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Natural Water Retention Measures

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Policy coordination linked to Natural Water Retention Measures Which integration with different European Directives?

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NWRM project publications are available at
http://www.nwrm.eu

The present synthesis document has been developed in the framework of the DGENV Pilot Project - Atmospheric Precipitation - Protection and efficient use of Fresh Water: Integration of Natural Water Retention Measures (NWRM) in River basin management. The project aimed at developing a knowledge based platform and a community of practice for implementation of NWRM. The knowledge based platform provides three main types of elements:

- the NWRM framework with access to definition and catalogue of NWRM,
- a set of NWRM implementation examples with access to case studies all over Europe,
- and decision support information for NWRM implementation.

For this last, a set of 12 key questions linked to the implementation of Natural Water Retention Measures (NWRM) has been identified, and 12 Synthesis Documents (SD) have been developed. The key questions cover three disciplines deemed important for NWRM implementation: biophysical impacts, socio economic aspects and governance, implementation of financing.

They rely on the detailed delineation of what NWRM cover as described in *SD n°0: Introducing NWRM. Natural Water Retention Measures (NWRM) are multi-functional measures that aim to protect water resources and address water-related challenges by restoring or maintaining ecosystems as well as natural features and characteristics of water bodies using natural means and processes.* Evidences included into these synthesis documents come from the case studies collected within this project (see the catalogue of case studies) and from the individual NWRM factsheets which are available on the page dedicated to each measure (see catalogue of measures). This information has been complemented with a comprehensive literature review.

More information is available on the project website *nwrm.eu*.

Key words: (EU Water) Blueprint, Flood risk management directive (FD), Green Infrastructure (GI), Land use planning, Sustainable Urban Drainage Systems (SUDS), River basin management plan (RBMP), Water Framework Directive (WFD) - Please consult the NWRM glossary for more information.

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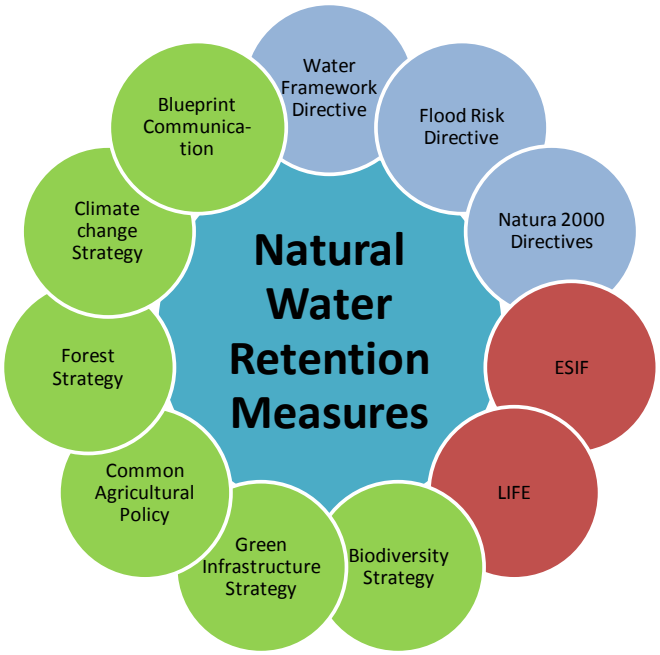
I. Introduction

All natural water retention measures (NWRM) have multiple benefits (see the synthesis document on NWRM benefits) and can contribute to different policy objectives. This fact creates win-win opportunities which can only be effectively seized through policy coordination between different sectors and stakeholders. Many NWRM appeared first to contribute to manage soil in agriculture, enhance biodiversity or contribute to climate change adaptation (amongst other areas). Water retention was not the main purpose when almost all of these measures now known as water retention ones were proposed. However, they are all means to restore natural functions and water plays the critical role. As a consequence, water policy might be able to provide the common ground to coordinate many sectors of the economy, making them part of water policy.

