

**BASIC PROJECT INFORMATION**

**Title and acronym:** Municipalities as Integrators and Coordinators in Adaptation to Climate Change, LIFE-MICACC  
**Project No.:** LIFE16 CCA/HU/00015  
**Duration:** 01/09/2017-31/08/2021  
**EU contribution:** 1,528,069 Euro  
**Total budget:** 2,546,783 Euro

**THE PARTNERSHIP**

**Coordinating entity:** Ministry of Interior of Hungary  
**Partner municipalities (pilot sites for implementation of Natural Water Retention Measures):** Municipality of Bátya, Municipality of Püspökszilágy, Municipality of Rákócziújfalu, Municipality of Ruzsa, Municipality of Tiszatarján

**Public partners:** General Directorate of Water Management of Hungary

**Private partners:** Pannon Pro Innovation Services Ltd.

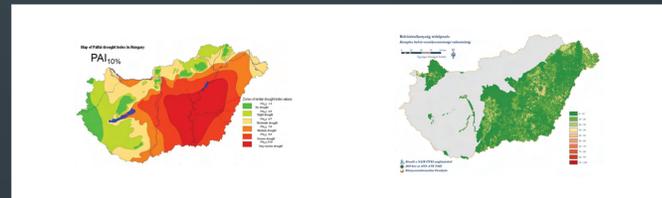
**Partner NGOs:** Association of Climate-Friendly Municipalities, WWF Hungary

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**CLIMATE CHANGE AND WATER RISKS IN HUNGARY**

Hungary is expected to be impacted by climate change more severely than the global average. According to regional climate models' forecasts (ALADIN, RegCM) for the period of 2071-2100 the increase in average temperature will be over 3-5 °C. This is expected to be accompanied by a decrease in precipitation with a more hectic distribution and increase of extremities, leading to change in the runoff up to 60%. The traditional water management approach has drained waters from the landscape, eliminated wetlands and contributed to the drying out of soils and vegetation. Combined with intensive agriculture and tree plantations, this led to the degradation of the natural buffering capacity and a high exposure to water risks. Strong seasonal shifts in water availability are already a burning problem. In spring-time usually there is abundance of water and some lower areas of cropland are inundated. Within a few weeks, the situation may change dramatically, droughts and heat waves threat agricultural production, human health, and infrastructure. The areas with the highest water related risks mostly overlap (see maps).



With climate change more frequent extreme hydrological events are expected, i.e. more severe water scarcity and droughts, more intensive and unpredictable precipitation, increasing floods and excess inland water inundations.

# NATURAL WATER RETENTION MEASURES HARNESSSED FOR CLIMATE CHANGE ADAPTATION IN RURAL HUNGARY

**LIFE-MICACC PROJECT**  
 Municipalities as Integrators and Coordinators in Adaptation to Climate Change

## PROJECT GOALS

- To improve climate resilience of the most vulnerable Hungarian local governments
- To disseminate Natural Water Retention Measures
- To build local capacity for climate change adaptation
- To increase knowledge of decision makers about the impacts of climate change and about Natural Water Retention Measures as a tool to improve climate resilience
- To test and demonstrate the practical applicability and viability of NWRMs prototypes on five pilot sites
- To plan and prepare upscaling these prototype measures to a catchment level
- To create innovative and user friendly IT tools accessible for all Hungarian local governments
- To support networking of Hungarian local governments

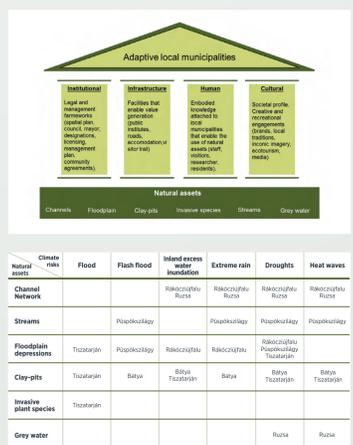
## CONCEPTUAL FRAMEWORK

**Key point:** The use of Natural Water Retention Measures reduces climate change vulnerability. Water retention in the landscape would revitalise the local climate, buffer extremities, and therefore increase the climate resilience of local communities and their economies.

