly unclear how future trends in sea level rise had been factored into the methodologies applied. Bulgaria proved the exception, providing ranges of values for climate change-induced sea level rise, taking into account three levels of probability in two scenarios.

85. It will become increasingly important for Member States with key cities, inhabitants and infrastructure in coastal regions to be aware of likely global and local sea level rises. Likely sea-level rise risk has been quantified up to 2050; greater uncertainty affects the possible rate of change from 2050 to 2100 (see ***Figure 6***), when it may accelerate further.

---

[55] EEA report 1/2017 "Climate change, impacts and vulnerability in Europe 2016: An indicator-based report", p. 82.

Figure 6 – Sea-level rise projections for the 21st century



Representative Concentration Pathways (RCPs) are greenhouse gas concentration trajectories used by the IPCC. By 2081-2100, RCP 8.5 is projected to result in a surface air temperature increase, compared with the 1850-1900 (pre-industrial) average, within a likely range of 3.2 to 5.4°C (mean of 4.3°C). RCP 4.5 is projected to result in a temperature increase within a likely range of 1.7 to 3.2°C (mean of 2.4°C).

Source: ECA, adapted from Mengel, Levermann et al. PNAS, 2016.

Member States generally used historical data, which carries the risk of not reflecting heightened climate risks

86. The Floods Directive does not require mapping exercises to consider the impact of climate change on flooding. When mapping flood risk, all the Member States visited applied the floods scenarios based on the three probabilities required by the Floods Directive (see ***paragraph 40***). These flooding probabilities are expressed in terms of the "likely return period", or as a percentage reflecting the probability of a flood's occurrence in a given year. These common classifications were based on historical statistical series, which only take into account historical hydrological and meteorological patterns. However, they do not reflect future weather conditions or potential changes in the frequency and severity of floods, due

to climate change. Taking into account these future conditions require adequate forecasting capabilities (see ***paragraphs 80 to 82***).

87. Similarly, we also found that investment decisions had often been guided by risk assessments based on a level of protection expressed, for example, in terms of "1 in 100" years. This could distort investment decisions due to a lack of awareness of changing risk profiles resulting from the rapidly changing climate (see ***paragraphs 4 to 13***).

88. The consequences of flash floods caused by periods of more intense rain (see ***paragraphs 4, 8 and 82***) and the impact of sea level rise (see ***Box 13***) can be underestimated, creating a risk of investments being submerged or rendered inadequate earlier than anticipated, thus becoming "stranded assets".

Box 13 – Practices based on historical measurements without adjustment for sea level rise

In northern Italy, measuring stations in Venice and Trieste showed a sea level increase based on data collected over the past 140 years. In Trieste, an average increase of 1.2 mm / year has been recorded, also showing an accelerated trend over the past 20 years. However, information regarding future sea level rises was not reflected in the methodology used by the authorities to determine the floods scenarios.

In Romania, the level of the Black Sea rose since 1860: +33 cm in 145 years at Sulina, i.e. on average 2.3 mm / year; and +13 cm in 70 years, i.e. on average 1.9 mm per year at Constanta. Similarly, the maximum flow of the Danube has increased: +12 % in 165 years. The design of flood protection projects did not take account of the impact of climate change on sea level rise.

Where Member States opted for private flood insurance, coverage remained low

89. The EU strategy on adaptation to climate change recommends as a key action to "Promote insurance and other financial products for resilient investment and business decisions"[56]. Flood risk-adjusted premiums can help raise awareness among private individuals of the risk of flooding and deter settlements in flood-prone areas. Insurance

[56] COM(2013) 216 final of 16 April 2013 "An EU Strategy on adaptation to climate change", p. 9.

payments against flood claims can also boost economic recovery in the wake of a disaster. According to data from the insurance industry[57], about 25 % of floods losses in Europe were covered by insurance in the period 1980 to 2017.

90. The Commission, in monitoring the implementation of this strategy in the Member States, has found that insurance instruments have not yet been well integrated into national adaptation decision-making processes or broader climate risk management strategies. The Commission's aim in devising the EU strategy was to increase the use of natural disaster insurance. If insurance coverage stays low, flood premiums remain high, which in turn further reduces the insurance demand[58].

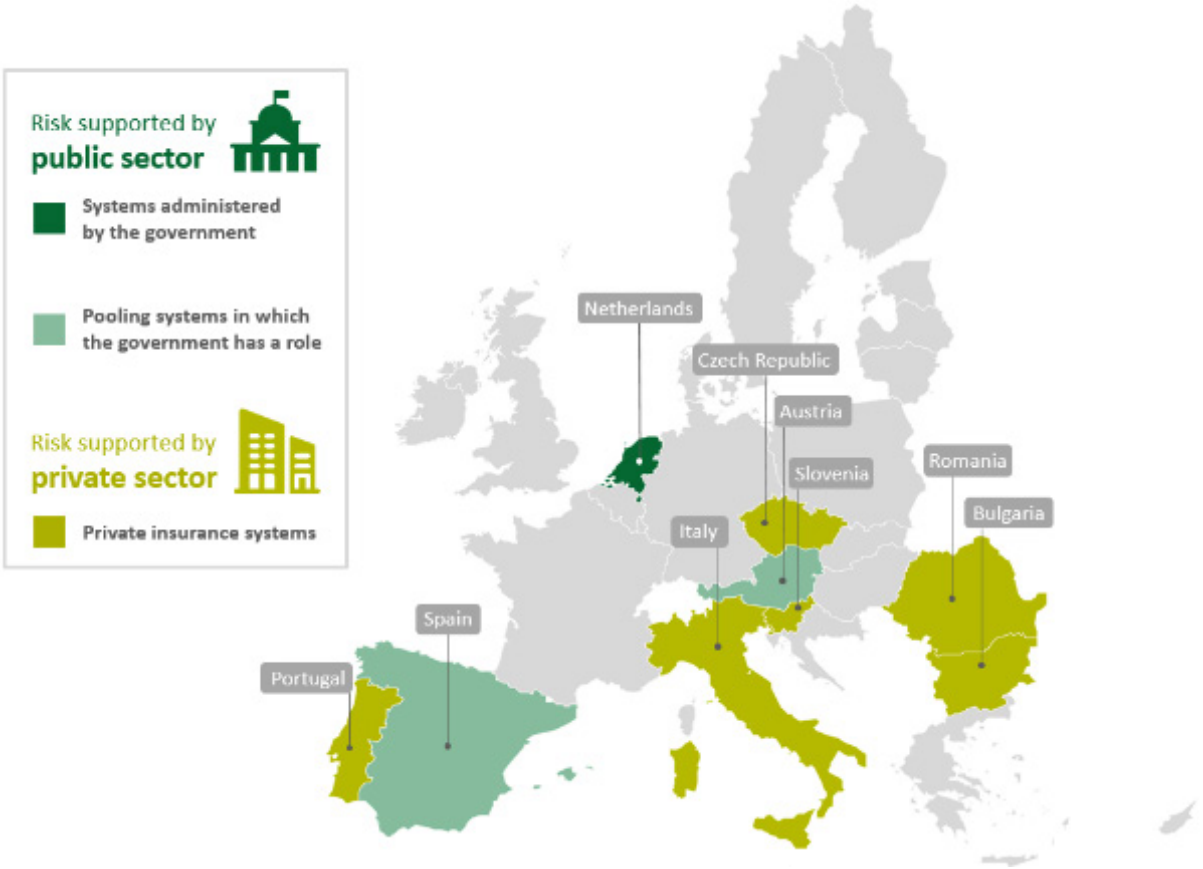
91. We found low insurance coverage against floods. Although various insurance models exist (see ***Figure 7***), the most widely used in the visited Member States was the provision of non-mandatory private flood insurance. This model is used in Bulgaria, the Czech Republic, Italy, Portugal and Slovenia. Romania's system is also private and flood insurance is supposedly mandatory for housing. In Bulgaria, Italy and Romania, the number of people taking out flood insurance was low (see ***Box 14***).