Today, the maximisation of the use of NWRM, as well as the reduction of flood and drought risk form part of the specific objectives of the Water Blueprint[1] (Achilleos, 2013). However, examples of policy coordination for the implementation of NWRM in the context of the EU Floods Directive (FD) (Directive 2007/60/EC) and the Water Framework Directive (WFD) (Directive 2000/60/EC) are not widely spread, as work is ongoing, and only some evidence can be found on NWRM already implemented directly for this purpose. Although flood risk management plays a role for the implementation of certain NWRM, many NWRM projects identified today did not start with a main water related objective. Several have been initiated for either river restoration, biodiversity and nature conservation, or nutrient reduction purposes - and turned out to have also significant benefits linked to water retention functions. A similar observation could already be made in the context of climate change. Many projects and measures which today are considered as ecosystem-based approaches to mitigation and adaptation to climate change did not have it as an initial objective (Doswald and Osti, 2011). The figure below shows the different EU directives and policies to which NWRM could contribute.

Policies/Strategies

- Water Blueprint Communication (2012)
- EU Biodiversity Strategy to 2020 (2011)
- Green Infrastructure Strategy (2013)
- EU Strategy on adaptation to climate change (2013)
- [Communication on Water Scarcity and drought (2007/2012)]
- A new EU Forest Strategy (2013)
- Common Agricultural Policy 2014-2020 (2013)
- [7th Environment Action Program (2013)]
- [Roadmap to a Resource Efficient Europe (2011)]
- [Europe 2020 Strategy (2010)]



[1] http://ec.europa.eu/environment/water/blueprint/index_en.htm

Directives

- Water Framework Directive (2000)
- Flood Risk Directive (2007)
- Birds & Habitats Directives (1979/1992)
- [Nitrates Directive (1997)]
- [Marine Strategy Framework Directive (2010)]
- [Groundwater Directive (2006)]
- [Drinking Water Directive (1998)]
- [Urban Waste Water Treatment Directive (1991)]
- [Priority Substance Directive (2008)]
- [Bathing Water Directive (2006)]

Funding

- EU Structural and Investment Funds (ESIF), i.e. ERDF, EAFRD, EMFF
- LIFE 2014-2020

Figure 1 EU Directives and policies for which NWRM are relevant (Borchers, 2014, adapted)

The present synthesis document will point out possibilities for policy coordination linked to NWRM and present examples on how decision makers managed to address related governance issues in an integrated manner by implementing NWRM. Furthermore, existing methods and tools to select NWRM relevant for several policy objectives will be mentioned. The present document will furthermore provide evidence on the role (policy) coordination can play for implementing NWRM. A focus will be laid on the WFD and the FD, although it is acknowledged that NWRM can have a positive impact on several other EU Directives (e.g. Habitats Directive, Drinking Water Directive, Groundwater Directive, Urban Wastewater Directive, see for example European Commission, 2013, and the figure above).

II. How can related governance issues be addressed?

Through the multifunctionality of NWRM, several issues can be addressed at the same time. Wetlands for example can retain water, having a positive impact regarding flood mitigation (FD-objective). In addition they can retain nutrients and improve water quality (WFD-objective), retain carbon through the development of peat (climate policy relevant objective), increase infiltration into groundwater bodies (WFD- and water scarcity and drought relevant objective) and create a suitable habitat for improving biodiversity (objective of the Biodiversity Strategy / the Birds and Habitats Directives). Choosing a multifunctional measure which contributes to different policy objectives instead of a measure which contributes to only one objective has several advantages – and might be even indispensible in areas where land – and hence opportunities – are scarce. This idea of the multifunctionality of actions taken is also promoted by the overall green infrastructure (GI) strategy supported by the EU Commission (European Commission, 2013; Stella, 2012), of which NWRM are a component (Achilleos, 2013). However, such an integrated approach requires coordination between authorities and stakeholders working on the different strands of environmental policy which are concerned by NWRM.

With regards to the WFD and FD, coordinating the work is a basic requirement fixed in the text of the FD (Article 9, see also for example Gierk, 2013). Both the WFD and the FD follow a

cyclic river basin management approach, and their timetables have been aligned (see below). In particular the flood risk management plans (FRMPs) and the river basin management plans (RBMPs) - in which NWRM could be included - shall be coordinated, as well as the public participation procedures in the preparation of these plans (Santato, Bender and Schaller, 2013). The first flood risk management plans are due by the end of the first management cycle of the WFD in 2015, together with the second RBMPs. Furthermore, the first management cycle of the Floods Directive and the second management cycle of the WFD end together in 2021 (Stella, 2012; European Commission, 2014).

