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Elaborating a concept for precipitation management and adapting to climate change in the settlements of Tát and Tokod, Hungary



The project is implemented in the framework of the European Economic Area Financial Mechanism 2009-2014 Adaptation to Climate Change Programme no. HU04-C3-2013.

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Programme objectives

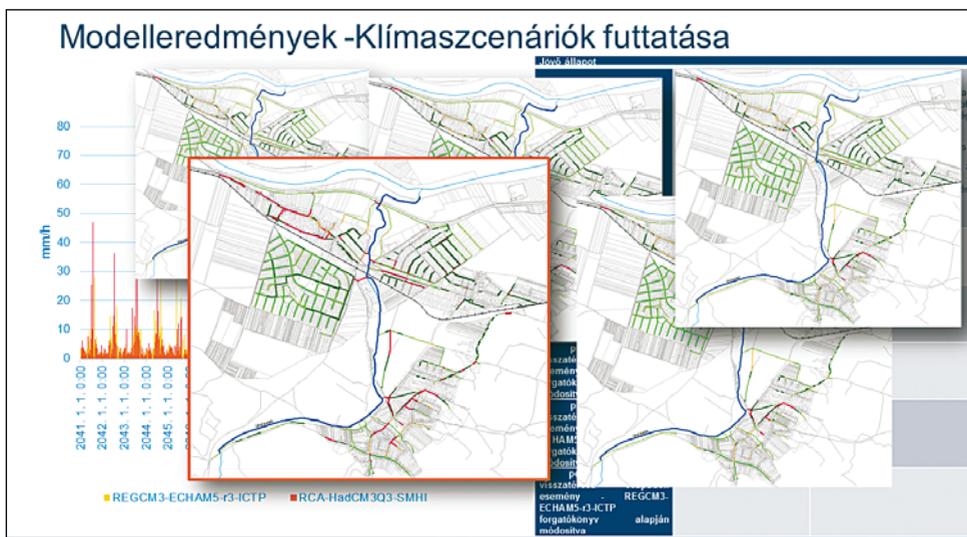
Based on observations concerning climate change and the results of regional climate models it is likely that the tendency of warming will continue in Hungary in the 21st century. The quantity and distribution of precipitation is expected to change. As a consequence, reliable and scientifically-based knowledge is needed to promote the elaboration of adaptation strategies and to facilitate decision-making targeting adaptation. The present pilot project aims to enhance resistance towards the effects of climate change and to promote adaptation, focussing on a pre-defined area around the settlements of Tát and Tokod in Hungary.

In these settlements and the neighbouring area problems are caused mainly by high levels of ground water, extreme and big amounts of precipitation and unexpected flows of water due to the already terminated mining activity. The programme provided support for tackling these issues also in the form of constructions.

Simulation model

One of the major innovative elements of the project is the methodology applied in professional activities, more specifically, the application of a simulation model to map the inter-related processes that characterize water-flows in the drainage network and infrastructure of the settlements. The simulation model elaborated in accordance with the objectives of the project may be an example to be followed in other settlements with a similar topographical, morphological environment and climate.

In the framework of the project a planning guide was also elaborated for the catchment area and the territory of the two settlements of Tát and Tokod. The aim of the guide is to support planning experts and promote a more accurate planning of local infrastructure, showing the system-level impact of different precipitation events. A range of model varieties were developed to simulate different weather scenarios, and these scenarios were then used to elaborate measures that the local governments may implement to tackle the settlement-level issue of precipitation management in a wider context, covering the catchment area around the settlements. The elaboration of the simulation model was assigned to an external research team, DHI Hungary Ltd. (www.dhi.hu)



Development at the settlement of Tát

Problems caused by precipitation and ground water

In a major part of the settlement precipitation is managed in drying ditches, and only a minor part of water is directed into a closed system. In average weather conditions the ditches are appropriate. However, they fail to function whenever the water-level of the neighbouring river Danube is high and heavy rains lead to increased levels of ground water. Such occurrence of extreme weather conditions led to a critical situation of flooding in the eastern part of the settlement of Tát-Újtelep in 2010. The problem was further aggravated by the big amount of precipitation flowing into the sewage system of Tát from the settlement of Tokod, because the dirty water pushed up the covers of man-holes in the streets and flooded residential areas.

Since 2010 ground water has caused more and more problems in residential buildings due to the lack of proper insulation. The situation is expected to improve considerably after the closed system of precipitation management becomes operational in the whole settlement.



Constructions implemented

The precipitation draining ditch in the area called Falu-alja is finished.

Precipitation management is permanently solved by the construction of a partly open, partly closed precipitation drainage system and a link connecting the system to the ditch of the stream called Unyi patak.

The existing precipitation draining system was also renewed.

Overall, a 12 km long section of the system was cleaned and reconstructed by replacing the damaged covers of ditches in 31 streets in the settlement.

Elaborated plans

The precipitation management plan of the area called Tát-Kertváros is finished, and the plan received the official license of the water management authority and can be implemented.

An infrastructure development plan was also elaborated for an area of 20 hectares in the most critical part of Tát-Kertváros, the area around Nefelejcs street.



Development at the settlement of Tokod

In the central part of the settlement of Tokod problems are caused by precipitation and water-flows appearing as a result of the termination of the withdrawal of water from former mines.

Water-flows coming from the surrounding hills carry large amounts of precipitation across the settlement and into the stream called Unyi-patak. Tokod is located mainly on a hillside, and precipitation water reaches the stream called Unyi-patak through precipitation draining ditches and besides the roads built with a cobble-stone lining.

In the area called Tokod-Üvegyár the "U-shaped" precipitation water ditch built in the 1950s needed a major renewal. Currently one of the biggest problems affecting the sewage system and the sewage plant is the permanently high level of ground water caused by the nearby river Danube. The old and outdated sewage system, which was built by using concrete tube elements, receives big amounts of ground water through infiltration, thereby significantly increasing the cost of sewage water management.

Constructions implemented

A public procurement procedure was implemented by the municipality of Tokod and a framework contract was signed in relation to the elaboration of water management plans, conceptual plans, licensing plans and tender plans. Planning activities were carried out on the basis of the results provided by the simulation model.

Another public procurement procedure was carried out for the reconstruction works of the precipitation management system in the village of Tokod and a part of the settlement called Tokod-Üvegyár. On the basis of the contract signed with the winning tenderer the reconstruction works were finished in the area between the streets called Ady Endre and Kodály Zoltán köz.

All infrastructure reconstruction works were finished, the authorized plans for new infrastructural development were finalized, public procurement procedures were implemented and the development of new infrastructure is expected to be finished by April 2016.



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