---

[57] NatCatService (https://natcatservice.munichre.com).

[58] OECD, "Flood Management of Flood Risk", 2016, p. 58.

Figure 7 – Spectrum of flood insurance systems in the Member States reviewed



Source: ECA.

Box 14 – Flood insurance coverage

The Czech Republic: in 2016, 54 % households had natural disaster insurance, not limited to floods.

Bulgaria: approximatively 10 % of households and buildings and 27 % of farms have an insurance policy against floods.

Italy: approximatively 1 % of residences have a flood insurance policy.

Romania: mayors should charge fines of up to €110 to people who neglect to take out insurance against floods. Despite this, only 1 in 5 houses is insured against floods.

92. The OECD has also concluded that low levels of insurance coverage could place governments under higher pressure to provide compensation for flood losses, which would stunt the growth of insurance coverage[58]. We found an illustration of this situation in

Austria, where a recent study[59] had concluded that the public compensation scheme "*Katastrophenfonds*" might dissuade the insurance sector from assuming a larger role in indemnifying damages from extreme weather events.

93. In the Netherlands, the very high level of risk[60], potentially from serious coastal flooding or dike breach, explains the need for public intervention. The public protection and prevention system actually operates as a collective or public insurance scheme against coastal floods or dike breach.

94. In Spain, a public entity manages the system for covering extraordinary risks, including floods, in cooperation with the private sector. We found some strengths in this system's mode of financing and the extent of its asset coverage (see ***Box 15***).

Box 15 – Coverage of extraordinary risks in Spain

In Spain, private companies collect a surcharge for extraordinary risks on insurance contracts and transfer it to the public entity "Consorcio de compensación Seguros" (CCS) each month, retaining a small amount as commission.

In the event of damage caused by a legally defined extraordinary risk, such as flooding, the CCS compensates the policyholder. The public entity itself does not issue any insurance policies. This optional extraordinary risk coverage must be attached to insurance policies covering the assets.

The European Commission[59] estimated the flood insurance coverage in the Spanish insurance market to be above 75 % for households and the commercial sector. The CCS is also a key source of data for public authorities in Spain when assessing damages caused by floods, notably when developing a cost-benefit analysis methodology.

---

[59] European Commission, "Final report on Insurance of weather and climate related disaster risk: Inventory and analysis of mechanisms to support damage prevention in the EU", 2017, p. 109.

[60] Approximately 60 % of the country is located in flood-prone areas, in which approximately 9 million people are living and where approximately 70 % of the GDP is produced.

Some land use and spatial planning regulations to mitigate flood risk were in place, but Member States had more to do

95. The Floods Directive also names land use and spatial planning as aspects that FRMPs must consider. Such activities are important for limiting the exposure of people and assets in areas at risk of floods (see ***paragraph 16***) and reducing run-off from areas located upstream.

96. We found that all the Member States visited had introduced some land use planning rules restricting or prohibiting certain activities in flood-prone areas. Austria, Slovenia and Spain had clearly integrated their spatial planning policy within flood risk management (see ***Box 16***).

Box 16 – Cases of clear integration of spatial planning within flood risk management

In Austria, hazard zone plans show the areas that are at risk of floods, mountain streams, avalanches and erosion. Municipalities' zoning and development plans include information on hazard zones, which form the basis for further planning.

The Spanish authorities listed the adoption of a decree on spatial planning as one of the Floods Directive's key achievements. Strict limitations are imposed on most land uses in the main floodway, where there is a medium probability of flooding.

97. However, in five Member States visited, definitions of flood-prone areas were often not clear or there was not always a direct link with the flood hazard maps stemming from the application of the Floods Directive. For instance, while Romania had introduced restrictions in "floodable areas", this notion was not clearly defined and the law does not link it to the flood mapping. Regulations indicated neither the type nor frequency of floods, nor the water depth considered.

98. The FRMPs in Bulgaria, the Czech Republic, Portugal and Romania included measures, not yet implemented, to update planning regulations or to better integrate land use planning in flood management risk, thus recognizing insufficiencies in current regulations. In Portugal, a national prevention measure aims to establish flood areas according to floods scenarios. The measure intends to place conditions on construction in areas with a medium flood probability and to ban it in areas where the probability of flooding is high.

99. All Member States visited have the legal means to move assets through, for instance, expropriation (see ***Figure 8***). However, the authorities in the Member States visited explained that these powers were rarely enforced, or exercised only as a last resort. This was the case everywhere, mainly because the conditions for moving assets and people were legally difficult to meet and expensive.

