





Natural Water Retention Measures

Web-based knowledge
Community of practice
NWRM practical guide



Pilot Project - Atmospheric Precipitation - Protection and efficient use of Fresh Water: Integration of Natural Water Retention Measures in River basin management

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What characterizes NWRMs and how do these relate to the core of River Basin Management Plans (RBMPs)?

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Some Basics: What are NWRMs?

Natural Water Retention Measures

- Water retention?
 - ◆ Longer residence time somewhere in the water cycle
 - on land?
 - in surface water?
 - in groundwater
- Natural?
 - ◆ NWRMs use natural processes
 - ◆ Functions commonly performed by nature
 - slowing down water flows
 - allowing soil infiltration
 - supporting aquifer recharging

Some Basics: Why are NWRMs interesting?

Background

- Most of the measures are not new
 - ◆ Wetlands
 - ◆ Riparian buffer zones
 - ◆ Continuous forest cover
 - ◆ Green roofs
 - ◆ Swales along roadways
- What is new is the focus on retention
 - ◆ Where?
 - ◆ When?
 - ◆ Why?
 - ◆ What?
 - ◆ Who?

Where and when? EU and DG Environment

- A **White Paper (2009)** on adapting to climate change suggested that "working with nature's capacity to absorb or control impacts in urban and rural areas can be a more efficient way of adapting than simply focusing on physical infrastructure".
- An information package **Towards Better Environmental Options in Flood Risk Management (2011)** was communicated by the Commission to Water Directors highlighting the role and benefits of Natural Flood Risk Management.
- **Blueprint to Safeguard Europe's Water Resources (2012)** recognizes the role of NWRMs and proposes support through guidance and other actions that promote their uptake in the next planning cycles and their inclusion in the investments foreseen in the next programming period.
- The **Green Infrastructure Communication (2013)** suggested that support is needed for strategic planning and management of natural areas to deliver multiple ecosystem services and contribute to water management and reduction of flood and drought risks.

Why the interest from DG Environment?

- Floods Directive and WFD
 - ◆ Opportunity for measures which reduce flooding AND are compatible with the WFD
 - ◆ Symmetrical relationship
 - ◆ Opportunity for measures in RBMP (PoM) which are compatible with the Floods Directive
- Outlined in the Blueprint to Safeguard Europe's Water Resources
- And the Green Infrastructure Communication



The Green Infrastructure Communication

What is Green Infrastructure?

- An alternative to grey infrastructure
 - ◆ Embankments, dykes and dams
- “Restoration of riparian areas, wetlands and flood plains”
 - ◆ to retain water,
 - ◆ support biodiversity and soil fertility
 - ◆ and prevent floods and droughts”
 - ◆ WFD? FD?



Green Infrastructure for Flood Prevention

Towards Better Environmental Options for Flood Risk Management (DG Environment, 2011)

- Introduces a number of tested techniques for natural approaches which might be concretely applied on a local scale to reduce floods
- Includes case studies with driving force “flood protection”
- Also presents a number of projects which have restored flood plain ecosystems and at the same time contributed to flood prevention, as examples of Green Infrastructure elements.

Tested techniques for natural approaches

Technique	Description	Key Goals	NWRM/WFD
Hedgerow planting and management	Planted across slopes along existing field boundaries	To enhance infiltration and storage within soils and to impede overland flow of water and sediments	NWRM?; WFD?
Channel re-profiling	Creating a two-stage channel	To maintain adequate depths during low flows, enhance winter storage and encourage natural morphology	NWRM?; WFD?
Blocking of inappropriate artificial drains using dams	Construction of permanent dams to restrict flows to drains	To slow flows, enhance water storage and intercept excess sediments.	NWRM?; WFD?
Wetland restoration		To enhance flood storage capacity	NWRM?; WFD?

Tested techniques for natural approaches

Technique	Description	Key Goals	NWRM/WFD
Gully woodland planting		To impede rapid runoff entering steep channels	NWRM?; WFD?
Native mixed woodland on hillslopes	Planting on deforested and drained hillslopes	To intercept rainfall and enhance soil storage capacity and to reduce erosion	NWRM?; WFD?
Floodplain 'leaky barriers'	Living walls of woven willows to disrupt flow paths over floodplains	To intercept overland flows and enhance floodplain storage potential for both water and sediments	NWRM?; WFD?
Riparian buffer zones		To impede overland flow enhance soil storage capacity and to reduce erosion	NWRM?; WFD?

Case studies with driving force “flood protection”

Case study	Measures	NWRM/WFD
Construction of bank protection to prevent erosion of salt marshes	Low dam to stop erosion	NWRM?; WFD?
Restoration of a brackish water reduced tidal area	Installation of a culvert for exchange between salt and freshwater habitats	NWRM?; WFD?
Habitat creation	Creation of breaches in the sea wall to open the site to tidal action	NWRM?; WFD?
Fishway	Installation of behavioral barrier and fish pumping stations	NWRM?; WFD?
River restoration	Renaturalization of the river	NWRM?; WFD?
Creation of side channels along the Rhine	Three side channels created, rehabilitation of riparian zone	NWRM?; WFD?