In addition, flood defence measures considered in the FRMPs may entail new physical modifications to water bodies. If these modifications lead to a deterioration of the status of the water body as per the definitions of the WFD, this is only possible if the requirements under article 4.7 of the WFD are met. One of such requirements among others is that the beneficial objectives served by those modifications cannot be achieved by "significantly better environmental options" under which NWRM could be considered (DG Environment, 2011).

In general terms, to be relevant for both directives, measures need to have a positive impact on the qualitative (linked to biological, physico-chemical or hydromorphological elements) or quantitative objectives of water bodies (WFD objectives) - and the mitigation or avoidance of floods (FD objectives). This is the case of several NWRM[2].

TABLE 1 COORDINATED TIMETABLE OF THE FLOODS DIRECTIVE AND THE WFD (EXTRACT)

Floods Directive	Reference Floods Directive	Deadline	Water Framework Directive	Reference WFD
Public participation process starts (publication of mechanism and timetable for consultation)	Art 9.3 & 10 (FD)	December 2012	Make operational programmes of measures	Art. 11
First flood risk management plans	Art. 7 (FD)	December 2015	Meet environmental objectives First management cycle ends - Date of 1st review of WFD river basin management plans Second river basin management plans	Art. 4 (WFD) & 13
End of the 1st flood risk management cycle 2nd Flood Risk Management Plans, specific requirement on climate change	Art. 14.3 & 4	December 2021	Second management cycle ends 3rd Water Framework Directive River Basin Management Plans	Art. 4 & 13
		2027	Third management cycle ends, final deadline for meeting	Art. 4 & 13

[2] Please check the project website (www.nwrm.eu) for the catalogue of measures, and any NWRM case study mentioned in the following.

Floods Directive	Reference Floods Directive	Deadline	Water Framework Directive	Reference WFD
			objectives	

Sources:

- WFD TIMETABLE: HTTP://EC.EUROPA.EU/ENVIRONMENT/WATER/WATER-FRAMEWORK/INFO/TIMETABLE_EN.HTM
- FD TIMETABLE: HTTP://EC.EUROPA.EU/ENVIRONMENT/WATER/FLOOD_RISK/TIMETABLE.HTM

In many case studies examined in this project, a positive contribution of NWRM to the objectives of the WFD and FD is stressed, although measures have been implemented before the directives have been adopted, and the link has been made afterwards (e.g. see the NWRM case study on the "Dyke relocation on the Elbe river near Lenzen, Germany"). NWRM case studies which have been identified in this project and which had the explicit objective of improving the ecological status (in terms of the WFD) include for example the "Revitalisation of the Upper Drau river in Austria" or the "Wetland restoration in Persina, Bulgaria", where the NWRM forms part of the river basin management plan (RBMP). An explicit, integrated approach in the WFD and FD implementation is followed in the NWRM case study "Órbigo River ecological status improvement, Spain", where river connectivity with the floodplains has been restored. More evidence on combined efforts for different policies is available with regards to NWRM on the interface between biodiversity and water policy, although not always directly linked to the WFD. The NWRM case study "Wetland restoration in Ciobarciu, Romania", for example, has as a long-term objective the integration of nature and water policy and the implementation of European Directives. In protected areas, NWRM are often included in the management plans.

Examples of initiatives for more holistic approaches to flood risk management which started already before the implementation of the Floods Directive are the Dutch "Room for the Rivers" Program from 2007 (see the "Room for the River: Nijmegen dike relocation, Netherlands" case study) and the English "Making Space for Water" from 2005. Both allow at the same time for ecological and social development in highly urbanized areas (Szostak, 2013). Furthermore, in particular urban river restoration projects provide examples for NWRM applied for different policy issues. They consider often water quality (e.g. WFD related), water quantity (e.g. FD related), nature conservation and quality-of-life agendas (Lundy and Wade, 2011).

NWRM and climate change

The objective of the European Climate Change Adaptation Strategy is to contribute to a more climate-resilient Europe. Given the high uncertainties, a strong emphasis is laid on incorporating win-win, low-cost and no-regret adaptation options. Many of the NWRM are no-regret measures for adaptation in a changing climate and hence interesting options (Borchers, 2014; Stella, 2012). Depending on the climatic situation and the selected measure, NWRM can help to reduce the vulnerability both to flooding events and to droughts. Although not directly mentioned in the text of the WFD, some Member States have considered climate change aspects in the first management cycle. In 40 % of the RBMPs, a separate chapter is dedicated to the adaptation to climate change (European Commission, 2012c). Water Directors decided furthermore that climate-related threats and adaptation planning should be part of their RBMPs from the second

planning cycle onwards (European Commission, 2012c). This further strengthens arguments for implementing NWRM (Borchers, 2014).

