Climate Change Vulnerability in Rákócziújfalu

– Municipality of Rákócziújfalu, Jász-Nagykun-Szolnok County, Hungary –

This document is an extract of a climate change vulnerability assessment prepared by the municipality of Rákócziújfalu in 2018, as part of the LIFE-MICACC – Municipalities as Integrators and Coordinators in Adapting to Climate Change project.

Introducing Rákócziújfalu

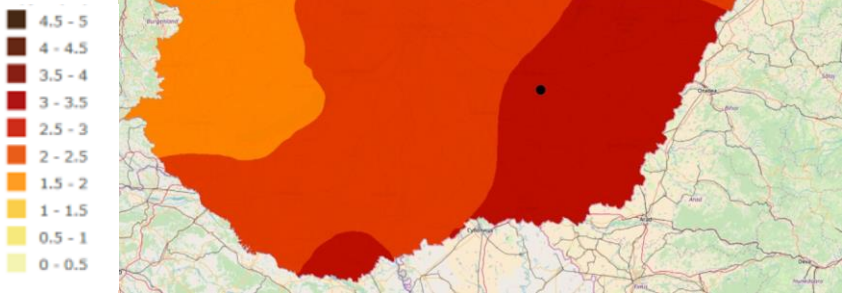
Location: Eastern Hungary, on the east side of the Tisza river. The nearest city is Szolnok, 12 km away.
Area: 19.61 km^2
Population: about 2 000 inhabitants
Geography: The village is characterized by the proximity of the Tisza, and a major part of the settlement used to belong to the river's floodplain prior to the river regulations. Most of the previously dominant wetlands disappeared as a result, but some can still be found between the flood protection dykes. Being a former floodplain, the area is almost completely flat and often cannot drain, therefore inland waterlogging is common.
Key economic sector: Most of the area of the settlement is under intensive cultivation as agricultural land. Commonly grown plants are: cereals, strawberries and vegetables. Small scale farming is characteristic and popular in the village.
Infrastructure: The village has well developed infrastructure and public facilities by local standards, which includes a kindergarten, a community building and library, health centre, pharmacy and dentistry. There is also an outdoor football field, and a playground.

Box 1. What is a Vulnerability Assessment?

The aim of a climate change vulnerability assessment (VA) is to identify who and what is vulnerable to changing future climate, including increasing variability and extreme weather events. Vulnerability is usually defined as a function of three factors: **Vulnerability = Exposure x Sensitivity x Adaptive capacity**. This document observes each factor in turn and highlights some of the potential adaptation measures.

Exposure: climate hazard mapping

Exposure is defined as the degree to which something experiences a climate related hazard, such as an extreme weather event that is capable of causing harm. Key climate hazards in Rákócziújfalu were identified using NATÉR[1] and are summarized in the table below.



Exposure - Expected summer average temperature change in Hungary for the period 2021-2050 based on the ALADIN-Climate climate model (° C)

[1] 1: Nemzeti Alkalmazkodási Térinformatikai Rendszer – A country level database for Hungary of projected climate impacts and various vulnerability indices. Available at: http://nater.mbfsz.gov.hu/

Climate factor	Current state / change already seen	Future change
Mean annual temperature	1.5°C increase since year 1901	1-2°C increase till 2021-2050 compared to 1961-1990 baseline
Temperature extremes, heat waves	currently 13-15 heat wave days/year	25-30 days increase in heat days/year for 2021-2050
Mean annual precipitation	500-525 mm	is expected to decrease by 25 mm
Precipitation extremes	0.5 day per year between 1961-1990	0.5-1 day per year projected for 2021-2050
Droughts (expressed as aridity index: precipitation/potential evapotranspiration.)	Aridity index: 0.7-0.75 between 1960-90. The village lays in the most drought hit region of Hungary.	Aridity index change between 2020-2050: 0.05-0.2 point decrease (meaning increased aridity)

From the data it is clear that Rákócziújfalu is located in the highest summer average temperature zone, and the average temperature increase expected for the next 30 years is between 1.5-2 °C. The annual rainfall in Rákócziújfalu is 500-525 mm / year, which is expected to decrease by 25 mm between 2021-2050. The frequency and magnitude of heat waves will rise moderately between 2021 and 2050, and the climate will become drier.

Sensitivity analysis

Sensitivity is defined as the degree of harm a hazard can cause to something.

Healthcare: The population is the most sensitive to heat waves, weather fronts and storms. The most endangered are pregnant women, chronic patients and elders.