Figure 8 – Case of expropriation in the South of Spain

Source: ECA, based on Ministry for Agriculture and Fisheries, Food and Environment of Spain.

CONCLUSIONS AND RECOMMENDATIONS

100. We found that the Floods Directive has had positive effects overall (see ***paragraphs 32 to 45***), in particular in terms of coordination between the Commission and Member States (see ***paragraphs 33 to 37***), and assessment of flood risks (see ***paragraphs 38 to 40***). There were weaknesses, but also some good practices, in allocating funding (see ***paragraphs 50 to 57***), prioritising flood-related measures (see ***paragraphs 58 to 60***) and implementing the flood risk management plans (see ***paragraphs 61 to 76***). Major future challenges remain to embed climate change, flood insurance systems and spatial planning much more firmly within flood risk management (see ***paragraphs 77 to 99***).

101. The Floods Directive has improved coordination between the Commission and the Member States and resulted in progress in assessing flood risks. The Floods Directive built upon existing work, including long-standing cooperation between Member States. However,

cross-border cooperation involved mainly the exchange of information, and had not extended to international joint planning for shared river basins (see ***paragraphs 32 to 45***).

102. The objectives in the FRMPs were generally neither quantified nor time-bound. In seven Member States visited, we found that the FRMPs set too broad policy objectives. This hampered the assessment of the results and the establishment of an accountability framework for the bodies involved (see ***paragraphs 47 to 49***).

Recommendation 1 – Improve accountability

The Commission, in its supervisory capacity under the Floods Directive, should check, when reviewing the FRMPs of the second and subsequent cycles, that the Member States set quantifiable and time-bound objectives for flood-related action, thereby allowing the progress made towards their achievement to be assessed, in accordance with the Floods Directive. It should share any instances of good practice in objective setting with all Member States.

Target implementation date: March 2022.

103. We found that both national and EU funding sources were only partially identified and secured, and that funding for cross-border investments was limited. The FRMPs are not funding programmes, so any amount recorded is not necessarily available. This situation increases the insecurity of funding of flood-related action (see ***paragraphs 50 to 56***). Funding for cross-border investment was limited (see ***paragraph 57***).

Recommendation 2 – Improve the identification in FRMPs of financial resources, including for cross-border action

For the second cycle of the Floods Directive, **the Commission**, in its supervisory capacity under the Floods Directive, should assess and report on whether Member States have:

(a) identified sources of financing to cover investment needs arising from FRMPs and established a timeline for implementation in line with available funding;

(b) for flood measures on international river basins, considered cross-border investment.

Target implementation date: March 2022.

104. Ranking procedures for allocating resources to flood measures should be more strongly linked to the priorities in the FRMPs. In seven of the Member States visited, these procedures presented weaknesses. For example, in four Member States, the readiness of a project for implementation, rather than its potential effectiveness, was a key consideration for prioritisation (see ***paragraphs 58 to 60***).

105. Managing flood risks requires good quality data on weather, topography, hydrology and human activities. We found the Member States visited aware of the benefits of investing in technologies and data to run models helping to manage flood risks. In all the Member States visited, we also found that modelling aided the implementation of flood-related projects (see ***paragraphs 63 to 67***).

106. Most Member States visited used cost-benefit analysis, when designing or selecting projects. We encountered instances where weaknesses were detected (see ***paragraph 68***).

Recommendation 3 – Improve prioritisation procedures and achieve value for money

Where EU funds are requested, **the Commission**, in its supervisory capacity under the Floods Directive and under the shared management mode, should only co-finance flood measures prioritised in accordance with the future FRMPs. This prioritisation by Member States should be based on objective and relevant criteria, including:

- a good-quality cost-benefit analysis, to achieve the best value for money for the investments, and
- where relevant, a criterion considering the cross-border impact of projects.

Target implementation date: March 2022.

107. Coordinating implementation of the Floods and Water Framework Directives generally resulted in synergies. Some FRMPs showed signs of efforts to remain in line with the Water Framework Directive. However, in Bulgaria and Romania, we visited projects not compliant with the Water Framework Directive (see ***paragraphs 69 and 70***).

Recommendation 4 – Achieve Member States' compliance with the Water Framework Directive

The Commission, in its supervisory capacity under the Floods Directive and the Water Framework Directive, should enforce the compliance with the Water Framework Directive of new floods infrastructure proposed in FRMPs by the Member States.

Target implementation date: January 2019.

108. Green infrastructure projects have multiple benefits. They offer a cost-efficient means of reducing flood risk, and the Commission has taken action to promote green solutions (see ***paragraph 71***). They can also be effectively used in combination with grey infrastructure (see ***paragraph 72*** and ***Box 12***), as complementary measures.

109. However, it can sometimes be difficult to put in practice green solutions. In six Member States visited, the FRMPs did not focus on green infrastructure. Aside from the lack of stakeholder support in certain instances, we came across practical obstacles to the creation of green infrastructure such as the absence of an adequate methodology, a land registry or land availability (see ***paragraphs 72 to 76***).

Recommendation 5 – Check that Member States have analysed the feasibility of implementing green measures in combination with grey infrastructure where appropriate

The Commission, in its supervisory capacity under the Floods Directive and the Water Framework Directive, should check that, whenever EU co-financing is requested, Member States have analysed the feasibility of implementing significant green measures, alone or in combination with grey solutions.

Target implementation date: January 2019.

110. The Member States visited were not able to factor in the impact of climate change on the magnitude, frequency and location of floods. Some trends, such as flash floods, were recognised, but they were not yet taken into account in floods models (see ***paragraphs 81 and 82***).

111. The rising sea level, triggered by climate change, increases the risk of coastal flooding. Most Member States had considered climate change only when establishing APSFRs in coastal areas. However, we found it to be mostly unclear how future trends in rising sea levels had been factored into the methodologies applied. It will become increasingly important for most Member States, especially those with key cities, inhabitants and infrastructure in coastal regions, to be aware of, and plan for, likely sea level rises (see ***paragraphs 83 to 85***).

112. Member States generally used historical data, which carries the risk of not reflecting the increasing and changing risks arising from climate change. When mapping, flooding probabilities are expressed in terms of the "likely return period", or as a percentage reflecting the probability of a flood's occurrence in a given year. Such figures, based on historical data, do not reflect future weather conditions or potential changes in the frequency and severity of floods. Investment decisions were often affected by the same bias. The consequences of flash floods and the impact of sea level rise can be underestimated, creating the risk that investments prove inadequate sooner and become "stranded assets" (see ***paragraphs 86 to 88***).

