March 2022

GUIDANCE DOCUMENT

HOW TO GET MORE LAND4FLOOD

Navigating key stakeholders by the pan-European networking lessons learnt

The document was compiled within the LAND4FLOOD COST Action, supported by COST (European Cooperation in Science and Technology).

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ABOUT LAND4FLOOD

Climate change increases the frequency and intensity of future flood events, leading to higher costs of flood damages. Traditional flood protection measures, mainly based on grey infrastructure such as dikes, are not sufficient to cope with dynamic flood risk alone. **Nature-based solutions** (NBS) are promising options to mitigate flood risks as a complement to grey infrastructure. They also support climate change adaptation. However, they often claim more land than traditional methods.

For 5 years, more than 200 researchers and practitioners from 36 European countries discussed: a) the effects of land on catchment hydrology, b) property rights, opportunities and limitations for negotiating land for flood risk management, c) negotiating and mobilizing processes to secure land for flood risk management.

The European Commission defines **nature-based solutions** (NBS) as *"solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions."*

Similarly, terms **Natural Water Retention Measures** (NWRM) or **Natural Flood Management** (NFM) are used.

The guidance document summarizes lessons learn that are useful for key stakeholders (land owners, local and regional politicians, bureaucrats, NGOs).

Learn more: www.land4flood.eu

The water retention swale in Riga (Latvia)

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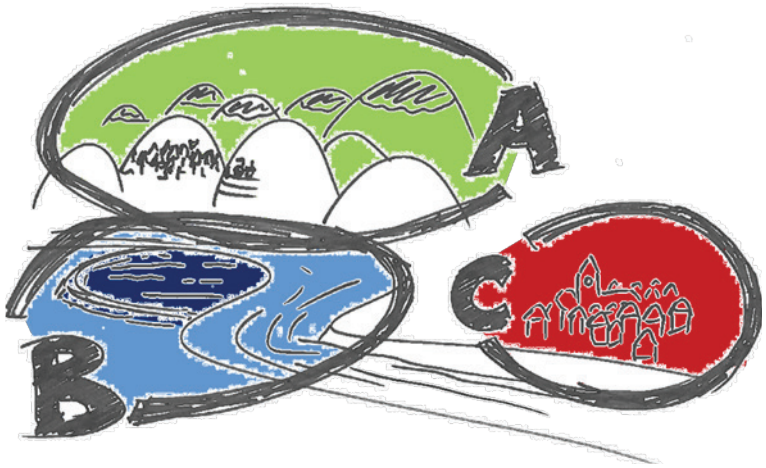
ACCEPTING THE LAND AND LAND OWNER IMPORTANCE IN FLOOD RISK MANAGEMENT

Flood water can be stored in the catchment (A), upstream of cities along the rivers (B), or in the cities themselves (C).



In all three areas, the affected land is often privately owned.

Hence flood risk management – including prevention and resilience – should be based upon land management.

Making the land available and mobilizing land owners to implement the flood retention measures are thus two key challenges. Usually, flood risk management deals first with technical and hydrological issues before addressing land management. But comprehensive hydrological plans lack coordinated implementation due to fragmented property rights and other competing land uses. Approaches for collaborating with private land users to realize risk reduction and adaptation measures on private land are lacking in theory and practice. We need to reverse this logic and start the dialogue with people owning the land first.

Learn more:

Policy Brief: How Private Land Matters in Flood Risk Management.

Book: Hartmann T., Slavíková L., McCarthy S. (eds). Nature-Based Flood Risk Management on Private Land. Springer, Cham. ISBN: 978-3-030-23841-4.

Floods in Ústí nad Labem (Czechia) in 2013

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REDUCING HYDROLOGICAL UNCERTAINTY ABOUT NBS EFFECTS

NBSs aim at restoring and mimicking natural hydrological processes in cultural landscapes.

We know that NBSs slow the runoff and store flood water – the evidence is available for small catchments (up to 10 km^2).

We don´t know well how much NBSs contribute to flood risk mitigation in large catchments in case of extreme floods, where compound effects of multiple small interventions is difficult to measure or model. The isolated effect of single NBS is difficult to demonstrate in case of catastrophic floods.

