



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

Service contract n°ENV.D.1/SER/2013/0010



## **Thematic Group Session on NATURAL AREAS**

**Jovanka Ignjatović  
Regional Environmental Center**

**Danube Region Workshop  
28-29 January 2014  
Szentendre (Hungary)**



# NWRM in Natural Areas



CLASS	CODE	NWRM
Rivers and their wetlands	N1	<a href="#"><u>Basins and ponds</u></a>
	N2	<a href="#"><u>Wetland restoration and creation</u></a>
	N3	<a href="#"><u>Floodplain reconnection and restoration</u></a>
	N4	<a href="#"><u>Re-meandering</u></a>
	N5	<a href="#"><u>Revitalisation of flowing waters</u></a>
	N6	<a href="#"><u>Restoration of the flows of temporary tributaries</u></a>
	N7	<a href="#"><u>Reconnection of hydraulic annexes</u></a>
	N8	<a href="#"><u>Restoration of the riverbed (alluvial mattress)</u></a>
	N9	<a href="#"><u>Levelling of dams/ longitudinal barriers</u></a>
	N10	<a href="#"><u>Natural bank stabilisation</u></a>
	N11	<a href="#"><u>Elimination of riverbank protection</u></a>
Lakes and their wetlands	N12	<a href="#"><u>Restoration of lakes</u></a>
Aquifers	N13	<a href="#"><u>Artificial groundwater recharge (AGR)</u></a>



# NWRM Table



CLASS	CODE	NWRM
Rivers and their wetlands	N1	<a href="#"><u>Basins and ponds</u></a>
	N2	<a href="#"><u>Wetland restoration and creation</u></a>
	N3	<a href="#"><u>Floodplain reconnection and restoration</u></a>
	N4	<a href="#"><u>Re-meandering</u></a>
	N5	<a href="#"><u>Revitalisation of flowing waters</u></a>
	N6	<a href="#"><u>Restoration of the flows of temporary tributaries</u></a>
	N7	<a href="#"><u>Reconnection of hydraulic annexes</u></a>
	N8	<a href="#"><u>Restoration of the riverbed (alluvial mattress)</u></a>
	N9	<a href="#"><u>Levelling of dams/ longitudinal barriers</u></a>
	N10	<a href="#"><u>Natural bank stabilisation</u></a>
	N11	<a href="#"><u>Elimination of riverbank protection</u></a>
Lakes and their wetlands	N12	<a href="#"><u>Restoration of lakes</u></a>
Aquifers	N13	<a href="#"><u>Artificial groundwater recharge (AGR)</u></a>





# ***D1: Measures***

1. Have we captured all relevant types of measures?
2. Any listed measure that do not belong here?
3. Cross-cutting issues with other sectors:
  - Agriculture
  - Forestry
  - Urban Areas
4. Examples

## ***D2: Challenges in implementation***

1. What are the experiences in your fields
2. How do you manage to overcome faced challenges?
  - Financing
  - Investments
  - Maintenance
  - Lack of knowledge
  - Lack of interest
  - Institutional & organisational issues
  - Land planning process
  - Safety and health considerations
3. ??
4. ?

## ***D3: Benefits, good practices***

1. What have been the key **benefits** from implementing NWRM?
  - Less pressure on eco- systems
  - Lower flood risk
  - Local water retention
  - Water quality & quality protection
  - Quality of life: mitigating effects; green areas; cleaner airLeisure
  - ???
2. Where are the best examples/case studies and why have they been successful?
3. How could these be built upon to help overcome the challenges so that more NWRM can be Implemented?

## ***D4: Instruments to promote NWRM***

1. Legal framework (By-laws, regulations, Standards)
2. Taxes, fees (e.g. storm water fee)
3. Voluntary agreements
4. Information campaigns, education
5. ....?



# Discussion points



## D1: NWRM

1. Have we captured all relevant types of measures?
2. Any listed measure that do not belong here?
3. Cross-cutting issues with other sectors:
  - Agriculture
  - Forestry
  - Urban Areas
4. Examples

## D2: Challenges in implementation

1. What are the experiences in your fields
2. How do you manage to overcome faced challenges?
  - Financing
  - Investments
  - Maintenance
  - Lack of knowledge
  - Lack of interest
  - Institutional & organisational issues
  - Land planning process
  - Safety and health considerations
3. How do you manage to overcome faced challenges

## D3: Benefits, good practices

1. What have been the key **benefits** from implementing NWRM?
  - Less pressure on eco- systems
  - Lower flood risk
  - Local water retention
  - Water quality & quality protection
  - Quality of life: mitigating effects; green areas; cleaner airLeisure
  - ???
2. Where are the best examples/case studies and why have they been successful?
3. How could these be built upon to help overcome the challenges so that more NWRM can be Implemented?

## D4: Instruments to promote NWRM

1. Legal framework (By-laws, regulations, Standards
2. Taxes, fees (e.g. storm water fee)
3. Voluntary agreements
4. Information campaigns, education
5. ....?







**Thank you for your attention**



# ***Rivers and their wetlands***

## ***N1 - Basins and ponds***

- Basins and ponds store surface run-off.
- Detention basins are free from water in dry weather flow conditions;
- Ponds (e.g., retention ponds, flood storage reservoirs, shallow impoundments) contain water in dry weather, and are designed to hold more when it rains.