Settlement Infrastructure: The local power grid is particularly sensitive to intense storms.

Box 2. Perception of climate change in the local community

We interviewed the doctor, school nurse, farmers, and backyard farmers to ask their views on climate change. They mentioned the following as the most harmful already noticeable impacts of climate change:

Healthcare: More people became allergic and chronic patient, and the number of unknown insect bites increase.

Agriculture and backyard farming: Yield decrease and frost damage, the proliferation of invasive pests and drying grasslands.

Agriculture: A significant economic sector in the settlement is agriculture, which is sensitive to inland waterlogging (see photo below), droughts and late frosts.

Domestic farming: Small scale household level farming is typical locally and is sensitive to droughts, storms and late frost. Main crops are vegetables and fruits.

Adaptive capacity

Adaptive capacity is the ability to modify circumstances and improve flexibility to reduce vulnerability.

The resources of the municipality are limited, but they are looking for effective adaptation methods. The population has little knowledge of climate change.

Health care: the health centre follows the national protocols for climate change. There are heat-plan and a special weather-plan in the settlement.

Settlement Infrastructure: The electric service provider is not prepared for extreme weather conditions, repeated failures can be detected.
Agriculture: Most farmers perceive climate change but think it is difficult to adapt. There is no common action and dialogue.
Backyard farming: Backyard farmers are openminded to new solutions and methods. More and more resistant species are grown.

Key Vulnerabilities in Rákócziújfalu

The below table summarizes the arising vulnerabilities based on the above analysis, and a ranking table that was prepared along with the original VA study.

Climate hazard	Sector and relevant threat	Sensitivity	Adaptive capacity	Potential adaptation measure
Heat waves	Population - there are more chronic patients	***MEDIUM***	***MEDIUM***	air conditioners, planting trees, shading techniques
Late spring frosts	Agriculture and backyard farming – strawberries and peach frost damage	***HIGH***	***LOW***	use of resistant varieties
Extreme rain and	Agriculture- inland waterlogging	***HIGH***	***LOW***	drainage and retention of inland water (NWRM), channel maintenance
Droughts	Agriculture-crop yield decrease	***MEDIUM***	***MEDIUM***	use of resistant varieties; Natural Water Retention Measures; Correct operation of Falus-1 drainage canal
Powerful storms	Settlement Infrastructure: blackouts due to extreme weather damaging transmission network	***HIGH***	***LOW***	Power grid network renewal

Climate risks were assessed by their probability of occurrence and their potential impact on the settlement.

Recommended adaptation measures

In Rákócziújfalu, the following most important actions were identified that may be taken to reduce risks stemming from climate change.
Agriculture:

- Initiating a dialogue between farmers, action at Community level: facilitating adaptation measures at Community level, adding resources and capacities.
- Cultivation of drought-tolerant plant varieties: these varieties are less sensitive to negative effects.

- Use of water-saving methods (mulching) in agriculture: the precipitation in the vegetation period can be utilized more efficiently.
- Collecting and using rainwater in households (rainwater harvesting)
- Acquiring property rights of the Falus-1 drainage canal and managing the canal for the purpose of water retention in the summer months; delegating responsible person for management of the canal.
- Using other lowland areas for the purpose of Natural Water Retention

Public Health and Infrastructure:

- Tree planting in public areas: woody plants contribute to the improvement of the local climate through evaporation and shading effect.
- Shielding technology for public institutions: mitigates the effects of summer heat waves.
- Air conditioning equipment.

Box 3: Measures already being taken – Natural Water Retention Measures at Rákócziújfalu In the framework of adaptation to climate change we will develop a water-retention investment in Rákócziújfalu. The inland waters caused by extreme weather are currently drained to the Tisza river through the Falusi drainage canal. In the area next to the canal, a natural inland water reservoir will be created, to retain periodically appearing excess water. As a result, we solve the problem of inland waterlogging and mitigate droughts too. The inland water reservoir will serve as a natural habitat for the wild animals and plants in the future. Within the Life project, we have resources to adapt to climate change and increase climate awareness at local level.

The above picture was made in spring 2018, and shows the Falus-1 drainage canal, and inland waterlogging occurring on arable land around the planned reservoir site.

This vulnerability assessment was prepared by the municipality of Rákócziújfalu as part of the LIFE-MICACC – Municipalities as Integrators and Coordinators in Adapting to Climate Change project, LIFE16 CCA/HU/000115. For more information, visit: **www.nwrm.bm.hu**
www.rakocziujfalu.hu