



LocAll4Flood

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LOCALL4FLOOD INTEGRATED MULTISTAKEHOLDER GOVERNANCE MODEL – TRAINING PROGRAMME

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Deliverable 1.5.1

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Executive summary

This deliverable report presents main results of the Activity 1.5 **“Boxing the prevention, adaptation and mitigation solutions into the LOCALL4FLOOD Integrated Multi-stakeholder Governance Model (IMGGM) – Training Programme”**, aiming to shape the basic structure of the IMGGM, to provide guidelines and main steps toward establishment and testing of the IMGGM in 9 pilot catchments particularly sensitive to flash floods distributed in 6 countries across the Mediterranean: in Balearic Islands (Spain), Bulgaria, Catalonia, Greece, Italy, and Malta.

The IMGGM involves different levels of flash flood risk management, and considers various prevention, adaptation and mitigation solutions aiming to reduce flash flood risk. The relevant Guiding principles for the IMGGM are presented in Section 2 of the report, while the Basic structure and the Main steps in establishing the IMGGM in LOCALL4FLOOD pilot sites are presented in Section 3.

The main tool to facilitate the establishment of an IMGGM in each of the pilot sites in each of the partner’s countries will be a targeted Training programme. It will be implemented in a series of training events organised by Project partners, in cooperation with the Associated Partners (supporters). The Training programme will function as a flexible methodology, including a range of applicable instruments to involve stakeholders into planning and execution of prevention, adaptation and mitigation actions, as a tool to reduce flash-flood risk and provide multi-benefits. The Training programme is described in Section 4 of the report, while a detailed Agenda of the training sessions, as well as the relevant lectures (presentations) that will be used for training is presented as Appendix 1 to this report.

Organizations and bodies at diverse governance levels (national, regional, local, and neighbourhood / community) in Mediterranean are targeted by this model, but primarily it is aimed for local and regional public authorities, which are the key players in flash flood risk management.

The IMGGM Training programme provides guidance on setting-up and operating integrated multi-stakeholder frameworks, as well as fostering new forms of collaboration, with the goal of establishing and implementing IMGGMs at pilot sites.

The IMGGM structure and the training programme will be validated (WP1, A1.6), tested (WP2) and finalized as a set of tailor-made versions (corresponding to case specifics), based on the guidance provided in this report, and lessons learnt through pilot actions.



Introduction

LocAll4Flood project aims to establish IMGGM to tackle flash floods, for 4 different topographical areas (urban, industrial, rural & natural, coastal) combining prevention, adaptation and mitigation strategies to better cope with climate change threats.

This flash flood governance model (IMGGM) addresses organizations and bodies at diverse governance levels (national, regional, local, and neighborhood/community) in the Mediterranean, focusing on local and regional public authorities, which are the key players in flash flood risk management. It is designed for 4 kinds of topographical areas (urban, industrial, rural /natural, coastal) and will be tested in 9 pilot sites located in 6 regions particularly sensitive to flash floods distributed across the Mediterranean, as follows:

1. Pilot site "Gurri Catchment, Spain-Catalonia (Urban & Industrial)
2. Pilot sites "Torrent Gros", Spain – Balearic Islands (Rural & Natural)
3. Pilot sites "Torrent de na Bàrbara, Spain – Balearic Islands (Rural (Urban)
4. Pilot site "Kamchia – Varna", Bulgaria (Coastal)
5. Pilot site "Dalgopol", Bulgaria (Urban)
6. Pilot site "Birkirkara – Msida Catchment", Malta (Rural/Natural)
7. Pilot site "Burmarrad Catchment", Malta (Urban)
8. Pilot site "City of Bari", Italy (Urban)
9. Pilot site "Anthemountas", Greece" (Rural / Natural)

This transnational approach is needed to demonstrate the IMGGM in a wide range of sensitive areas and is crucial for cross-border cooperation and transferability to other vulnerable regions.

Within Activity 1.5 (Work Package 1) the basic structure of the IMGGM is elaborated, founded on the guiding principles of flood risk governance, and taking into account specifics of flash floods. The present report provides guidelines and traces main steps in the establishment of the IMGGM in the project pilot sites.

The establishment of IMGGM in each of the partner's countries will be achieved by implementation of a Training programme which will be used as a flexible methodology for attracting and involving stakeholders in the planning and implementation of measures for prevention, adaptation and mitigation of flash flood impacts.

The Training Programme presented in this report (Section 4, and Appendix 1) aims to:

- provide guidelines for designing and implementing an IMGGM at each of the selected pilot sites;
- present substantiated information on the possibilities for mitigating flash floods through Nature Based Solution (NBS);
- enhance capacity and train all stakeholders from the selected pilot areas to manage flash floods risk.



It will be implemented in a series of training events organised by Project partners, in cooperation with the Associated Partners (supporters).

1. Objectives of the Integrated Multi-stakeholder Governance Model - Training Programme

EU Flood Directive defines the Flood Risk Management (FRM) as concerted and coordinated action at Community level for flood prevention, protection and mitigation, that would bring considerable added value and improve the overall level of flood protection. Following the EU Water Framework Directive which suggest that “*Member States shall encourage the active involvement of all interested parties in the implementation of this Directive*” (Art. 14 /1, EU WFD, 2000), The Flood Directive stipulates that “*Member States shall encourage active involvement of interested parties in the production, review and updating of the flood risk management plans*” (Art. 10 (2), EU FD, 2007),

However, whilst the states may have diversified governance strategies in line with EU Directives, they continue to be a pivotal actor, exploring the state-led, ‘top-down’ decision-making, as illustrated here below with an example on Figure 1.