Recommendation 6 – Better integrate the effects of climate change into flood risk management

A- **The Commission**, in its supervisory capacity under the Floods Directive, should check that FRMPs include measures to improve the knowledge and modelling of the impact of climate change on floods.

Target implementation date: July 2019.

B- In its review of the documents required for the second cycle of the Floods Directive, **the Commission**, in its supervisory capacity under the Floods Directive, should check whether the Member States:

(a) estimate and model the impact of climate change on floods through studies and research;

(b) develop appropriate tools to better analyse and forecast:

- pluvial floods, including flash floods;
- coastal flooding due to rising sea levels;

(c) where the impact of climate change is not quantifiable, plan flexible measures to adjust the level of protection if needed.

Target implementation date: March 2019 (preliminary flood risk assessments) and March 2022 (FRMPs).

113. In the context of growing climate related risk (see ***paragraphs 4 to 13***), insurance is a tool for flood risk management (see ***paragraph 16***). Although various insurance models exist, the most widely used in the visited Member States was the provision of non-mandatory private flood insurance. Where Member States opted for private flood insurance, the coverage remained low, meaning that market failure persisted. We found that cooperation between the public and private sector in relation to flood insurance increased the coverage of assets (see ***paragraphs 89 to 94***).

Recommendation 7 – Raise public awareness of the benefits of flood insurance and seek to increase coverage

The Commission, in its review of the FRMPs for the second cycle, should check whether Member States have planned action to:

(a) raise public awareness of the benefits of insurance coverage against flood risks; and

(b) increase coverage, e.g. via cooperation between the public and private sectors in relation to flood insurance.

Target implementation date: March 2022.

114. Some land use and spatial planning regulations to mitigate flood risk were in place, but Member States had more to do. All visited Member States had implemented some land use planning rules restricting or prohibiting certain activities in flood-prone areas. We found cases where Member States had clearly incorporated their spatial planning policy within flood risk management (see ***paragraphs 95 and 96***).

115. However, some national land use and spatial planning regulations were not specific and complete enough to correctly take the flood risk into account. Some FRMPs included measures to update planning regulations or to better integrate land use planning in flood

management risk in future, thus recognizing weaknesses in current regulations, but these measures were not implemented yet. Even if legal means to move assets, like expropriation, were in place, these powers were rarely enforced or used only as a last resort (see ***paragraphs 97 to 99***).

Recommendation 8 – Assess the alignment of the FRMPs with land use planning rules

The Commission, in its supervisory capacity under the Floods Directive, should:

(a) check whether Member States have used their FRMPs to assess the extent to which land use planning rules in Member States are adequately designed and effectively enforced in areas at risk of flooding; and

(b) disseminate good practices and guidance to Member States.

Target implementation date: March 2020.

This Special Report was adopted by Chamber I, headed by Mr Nikolaos MILIONIS, Member of the Court of Auditors, in Luxembourg at its meeting of 19 September 2018.

For the Court of Auditors

Klaus-Heiner LEHNE

President

ANNEX I

DIFFERENT TYPES OF FLOOD-RELATED PROJECTS

Flood expansion plain also used as pastureland for an organic milk cow farm
(The Netherlands)

River dike with removable walls allowing the controlled flooding of one river bank, in order to protect the opposite densely populated bank (Slovenia)

Dry reservoir used for temporary water storage to reduce the risk of flooding the towns downstream. The 110 hectares of the reservoir are also used for farming (Italy)

Coastal embankment to prevent flooding of a residential area. The height of the embankment can be increased in future if the flood hazard increases (Bulgaria)

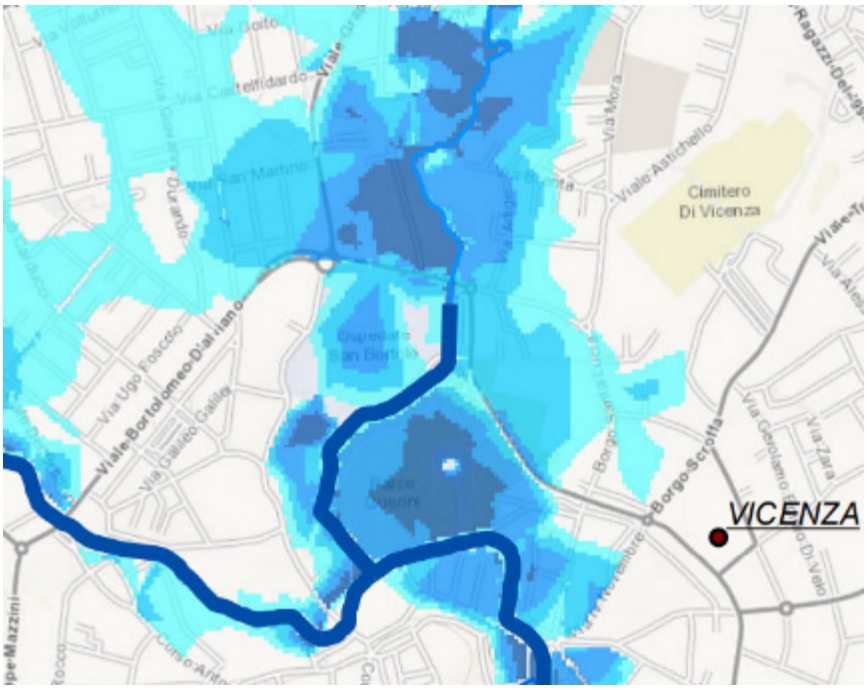
Raised 200 m-long wall at the confluence of two rivers where floods had occurred in the past (Spain)

Meteorological monitoring networks collect data used in modelling and risk evaluation, contributing to evidence-based policy-making (Portugal)

Source: ECA.