Certain NWRM (in particular restoration of wetlands) also play a role in climate change mitigation through their carbon storage function (e.g. peatland rewetting, soil carbon sequestration and biomass production). Approaches exist to link the implementation of NWRM to (voluntary) emission trading systems (see e.g. Moorfutures[3])

In a given area, all parties potentially interested or affected by the implementation of NWRM need to be identified, and brought together to discuss the best options for achieving different objectives. Spatial planning activities could provide the appropriate room to bring the different needs and constraints together (Parrod et al., 2014), as they aim to define coherent actions which concern different sectors in the same area. Done effectively, it helps to avoid duplication of efforts by different levels of government authorities, communities and individuals (UNECE, 2008). However, spatial planning is today not yet widely used to address the different environmental policy objectives mentioned above. Examples of concrete methods and tools for integrated approaches are provided in the following part.

=> In summary:

Choosing multi-objective measures to address different policy objectives at the same time has several advantages, in particular in areas where land and hence opportunities are rare. Work on the flood risk management plans and the RBMPs needs to be coordinated and provides a good opportunity to consider NWRM in the future. In the past, NWRM could often be found in the management plans of protected areas. NWRM play furthermore a role in both climate change mitigation and adaptation. Stakeholders working on different environmental objectives need to be identified and brought together to discuss and choose the best alternatives. Spatial planning activities could provide such a room, but they are today not yet widely used for this purpose.

III. Which methods and tools exist to select measures relevant for several policy objectives?

Several tools exist to support decision-making in the water management sector. This includes for example cost-benefit analysis (CBA) as a widely applied method for evaluating the social profitability of projects and policies (Kinell et al., 2012). Whereas some directives specifically require CBA, like the Marine Strategy Framework Directive (MSFD), the WFD insists on the economic analysis of water use (for specific economic methods to value the benefits of NWRM, please see the synthesis document on economic assessment methods). In addition, the WFD - as well as the Floods Directive - promotes public participation as a support to the decision making process.

3 http://www.moorfutures.de/en

SD10: Policy coordination for NWRM

Many case studies looked at in the present project have shown that the implementation of NWRM often goes back to the motivation of individuals or small groups (see for example the NWRM case study "Dyke relocation on the Elbe river near Lenzen, Germany"). At the beginning - for different reasons - a preference for a certain measure (e.g. floodplain restoration) is expressed and is then justified with the positive impact on several policy objectives. However, in view of an integrated and anticipatory approach, the ideal situation would be to have all relevant (environmental) objectives in mind, and to select the most suitable measures for a given area while considering all relevant policy objectives. Overcoming the existing share of responsibilities in the different countries regarding environmental matters is one of the main issues to handle.

But also the choice of measures as such is a quite complex issue. The effectiveness of one NWRM with regards to a specific objective (e.g. increasing the amount of water stored in the landscape) is rarely exactly known. As a result, choosing the right measure only for one objective is already quite challenging. Taking other objectives into account makes it even more complicated. In the case of flood risk management, for example, it is acknowledged that there is no single response that will substantially reduce the risk - and which is completely sustainable. Governments need to support the concept of a portfolio of responses to decreasing flood risk, from which different response measures can be chosen under different scenarios. A site-specific mix of structural and non-structural measures needs to be designed, which is robust to changing conditions - including those linked to the uncertainty of climate projections (Santato, Bender and Schaller, 2013; European Commission, 2009). Despite the advantages of non-structural measures like NWRM, technical flood protection measures might be necessary to handle rare, major events (European Commission, 2009). This observation reveals not only a need for combining different individual measures, but stresses the importance of policy mixes, to develop integrated approaches.

For water managers, river catchments seem to be the most suitable scale for action. Instead of arguing about measures directly, starting with mapping opportunities for improving ecosystem functions throughout the catchment could be a convenient approach to guide the identification of measures. The effectiveness of the identified measures and their impacts, e.g. on the local population, can then be evaluated to support the decision making process and to optimise the benefits from the interventions (Parrod et al., 2014). As mentioned above, for integrated approaches, land use planning, but also GIS based approaches play an important role - in particular with regards to long-term objectives (Santato, Bender and Schaller, 2013). Different examples of methods and tools used to choose among different measures are illustrated in the boxes below.

