Interreg
North Sea Region
FAIR
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EUROPEAN UNION

A perspective on the future of asset management for flood protection

A Policy Brief from the Interreg North Sea Region FAIR project

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Summary

FAIR[1] brings together flood protection asset owners, operating authorities and researchers from across the North Sea Region (NSR) to share the policy, practice and emerging science of asset management.

Despite the diverse character of the NSR, asset managers face common challenges across the region. FAIR identifies four priority policy recommendations that respond to these challenges. Addressing these policy challenges will be a prerequisite to ensuring flood protection assets are fit for purpose in an uncertain future.

The four FAIR recommendations:

1. Break-free of the silo: Align multiple planning processes within, and beyond, flood management;
2. Mind the gap: Link strategic planning and operational processes through a tactical handshake;
3. Prepare for change: Develop flexible strategies and asset designs that can be adapted to meet changing requirements in future;
4. Make space for innovation: Embrace and manage risk to support the development of innovative solutions.

Background

Collectively EU Member States invest an average of €3 billion per year on flood protection infrastructure[2]. But a combination of climate and socio-economic change is increasing the annual average damage caused by flooding. Complex and difficult decisions will need to be taken in response to these threats, especially in coastal regions, as rising sea levels challenge the sustainability of existing policies and plans[3]. An improved approach to the planning, design and management of new and existing flood protection assets will be central to addressing this challenge.

Significant new ideas and methods are being developed to ensure best value asset management options are identified for both existing and new infrastructure. However, their alignment with socio-economic policies and supporting governance systems is often neglected[4].

FAIR recognises these challenges and identifies four priority policy recommendations to progress flood protection asset management. This Policy Brief presents the drivers behind these challenges facing the NSR and elaborates the four policy recommendations supported by good practice illustrative examples from across the FAIR partnership.

[1] https://northsearegion.eu/fair/
[2] Acteon (2018) Investment Needs and Innovative Financing Mechanisms for Flood Protection. Report for OECD, Paris highlights that between 1971 and 2015, flood damage increased by seven times worldwide.
[3] Committee on Climate Change (2018). Managing the coast in a changing climate. Authors Russell, Jacobs and Sayers.
[4] Rijke J., et al., (2012) Fit-for-purpose governance: A framework to make adaptive governance operational. Environmental science and policy 22(2012) 73 – 84.

South coast, England – Courtesy Sayers and Partners

Recommendation 1: Break free of the silo

The challenge: The institutional context for asset management is often fragmented

As a multi-stakeholder endeavour, flood protection brings together issues of place-making through spatial planning, investment, aesthetics, acceptable risks and many more. Flood protection asset management balances the perspectives of stakeholders and trades-off issues of cost, risk and performance at multiple scales (from a single asset to a system of assets that act in combination to provide flood protection). Asset managers will recognise this context which is also reflected in ISO 55000[5].

The demands of local communities for flood protection and the national desire for efficient investment are not always compatible. In some cases, it may not be efficient (from a national economic perspective) to invest in improving flood protection locally due to the relative cost and economic value of doing so. To avoid making planning choices based solely on maximising national investment returns, broader issues must be considered, including social justice and well-being, and ecosystem health[6]. Understanding the role of, and opportunity for, leveraging local funding and private investment to supplement national sources is also an important consideration.

The institutional context within which these challenges are responded to is crucial for flood protection assets planning, promotion and management. With a few exceptions, like Helsingborg Municipality, Sweden (see right), no single organisation is entirely responsible for asset management throughout all its stages. In most countries, roles and responsibilities are dispersed amongst many organisations. Consequently, any mismatch between responsibilities and available capabilities and resources can undermine the provision of fit-for-purpose flood protection. A self-assessment of asset management approaches used by FAIR partners points to the strengths of a decentralised governance model for coordination and problem solving between the different departments of an organisation. But the same survey also highlights the risks of adding responsibilities to municipalities without sufficient resources or knowledge to deliver[7].

[5] ISO 5500 provides a useful overview of asset management, its principles and frameworks applicable to all organisations
[6] Sayers, PB. (2017). 'Evolution of Strategic Flood Risk Management in Support of Social Justice, Ecosystem Health, and Resilience'. Published by Oxford Research Encyclopedia: Natural Hazard Science.
[7] Gersonius et al. Asset management maturity for flood protection infrastructure: a baseline across the North Sea region. Proc. International Symposium on Life-Cycle Civil Engineering (IALCCE 2018).

The policy recommendation: Align multiple planning processes within and beyond flood management

There are many complex and interacting planning processes and actors that influence effective asset management (often with centralised processes delivered by dispersed, localised operators).