ANNEX II

EXAMPLE OF HAZARD AND RISK MAPS

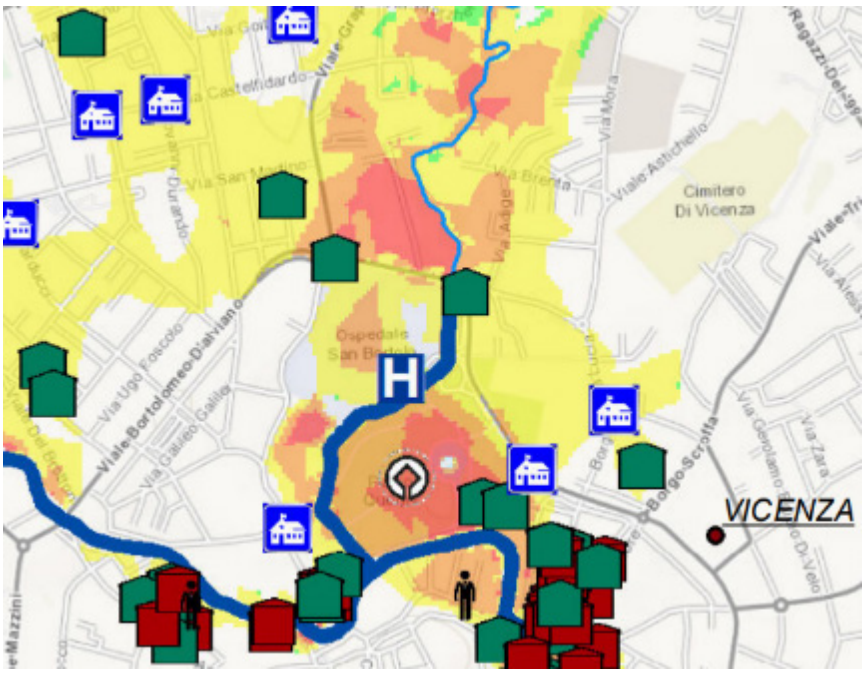


Hazard map in the town of Vicenza, Italy in the case of a flood event with a 1 % probability of occurrence
Source: Online maps published by Eastern Alps Hydrographical Basin, Italy.

Legend:

Classes of water height:

- 0 – 0.5 m
- 0.5 – 1 m
- 1 – 2 m
- > 2 m



Risk map in the town of Vicenza, Italy in the case of a flood event with a 1 % probability of occurrence
Source: Online maps published by Eastern Alps Hydrographical Basin, Italy.

Legend:

Classes of risk:

- Moderate risk
- Medium risk
- High risk
- Very high risk

Pictograms on the map represent:

- Less than 500 persons at risk
- Buildings and objects of cultural importance
- UNESCO World Heritage site
- Schools

REPLIES OF THE COMMISSION TO THE SPECIAL REPORT OF THE EUROPEAN COURT OF AUDITORS

"FLOODS DIRECTIVE: PROGRESS IN ASSESSING RISKS, WHILE PLANNING AND IMPLEMENTATION NEED TO IMPROVE"

EXECUTIVE SUMMARY

V. Member States are responsible for identifying and securing the sources of financing. There are possibilities for EU support to related projects, including cross-border projects (European Territorial Cooperation (Interreg) has funded various investments into prevention of floods, as well as into preparedness and response to them), but given the limited EU budget, Member States have an important role as well. Activities related to macro-regional strategies[1], such as the EU Strategy of the Danube Region (EUSDR), help shaping national activities by adopting a transnational approach, e.g. in the case of national programmes against natural disasters in several countries.

VI. The Commission has proposed for 2021-2027 that managing authorities for cohesion policy programmes have to "*ensure that selected operations present the best relationship between the amount of support, the activities undertaken and the achievement of objectives*". Conducting a cost-benefit analysis can be an effective tool for implementing this requirement.

The Commission will continue to promote and support the use of the established methodology for cost-benefit analysis.

The cost-benefit analysis is a requirement in the 2014-2020 programming period for investments funded by European Regional Development Fund (ERDF) or Cohesion Fund that are major projects in the meaning of Article 100 of the Common Provision Regulation (CPR)[2]. Moreover, the Commission issued in December 2014 a cost-benefit analysis guide for the 2014-2020 programming period as an economic appraisal tool for cohesion policy 2014-2020.

Whereas the Floods Directive (Article 7) mentions spatial planning, land use, water retention natural floodplains and the controlled flooding of certain areas, which are all relevant to the promotion of green infrastructure over grey solutions, the legal provisions governing the European structural and investment funds (ESI Funds), the Floods Directive and the Water Framework Directive (WFD) do not make the use of green infrastructure mandatory.

VIII.

First indent: The Commission refers to its reply to recommendation 1.
Second indent: The Commission refers to its reply to recommendation 2.
Third indent: The Commission refers to its reply to recommendation 3.
Fourth indent: The Commission refers to its reply to recommendations 4 and 5.
Fifth indent: The Commission refers to its reply to recommendations 6 and 7.
Sixth indent: The Commission refers to its reply to recommendation 8.

INTRODUCTION

---

[1] A 'macro-regional strategy' is an integrated framework endorsed by the European Council, which may be supported by the European Structural and Investment Funds among others, to address common challenges faced by a defined geographical area relating to Member States and third countries located in the same geographical area which thereby benefit from strengthened cooperation contributing to achievement of economic, social and territorial cohesion; see http://ec.europa.eu/regional_policy/en/policy/cooperation/macro-regional-strategies/.

[2] Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013.

17. The RescEU initiative lead by Directorate-General for European Civil Protection and Humanitarian Aid Operations (DG ECHO) may also play a role as regards the contribution of the EU to prevent or alleviate the negative effects of floods[3].

21. In order to ensure an efficient and effective use of the ESI Funds, Member States prepared at the beginning of the programming period a Partnership Agreement setting out their strategy, priorities and arrangements for the implementation of the funds, including complementarity and coherence with other EU and national/regional support instruments.

22. The European Regional Development Fund (ERDF) and Cohesion Fund data is reported for all risks together.

24. To improve the information collected, the Commission has proposed a more detailed breakdown for the next Multiannual Financial Framework 2021-2027, including data on ERDF and Cohesion Fund allocations to "*Adaptation to climate change measures and prevention and management of climate related risks: floods (including awareness raising, civil protection and disaster management systems and infrastructures*)" and a result indicator on "*Population benefiting from flood protection measures*".