Project WaReLa - Water retention through adapted land-use

In order to ensure flood protection not only through measures in the field of water management, but also through spatial planning and land use, the French, German, Swiss and Luxembourgish INTERREG IIIB WaReLa-project aimed at identifying and quantifying water retention potentials in catchment areas. It took agriculture, forestry, the development of urban areas as well as recreational use into account. A transnational spatial planning decision support system has been developed to evaluate the impact of measures for improving the water retention capacity of landscapes (Schüler, after 2005).

The project considered both structural and pre-cautionary, non-structural measures. The decision support system is based on different land use possibilities, the landscape structure, the site characteristics and potential meteorological situations. It uses a geographic information system (GIS) to identify hotspots of run-off creation in order to implement their targeted measures for retaining water and reducing flood peaks. GIS is also used to display the water retention potential in the landscape (Schüler, Gellweiler and Seeling, 2007).

The Eddleston Water Project

Channelization, land drainage and creation of flood banks have led to an increased risk of flooding in the downstream parts of the Eddleston water catchment in the UK. In a partnership project of local and national organisations it has been investigated whether changes to land use management and the restoration of natural habitats can help to both improve habitats for wildlife *and* reduce the flood risk in the downstream parts. In order to develop a restoration strategy, an initial scoping study has been carried out to assess the status of the river and to identify type and location of potential restoration measures. They have then been checked for their feasibility. Efficacy for flood attenuation of key sites has been assessed through modelling. The measures which finally have been chosen include amongst others the creation of riparian woodland and river re-meandering.

Source: http://www.tweedforum.org/projects/current-projects/eddleston

Coordination of the Floods Directive and the Water Framework Directive in Germany

The German Working Group on water issues of the Federal States and the Federal Government (LAWA) has developed a common catalogue of measures for the WFD and the FD as well as recommendations for the coordinated implementation of the two directives. The common catalogue of measures includes 100 measure types for the WFD and 29 measure types for the Floods Directive, as well as 9 conceptual measures. It provides an indication of the relevance of each measure for the other directive and classifies them into one of the three categories: measures supporting the objectives of the respective other directive, measures which might have conflicting interests (and which need hence a case-by-case review) and measures which are not relevant with regards to the objectives of the other directive (LAWA, 2013; Schreiber and Deutschmann, 2014). Each German Federal Land provides then individual measures which underpin these measure types. In the Land of Brandenburg, for example, the catalogue of measures for the WFD includes 416 measures underpinning the 100 LAWA WFD measure types, and 245 measures underpinning the 29 Floods Directive and 9 conceptual LAWA measure types (Schreiber and Deutschmann, 2014). A specific method for prioritisation is used.

SEE River project in South East Europe

The SEE River project aims at developing a joint approach for integrative management of international river corridors in South East Europe. A toolkit is being developed as a generally applicable model and guidance on how to reach a common agreement on river management, taking both development and conservation interests into account. It aims at facilitating the implementation of relevant EU legislation, and in particular the Water Framework Directive, the Flood Directive, the Habitat Directive, the Birds Directive and the Renewable Resources Directive. The plans which are developed within the project will identify and coordinate issues like flood risk, water ecology, spatial planning and tourism. The river Drava is the main pilot basin (European Commission, 2014).

Further sources: http://www.see-river.net; See also the NWRM case study "Revitalisation Upper Drau"

=> In summary:

Choosing the right combination of measures is a very complex task. Information gaps on the effectiveness of measures are rendering decisions difficult with regards to one objective, but even more if several objectives shall be taken into account.

Different approaches have been developed in different places: Elaboration of a catalogue of measures and checking their relevance (positive and negative effects) for different directives; use of GIS for the distribution of measures in the landscape; setting rules for prioritisation; etc. In general terms, mapping the opportunities at catchment scale for improving ecosystem functions seems to be a convenient starting point for the identification of measures.