Well-aligned asset management is dependent on having a coherent strategy in place to link flood asset planning, delivery and operation with broader planning objectives. In many cases, strategic oversight by a responsible authority or process lead will be required to provide the bridge between these multiple planning processes and flood asset management. Without this oversight opportunities for efficiency savings can be missed and the successful delivery of flood management undermined by uncoordinated local choices.

Illustrative examples

Sweden, integrated city planning, Helsingborg: The municipality of Helsingborg leads the coordination of all aspects of city planning. This enables a simultaneous consideration of major investments in regeneration of the seafront and harbour area (including green space and beach access) and improvements to flood protection standards. Plans are also adjustable in response to resources and changing needs.

England, strategic oversight and local delivery: Following widespread flooding in 2007, arrangements were put in place to enable more effective working between the main agencies involved in managing risks. The Environment Agency[8] was given the responsibility of strategic oversight of all flood-related planning. Delivery was devolved to local municipalities designated as the Lead Local Flood Authority (LLFA). LLFAs are one 'department' of a local municipality and therefore local policies must balance the need for flood protection and a range of other activities including: education; public health; crime; highways etc. Overall these arrangements are broadly successful in enabling a more strategic approach to flood risk management[9] when adequately resourced. There is potential for problems however, including: a lack of resources; differing partner objectives, priorities and regulatory environments; a mismatch between public expectations and delivery; a lack of the necessary partner skills, capacity and knowledge etc.

Belgium, multi-functional and adaptive dyke reinforcement: In Middelkerke an existing dyke wall is being augmented with a dune system to provide a natural habitat and enhanced recreational opportunities. The dune also provides a natural adaptive capacity and can be widened or heightened to cope with sea level rise.

Belgium coast redevelopment – Courtesy Vlaanderen is maritime

[8] The Environment Agency was the first organisation to achieve ISO 55000 accreditation for flood risk asset management.
[9] Defra (2017) Evaluation of the arrangements for managing local flood risk in England - Final report FD2680 Published January.

Recommendation 2. Mind the gap

The challenge: Strategic planning and operational processes are often misaligned

Good asset management requires strategic plans and perspectives to link seamlessly with operational activities and perspectives. This is easier said than done.

There is often a 'gap' in responsibility, with organisations tending to be divided between strategic and operational activities. This encourages processes to be considered in isolation.

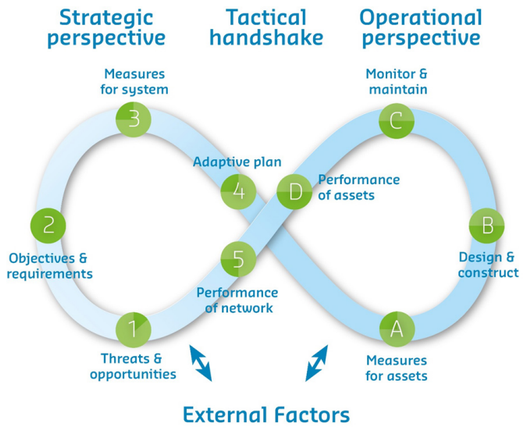
Without a clear line-of-sight from operation to strategy and vice versa, strategic objectives are likely to be undermined by operational realities. Operations may fail to reflect the longer-term direction set by the strategy. This mismatch can lead to poor targeting of investment and inappropriate design and maintenance choices.

The policy recommendation: Link strategic planning and operational processes through a tactical handshake

FAIR promotes the development of a 'tactical handshake' between strategy and operation. Establishing a culture of collaboration (inside and outside of any single organisation) is central to the success of this continuous process. But although necessary, collaborative culture is not enough to ensure success.

A shared understanding of the assets to be managed is vital, including basic information on what and where the assets are, to how they are likely to perform now and in future. Take the adoption of structured assessment processes (methods, monitoring and databases) for example. By progressively refining performance information and detailed level assessments, these processes provide insights for reuse in higher levels plans. Similarly, insights generated from strategic assessments inform more local analysis and activities.

FAIR highlights several strategies that are emerging to aid this process. Progressive approaches to performance help bridge the gap between strategy and operation by providing a common assessment framework at each level. Consider, for example, fragility assessments that enable uncertainty to be reduced without influencing the form of the performance data[10], or 'total expenditure' (TotEx) which enables whole life capital, maintenance, modification, and eventual removal costs to be assessed[11]. Developing a structured understanding of the indicators of asset performance is also central to achieving ISO 55000.



10 Sayers et al., (2002). Risk, performance and uncertainty in flood and coastal management - A review. A report for the Environment Agency by HR Wallingford
11 Klerk, W. & Den Heijer, F. A framework for life-cycle management of public infrastructure. Proc. International Symposium on Life-Cycle Civil Engineering (IALCCE 2016). CRC Press, 101.