# ***Rivers and their wetlands***

## ***N2 - Wetland restoration and creation***

1. Wetlands restoration and creation can involve:
  - technical, spatially large-scale measures (including the installation of ditches for rewetting or the cutback of dykes to enable flooding);
  - technical small-scale measures such as clearing trees;
  - changes in land-use and agricultural measures, such as adapting cultivation practices in wetland areas.
2. Wetland restoration can improve the:
  - hydrological regime of degraded wetlands and generally enhance habitat quality.
3. (Creating artificial or constructed wetlands in urban areas can also contribute to flood attenuation, water quality improvement and habitat and landscape enhancement).





# ***Rivers and their wetlands***

## ***N3 - Floodplain reconnection and restoration***

- A floodplain is a plain bordering a river which provides space for the retention of flood and rainwater.
- Floodplain soils are generally very fertile and they have often been dried-out to be used as agricultural land
- Floodplain sediment (alluvial mattress) removal to be used for construction purposes
- Nowadays, the objective is to restore them, their retention capacity and ecosystem functions.

# ***Rivers and their wetlands***

## ***N4 - Re-meandering***

- In the past, rivers have been straightened by cutting off meanders.
- Re-meandering is bringing a river back closer to its naturally meandering state by creating a new meandering course and by reconnecting cut-off meanders.
- Re-meandering slows down the flow of a river.
- The new form of the river channel creates new flow conditions and very often also has an impact on sedimentation.
- The newly created or reconnected meanders also provide habitats for a wide range of aquatic and land species of plants and animals

# ***Rivers and their wetlands***

## ***N5 - Revitalisation of flowing waters***

- In the past, rivers flows have been modified through channelization, embankments or modification of river beds.
- Those modifications were aiming at flood prevention or supporting changes of agricultural practices for example.
- This has led to uniformed flows in the rivers and often having effect on the water time transfers.
- Current practices for revitalisation of flowing waters are trying to create the conditions for:
  - diversifying the water flows, inducing more diversity in habitats for faun and
  - increasing the water time transfers in order to prevent flash floods in the downstream areas for example



# ***Rivers and their wetlands***

## ***N6 - Restoration of the flows of temporary tributaries***

- Temporary streams are of particular importance when it comes to:
  - water storage and time retention especially in flash flood prone areas.
- Some measures can be directly implemented in order to ensure their proper functioning.

# ***Rivers and their wetlands***

## ***N7 - Reconnection of hydraulic annexes***

- To ease the overall functioning of the river, some hydrographic network elements could be reconnected, including the so-called hydraulic annexes.
- This will allow for:
  - improvement of lateral connectivity,
  - diversifying flows and habitats,
  - cleaning the secondary arms that play a key role for retention in high water periods

# ***Rivers and their wetlands***

## ***N8 - Restoration of the riverbed (alluvial mattress)***

- The reconstitution of the alluvial mattress consists in levelling-up the riverbed and/or reactivating the bank erosion in order to stop the incision of the riverbed.
- It can allow better connection with side arms, level-up the water level at low flow periods, diversifying flows (depth, substrate, speed), diversify habitats and increase retention times



# ***Rivers and their wetlands***

## ***N9 - Levelling of dams/ longitudinal barriers***

- Levelling longitudinal barriers allows re-establishing fluvial dynamics and ecological continuity.
- The aim is to restore the slope and longitudinal profile of the river:
  - to restore natural water flows,
  - to allow for the solid transport (sediment) to take place,
  - to diversify flows (depth, substrate, speed),
  - to diversify habitats and related flora and fauna

# ***Rivers and their wetlands***

## ***N10 - Natural bank stabilisation***

- In the past, various activities were undertaken to straighten rivers, such as the stabilisation of riverbanks with concrete or other types of retention walls.
- Such actions limited rivers' natural movements, leading to degradation of the river, increased water flow, increased erosion and decreased biodiversity.
- Natural bank stabilisation reverses such activities, allowing rivers to move more freely.
- Where bank stabilisation is nevertheless necessary, such as in residential areas, natural materials such as roots or gravel can be used
  - Natural materials are preferable as they allow water to infiltrate into the bank.
  - They also provide better living conditions for aquatic fauna

# ***Rivers and their wetlands***

## ***N11 - Elimination of riverbank protection***

- The suppression of lateral constraints consists in removing some bank protection in order to enhance:
  - lateral connection of the river,
  - diversifying flows (depth, substrate, speed),
  - diversify habitats
  - capping floods in the mainstream



# ***Lakes and their wetlands***

## ***N12 - Restoration of lakes***

Lakes are by definition;

- water retention facilities;
- they store water (for flood control) and
- provide water for many purposes such as:
  - water supply, irrigation, fisheries, tourism, etc.
  - they serve as sinks for carbon storage and
  - provide important habitats for numerous species of plants and animals, including waders.
- In the past, lakes have sometimes been drained to free the land for agriculture purposes, or have simply not been maintained and have silted up.
- Restoring lakes is re-introducing them where they have been in former times or revitalising them.

# Aquifers

## *N13 - Artificial groundwater recharge (AGR)*

- AGR stores large quantities of water in underground aquifers to increase the quantity of groundwater in times of shortage.
- It results in a lowering of run-off from surrounding land, and in an enhanced natural condition of aquifers and water availability.
- The natural cleaning process of water percolating through the soils when entering the AGR improves water quality.