IV. What is the role of (policy) coordination for implementing NWRM?

Conclusions drawn from the present pilot project indicate that an integrated catchment-based approach is the best suited one to promote the implementation of NWRM (Williams, 2014). In many cases, individual measures may have little effect, and it is rather the cumulative impact of several measures appropriately situated throughout a catchment that is relevant when considering benefits. Although the catchment approach is asked for by the WFD (implementation of river basin districts, Article 3), countries did not radically change their administrative water management structures to better fit these spatial management units, but they have "chosen to manage the districts by coordinating the work among 'old' administrative water management organizations" (Bekiroglu and Eker, 2011). In France for example, catchment management has a long historical background and is well established. Other countries, like Sweden, only have a fragmented approach per water body, which limits also the possibility for implementing NWRM. Consequently, challenges to ensure a catchment-based approach still exist. Even in countries where catchment management is in place, it is often ineffective and the managers' catchment vision is broken down into different functions – which are linked to different policy strands (Parrod, 2014). Working on the establishment of an effective catchment management seems to be a prerequisite for promoting an integrative approach to NWRM.

In general, awareness of the different kinds of coordination challenges is key to decide which stakeholders should be included in the planning and implementation process for NWRM. The

main coordination issues which need to be taken into account for a successful implementation of NWRM are listed in the following.

- Coordinating NWRM for different EU directives

As mentioned before, NWRM can contribute to the objectives of different EU directives, and coordinating their implementation allows for synergies. In general terms, next to being a legal requirement (see Article 9 Floods Directive), coordinating the choice of measures to comply with different EU directives is to some extent indispensible, as the same limited area is available to fulfil different demands: keeping or restoring near nature hydromorphology and limiting nutrient transport to water bodies (WFD), conservation and reestablishment of a favourable conservation status of alluvial forests (Habitats Directive) and the protection of economic areas (FD). This clearly asks for the coordinated implementation of multifunctional measures like NWRM (Schreiber and Deutschmann, 2014). The Sigmaplan in Belgium is one of the examples where the need for both nature conservation and flood protection measures and the limited availability of land led to a combined approach (see the NWRM case study "Floodplain reconnection in the Vallei van de Grote Nete, Netherlands").

Furthermore, following the Water Blueprint Communication, the EU Commission supports the integration of the ecosystem services approach into the implementation of the WFD and the FD. Choosing NWRM for the programmes of measures can be put forward as examples of applying the ecosystem services approach (European Commission, 2012a; see also the Watereco[4] project website).

- Coordination between different administrative units

The limits of catchment areas very often do not coincide with the boundaries of administrative entities. Catchment approaches necessary for many - in particular nature restoration related NWRM - often require the cooperation of different institutions responsible for different parts of the area (Bekiroglu and Eker, 2011). In the case of transboundary projects, this includes even different countries (see for example the NWRM case study "Green Borders: Transboundary conservation activities in Romania and Bulgaria"). On the other hand, this might play a limited role in the case of urban NWRM. The areas covered in urban areas are more likely to belong to the same administrative unit – although different division e.g. of the town administration might be concerned.

The need for coordination between different administrative units also includes a vertical aspect, e.g. with regards to national, regional or local competencies. It will depend on the share of responsibilities in the different countries, and also on the different functions of the respective NWRM (e.g. biodiversity and / or water resource management related), and whether they are managed by the same entity.

- Coordination between different types of stakeholders

[4] www.watereco.info

SD10: Policy coordination for NWRM

Coordination between different types of stakeholders, including different sectors, plays a role at different levels. On the project level, in the case of river restoration for example, the successful implementation of NWRM will in many cases depend on the cooperation with farmers, nature conservation stakeholders, possibly regional tourism agents, etc. (see also for example Fournier and Larrue, *after 2011*). Implementing NWRM often requires land use changes, but benefits and costs might not fall upon the same people. This is one barrier to the implementation of NWRM, and only exchanges and cooperation among different stakeholder groups will allow finding solutions for problems of agreements on land use.

Also in the case of urban NWRM, a holistic approach is needed for designing SUDS. It encompasses working at several spatial scales (from sewersheds down to neighbourhood streets and single open gutters), but furthermore requires collaboration between different stakeholders like park departments, water utilities, traffic administrations, private households, architects etc. to ensure that all requirements and local knowledge is considered (DG Environment, 2012).

Furthermore, in general terms, exchange and coordination between sectors with regards to NWRM might also be needed to create awareness. In the forestry sector for example, awareness about the importance of the water retention function of forests might not be sufficiently present, and hence not be sufficiently taken into account by forest managers (Schüler, G. *pers.comm.*). In an integrated approach, cross-sectoral discussions can raise awareness and promote the implementation of NWRM.