Small wet retention reservoir “Podutik” protecting Ljubljana (the capital of Slovenia) against floods

The debate among different scientific disciplines is, however: Do we need to know precisely the NBS effects in large catchments? Or shall the NBS implementation be promoted based on “no harm” adaptation logic?

Learn more:

Paper: Bezak, N.; Kovačević, M.; Johnen, G.; Lebar, K.; Zupanc, V.; Vidmar, A.; Rusjan, S. (2021). Exploring Options for Flood Risk Management with Special Focus on Retention Reservoirs. Sustainability 13, 10099.

Paper: Wilkinson, M. E., Addy, S., Quinn, P. F., Stutter, M. (2019). Natural flood management: small-scale progress and larger-scale challenges. Scottish Geographical Journal 135/1-2, 23-32.

Paper: Ferreira, C.S.S., Mourato, S., Ksanin-Grubin, M., Ferreira, A.J.D., Destouni, G., Kalantari, Z. Effectiveness of Nature-Based Solutions in Mitigating Flood Hazard in a Mediterranean PeriUrban Catchment. Water 2020, 12, 2893.

Database: Natural Water Retention Measures

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FACILITATING KNOWLEDGE EXCHANGE AND LEARNING

LAND4FLOOD meeting in Riga (Latvia)

The scientific evidence is rich. Scientists need to search for ways of how to communicate it to key stakeholders and the public, especially at the local level.

The local experiences, especially of people making a living from the land, reflect the existing every-day barriers and challenges and should become part of transdisciplinary knowledge creation and mutual learning.

The problem of flood retention further requires interactions and knowledge exchange between a) farming (rural) and urban communities, b) upstream and downstream actors, c) land owners and land tenants.

Learn more:

Workhop Report: Delivering Nature-Based Solutions: Learning from international best practice

Workshop Report: Nature based solutions for flood retention in Southern Europe

SIMULATING UP-STREAM / DOWN-STREAM NEGOTIATIONS OF STAKEHOLDERS

Serious games are developed to simulate communication, motivations and decision making of stakeholders in flood risk management. By playing these games different actors can better understand dilemmas of the governance of real-life situations.

The flood game developed within LAND-4FLOOD introduces the decision-making of up-stream and down-stream municipality representatives (mayors). The game illustrates benefits of cooperation between cities located upstream and downstream. It is played in several rounds which differ in a way in which liability for flood damage is distributed. From 2022 the game is available for download from land4flood.eu.

Games could be used for training of relevant stakeholders but there is also an educational aspect – they serve as a tool for measuring willingness to change opinions and accept alternative points of view. Additionally, a cooperative game theory models combined with cost-benefit analysis can be applied to investigate upstream-downstream relationship between different landowners.

Learn more:

LAND4FLOOD Game design

Warachowska W. et al. (2021): A Cooperative Game for Upstream–Downstream River Flooding Risk Prevention in Four European River Basins. In: The Handbook of Environmental Chemistry. Springer, Berlin, Heidelberg.

LAND4FLOOD game tested in Budapest (Hungary)

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FOCUSING ON GOVERNANCE AND MANAGEMENT

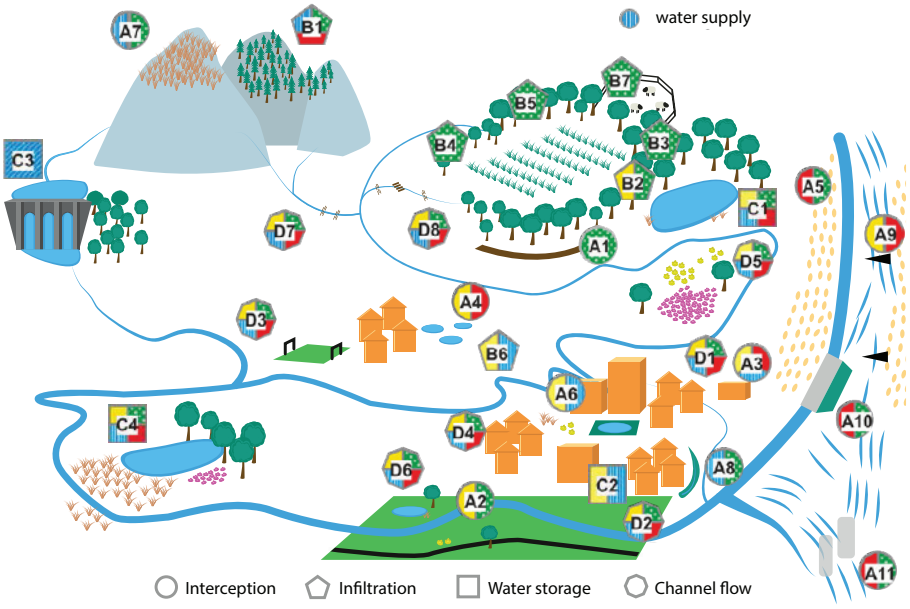
Bridging the gap between knowledge-making and decision-making is still a major challenge.