**Key actors:** Municipalities

**Our approach:** The focus is mainstreaming adaptation into natural resources management strategies and land use planning practice of Hungarian local governments, linking the urban areas with the surrounding land that also belongs to the municipality. Effective adaptation requires integrated territorial solutions, as opposed to the traditional fragmented sectorial approaches. As the responsibility of municipalities is territorial and they are embedded in the local society, they are the most appropriate bodies to coordinate local adaptation processes. Municipalities have institutional, infrastructure, human and cultural assets available,

and all these are based on local natural assets. The project will demonstrate how and which local natural 'assets' can be used for climate adaptation.



## NATURAL WATER RETENTION MEASURES (NWRM)

Natural Water Retention Measures are a group of ecosystem based green infrastructural solutions, the goal of which is to improve, restore and preserve the water retention capacity of aquifers, soil, and ecosystems. By using natural means and processes, NWRMs provide cost-effective, no-regret alternatives to irreversible hard engineering solutions, and provide multiple benefits contributing to various European and national environmental and climate policy objectives. A catalogue of the potential interventions that fall within the still evolving framework of NWRMs has been created by an EU funded project, further information is available at: nwrw.eu



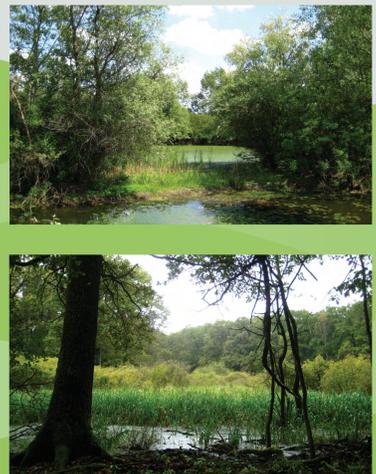
## BÁTYA HISTORICAL CLAY-PITS AS WATER RESERVOIRS

**Vulnerability factors:** Damaging water abundance in the village in case of extreme rainfall events, accompanied by serious water scarce periods during summer.

**Key available assets:** The clay-pit system, which are natural depressions, typical on the alluvial fan of the Danube, from where local communities have had sourced building materials for houses and dykes and therefore deepened them.

**Solution concept:** Use local clay-pits in climate change adaptation to collect and retain rainwater during extreme rainfall events, and to ensure infiltration of the retained rainwater to recharge groundwater in periods of drought. The restored and expanded clay-pit system will serve as freshwater habitat for birds, fish and amphibians, and also as a buffer zone around the settlement, improving local climate through evaporation.

**Planned intervention:** In Bátya a clay-pit previously used for illegal waste-disposal will be restored and transformed to a wetland system. It will be designed as a criss-crossed, multi-basin lake system with several sub-basins with different depths. This will ensure permanent coexistence of deeper open water surface and shallow wetland habitats. Rainwater recharge will be supplied from the residential area through the existing channel network.



## PÜSPÖKSZILÁGY NWRM AGAINST UPLAND EROSION AND FLASH FLOODS

**Vulnerability factors:** Record level flash floods every 2-3 years lead to significant soil erosion and causes damages to buildings, while the upland village is also exposed to droughts during summer.

**Key available assets:** The local stream, the adjacent erosional gullies in the upper watershed, and a piece of land in the bottom of the valley owned by the municipality.

**Solution concept:** Combination of natural water and sediment retention measures both in the upper and the lower basins of the stream to create buffering capacity for hydrological extremities. The system will be created under local ownership and as a result of collective actions of different interested stakeholders.

**Planned intervention:** In the upper watershed, four wooden check dams will be built in the erosional gullies and in the Szilágyi stream to retain water and the sediment load during flash floods, before they reach the built environment. In the lower watershed, a small wetland and lake system will be restored on the floodplain to increase water retention capacity and reduce drought risk. Besides, a wooden check dam will be built right above the wetland to retain sediment that would otherwise block bottlenecks, such as small bridges.



