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THE NEW WATER PARADIGM – WATER FOR THE RECOVERY OF THE CLIMATE

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Abstract. Human activities have gradually altered the earths surface and with it brought about changes to the earth's ecosystems. In Slovakia, millions of cubic metres of water are drained from the landscape every year causing changes to the country's climate and natural environment. To reverse the gradual dehydration of a landscape, human beings must consciosly re-establish the conditions necessary for the hydrological cycle and natural environment to renew itself; this process must start with the retention of rainwater where it falls.

Introduction

Humanity, through its activities (deforestation, agriculture, urbanization), accelerates the runoff of rainwater and causes draining of the transformed land. For example, the public sewerage systems, which hardly existed in Slovakia hundred years ago, sluice away more than 400 million m^3 of water each year. Part of that water sluiced away to rivers and the sea is missing in the soil, on its surface and in plants. If there is insufficient water, immense flows of solar energy cannot be transformed into the latent heat of water evaporation but are instead changed into sensible heat.

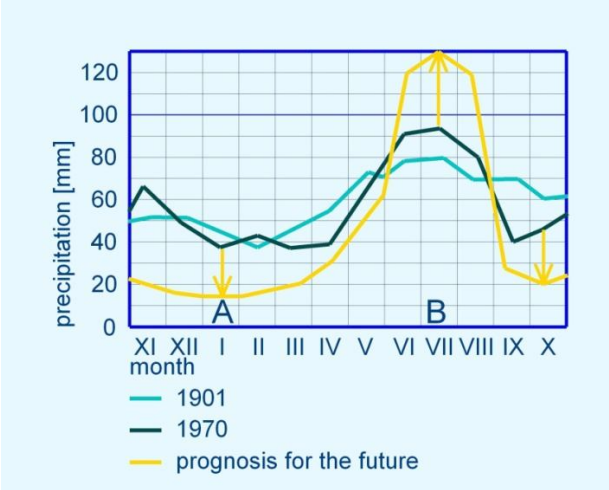
Water that has been lost from the land served as a thermal regulator that maintained a stable climate and well hydrated land. Additionally, other than evaporation, land would absorb part of the solar energy and with it commence the process of photosynthesis leading to the creation of biomass. A landscape lacking in water is susceptible to erosion and gradual dessertification.

Data and methods

A fall in evaporation by only 1 mm per day over the area of the Slovak Republic leads to the release of additional sensible heat of around 35,000 GWh for one sunny day. This is an amount of heat larger than the annual power production of all the power plants in the Slovak Republic. The rise in temperature differences causes breakdowns in the stable water cycle over the affected land and triggers off mechanisms which cause a rise in climatic extremes. It is accompanied by more frequent flooding, longer periods of drought, extreme heat, forest fires, a gradual drop in groundwater reserves, and decrease in soil fertility and biodiversity.

During the 20th century the annual average air temperature in Slovakia rose by about 1.1 °C, the average annual sum of precipitation decreased by 5.6% (in the southern plains the decrease was more than 10%; in the mountainous north there was a rise of 3% during the century). Spatial concentration in the fall of precipitation is accompanied by a concentration in the time division of this precipitation, i.e. periods of "drought" are lengthening and the timeframe in which the majority of precipitation falls is getting shorter. Local processes over huge areas exploited by human beings are changed into global processes and together with processes that occur without the assistance of human beings they create the phenomenon known as *global climate change*.

Figure 1 Precipitation patterns for last 100 years



Stable climate can be maintained by water vapour (H_2O) which requires water to be present on land so that it can evaporate. If it is not, then a great part of solar energy is changed into sensible heat. In a country saturated with water, up to 80% of radiation can be converted into latent heat via evaporation.

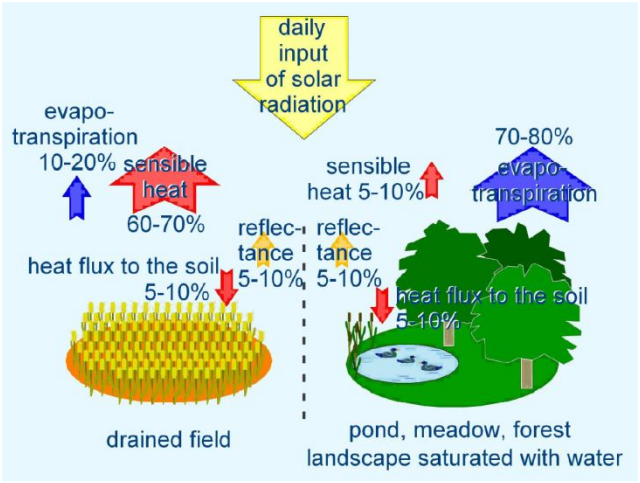


Figure 2 Distribution of solar energy on dehydrated and hydrated surface

Results and disscussion

Part of the climatic change which is the result of human draining of a land, can be reversed through intentional watering of a land and a renewal of the water cycle. It can be achieved through comprehensive conservation of rainwater on land. The state of the Slovak countryside before the advent of communist homogenization can inspire a wide range of possibilities for increasing the water-holding capacity of the land: scenic mosaics of ploughlands, meadows and veldts separated by terraces and vegetation strips, added by meandering rivers, water bodies and wetlands.

Comprehensive conservation of rainwater and enabling its infiltration and evaporation can stop or moderate the trend of regional warming - temper extreme weather events and ensure a growth in water reserves in the territory, curb erosion, increase soil fertility and biodiversity, prevent the likelihood of droughts, floods and fires. Investment costs for implementation and the maintenance of the measures in the first period are estimated to be worth roughly 0.1% of the country's annual GDP, which is less than the other proposed solutions and incomparably less than expected damage as a consequence of climate change.

Given the conditions in Slovakia, visible results are expected in a relatively short period of time estimated to take about 10-15 years after applying measures. The described insight represents a cardinal innovative input for the economic sector. It sets direction for private and state water management, agriculture and forestry companies disoriented by the changing climate and water-management conditions. At the same time it affects a much broader circle of professions and activities, such as land planning and development, architecture, construction, to which it provides an impulse and outline for a prudent treatment and upgrade of the land.

Conclusions

Humanity is not helpless in combatting climate change and environmental degradation. In fact, we do not need to start preparing for the worst. Instead we should proactively seek to address the root causes of climate change that are within our control, preventing the excess runoff of rainwater from the land. Through conscious and systematic retention of rainwater on land, an area's microclimate and ecosystem can be restored to a healthy state abundant in water for people and the environment. Water retained on land will simultaneously tackle the various problems faced by an area. It will contribute to a stable climate, mitigate extreme temperature oscillations and reduce the risk of flooding and drought.

In addition to the environmental benefits of retaining water on land, there are numerous social-economic benefits for society. Amidst a global economic slump and rapidly changing environment with consequences on economic growth, the retention of rainwater on land is a welcomed initiative with the potential to tackle the wide ranging socio-economic issues challenging many societies. Water is essential not only to life but to our livelihoods as well. Water allows for the renewal of natural resources which are the backbone of every sector of the economy. The systematic retention of rainwater is an effective mechanism for job creation and sustainable economic growth.

References

Michal Kravcik, Jan Pokorny, Juraj Kohutiar, Martin Kovac, Eugene Toth. *Water for the Recovery of the Cliamte: A New Water Paradigm.* Kosice: Typopress-Publishing House, 2008.