GOVERNANCE	STRATEGIC FLOOD & WATER MANAGEMENT			RESPONSIBLE AUTHORITIES		
NATIONAL	National Disaster / Flood Management Strategy			National Council of Disaster Management	Ministries of Water, Environment, Public works, ...	National Dept. of Emergency Response-Ministry of Interior
REGIONAL/DISTRICT RIVER BASIN COASTAL CELL	Flood Risk Management Plan (FRMP), EU Flood Directive	River Basin Management Plan Water Framework Directive	Regional Program / Plan for Disaster Management	Regional Council of Disaster Management	Regional Government / District Governor	Regional Directorate of Emergency Response (EWS)
				River Basin Directorate / Agency / Board	Regional Inspectorate of Environment and Water	Regional / Basin Agency of Protected Areas
LOCAL	Local/Municipal Contingency / Emergency / Flood Response Plan	Drainage and Wastewater Management Plan		Municipal Council of Disaster Management	Mayor / Municipal Board / City Hall Council	Municipal Unit of Emergency Response

Figure 1. Illustration of a typical hierarchy of responsible authorities in a „Top-Down“ Management of Flood Risk ([National Strategy BG, 2018](#); [LGA, UK, 2022](#))

recently flood risk management marks a transition from traditional state-led management towards increasingly complex actor networks and non-hierarchical processes, introducing the integrated management approach. This signifies a shift from ‘government to ***governance***’ of flood risk (Walker et al., 2014).



Integrated Flood Risk Management (IFRM) is accepted as a framework that promotes sustainable, long-term flood resilience by combining social, economic, financial, environmental, and institutional solutions, as well as those involving engineering, disaster preparedness, insurance, and emergency response (Wehn et al., 2015).

Integrated Flood Risk Governance means implementing the FRM principles in policy and practice by integrating the complex institutional arrangements that shape the behaviour of state and societal actors concerning flood risk management.

Considering the above, a **Integrated Flood Risk Governance Model** (Framework / Arrangement) can therefore be defined as the actor networks, rules, resources, discourses and multi-level coordination mechanisms through which FRM is pursued (Alexander et al., 2016). This integrated approach involves a wide range of stakeholders of central and local governments, private sector, academia, local communities engaging in various sectors, such as water resources management, agriculture, forestry, housing, and urban planning.

A number of countries are now introducing Integrated Systems of Flood Risk Management (Ishiwatari, 2019), however too little has been done to investigate the specifics of the application of such a model for the typical case of a flash flood, considering the following:

- for the typical climatic conditions of the Mediterranean;
- at different topographical and environmental conditions (urban, rural/natural, coastal, industrial);
- accounting for the different prevention, adaptation, mitigation strategies to reduce flash flood risk (which suppose for different ways of involvement of stakeholders in implementation of these strategies).

Aiming at active involvement of interested parties in governance of the flood risk management, an important condition for the implementation of such an IMGGM for Flash Floods is the raising of the awareness and capacity of the responsible authorities and local communities in the affected areas, so that they can be prepared and fully involved in this process.

This is where the role of the LocAll4Flood project comes in Activity 1.5, which aims:

1. To define **guiding principles of an IMGGM for efficient flash flood risk management**, providing involvement of stakeholders in all phases – prevention, adaptation, mitigation, for the typical geographical, climatic, and social conditions of the Mediterranean basin.
2. To develop a **IMGGM - Training programme** that will:
 - function as a flexible methodology that offers **guidelines** on flash flood risk management;
 - serve as a **capacity enhancement** tool for public authorities that can help in delivering more effective and sustainable flood protection solutions.

Organizations and bodies at diverse governance levels (national, regional, local, and neighbourhood / community), and diverse sectors (academia/research, private sector, NGOs) in Mediterranean, including small islands such as Malta and Balearic Islands, are



targeted by this Training Programme, but primarily it is aimed for local and regional public authorities, which are the key players in flash flood risk management. Further actions of the LocAll4Flood project shall establish and test an IMGGM for flash floods in each project pilot site.

2. Guiding principles of the Integrated Multi-stakeholder Governance Model (IMGGM) for flash flood risk prevention & resilience

2.1 General principles of Governance of Flood Risk Management:

Here below general principles of an effective management of flood risk under the pivotal role of the responsible authorities, but in close cooperation with key stakeholders in the concerned area, are listed.

1) Provide coherence with EU Policies, Regulations and Directives, and with National legislation

- Ensure coherence between local, regional, national and EU policies for Disaster Risk Management.
- Follow the EU Directives (Water Framework Directive, Flood Directive), comply with the relevant EU regulations (e.g. Nature Restoration Law), while observing relevant National regulatory framework.
- Synchronize with the Flood Risk Management Plan of the catchment area.
- Provide Policy Coherence through effective cross-sectoral co-ordination. Follow incentives and regulations to mitigate conflicts among sectoral strategies, bringing these strategies in line with flood management needs.

2) Define Roles and Responsibilities of key stakeholders at all levels

- Allocate and distinguish roles and responsibilities among key stakeholders.
- Encourage co-ordination across the responsible authorities, and cooperation with concerned stakeholders.

3) Promote Multi-level cooperation

- Encourage multi-level cooperation among users, stakeholders and authorities for the management of flood risk, based on best practices and successful case studies.
- Align identified risks with risk perceived by stakeholders; unveil opportunities for their active involvement; show them benefits and co-benefits (e.g. from NBS for climate resilience and flood protection); find the right approach how stakeholders can protect their own interest without hindering the governance process.

4) Enhance Capacity of responsible authorities/organisations

- Adapt the Level of Capacity of responsible authorities to the needs of an effective Integrated Multi-stakeholder Governance of flash flood risks.
- Understand flood risk, and how it may change (due to climate).

Often, the responsible authorities require tools, expert technical knowledge and specific recommendations in order to assist in the decision-making process.