- Upstream-downstream coordination

Flood protection and mitigation measures often include an upstream-downstream component which is worth putting forward. The measures applied upstream will protect residents downstream from flood events. This requires on the one hand coordination within the spatial scale, but also in many cases between different sectors; e.g. agricultural NWRM applied upstream might protect an urban area downstream – an issue which might also raise the question of compensation payments. The importance and necessity of upstream-downstream cooperation will, however, depend on the measures and the scale of their impact. In the case of the large dyke relocation project in Germany on the river Elbe, for example, it is emphasised that the measure clearly reduces the impact of flood events, but only at a regional level. The impact diminishes significantly with increasing distance from the application area of the measure. Upstream-downstream issues could typically be handled in an integrated catchment-based approach.

Advantages of coordination

For a successful implementation of NWRM, coordinated efforts are crucial. As stated by the European Commission (2013) with regards to green infrastructure, it can be expected that "benefits are significantly enhanced when a minimum degree of consistency and coherence is achieved across different scales". In many cases, a single NWRM is unlikely to change the status of a water body, but the widespread use of NWRM can make a significant contribution to meeting these objectives. Among the numerous advantages of coordinated efforts, the following can be stressed:

❖ Finding best adapted solutions

Coordinating efforts - instead of imposing them - allows finding the best adapted solutions for all. Wetlands for example can be built on relatively unproductive, agricultural land at field edges. In this case, they are only linked to little loss to agricultural production (Ockenden et al., 2012). Exchanges among stakeholders are necessary to identify optimal solutions.

❖ Improving financing possibilities

To ensure that measures become operational, financial commitments are necessary (European Commission, 2012). For very costly measures, funds available for promoting a single objective (e.g. biodiversity protection, flood protection) might not be sufficient. Emphasising the multifunctionality of NWRM and coordinating efforts between different groups can help finding sufficient financial sources (see illustration boxes).

Dyke relocation on the river Elbe: multiple functions – multiple financing sources

The German large-scale dyke relocation on the river Elbe near Lenzen aimed at recreating a near nature floodplain landscape - including alluvial forests and half-open pasture areas – and at the creation of a large area able to retain water in times of high water events. Financing of the project was only able through coordinated efforts: The status of the old dyke made maintenance and renovation necessary to further ensure flood protection. However, instead of upgrading the old dyke, resources from the respective state agency of Brandenburg have been used to finance the new, relocated dyke. The opening of the old dyke has mainly been financed by the German government and the state of Brandenburg. The creation of the private association Trägerverbund Burg Lenzen e.V. – composed amongst others by the municipality of Lenzen and the nature conservation association BUND – allowed the eligibility for funds provided in the framework of large-scale nature conservation projects financed by the Federal Agency for Nature Conservation. Finally, the rural development effects of the project made it possible that the main agricultural land owner in the area supported the project so that land availability did not hinder its implementation.

❖ Increasing public acceptance

Public perception plays an important role when implementing NWRM. A coordinated action for NWRM, showing the support from different sectors, might facilitate the possibility to gain acceptance for large and costly measures.

❖ Overcoming concentration on individual policies

As emphasised before, NWRM are multifunctional and can be considered under different policies. However, comparing their effectiveness to a single objective (of one policy), they might be less interesting than other types of measures. Only when considering different objectives at the same time the advantageousness of NWRM will stand out.

=> In summary: The effective implementation of NWRM requires the coordination of efforts at different levels and an integrated catchment management approach. In many cases, different stakeholders, including different administrative units, need to work together to fully capitalize synergies. Cooperation will in particular allow finding the best adapted solutions, will diversify financing options and might increase public acceptance of measures.

V. Conclusions

Through their multi-functionality NWRM are able to contribute to the achievement of different policies, including for example the objectives of the EU Floods Directive, the Water Framework Directive, the NATURA 2000 Directives or the EU Climate change strategy. The current implementation phase of the FD and the WFD represent an important opportunity for the further application of NWRM, as they can be included in the programmes of measures which are developed. Considering different objectives when choosing measures will allow capturing synergies, but will require coordination between different administrative units. Investigations undertaken within the current project have shown that this cooperation is not yet very widespread, and the remaining potential is high. In particular the use of spatial planning approaches to optimise the use of NWRM could be promising, but is currently not widely used.

VI. List of references

Please note: Case study specific literature can be found under the links provided to the NWRM case study factsheets. They have not been included in the following list.

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