Governance can be a barrier to NBS implementation when there is a disconnect between those managing different drivers, planning systems and national/ local policy.

Water retention is multi-purpose and, therefore, multi-sectoral. It requires careful policy coordination, so e.g. that farmers are not encouraged to increase land productivity through drainage on one side while subsidies for NBS implementation are provided on the other side.

Figure: **Catchment-wide NFM interventions categorised as the initial step in the hydrological cycle.**

Legend:
Interception: A1 bunded ditches, A2 vegetative cover, A3 green roofs and walls, A4 interception ponds, A5 managed realignment, A6 rain gardens, A7 restoring peatlands, A8 swales, A9 beach nourishment, A10 habitat promotion, A11 reef creation.



Source: Adjusted from Wingfield et al. (2021)

Infiltration: B1 woodlands, B2 filter/buffer strips, B3 hedgerows, B4 managing soil quality, B5 no and low till agriculture, B6 permeable paving, B7 reduced stocking density.
Water storage: C1 ponds, C2 rainwater harvesting, C3 reservoirs, C4 wetlands and reed beds.
Channel flow: D1 de_culverting, D2 increase channel roughness, D3 regulated washlands, D4 remeandering, D5 restore functioning floodplain, D6 setting back flood defences, D7 woody material dams, D8 species reintroduction (e.g., beavers).
Each intervention uses a number of hydrological processes to slow the flow of water, for example interception, infiltration and water storage in wetlands and surrounding vegetative cover will result in reduced surface run-off.

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Exploring natural flood management in Scotland

Many cases suggested that the use of Non-Governmental Organisations (NGOs) or a central coordination body – as trusted intermediaries – are critical to successful NBS implementation. Many projects have been implemented with NGOs serving as land owners or long-term tenants or initiators of change.

Additionally, management of implemented NBS can be problematic. The budget for future management is often more difficult to attain than capital costs. Also, it is difficult to determine who will manage the measures.

Learn more:

Conference report. Conclusions of the first European conference on risk perception

Workshop Report. Delivering Nature-Based Solutions: Learning from international best practice

Paper: Wingfield, T., Macdonald, N., Peters, K., Spees, J. (2021). Barriers to mainstream adoption of catchment-wide natural flood management: a transdisciplinary problem-framing study of delivery practice. Hydrological and Earth System Sciences 25, 6239–6259.

IMPLEMENTING COMPENSATION MECHANISMS FOR FLOOD STORAGE

Flood storage is an effective but also land intensive approach for alleviating flood risk. Governance approaches are needed to balance costs and benefits by involving both the providers and the beneficiaries of flood retention services.

Two implemented schemes in Austria (Altenmarkt im Pongau and Mittersill) revealed existing challenges:

a) Risk-based cost allocation between up-stream and down-stream communities can work.

b) It takes time to come up with complex solutions. Implementation must be transparent and participatory.

c) Scale and context matters – actor preferences and local conditions affects the final result.

Learn more:

Workshop Report: Compensation mechanisms for flood storage

Policy Brief: Compensation for flood storage

Paper: Löschner, L., Nordbeck, R., Schindelegger, A., & Seher, W. (2019). Compensating Flood Retention on Private Land in Austria: Towards Polycentric Governance in Flood Risk Management? Landscape Architecture Frontiers, 7(3), 32-45.