That is why one of the objectives of the Training Programme is to train and prepare the responsible authorities to participate and lead the “integrated multi-stakeholder” flash flood risk governance. An assessment of the level of capacity will be done within the first stage of the project, in order to further implement the relevant training and capacity enhancement actions. Responsible authorities not only participate, but they also lead the “integrated multi-stakeholder governance” of flash flood.

2.2 Principles of the LocAll4Flood IMG

5) Focus on specifics of Flash Floods (in climate change): Emphasize on Early Warning Systems (EWS)

- The crucial role of EWS! Flash flood is of short duration with a relatively high peak discharge usually having less than 6 hours between the occurrence of the rainfall and the peak ([EIONET, web-link](#)); the role of EWS (in this short time available for warnings) is extremely important, as they may save and protect lives, livelihoods and assets of people at risk.
- Unlike in the typical fluvial floods, some specific prevention and resilience actions and measures are required in flash flooding (e.g. the placement of mobile barriers, or sandbags, may work in a river flood, but cannot be so effective in a flash flood). Preparedness of people to react in these specific conditions can be a key measure to reduce risk.
- Areas most susceptible to flash flooding are urban areas, mountainous streams and rivers, torrents and non-perennial flow waterways, low-lying areas, storm drains, and culverts ([NWS, web-link](#)). This means – that the IMG is of particular importance for this type of areas.

6) Adjust according to Local Specifics

- Find solutions that fit with local environmental conditions, local governance and norms.
- Adjust according to the different phases: prevention, adaptation, and mitigation.

7) Promote Nature Based Solutions

- Define NBS promotion framework. Include NBS as a preferred option to reduce flood risk and bring multiple co-benefits.
- Where appropriate - apply innovative NBS or Hybrid (Grey + NBS) technologies to region-specific solutions.

8) Promote Bottom-up Approach

- Encourage Bottom-up Approach through involvement of stakeholders from all levels, in all phases – prevention, adaptation, mitigation.
- Ensure Community involvement not only in public consultation, but also in planning and decision making for flood protection measures.



- Trace, where possible, institutionalized ways of involving non-governmental actors (e.g. as members of consultative bodies or advisory committees of the responsible authorities).
- Use applicable “smart tools/instruments” to involve stakeholders and facilitate cooperation between different governance levels and sectors, and internally across various departments of authorities.

3. Challenges, and recommendations, on structuring the LOCALL4FLOOD IMG M for Flash Floods

3.1 Collaborative mechanism and basics of the LOCALL4FLOOD IMG M

As it was highlighted, a Flood Risk Governance Model can be defined as the actor networks, rules, resources, discourses and multi-level coordination mechanisms through which Flood Risk Management is pursued. This integrated approach involves a wide range of stakeholders of central and local governments, private sector, academia, local communities engaging in various sectors, such as water resources management, environmental protection, agriculture, forestry, urban planning, housing, insurance, etc.

However, establishing a collaborative mechanism among all these stakeholders is a challenge.

The implementation of the EU Floods Directive requires the establishment of public participation mechanisms to ensure the involvement of the general public in the flood management cycle. All assessments, maps and plans prepared according to the Floods and WFD directives have to be made available, and consulted with the public.

This raises questions on how to achieve this goal and successfully translate the directive into meaningful, innovative, and effective participation. A variety of consultation channels with the public and stakeholders was used and, overall, a broad range of stakeholders was involved in the preparation of the first FRMPs (completed by 2015). The implementation of the 2nd Cycle (2016-2021) is practically completed (state of play shown at environment.ec.europa.eu), while currently, the 3rd cycle (2022-2027) is now on the run.

At first instance, main principles set for the integrated flash flood governance by the multi-stakeholder model should be considered (section 2.2, item 5 to 8). However, establishing a collaborative mechanism among various stakeholders and building an IMG M for flash floods in a concrete location (pilot catchment), is framed by a set of policies, regulation, guidelines, and should be also adhered to the local specific topographic, environmental, social conditions, and should also step on the available knowledge and experience. Here is a short (and not exclusive) list, of some of the ‘framing considerations’:

- Follow (strictly) the Flood Risk Management Plans, according to EU Flood Directive;
- Adhere to National/Regional/Local Policies/Strategies/Regulations for Disaster Management.



- Comply with all relevant EU and International regulations and standards.
- Explore local knowledge and experience, including Traditional Ecological Knowledge regarding the specific catchment, that could be the key in strengthening the IMGGM collaborative mechanism.
- Consider local socio-economic and cultural aspects, such as community vulnerability, cultural sensitivities (practices and perceptions of risk), economic dependencies (financially affected populations by floods or flood management measures), etc.
- Assess existing technical and knowledge resources, such as prior and current infrastructure (dams, levees, drainage systems, etc.), data availability (accessibility to hydrological, meteorological, and socio-economic data), available technology and tools (modern web-GIS, remote sensing, and real-time monitoring systems), unused research and studies (scientific literature on flash flood risk assessments and modern water resources management in similar study areas).
- Consider innovation (including AI), that may give new opportunities for participation of the general public.
- Use “smart tools” to train, raise capacity, prepare and involve stakeholders.

It should be underlined that the modern information and communication technologies, social networks, AI, have the potential to support local communities in their attempt to have a substantially new role in decision-making. In fact, it may facilitate transposition of the EU Flood directive and the mechanisms in place for people participation during different phases of the disaster cycle – Prevention / Preparedness - Adaptation - Mitigation.

A simplified diagram illustrating the integration of all the above, presenting the general approach in building the IMGGM for flash flood is presented on Figure 2.



Figure 2. Guiding principles and key actors (five pillars) of the IMGM for flash floods

Potential stakeholder categories spread within the 5 main pillars:

- **NATIONAL AUTHORITIES:** Ministries / Government departments; • Government agencies;
- **REGIONAL & LOCAL AUTHORITIES:** Regional authorities; • Local authorities / municipalities; • Municipal associations; • Relevant municipal companies;
- **LOCAL COMMUNITY:** Civil society organisations; • Professional groups and their representative bodies; • Public institutions (e.g. schools, hospitals); • Community groups; • Media;
- **ACADEMIA:** Universities; • Public research institutions; • Private research organisations;
- **PRIVATE SECTOR:** Utilities; • Private companies; • Landowners and land managers; • Insurance companies.