The European Agricultural Fund for Rural Development (EAFRD) supports risk management in agriculture and forestry, which may include prevention of floods, restoration of agricultural and forestry potential destroyed by floods and the take up of risk management instruments (e.g. insurances and mutual funds). Total public expenditure: around €4,8 billion, of which around €0,7 billion spent so far. Other Rural Development Programme measures might have an indirect effect preventing floods and reducing the damage caused by floods.

OBSERVATIONS

Box 6 – EU funding: an important source of financing for the Flood Risk Management Plans (FRMP)

The Commission recalls that ESI Fund programmes and the FRMPs cover different time periods.

Third alinea: More broadly, priority axis 5 of the Romanian Large Infrastructure Operational Programme 2014-2020 allocates € 479 million to climate change adaptation, risk prevention and management, including for flood risk management projects.

55. The Spanish ESI Funds Partnership Agreement refers to the primary competence of the Autonomous Communities in the risk prevention and management area. When the SWOT[4] analysis identified risk prevention and management as a specific weakness, then this was included as a priority for funding in the relevant operational programmes (OPs). In the current period, four Spanish regional OPs envisage risk prevention and management measures, including flood measures. These are OP Galicia, País Vasco, Andalucia and Canary Islands.

---

[3] Please see the Communication from the Commission to the European Parliament, the Council and the Committee of the Regions. Strengthening EU Disaster Management: RescEU. Solidarity with Responsibility (23.11.2017 COM(2017) 773 final) (https://ec.europa.eu/echo/sites/echo-site/files/eu_disaster_management_rescue.pdf) and the Proposal for a Decision of the European Parliament and of the Council amending Decision No 1313/2013/EU on a Union Civil Protection Mechanism // COM(2017) 772 final // 2017/0309 (COD) (https://ec.europa.eu/echo/sites/echo-site/files/decision_rev1313_772final.pdf) Please see the following page: https://ec.europa.eu/echo/news/resceu_en

[4] Strengths, Weaknesses, Opportunities and Threats

56. Romania intends to use 35 % of the total allocation to the priority axis on "*Promoting adaptation to climate change, risk prevention and management*" of the programme, (see Commission's reply to Box 6) for a coastal erosion rehabilitation project that addresses the erosion risk, benefits local communities and contributes to Natura 2000.

57. Besides exchange of information (which is one of the activities co-financed by cross-border projects), European Territorial Cooperation (Interreg) has funded various other investments into prevention of floods, as well as into preparedness and response to them.

Despite the fact that cooperation projects as such have limited budget from the EU side, their overall impacts are much bigger, as they can trigger larger investments on a national level in an internationally (transnationally) coordinated way.

60. With regard to ESI Funds, national authorities are responsible for establishing criteria for the selection of operations, launching calls for proposals, evaluation and selecting the projects for funding.

64. Topographical and land use data in Romania will benefit from the Cadastre project foreseen by the Regional Operational Programme (EUR 265 million).

68. The use of cost-benefit analysis is a requirement in the 2014-2020 programming period for investments funded by the ERDF or the Cohesion Fund that are major projects in the meaning of Article 100 of the Common Provision Regulation (CPR)[5]. This is set out in Article 101 of the CPR, which sets the information necessary for the approval of a major project. According to point (e), a cost-benefit analysis, including an economic and a financial analysis, and a risk assessment is required for each major project. In addition, Annex II of Commission Implementing Regulation (EU) 2015/207 of 20 January 2015 sets the details of information requirements related to the financial analysis, economic analysis, risk assessment and sensitivity analysis that needs to be presented in the application form for a major project. Moreover, the Commission issued in December 2014 a cost-benefit analysis guide for the 2014-2020 programming period as an economic appraisal tool for cohesion policy 2014-2020. It is an update of the previous guide, which was used for the 2007-2013 programming period.

70. The Commission takes note of the European Court of Auditors' findings and will further assess the matter in line with the Commission Communication '*EU law: Better Results through Better Application*' of 19 January 2017.

73. In the Czech Republic, green infrastructure is supported not only as anti-flood measure. Many projects are supported as nature protection activity while contributing to the FRMP objectives indirectly.

74. As regards Bulgaria, the Commission considers that the objectives of the National Biodiversity Strategy to 2020 are in line with the EU Green Infrastructure Strategy. Bulgaria aims to integrate its National Ecological Network into the EU and global ecological network and to launch trans-boundary protected areas, zones and corridors. The first transboundary protected wetlands under the Ramsar Convention were announced in 2013, with shared management between Bulgaria and Romania: Silver - Yezerul Calarash, Belene Islands Complex - Suhaia and Island Ibisha – Bistrets. Bulgaria is part of the European Green Belt Initiative.

75. As regards Romania, the Cadastre project mentioned in the reply to paragraph 64 is to be implemented in the current programming period.

---

[5] Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013.

As regards Bulgaria, a number of activities[6] have been implemented, including an assessment of riparian habitats' condition and the impact of watercourse modifications on biodiversity in the lower parts of the rivers. The National Plan for the Most Important Wetlands in Bulgaria 2013-2022 sets protection, maintenance and restoration priorities as well as horizontal measures for the conservation and sustainable use of wetlands[7]. However, Bulgaria still faces numerous challenges in the implementation of green infrastructure.

76. The EAFRD legal framework provides Member States with a set of non-mandatory instruments that may be used to promote risk management in agriculture and forestry.

Despite the Commission promoting green infrastructure applications, it is for the Member States to decide, based on their needs assessment to adopt flood measures including green infrastructure.

However, the definition of green infrastructure should be conceived at Member State level in the framework of a (non-mandatory) Green Infrastructure Strategy, which most of the Member States have not designed yet.

As mentioned in the reply to paragraph 24, other Rural Development Programme measures might have an indirect effect preventing floods (operations aiming at reducing greenhouse gas and ammonia emissions) and reducing the damage caused by floods (e.g. keeping vegetation in the soil to prevent erosion).

77. The fight against Climate change is one of the Commission's policy priorities. Besides the Floods Directive, the Commission has set in place, notably in the context of the Energy Union Strategy, a comprehensive package of legislation and other instruments for climate change mitigation (reducing greenhouse gas emissions) and adaptation (to climate change impacts).

87. Investment decisions and prioritisation of funding is a national or regional competence according to the level of planning. Furthermore, when private investments are indicated this is a decision based on the availability of private funds.