River widening in Altenmarkt (Austria)

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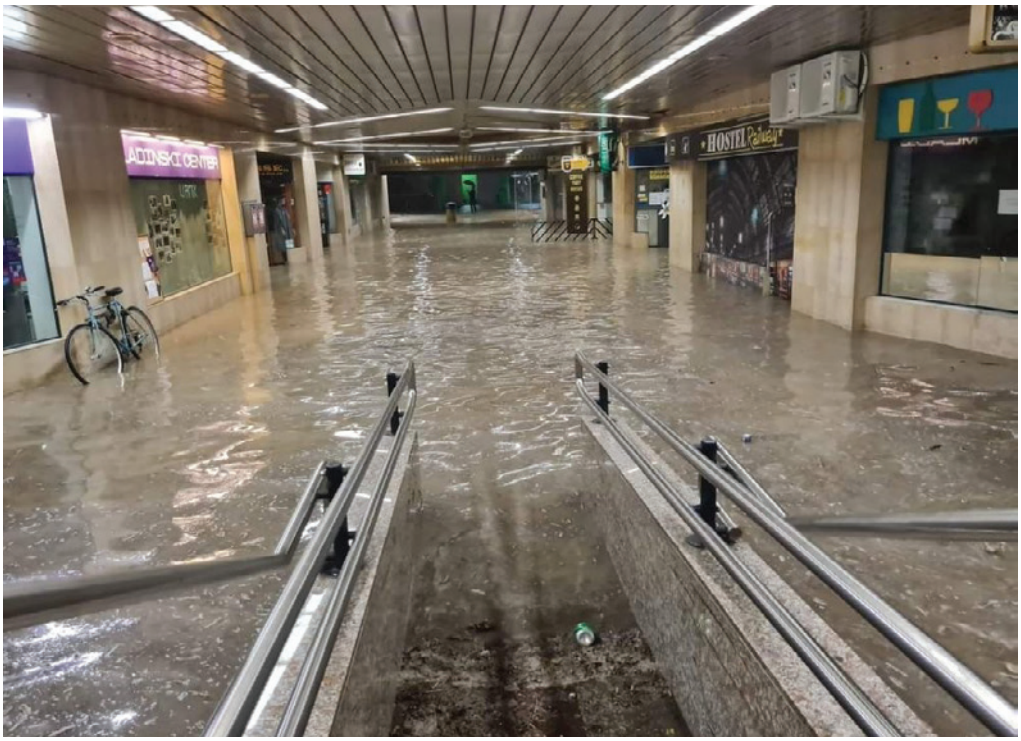
LEARNING TO "LIVE WITH FLOODS" IN CITIES



Urban floods Ljubljana (Slovenia) in September 2021 (the main railway station)

Cities are not designed to be flooded – city managers tend to fight floods with barriers and to get rid of water as fast as possible by sending it further downstream.

A significant challenge is how to motivate homeowners to take steps – to reflect the existing flood risks and to share the responsibility for flood damages with public authorities. Risk communication is not just about informing citizens, but also clarifying public and private responsibilities.

Also, planning and (re)building of cities can be adjusted to enable (limited) flood water retention and infiltration.

Learn more:

Policy Brief: Flood-resilient cities start at home

Special issue: Flood resilience of private properties

LINKING FLOOD RECOVERY COMPENSATIONS WITH FLOOD RESILIENCE

Early recovery after the torrential outburst in 2014 in Slovenia

Existing financial instruments to cover flood damages (government relief subsidies, insurance schemes, buy-outs, etc.) affect the behavior of land owners and households and their choices – e. g. if to build back (better) or to relocate to areas with lower flood risks, or to adjust land use to enable inundation of property in active flood zones.

Recovery schemes (especially those provided by governments) should not aim only at early restoration. They should provide incentives to adapt to lower future flood damages. Existing examples includes mainly positive incentives, such as higher compensation if adaptation occurs.

Learn more:

Special Issue: Financial schemes for resilient flood recovery

Paper: Suykens, C., Priest, S. J., van Door-Hoekveld, W. J., Thuillier, T., & van Rijswick, M. (2016): Dealing with flood damages: Will prevention, mitigation and ex post compensation provide for a resilient triangle? Ecology and Society, 21(4).