3.2 Local Community participation in Flood Management

No longer seen solely as recipients, Local communities are recognized as critical stakeholders who have a major role to play in flood management plans. Local community can participate in the entire disaster risk reduction cycle, which includes prevention,



adaptation and mitigation, as well as preparedness for, response to, and recovery from, flood disasters.

However, community participation requires clarifying institutional linkages at local and regional levels, identifying appropriate motivations for participation, embracing climate change adaptation - along with the main steps needed to implement common actions, including avoiding/mitigating conflicts between different groups ([APFM, web-link](#)).

Analysis of the transposition of legal obligations for various stakeholders' involvement has shown that implementation is limited when examining both the respective roles and types of interactions between local communities and authorities and the relevant impact on decision-making (Wehn et al., 2015). Different authorities have differing perceptions of stakeholder's participation in flood risk management in terms of their roles and influence. These perceptions are related to the importance that the authorities place on the different stages of the FRM. This understanding is crucial for identifying the potential of observatories run by the local communities to foster greater people engagement and participation.

An example approach to "Community-Based Flood Management" is presented in graphical form in Figure 3.



Figure 3. Step by step involvement of stakeholders in "Community-Based Flood Management" ([APFM/WMO, 2014](#))



3.3 Stakeholders' roles in different cycles of the flash flood risk management

There are various approaches and various definitions regarding the different cycles of flash flood risk management, as connected to climate change and disaster management. They refer to different aspects of the management process (prospective, corrective, compensatory), and different solution that refer to Preparedness, Prevention, Adaptation, Mitigation, Response and recovery ([UNDRR, web-link](#)). For example, the EU develops policies that focus on "Prevention and Preparedness" and "Reduction" of disaster risks (both natural and human-caused) as these actions will reduce the impact of adverse events ([ECPHAD, web-link](#)). In parallel, IPCC does not include "Prevention" of climate change driven disasters, because it considers that there is not prevention possible, only adaptation and mitigation.

Within LocAll4Flood we use the approach where 3 main phases in flash flood risk management are considered (Prevention, Adaptation and Mitigation), and the relevant solutions, and respected actions, can be applied by responsible authorities and other stakeholders within the framework of the IMGGM.

Here below the LocAll4Flood approach in understanding prevention – adaptation – mitigation phases is presented, referencing to popular climate change and flood protection management definitions, and linking them to LOCAL4FLOOD focus on relevant actions and actors to be involved in IMGGM of flash flood in Mediterranean.

Prevention is defined as "Preventing damage caused by floods" (*definition, [FIONET, web-link](#)*). It can be achieved by avoiding the construction of houses and industries in present and future flood-prone areas, as well as by adapting future developments to the risk of flooding and by promoting appropriate land-use, agricultural and forestry practices. Prevention includes also "preparedness" of all the actors and infrastructure. Examples of preparedness actions are: Flood risk education; Exploring best practices; Developing guidelines and standards; Installing EWS; conducting emergency response training, etc.:

As it was highlighted, leading role in prevention of, and adaptation to, flash floods is given to **EWS, which are in focus in LocAll4Flood project.**

Considering the above, leading role in Prevention is given to Regional authorities, that shall operate EWS and coordinate efforts of local authorities and other stakeholders, as well as to Academia, that shall provide relevant knowledge, forecasting models, and monitoring technologies.

Adaptation (to climate change) means taking action to adjust to its present and future impacts. Adaptation is anticipating the adverse effects of climate change (including more frequent flash floods) and taking appropriate action to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise ([CLIMATE-EC, web-link](#); [EEA, web-link](#))



In essence, adaptation can be understood as the process of adjusting to the current and future effects of climate change, including more frequent flash floods. Examples of adaptation measures include changing behaviour of people, development of EWS, modifying existing residential houses and infrastructure, etc.

LOCALL4FLOOD focuses on **assessing the social awareness and risk perception revolving around flash floods, as well as on raising people awareness**, in order to join the cooperation established within the IMGGM in pilot sites.

Usually leading role in Adaptation is given to Local authorities, in close cooperation with Academia and Local NGOs, who can guide local communities in the adaptation process. For small islands such as Malta and Balearic Islands, the National government is in charge for Adaptation with some instances where Local Authorities like Local councils implement short term initiatives (storm-water piping etc.) to "adapt" to climate change.

Flood mitigation presents broader set of strategies taken to reduce flood risk and potential impact while improving resilience against flood events. These methods include prevention, prediction (which enables flood warnings and evacuation), proofing (e.g.: zoning regulations), physical control NBS and physical structures like dams and flood walls and insurance, e.g.: flood insurance policies (Bubeck et al., 2012).

Flood mitigation reduces the overall risk of structure experiencing flood damage and also reduces the severity of flood damage when it occurs. Mitigation means to reduce the vulnerability to flood hazards in order to protect the life, health, safety and welfare of the community's residents and visitors. Flood mitigation measures may only lessen the impact of flooding.

Flood mitigation approaches fall into two categories - structural and non-structural. Structural forms mitigate harm by reconstructing landscapes. They include floodwalls / seawalls, floodgates, embankments, dams, levees, floodplain management, NBS and hybrid measures, evacuation routes. Non-structural measures reduce damage by removing people and property out of risk areas, as well as by providing awareness, education and preparedness.

NBS are widely considered as one of the preferred options for flood mitigation, providing both benefits to protect local communities and infrastructure, but also co-benefits, such as biodiversity restoration, improvement of recreational opportunities, creation of green jobs, etc.