90. The EAFRD legal framework provides Member States with a set of non-mandatory instruments that may be used to promote risk management in agriculture and forestry.

The recent amendment of Regulation (EU) No. 1305/2013 (Rural development regulation) aimed at tackling some of the issues that hindered the uptake of risk management instruments by Member States. Member States may now grant support, inter alia, to insurance contracts covering production losses going beyond 20% of the average annual production. The contracts may also cover losses due to floods. The use of these instruments is conditional on Member States introducing them in their respective rural development programmes.

CONCLUSIONS AND RECOMMENDATIONS

Recommendation 1 – Improve accountability

The Commission accepts this recommendation.

The Annex of the Floods Directive foresees for the 2nd FRMPs that "*…an assessment of the progress made towards the achievement of the objectives referred to in Article 7(2);…*" and the

---

6 These activities are related to different measures in the National Biodiversity Conservation Plan 2005-2010.

7 The plan includes measures for spatial and functional re-connection of wetland habitats in line with the Green Infrastructure concept. A number of local restoration initiatives are underway, often involving partnerships between NGOs, local stakeholders and protected areas management authorities.

Commission, as part of its assessment of the Member States' 1st FRMPs, is already checking whether the Member States have set quantifiable and time-bound objectives and the findings will be shared with Member States (and eventually with the public) for good practice to be disseminated.

Indeed, each Member State should establish a methodology to this end. However, the Directive does not prescribe how the assessment of progress towards achieving the objectives shall be done from the part of the Member States, nor is there an explicit indicator mandated via the legal instrument that could serve as a baseline, or a proxy, for comparing progress.

In line with Article 16 of the Floods Directive, the Commission shall submit to the European Parliament and to the Council regular reports on the implementation of this Directive. The first of these reports will be published by December 2018 and subsequently every six years. Therefore, the Commission considers the recommendation will be fully implemented by December 2024.

103. There are possibilities for EU support to related projects, including cross-border projects (see reply to paragraph 57), but given the limited EU budget Member States have an important role as well. As regards funding for cross-border investments, despite the fact that cooperation projects as such have limited budget from the EU side, their overall impacts are much bigger, as they can trigger larger investments on a national level in an internationally (transnationally) coordinated way. Activities related to macro-regional strategies[8], such as the EU Strategy of the Danube Region (EUSDR), help shaping national activities by adopting a transnational approach, e.g. in the case of national programmes against natural disasters in several countries. Several macro-regional projects have been implemented or developed in the area of water management and environmental risks, in particular those related to floods, which are being aggravated by climate change.

Recommendation 2 – Improve the identification in FRMPs of financial resources, including for cross-border action

The Commission partially accepts this recommendation.

The Commission in its assessment of the Member States' 1st FRMPs, is already checking whether Member States have (1) identified sources of financing, (2) established a timeline and (3) is reviewing the degree to which cross border cooperation (including on joint measures) is taking place. It will make its findings public by December 2018. However, checking whether the sources of financing identified by the Member States in the FRMPs are in line with available funding (which may be or not be of the EU co-funding type) is not in the remit of the Commission as it would imply having access to and checking budgetary provisions of the Member States, all the more, at the level of individual investments.

In line with Article 16 of the Floods Directive, the Commission shall submit to the European Parliament and to the Council regular reports on the implementation of this directive. The first of these reports will be published by December 2018 and subsequently every six years. Therefore, the Commission considers the recommendation will be implemented by December 2024.

104. This is an issue of national competence, planning and choices.

Recommendation 3 – Improve prioritisation procedures and achieve value for money

---

[8] A 'macro-regional strategy' is an integrated framework endorsed by the European Council, which may be supported by the European Structural and Investment Funds among others, to address common challenges faced by a defined geographical area relating to Member States and third countries located in the same geographical area which thereby benefit from strengthened cooperation contributing to achievement of economic, social and territorial cohesion; see http://ec.europa.eu/regional_policy/en/policy/cooperation/macro-regional-strategies/.

The Commission does not accept this recommendation.

The Commission only takes a position on the first part of the recommendation (co-finance flood measures prioritised in accordance with the future FRMPs), as it is understood that the second sentence (prioritisation by Member States) is a recommendation to the Member States to follow up.

Already now in its assessment of the Member States' 1st FRMPs, the Commission is checking whether and how the Member States prioritised measures and will make its findings public by December 2018. However, it is noted that the Directive's Annex only requires "*a description of the prioritisation*" and "*a summary of the measures and their prioritisation*", which means that the requirement to approve or disapprove Member States' prioritisation methodologies on the basis of specific criteria is absent from the legal text.

As regards ESI Funds, the legal provisions governing these do not provide for such a role of the Commission under shared management with regard to establishing criteria for the selection of operations, launching calls for proposals, evaluation and selecting the projects for funding. It is the role of the Member States to organise this process. This is not changed in the Commission's proposal for the period 2021-2027.

However, as funding preconditions (called enabling conditions) for the ERDF/Cohesion Fund support, the Commission has proposed for the period 2021-2027 that the investments in risk prevention and management have to be in line with a national or regional disaster risk management plan. This is a similar approach to the 2014-2020 period, but strengthened and offering to look at all risks in an integrated manner.

As regards the cost-benefit analysis, the Commission notes that this recommendation is addressed to the Member States, and supports it. The Commission has proposed for 2021-2027 that managing authorities for cohesion policy programmes have to "*ensure that selected operations present the best relationship between the amount of support, the activities undertaken and the achievement of objectives*". Conducting a cost-benefit analysis can be an effective tool for implementing above requirement.

The Commission will continue to promote and support the use of the established methodology for cost-benefit analysis.

First indent: Whereas the Floods Directive says that "*Flood risk management plans shall take into account relevant aspects **such as** costs and benefits…*" [Article 7(3), added emphasis], it could be argued that costs and benefits are cited by way of example in terms of aspects to take into account – and that a consideration of costs and benefits does not equate to a cost-benefit analysis. Further, it is recalled that in the Annex of the Directive, a cost-benefit analysis to assess measures with transnational effects is to be a component of the flood risk management plan, **when available** [added emphasis].