Illustrative Examples

Netherlands, reducing life-cycle costs through a more strategic approach to deliver statutory protection standards: Dykes along the river Hollandsche IJssel are operated by the regional water authority (HHSK), but no longer met the statutory standard. This river can be isolated from the main river, Nieuwe Maas, by a storm surge barrier (operated by Rijkswaterstaat) controlling hydraulic loads on the dykes. Improving the reliability of the storm surge barrier decreases the expected hydraulic loading conditions on the dykes; but additional investment in the barrier would be needed to achieve this. By working together, HHSK and Rijkswaterstaat have managed to trade-off costs and benefits between dyke and barrier improvements to reduce whole life-cycle costs without compromising standards.
A programme focused solely on dyke strengthening would have missed these additional opportunities.

Hamburg, Germany, developing a strategic approach to management of 'on demand' assets: Hamburg is protected from flooding by a complex array of automated flood protection gates that operate (on average) about 10hours/year, to a very high standard of reliability. Understanding the trade-off between the benefits of a highly automated approach and the potential increased chance of error (due to process complexity) is a central challenge. Data and information is central in responding to this problem and LSBG Hamburg is developing a new georeferenced asset information system. In addition to geometry and functions, the system records operational permits, as-built details, and the consequences of failure. Analysis of this data helps to understand system behaviour and to target maintenance resources effectively.

Hamburg, Germany.

Recommendation 3. Prepare for change

The challenge: The future is uncertain, but decisions taken today have long-term implications

Change is inevitable but predicting the future is impossible. Developing flood protection infrastructure in this context presents several challenges: How much should be invested today in strengthening and raising assets? Should we delay investment?

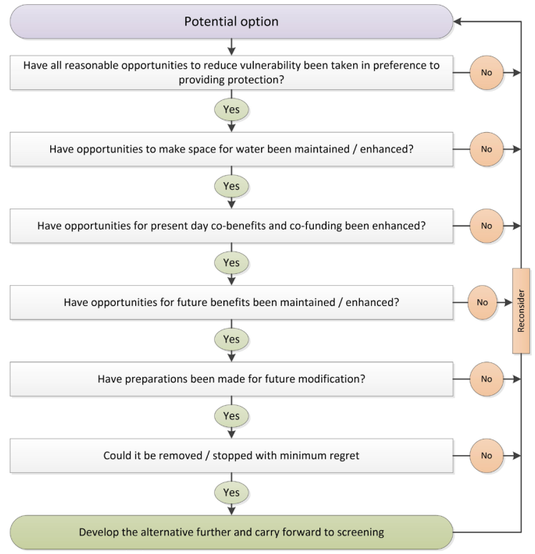
These complex decisions become even more difficult when the long-term choices (that take account of future uncertainties in climate and socio-economic context) clash with short-term political realities and varying perceptions of risk. In response, large-scale infrastructure investments, renewals or upgrades are often preferred over maintenance and monitoring. This 'bias-to-build' leads to solutions that may be unnecessarily costly or mal-adapted to the reality of the future as it emerges[12].

Coastal cliffs, Denmark - Courtesy Sayers and Partners

The policy recommendation: Develop strategies that are flexible and assets that can be modified

Policies and associated appraisal processes should support development strategies that proactively plan for an uncertain future. And as new evidence and insights emerge, these strategies must be modified accordingly. Investments in monitoring and evaluation (assets, loading conditions, socio-economic setting etc) underpin the continuous process of updating both strategy and operation delivery. Doing so ensures flood risks are well-managed, and plans are adapted in a timely manner.

Developing the capacity for future flexibility is not simply 'wait and see', but a process of purposeful preparation. There is often an immediate cost associated with these preparations, such as securing land for future set back of a dyke line, or to strengthen foundations in preparation for future raising. Various tools and techniques are available to help make the case for future-ready investment, from visualising adaptive pathways to formally valuing adaptive capacity (see below). Using these tools and approaches helps asset managers balance performance, risk and cost over short and longer term by maximising societal value and avoiding solutions that may be unsuitable for future conditions.



See footnote 13.

Illustrative Examples

England, developing an adaptive plan for the Thames Estuary. The Thames Estuary 2100 project (TE2100) was established in 2002 with the aim of developing a long-term tidal flood risk management plan for London and the Thames estuary. The resulting TE2100 Plan[14] sets out a management strategy that can be adapted in response to future climate and socio-economic changes.

The Netherlands and England, visualising and valuing adaptive pathways: New guidance and tools are being used to both visualise and value the flexibility offered by adaptive approaches. The guide includes advice on considering adaptive approaches at different stages in appraisal and formally valuing the adaptive capacity[15]. Software tools are used to visualise and explore alternative pathways together with stakeholders, providing insights into the adaptation options available, the sequencing of options over time, potential lock-ins and path dependencies[16].