That is why **NBS are in focus in LOCAL4FLOOD project**, aiming to adapt, fine-tune and categorize existing Nature Based Solutions (NBS) toolbox to mitigate the negative effects of flash flood events.

All key players in the IMGGM are responsible for advancing of mitigation actions and measures, while leading role in planning and coordination should be taken by Regional authorities (District government, Disaster Management Directorate), or National authorities for small islands, as well as by Academia, while leaders in implementation should be the local authorities, supported by NGOs and local people.



	PREVENTION	ADAPTATION	MITIGATION
NATIONAL GOVERNMENT AUTHORITIES	Provide regulations	Develop climate adaptation strategies	Provide plan of Measures Building codes
REGIONAL ADMINISTRATION DECISION MAKING	Develop regional plans Early Warning System	Provide financing	Subdivision/ zoning, Property buyouts,
IMPLEMENTING BODIES	Participate implementations of prevention measures	Implement measures Provide financing	Dikes/levees, flood walls, floodgates, evacuation routes.
INFLUENCING ADVISORY ORGANISATIONS (Academia, NGOs)	Forecast (Numerical models) Guidelines (e.g. how to build houses) Educate people How to react in flash flood	Advise programs and actions to improve people's behaviour	Advise mitigation measures. Innovative Nature-based Solutions
AFFECTED COMMUNITIES	Avoid construction of houses in flood-prone areas; Promote appropriate land- use; Follow Early Warning Systems and contingency plans.	Have your say. Participate in public discussion; Demand adequate and timely solutions from the authorities. Adapt your house/yard to expected flood.	Support NBS (aforestation, green parks, etc.), Participate in cleaning, demonstration, environmental actions.

Figure 4. Example Responsibilities & Actions / Measures within the 3 phases of flash flood risk management: prevention – adaptation – mitigation

3.4 Toward setting-up of an IMGM at each LocAll4Flood Pilot site

Pilot site leaders are expected to design, establish and test an IMGM at their pilot sites. This task shall be completed once a baseline study on local Flood Risk management Plans, is completed, together with stakeholder mapping, and outlining barriers and opportunities, which will be completed in WP2. Establishing a collaborative mechanism among various stakeholders and building an IMGM for flash floods in pilot catchments of LOCALL4FLOOD project should be based on the following main steps:

1. start with the main principles of the basic IMGM, as presented here above in Section 2;



2. study and analyse local specifics of flash floods in the pilot catchment, justify and select appropriate measures and actions, for all phases of the flash flood cycle (prevention, adaptation, mitigation);
3. complete the stakeholder mapping / identification and analysis to guarantee the effective multi-stakeholders' engagement (using Social Network Analysis (SNA) and Problem Structuring Methods (PSM), A2.6);
4. discover relevant roles and responsibilities of all various stakeholders involved in the IMGGM – draw a hierarchy diagram, indicating links and responsibilities of relevant Responsible Authorities, but also possible involvement of other stakeholders – local community, NGOs, private sector etc., in all phases – prevention, adaptation, mitigation;
5. make an Action plan and coordinate it with Responsible Authorities:
 - how to involve stakeholders, and then how to improve coordination between participating sides;
 - how to integrate L4F EWS at local scale (Project Output 2.1);
 - how to integrate Adaptation solutions in the 4 topographical types (Output 2.2);
 - how to promote Nature-Based Solutions – in co-implementation with local stakeholders (Output 2.3).
6. Implement this Action plan! Organise local events, participate awareness campaigns, facilitate cooperation with authorities.

Once the mutual understanding, cooperation and joint actions are on place, the IMGGM can be considered established, and in operation.

4. IMGGM Training Programme

4.1 Objectives

In line with the above principles and guidelines toward establishment of the IMGGM in project pilot sites, the objectives of the IMGGM Training Programme can be defined as follows:

- the Programme should serve to enhance capacity and train all stakeholders from the selected pilot areas to manage flash floods risk according to the IMGGM;
- the Programme should provide guidelines for designing and implementing an IMGGM at each of the selected pilot sites, as well as recommendations for reinforcing the coordination and interaction of interested parties, including through the creation and functioning of new forms of cooperation;
- the Programme should be designed in such a way to be used as a flexible methodology for attracting and involving stakeholders in the planning and implementation of



measures for prevention, adaptation and mitigation of the flash flood impacts; Interactive tools, digital applications for visualization, explanatory videos, etc. can be used to facilitate the training;

- the Programme shall present substantiated information on the possibilities for reducing the risk of flash floods through NBS, as well as for achieving many additional social, ecological and economic benefits and co-benefits;

The Programme shall be applicable for training both in the format of personal presence (in a training room), as well as, where/if appropriate, in online format - through the standard applications such as MS Teams, Zoom, Webex, GoogleMeet.

4.2 Training Programme Plan/Agenda

The Training Programme will be implemented within 3 training sessions, together with the planned co-creation workshops organised within Work Package 2.

Training sessions will include targeted presentations, followed by discussions, and feedback assessment, using interactive applications, e.g. Miro, Mentimeter or other.

Topics of the presentations which will be used for training purposes have been discussed during the 2nd Project Meeting (Malta, November 2024). Presentations (in audiovisual format – PPT including images, graphs, videos...) have been developed by relevant project partners in English, and will be further translated in local languages, and adapted to local specifics (in particular EWS, and response chain analysis) in each of the pilot sites.

Practical exercises may be included, such as work with flood hazard / flood risk maps of the pilot area (Flood Risk Management Plan 2022-2027), site-visit at flood protection infrastructure, or at existing NBS.

Detailed Training Programme, including the Agenda of the 3 training sessions, as well as PDF versions of the presentations which will be used during the training, is attached as Appendix 1 to this report.