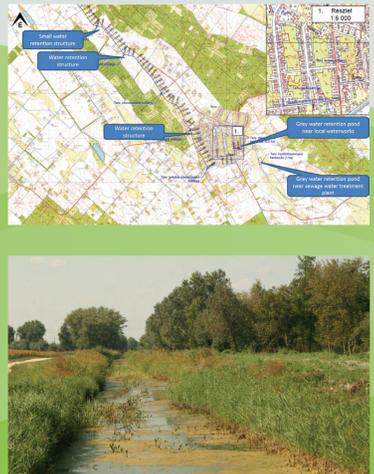
## RUZSA WASTEWATER EFFLUENT AS A VALUABLE NATURAL RESOURCE

**Vulnerability factors:** The average precipitation decreases, the groundwater table is sinking, and the soils are sensitive to hydrological effects. Water shortage has a stress-like effect on the vegetation, on agriculture, forestry, urban areas and the drinking water supply.

**Key available assets:** The effluent decanted water (grey water) of the local waterworks, the cleaned sewage water from the treatment plant, and the drainage channel network of the outer areas.

**Solution concept:** The goal is to improve groundwater recharge as much as possible by retaining and infiltrating locally available water resources. In the outer areas, collective implementation of the Greening element of the EU CAP will be combined with water retention by "greening" those land tracts where temporal inundations may occur.

**Planned intervention:** The effluent grey water from two local water treatment plants, which till now has been drained in the main canal, will be retained in two newly created ponds within the settlement. Outside the settlement, three sections of the channel network, originally designed to drain excess water, will be re-designed to retain it by building water retention engineering structures. Local farmers will be engaged in a pilot cooperation for collective use of newly created wetlands as ecological focus areas.



## RÁKÓCZIÚJFALU PRESERVING INLAND WATER FOR CONSERVATION AND WATER MANAGEMENT

**Vulnerability factors:** Situated on the former floodplains of river Tisza, the area is especially affected by inland water inundations from melting snow in early spring, followed by severe summer droughts. These phenomena cause severe losses to agriculture, a key economic sector in the area.

**Key available assets:** A natural, geomorphological depression (lowland) between the settlement and the Tisza river, which is currently a low quality cropland, and the drainage channel network of the outer areas.

**Solution concept:** A currently unused channel, which was originally designed to drain former marshlands, will be redesigned into a multi-purpose channel to both collect and retain excess water. It will feed collected water into a natural depression on the historical floodplain, transforming it into a wetland habitat, as a nature-based adaptation measure to excess water, heavy rainfalls and droughts.

**Planned intervention:** Using green engineering solutions, a 0,6 hectare wetland will be created through deepening the lowland and dam construction, to serve the dual purpose of water retention for droughts and nature conservation. On the channel, 2 water retention engineering structures will retain water and control its flow to the wetland.



## TISZATARJÁN MULTI-PURPOSE USE OF ABANDONED FLOODPLAIN CROPLANDS

**Vulnerability factors:** An economically disadvantaged settlement that has the majority of its territory in the floodplain of the Tisza river. It is exposed to floods, increasingly frequent droughts and inland excess water. As a symptom, the expansion of invasive plants reduces water retention capacity, increases flood risk, and harms biodiversity.

**Key available assets:** A clay-pit system and other land tracts on the floodplain owned by the municipality, and the invasive plant biomass which can be the basis of bioenergy production.

**Solution concept:** Land management: Removing invasive bushes, then partly replacing them with native willow plantations for biomass energy supply; partly maintaining the cleaned grassland through grazing with grey cattle and water buffalo. Water management: Restoring the clay-pit system for water retention, and as a suitable habitat for the buffalos.

**Planned intervention:** Land management interventions are already ongoing, and in this project the clay-pits will be transformed into an interconnected system of open surface water bodies. These will retain and store water from floods, provide natural water supply through infiltration to the groundwater, and serve as spawning, hiding and feeding ground for grazing and wild animals. A visitor trail will be built in the restored floodplain, to reduce dependence on climate-sensitive agriculture through enhancing ecotourism.



PILOT SITES