Denmark, embedding flood and erosion in local planning: In 2013 Danish municipalities were required to prepare climate adaptation plans that integrate erosion and flood protection into long-term strategic planning process (including urban development, wastewater management and environment). Revising these plans is not a statutory requirement but the importance of doing so is widely recognised. Many municipalities continue to work with national organisations to include improved evidence on present and future risks and potential adaptation options within local planning decisions.

[12] Sayers PB (2019). Water infrastructure: A strategic approach to combining built and natural infrastructure. (In press, WWF and UNESCO)

[13] Sayers, P., Walsh, C., & Dawson, R. (2015). Climate impacts on flood and coastal erosion infrastructure. Journal of Infrastructure Asset Management.
[14] Environment Agency (2012). Thames Estuary 2100 Flood Risk Management Plan.
[15] Environment Agency (2018). Accounting for adaptive capacity in FCERM options appraisal. Authors: Brisley, R., Sayers, P.et al..
[16] https://www.deltares.nl/en/adaptive-pathways/

Recommendation 4. Make space for innovation

The challenge: Innovation is not consistently embedded in standard practice

The UK's Chief Scientist's Annual Report 2014[17] stated that to be successful, a society must learn to manage risk and not simply seek to avoid it. Innovative solutions, and how to generate the political momentum to deliver them, remains a central barrier to progress. For example, the policy in recent years within England and Wales has been guided by the principle of *'Making Space for Water'*[18], and in the Netherlands providing *'Room for the River'*[19]. Across the NSR the role of nature-based approaches as legitimate flood assets is increasingly recognised. The sentiment of these policy goals is clear, but frequently at odds with local political and public response that prefers conventional, tried and tested, solutions. Consequently, asset managers struggle to promote and deliver more innovative solutions that challenge accepted norms.

The policy recommendation: Accept that new approaches attract risk but managing, rather than avoiding, risks can lead to innovative solutions

Policies should provide a platform for the inclusion of innovation – from ideas to implementation, regulation to analysis, and in the role of institutions and stakeholders. Central to the successful delivery of innovative solutions challenging conventional approaches and to positively promote new ways of working. This means rewarding innovation (using ring fenced innovation and pilot funds etc) and giving space to innovators from industry and academia to transition novel approaches into practice by accepting the potential for greater uncertainty.

Illustrative Examples

North Sea Region, learning from others: New practice can emerge from interacting with others addressing similar challenges. FAIR uses Peer2Peer meetings to create an active open space to discuss approaches to reliability, responsibilities, information management and future developments in flood protection. These meetings also challenge established practices and promote opportunities for innovation.

England, natural flood management: The UK is currently promoting several processes, considered to offer multiple benefits. Using natural features to slow the flow of flood waters through catchments and urban spaces, or realignment of the coast to maintain littoral processes for instance. There is currently limited quantified evidence[20] about the ability of these features to manage flood risk, so central Government is funding pilot studies and demonstration projects to encourage take-up and develop the evidence base[21].

Helsingborg, 'innovation of the year': The Municipality awards an annual prize to the most innovative project initiated during the year. There is even a prize for the 'failure of the year' that goes to an innovative project that did not necessarily turn out as expected. By rewarding projects that challenge conventional approaches, stakeholders are encouraged to embrace innovative solutions across all aspects of their work, from conception to implementation, and from public engagement to funding.

Netherlands, proactively encouraging innovative dyke reinforcement techniques: The opportunities provided by dyke strengthening innovations and emerging monitoring technology are widely encouraged. The national Dutch Flood Protection Program provides support funding for the development and testing of innovative dyke reinforcement techniques. Asset owners are also encouraged to use new sensor technologies to gain insight into dyke strength and performance (often in real-time an at a relatively low cost[22]) to maximise safety and optimise maintenance activities.

Sensors within a dyke – Courtesy the Rijkswaterstaat

[17] Walport et al., (2014) Innovation: Managing Risk, Not Avoiding It. Annual Report of the Government Chief Scientific Adviser 2014.
[18] Defra (2004). Making space for water Developing a new Government strategy for flood and coastal erosion risk management in England.
[19] Ruimte voor de Rivier (2018) https://www.ruimtevoorderivier.nl/english/

[20] Dadson, et al., 2017. A restatement of the natural science evidence concerning catchment-based 'natural' flood management in the UK. Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences, 473(2199), p.20160706.
[21] Defra (2018). Monitoring and evaluating the DEFRA funded Natural Flood Management projects.
[22] http://deltaproof.stowa.nl/Templates/pdf.aspx?rId=16

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Further reading

More detail, including factsheets relating to each illustrative example, can be found on the FAIR project website:
https://northsearegion.eu/fair/

Partners

FAIR brings together Asset Owners (facing real problems and challenges) and leading scientists (with domain expertise) to share and develop innovative solutions to the management of flood protection assets. In doing so, FAIR is the first collaboration of its kind.