Conclusions

- This report summarises the results of the LOCALL4FLOOD activities with WP1/ A1.5 in setting-up the guiding principles and main steps in establishing an Integrated Multi-Stakeholder Governance model (IMGGM) at 9 pilot sites in 6 EU countries in the Mediterranean. The IMGGM involves different levels of flash flood risk management, and considers various prevention, adaptation and mitigation solutions aiming to reduce flash flood risk. The relevant guiding principles are presented in Section 2 of the report, while the Basic structure and the Main steps in establishing the IMGGM on pilot sites are presented in Section 3.
- The IMGGM will be delivered as a Training programme in each of the pilot sites, in each of the partner's countries, and will function as a flexible methodology, including a range of applicable instruments to involve stakeholders into planning and execution of prevention, adaptation and mitigation actions as a tool to reduce flash-flood risk, and provide multi-benefits. The training programme is described in Section 4 of the report, while a detailed Agenda of the training sessions, as well as the relevant lectures (presentations) that will be used for training is presented as Appendix 1 to this report.
- The IMGGM Training programme provides guidance on setting-up and operating integrated multi-stakeholder frameworks, and new cooperation forms, aiming at establishment and operation of the IMGGMs at pilot sites.
- The IMGGM structure and the training programme will be validated (WP1, A1. 6), tested (WP2) and finalized as a set of tailor-made versions (corresponding to regional specifics), based on the guidance provided in this report, and lessons learnt through pilot actions.



References

EU Documents

Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks ([EU Flood 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 (EU Water Framework Directive)

Flood Risk Management Plan of the Black Sea River Basin, Bulgaria (Cycle 2, 2021-2027) (2023). Black Sea River Basin Directorate, Ministry of Environment and Water, December 2023

National Disaster Risk Reduction Strategy 2018-2030, Council of Ministers of Republic of Bulgaria, Sofia, 2018

Scientific publications

Alexander, M., Priest, S. and Mees, H. (2016) A framework for evaluating flood risk governance, Environmental Science and Policy, Volume 64, October 2016, Pages 38-47

Bubeck P, Botzen W. J. W., Aerts J. C. J. H. (2012). "A review of risk perceptions and other factors that influence flood mitigation behavior". Risk Analysis. 32 (9)

Dries L. T. Hegger, Peter P. J. Driessen & Marloes H. N. Bakker (2018) Rules and Resources for Flood Risk Governance, in "Flood Risk Management Strategies and Governance" ed. by T. Raadgever, D. Hegger, Springer, 2018

Ishiwatari M, (2019) Flood risk governance: Establishing collaborative mechanism for integrated approach, Progress in Disaster Science, 2019

Walker G., Tweed F., Whittle R. (2014) A framework for profiling the characteristics of risk governance in natural hazard contexts, Nat. Hazards Earth Syst. Sci., 14, 155–164, 2014

Wehn U., Rusca M., Evers J., Lanfranchi V. (2015) Participation in flood risk management and the potential of citizen observatories: A governance analysis, Environmental Science & Policy, Vol. 48, April 2015, Pages 225-236

Internet Publications

APFM/WMO (2014), Community-Based Flood Management, ([web-link](#))

Local Government Association of UK (LGA) (2022), Governance of flood risk management ([web-link](#))

United Nations Office for Disaster Risk Reduction - UNDRR (2024) Disaster risk management ([web-link](#))



European Civil Protection
and Humanitarian Aid Operations – ECPHAD (2024) European Disaster Management
([web-link](#))

European Environment Information and Observation Network – EIONET (2024) Flood
prevention definition ([web-link](#))

National Weather Service – NWS ([web link](#)), Floods and Flash Floods



Annexes

Training Programme - Session 1 - Agenda

February 2025

Title: Flood Risk Management: Tailored Approaches and Stakeholder Engagement for Flash Floods

Projected Date: end of February 2025

Number of attendees: 15-20 persons, by invitation, representing local/regional authorities (> 50%), academia, NGOs, local initiative groups, private sector)

Objectives:

- Understand the fundamentals of flood risk management, including key concepts, processes, and the importance of effective planning, with a focus on the EU Floods Directive and the unique characteristics of flash floods (**Training Presentation TP#1**)
- Gain insights into the development and implementation of EWS for flood risks, including how they work, and how to use them to reduce damage and improve community safety (**Training Presentation TP#2**)
- Define the best approach to implement FRMP, and implement the EWS developed in the framework of the Locall4Flood project (**Co-creation Workshop CW#1**)

Content:

Session 1 will consist of **Training presentations**, followed by time for questions and discussion with participants. The training presentations include:

- **Training Presentation TP#1:** Principles of Flood Risk Management and the EU Floods Directive.
- **Training Presentation TP#2:** Early Warning Systems: Enhancing Preparedness for Flash Floods.

After training presentations and discussions, an **interactive session on collecting feedback and assessment of stakeholder's awareness** in current topics will follow.

The **Co-creation workshop CW#1** will take place to analyse and improve the preparedness in prevention of flash floods in the specific pilot site. Specifically, the co-creation workshop in Session 1 will consist on:



▪ **Practical exercise and analysis on the local FRMP** - where attendees will have the opportunity to explore the FRMP (Flood Risk Management Plan) of their municipality in detail, including the Flood hazard and Flood risk maps.

- **Co-implementation of the local Early Warning System** - Following the presentation on the current Early Warning Systems (EWS; Technical Presentation #2), this workshop will gather information for further customization and identify the challenges in implementing the system. The workshop will focus on how to prevent these challenges and define the best approach to implement the Early Warning System developed in the framework of the Locall4Flood project, including the identification of vulnerable areas in the pilot.

Structure:

The preliminary agenda for Session 1 is outlined below.

It is important to note that the structure of this session may vary depending on the specific characteristics of each demo site.