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UNDERSTANDING OF LAND OWNER AUTONOMOUS RETENTION EFFORTS

There are individual land owners (farmers, municipalities, NGOs) willing to implement NBS on their land. They have multiple reasons to do so and their personal capacities are always required to get things done. Sometimes, they prefer to act on their own.

It is essential to learn who they are, what motivates them and what additional barriers they face:

- governmental bureaucratic processes can put off those trying to implement measures and these processes are not always fit for purpose,
- the neighboring community can oppose implemented measures,
- private and social benefits of measures can be better harmonized, if consulted, etc.

By building some local demonstration/ initial measures and inviting inspection of what is possible can provide proof of concept and overcome some hurdles from bottom-up.

Learn more:

Book chapter: Slavíková L., Raška P. (2019). This Is My Land! Privately Funded Natural Water Retention Measures in the Czech Republic. In: Hartmann T., Slavíková L., McCarthy S. (eds) Nature-Based Flood Risk Management on Private Land. Springer, Cham.

Retention lakes on agricultural land in Czech Central Mountains

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DESIGNING MULTIFUNCTIONAL NBS

Multi-functional use of the wet-retention reservoir Drtijščica (Slovenia)

NBS are multifunctional – they have a large potential to mitigate floods and droughts simultaneously, they contribute to biodiversity enhancement, provide recreational services, etc. When they are designed more than one purpose should be taken into account.

The multifunctional character complicates capturing all the NBS benefits or isolating one of them.

Learn more:

Paper: Jacobson, T. (2019). Too much water, not enough water: planning and property rights considerations for linking flood management and groundwater recharge. Water International 44/5, 588-606.

Book: Ferreira, C. S. S., Kalantari, Z., Hartmann, T., Pereira, P. (Eds.) (2022). Nature-Based Solutions for Flood Mitigation Environmental and Socio-Economic Aspects. Springer.

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IDENTIFYING BARRIERS FOR WIDER NBS UP-TAKE

NBS lack wider implementation due to the large number scientific and social barriers.

The most discussed barriers include:

- lack of financial incentives and political will to implement NBS,
- lack of institutional frameworks assigning responsibilities for specific actions regarding NBS,
- difficulties in acquiring a sufficient extent of the land for NBS, and
- unknown effects of particular NBS.

With the use of expert evaluation of LAND-4FLOOD members, we defined avenues for further interdisciplinary research, connecting hydrology and soil science, on the one hand, and land use planning, social geography, and economics, on the other. Our suggestions ultimately call for a transdisciplinary turn in the research of NBS in flood risk management.

Learn more:

Paper: Raška et al. (forthcoming) Identifying barriers for nature-based solutions in flood risk management: an interdisciplinary overview using expert community approach.

Policy Brief: Taking Land Seriously in Spatial Flood Risk Management

LAND4FLOOD group discussion in Thessaloniki (Greece)

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MOVING TOWARD SPATIAL FLOOD RISK MANAGEMENT

Managed flood retention area in Mittersill (Austria)

We need to change how we think about flood risk management.

NBS implementation requires approaches that are different than the management of grey infrastructure measures, such as dams, dikes or levees. The investment in time and money is needed not only for hydrological studies and models, but throughout the process for preparation, design, and dialogue with landowners before, during and after a program for flood risk reduction is proposed and approved. The engagement of landowners is needed from the earliest stages and throughout the process.

Privately owned land is usually small in size. Taking the site dimension seriously is an important starting point for the implementation of measures. Financing the measures should be an outcome of the process not the beginning.

Learn more:

Policy Brief: Taking Land Seriously in Spacial Flood Risk Management

Webinar: Taking Land Seriously in Spacial Flood Risk Management

Book: Hartmann, T., Slavíková, L., Willkinson, M. (2022). Spatial Flood Risk Management Implementing Catchment-based Retention and Resilience on Private Land. Edward Elgar

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WHAT COMES AFTER LAND4FLOOD

The COST Action ended in March 2022.

The LAND4FLOOD group, however, continues in networking and cooperation among different countries, disciplines and actors.

Our outputs and news are regularly published at www.land4flood.eu.

We plan for future gatherings, conferences and publications.

Feel free to join us!

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