Projects as examples of Green Infrastructure elements.

LIFE projects which have restored flood plain ecosystems and at the same time contributed to flood prevention

- Prevention of flooding by grassland protection (Belgium)
 - ◆ Removal of obstacles to flooding such as poplars and maize crops through land acquisition
- **Restoring the Danube's natural river dynamics**
 - ◆ Removal of bank stabilization and reconnection of stagnant waters on the floodplains with the river
- Wise use of floodplains (UK)
 - ◆ Sustainable management of floodplains, focus on stakeholder participation
- Establishing a European Centre for River Restoration
 - ◆ River restoration to satisfy WFD requirements for quality and quantity



Blueprint to Safeguard Europe's Water Resources (Nov, 2012)

- Blueprint based on:
 - ◆ EEA State of Water report
 - ◆ Commission assessment of MS RBMPs
 - ◆ Commission Review of the Policy on Water Scarcity and Drought
 - ◆ Fitness Check of EU Freshwater Policy
 - ◆ Impact Assessment (JRC)
 - ◆ Public Consultation with:
 - the general public
 - stakeholders
 - Member States
 - other EU institutions



Blueprint to Safeguard Europe's Water Resources

Land use and the ecological status of EU waters; problems

- WFD addresses all the challenges faced by EU waters
 - ◆ Land use and management have an effect on water quality and quantity
 - ◆ Ecological and chemical status is threatened
 - ◆ Risk of water scarcity
 - ◆ More vulnerable to extreme events; floods and droughts
 - ◆ Over-abstraction due to over-allocation
 - Overestimation of the available amounts
 - Economic pressure
 - Political pressure

Blueprint to Safeguard Europe's Water Resources

- Need to address the issue of over-allocation to put quantitative water management on a solid foundation
- Identification of the ecological flow
 - ◆ The amount of water required for the aquatic ecosystem to continue to provide desired services
- Recognition that water quality and quantity are intimately **related within the concept of “good status”**
- No EU definition of ecological flow and no common understanding of how it should be calculated
- WFD and quantity? NWRM?
- **“These measures [NWRM] should be included in both RBMPs and [Flood Risk Management Plans] (FRMPs) and, as mentioned, should become a priority for financing under the [Common Agricultural Policy] (CAP), Cohesion and Structural Funds”**



NWRM: Pilot Project Concept Note

- Not every measure that increases the water stored in water bodies is an NWRM
- NWRMs are interventions over water related ecosystems
 - ◆ the result of actions taken directly over soil, an aquifer, a floodplain, a forest or any other element that regulates the water cycle
- NWRMs use natural processes
 - ◆ functions commonly performed by nature that slow down water flows, increase infiltration rates, control storm flows, store water, reduce pollution loads
- Natural **water retention is not the end but the means that make NWRMs relevant for water resource efficiency and sustainability**



NWRM: Pilot Project Concept Note

- NWRM not simply a means to restore assets, but a process to adapt existing developments in order to enhance or recover the water regulation functions provided by them that were reduced or lost when these developments took place
- Sometimes NWRM restoration may recover the original structure (e.g. floodplain recovery), sometimes they may recover the lost functions but not the original structure delivering them in the past (e.g. permeable pavements), sometimes restoration lies in between recovering the structure and recovering the functions (e.g. in sustainable farming practices)
- **Restoration might also be the creation of new “ecosystems” (e.g. green-roofs) to perform “ecosystems functions” not previously performed by nature (water retention in the plain to avoid the flood reaching a large city: e.g. the Thames and the City of London).**



NWRM: Pilot Project Concept Note

Classification of NWRMs (Stella Report, 2012)

- **Rivers, lakes and their wetlands;** wetland restoration and creation, floodplain restoration, re-meandering, natural bank stabilisation, basins and ponds, restoration of lakes
- **Aquifers;** artificial groundwater recharge (AGR)
- **Agriculture;** restoring and maintaining meadows and pastures, buffer strips, soil conservation crop practices (crop rotation, strip cropping, intercropping, interlayer crops), no or reduced tillage, green cover, early sowing, traditional terracing
- **Forestry and pastures;** continuous cover forestry, maintaining and developing riparian forest, afforestation of agriculture land
- **Urban development;** filter strips and swales, permeable surfaces and filter drains, infiltration devices, green roofs



NWRM: Pilot Project Concept Note

What contribution can be expected from NWRMs to the purposes of water management?

- NWRMs might be cost-effective alternatives to be considered as part of the RBMP programs of measures
 - ◆ They can help meet RBMP aims as stated in the WFD, the FD, the Strategy for Water Scarcity and Droughts, climate change adaptation, sustainable urban development
- NWRMs might yield important direct benefits relevant for water management
- NWRMs come along with other significant ancillary benefits

Thank you for attention



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