AGENDA – Session 1 – February 2025

09:00 - 09:10	Welcome
09:10 - 10:00	Presentation of Participants (1 - 2 min each)
10:00 – 10:10	Introduction to LOCALL4FLOOD project
10:10 - 10:30	<u>Training Presentation TP#1</u> : Principles of Flood Risk Management and the EU Floods Directive. (Speaker from local L4F team)
10:30 – 10:40	Q&A. Discussion on TP#1
10:40 – 10:50	Coffee break
10:50 – 11:10	<u>Training Presentation TP#2</u> : Early Warning Systems: Enhancing Preparedness for Flash Floods.
11:10 – 11:30	<i>Site-specific Technical Presentation #1</i> : Local Early Warning System
11:30 – 11:40	Q&A. Discussion on TP#2
11:40 – 12:00	Interactive session (Mentimeter) to get feedback from the training session and evaluate awareness level of stakeholders. Final conclusions and further steps in training process



12:00 – 13:30	Co-creation Workshop #1: Prevention of flash floods (in the specific) Pilot site <ul style="list-style-type: none"> ▪ Practical exercise and analysis on the <u>local FRMP</u> ▪ Co-implementation of the local <u>Early Warning System</u>
13:30 – 14:30	Lunch break
14:30 – 16:30	Field or Institution visit (<i>optional, to be decided by the local pilot leader</i>)



Training Program – Session 2 – Agenda

June 2025

Title: Adapting to Flash Floods: Enhancing People Awareness and Preparedness.

Date: June 2025

Number of attendees: 15-20 persons, by invitation, representing local/regional authorities (> 50%), academia, NGOs, local initiative groups, private sector. It is important to include stakeholders responsible for educational policies, programs, and initiatives at the regional or local level, as well as, key stakeholders involved in communication and outreach efforts. *At least 70% should be among participants of Session 1.*

Objectives:

Understand the role of community awareness and education in building resilience to flash floods, highlighting how informed people can reduce risks and improve responses and the role of the local community on the IMGM. What are the factors affecting this awareness? How can we improve it?

- **Training Presentation TP#3:** Multi-level stakeholder engagement in flood risk management.
- **Training Presentation TP#4:** Understand the current situation at the local level regarding flash flood awareness and risk perception (Site-specific Technical Presentation).
- **Co-creation Workshop CW#2**

Analyse the current flood response chain at local level, from early detection and warning to emergency response, focusing on the stakeholder's roles and responsibilities at each stage

Explore educational strategies and tools that can be used to raise awareness about flash flood risks and promote adaptation measures within local communities.

Content:

Session 2 will consist of two Training presentation, followed by time for questions and discussion with participants. The training presentation includes:

- **Training Presentation TP#3:** Multi-level stakeholder engagement in flood risk management.
- **Training Presentation TP#4:** Community awareness and education as an adaptation tool to flash floods.
- **Overview on People awareness and risk perception** on the pilot site, based on results from the A1.3 (Site-specific Technical Presentation, by L4F pilot leader).



After training presentations and discussions, an **interactive session on collecting feedback and assessment of stakeholder's awareness** in current topics will follow.

The **Co-creation workshop CW#2** will take place to analyse current flood response chain and co-develop relevant educational tools to raise awareness and promote adaptation measure. Specifically, the co-creation workshop in Session 1 will consist on:

- **Analysis of the current flood response chain.**

Identification of the current challenges and most relevant weaknesses of the overall response chain to flash flood events in each demo site, focusing on the stakeholder's roles and responsibilities at each stage. During this co-creation workshop, the main barriers hampering the effective cooperation in the management of flash flood emergencies will be discussed. To this aim, the maps of the stakeholders' interaction and the results of the network analysis – e.g. lack of connections among stakeholders, power and resources unbalances, lack of information sharing, etc. – will be used as starting point for co-defining interventions, and further explore the roles of various stakeholders in flood risk management and understand how collaboration and coordination between different groups can enhance preparedness and response efforts.

- **Identification of opportunities, pathways, and challenges in improving people awareness** at the local level.

Define a list of key topics and related actions to be implemented in the following months. Co-development of education tools - **explore educational strategies and tools** that can be used to raise awareness about flash flood risks and promote adaptation measures within local communities.

Structure:

The preliminary agenda for Session 2 is outlined below.

It is important to note that the structure of this session may vary depending on the specific characteristics of each demo site.



AGENDA – Session 2 – June 2025

09:00 - 09:10	Welcome
09:10 - 10:00	Presentation of Participants (1 min each)
10:00 – 10:10	Introduction to LOCALL4FLOOD project
10:10 - 10:30	<u>Training Presentation TP#3</u> : Multi-level stakeholder engagement in flood risk management
10:30 – 10:40	Q&A. Discussion on TP#3
10:40 – 10:50	Coffee break
10:50 – 11:10	<u>Training Presentation TP#4</u> : Community awareness and Education as an adaptation tool to flash floods.
11:10 – 11:30	<i>Site-specific Technical Presentation # 2</i> : Current situation of people awareness and risk perception on the pilot site. Results from the A1.3
11:30 – 11:40	Q&A. Discussion on Training Presentation TP#4 and site-specific presentation
11:40 – 12:00	Interactive session (Mentimeter) to get feedback from the training session and evaluate awareness level of stakeholders. Final conclusions and further steps in training process
12:00 – 13:30	Co-creation Workshop CW#3: <ul style="list-style-type: none"> ▪ Analysis of the current flood response chain. Identification of the current challenges and most relevant weaknesses of the overall response chain to flash flood events in each demo site, focusing on the stakeholder's roles and responsibilities at each stage. ▪ Identification of opportunities, pathways, and challenges in improving people awareness at the local level.
13:30 – 14:30	Lunch
14:30 – 16:00	Field or Institution visit (<i>optional, to be decided by the local pilot leader</i>)