Second indent: A relevant criterion for use by Member States exists already in the Floods Directive (Article 7(4)): "*In the interests of solidarity, flood risk management plans established in one Member State shall not include measures which, by their extent and impact, significantly increase flood risks upstream or downstream of other countries in the same river basin or sub-basin, unless these measures have been coordinated and an agreed solution has been found among the Member States concerned in the framework of Article 8.*"

Recommendation 4 – Achieve Member States' compliance with the Water Framework Directive

The Commission accepts this recommendation.

Already now in its assessment of the Member States' 1st FRMPs, the Commission is checking whether the Member States have provisions in place and coordinating their actions under the FD and the Water Framework Directive (WFD) and whether the environmental objectives of the WFD are heeded - and will make its findings public by December 2018.

Further, the Commission insists on the correct application of Article 4(7) of the WFD in relation to new modifications (including flood infrastructure) to water bodies. Notably, in terms of support towards the Member States, a Common Implementation Strategy (CIS) Guidance Document on the implementation of the WFD's Article 4(7) was published in January 2018 on the website Communication and Information Resource Centre for Administrations, Businesses and Citizens (CIRCABC)[9].

The Commission will also investigate cases discovered or brought to its attention that jeopardise the attainment of the objective of the WFD, in line with the Commission Communication of 2017 '*EU law: Better results through better application*'.

The Commission considers that this is a continuous action in its role of guardian of EU law.

Recommendation 5 – Check that Member States have analysed the feasibility of implementing green measures in combination with grey infrastructure where appropriate

The Commission partially accepts this recommendation.

Already now, in line with Article 7 of the Floods Directive, the Commission is checking in its assessment of the Member States' 1st FRMPs, whether the Member States have employed Natural Water Retention Measures (one particular type of green infrastructure that can mitigate flooding) and whether nature conservation is a topic in the FRMPs. It will make its findings public by December 2018.

The Commission already recommends the use of green infrastructure, where relevant, in projects co-financed by the EU. However, as regards ESI Funds, the legal provisions governing them do not provide for such a role for the Commission under shared management. Consequently, the Commission is not in a position to check whenever EU co-financing is used, that Member States have analysed the feasibility of implementing significant green measures.

Recommendation 6 – Better integrate the effects of climate change into flood risk management

The Commission accepts this recommendation.

A. Overall, the Commission is already assessing how Member States have accounted for climate change in their 1st FRMPs - and will make its findings public by December 2018. It will regularly assess and report on how Member States integrate the effects of climate change in line with Articles 14(4) and 16 of the Floods Directive.

Target implementation date: In line with Article 16 of the Floods Directive, the Commission shall submit to the European Parliament and to the Council regular reports on the implementation of this Directive. The first of these reports will be published by December 2018 and subsequently every six years. Therefore, the Commission considers the recommendation will be fully implemented by December 2024.

---

9 https://circabc.europa.eu/sd/a/e0352ec3-9f3b-4d91-bdbb-939185be3e89/CIS_Guidance_Article_4_7_FINAL.PDF

Recommendation 7 – Raise public awareness of the benefits of flood insurance and seek to increase coverage

The Commission partially accepts this recommendation.

There is no obligation in the Floods Directive for Member States to include insurance as a measure in their FRMPs and insurance information is not made available by all Member States through their reporting. Therefore, the Commission is currently not in a position to report on efforts to increase insurance coverage across the EU. Nevertheless, the Commission is already checking whether and how Member States have treated insurance in their 1st FRMPs.

The Commission, however, supports the idea of raising public awareness on the option of insurance against floods as a risk transferring mechanism. Increasing insurance coverage as part of a broad flood risk management strategy can be a good approach to transferring risks. The benefits of insurance depend on the regulatory context within each Member State and the specific characteristics of flood risk in those Member States.

The EU Strategy on Adaptation to Climate Change has formulated an action which is in line with the recommendation made by European Court of Auditors. The EU Strategy is still valid and it acknowledges flood risk as one of the risks associated to climate change.

Target implementation date (for the part of the recommendation accepted – raising public awareness on insurance): The Commission intends to make public its assessment of FRMPs by December 2018.

Recommendation 8 – Assess the alignment of the FRMPs with land use planning rules

The Commission does not accept this recommendation.

Point (a) concerns land use planning and the rules governing it is a national competence.

Point (b) is already implemented to the extent possible bearing in mind Article 7 of the FD refers to spatial planning and (sustainable) land use with "*such as*" and "*may include*", which can both be interpreted as an indication and not as a requirement. The Commission has made public on its website a collection of Member States' guidelines to determinate flood prone areas and relevant laws and regulations for land use planning with regards to flood risk[10] – and is already checking whether Member States have considered land use in their 1st FRMPs and will make its findings public by December 2018.

[10] http://ec.europa.eu/environment/water/flood_risk/pdf/guides_flood_prone_areas_land_use.pdf

Event	Date
Adoption of Audit Planning Memorandum (APM) / Start of audit	6.9.2017
Official sending of draft report to Commission (or other auditee)	12.7.2018
Adoption of the final report after the adversarial procedure	19.9.2018
Commission's (or other auditee's) official replies received in all languages	23.10.2018

PDF ISBN 978-92-847-1008-9 doi:10.2865/356339 QJ-AB-18-024-EN-N
HTML ISBN 978-92-847-0970-0 doi:10.2865/12240 QJ-AB-18-024-EN-Q

Floods can cause injury and loss of life, considerable economic costs, and damage to the environment and cultural heritage. Serious floods have become more frequent in Europe. In recent years, more than twice as many flash floods of medium to large magnitude have been registered as in the late eighties. Climate change is an aggravating factor, triggering changes in precipitation and weather patterns, sea level rises and, consequently, more frequent and severe floods.
In response to the rising incidence of flooding, the EU adopted in 2007 the Floods Directive. We found that the Floods Directive had positive effects overall, but that the implementation of flood prevention measures suffers from weaknesses in allocating funding. Member States have begun implementation of Flood Risk Management Plans, but improvements are needed. Major future challenges remain concerning the need for much fuller integration of climate change, flood insurance and spatial planning into flood risk management.

EUROPEAN COURT OF AUDITORS

Publications Office

EUROPEAN COURT OF AUDITORS
12, rue Alcide De Gasperi
1615 Luxembourg
LUXEMBOURG

Tel. +352 4398-1

Enquiries: eca.europa.eu/en/Pages/ContactForm.aspx
Website: eca.europa.eu
Twitter: @EUAuditors