Training Program - Session 3 - Agenda

October/November 2025

Title: Mitigating Flash Floods using Nature-Based Solutions

Date: September 2025

Number of attendees: 15-20 persons, by invitation, representing local/regional authorities (> 50%), academia, NGOs, local initiative groups, private sector. *At least 70% should be among participants of Session 1 and/or Training Session 2.*

Objectives:

- Understand the concept of grey vs. green infrastructure and how nature-based solutions (NBS) offer sustainable alternatives to traditional flood mitigation methods (**Training Presentation TP#5**).
- Learn about the benefits of nature-based solutions (NBS) in mitigating flash flood risks, including their environmental, social, and economic advantages (**Training Presentation TP#6**)
- Explore and analyses the specific nature-based solutions that can be implemented on each pilot to reduce the risk and impact of flash floods (**Site-specific Technical Presentation SP#3 & Co-creation Workshop CW#4**).
- Bring attention to the need to address the design of NBS by adopting a systemic approach, in order to avoid the emergence of trade-offs and conflicts among different stakeholders/beneficiaries.

Content:

Session 3 will consist of **Training presentations**, followed by time for questions and discussion with participants. It is worth mentioning that, to make the training session more effective, information material will be share with the participants before the workshop. Specifically, this material will be composed by technical information sheets introducing NBS and containing simple information on effectiveness, implementation/maintenance challenges, and costs. The training presentations include:

- **Training Presentation TP#5:** Mitigate Flash Flooding: shifting from grey to green approaches.
- **Training Presentation TP#6:** Nature-Based solutions for mitigating flash flood risks. Results from A1.4.

After these presentations, the Local4Flood pilot leader will present a detailed analysis of the practicality of NBS Solutions in the Pilot sites (**Site-specific Technical Presentation**



SP#3). Based on this analysis, the attendees will participate in a co-creation workshop (**Co-creation Workshop CW#4**) to support the co-design and co-implementation of NBS as a measure for flash flood adaptation and risk mitigation. To this aim, the Participatory System Dynamic Model (PSDM) developed for each pilot will be used to support the development of intervention scenarios. The PSDM will allow the participants to simulate and assess the impacts of specific combinations of NBS and grey solutions on the flash flood risk. Besides, the PSDM will facilitate the detection of barriers hampering the NBS implementation and/or reducing their effectiveness. The results of the scenarios analysis will contribute to prioritize the interventions.

Structure:

The preliminary agenda for Session 3 is outlined below.

It is important to note that the structure of this session may vary depending on the specific characteristics of each demo site and stakeholder's availability.



AGENDA – Session 3 – October/November 2025

09:00 - 09:10	Welcome
09:10 - 10:00	Presentation of Participants (1 min each)
10:00 – 10:10	Introduction to LOCALL4FLOOD project
10:10 - 10:30	<u>Training Presentation TP#5</u> : Mitigate Flash Flooding: shifting from grey to green approaches. (Speaker from local L4F team)
10:30 – 10:40	Q&A. Discussion on TP#5
10:40 – 10:50	Coffee break
10:50 – 11:10	<u>Training Presentation TP#6</u> : Nature-Based solutions for mitigating flash flood risks. Results from A1.4.
11:10 – 11:30	<i>Site-specific Technical Presentation #3</i> : Nature-Based solutions at pilot scale.
11:30 – 11:40	Q&A. Discussion on TP#6
11:40 – 12:00	Conclusions and feedback for the training session - Mentimeter
12:00 – 13:30	Co-creation Workshop CW#3 <ul style="list-style-type: none"> ▪ Co-design and co-implementation of NBS as a measure for flash flood adaptation and risk mitigation
13:30 – 14:30	Lunch break
14:30 – 16:00	Field/ <u>NBS</u> or Institution visit (<i>optional, to be decided by the local pilot leader</i>)



Main outputs and conclusions of the Training programme

A final document with all the information collected during the sessions and the action plan defined will be provided to stakeholders at the end of the training programme (December 2025). This document will include the Locall4Flood IMGGM – Guidelines and Action Plan where the following points will be included:

- **IMGGM** – Analysis of the Response chain at each pilot. Action plan to improve it, including a stakeholders mapping and engagement strategy to involve them, considering prevention, adaptation and mitigation factors.
- **Early Warning System:** Presentation of the final version and action plan to implement it.
- **People awareness:** Education actions implemented. Action plan to further improve people awareness and people response to flash floods.
- **Nature-Based solutions:** NBS to be applied in the pilot area following the participatory modeling approach. Action plan to implement them.

All the participants will be invited to a final conference (April 2026) where these outputs will be presented and discussed.



Training Presentations



Training Presentation #1: Principles of Flood Risk Management and the EU Floods Directive

(by EWA, Malta)

Extended draft structure, e.g. 3-4 PPT slides (in PDF format) will be attached

Training Presentation #2: Early Warning Systems: Enhancing Preparedness for Flash Floods.

(by HIDS, Spain)

Extended draft structure, e.g. 3-4 PPT slides (in PDF format) will be attached

Training Presentation #3: Multi-level stakeholder engagement in flood risk management.

(by BETA & BDCA)

Extended draft structure, e.g. 3-4 PPT slides (in PDF format) will be attached

Training Presentation #4: Community awareness and Education as an adaptation tool to flash floods.

(by UIB-GLOWATER)

Extended draft structure, e.g. 3-4 PPT slides (in PDF format) will be attached

Training Presentation #5: Mitigate Flash Flooding: shifting from grey to green approaches.

(by AUTH)

Extended draft structure, e.g. 3-4 PPT slides (in PDF format) will be attached

Training Presentation #6: Nature-Based solutions for mitigating flash flood risks

(by CNR-IRSA)

Extended draft structure, e.g. 3-4 PPT slides (in PDF format) will be attached