WHITE PAPER

WATER

FOR CLIMATE HEALING

A NEW WATER PARADIGM

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PICTURE CREDITS: Authors

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT OF THE SLOVAK REPUBLIC

PEOPLE AND WATER

ENKI o.p.s.

BIOTIC PUMP

VOICES OF WATER FOR CLIMATE

WATER HOLISTIC

A CLIMATE CRISIS is manifesting as a water crisis. Many communities experience climate change through changes to freshwater systems. Freshwater will be not a renewable resource if land degradation continues! Business-as-usual drives the climate risks over the blue water and green water thresholds, with a threat of shutting down the functioning ecosystems along with dire social and economic consequences. The good news is that watershed restoration and land rehydration can reverse the trend. Freshwater has been a renewable source for millennia as a "green water" since the plants, soil biodiversity, and wetlands began to maintain and recycle the rainwater over land.

THE OBJECTIVE IS TO SUPPORT **WATERSHED RESTORATION AND LAND REHYDRATION** THROUGH:

- reforestation
- natural-based solutions, rainwater harvesting, **decentralized aquifer recharge and storage,** and natural sequence farming practices to sustain farming communities to successfully navigate the task of producing food, fiber, and biomass while also being stewards of our natural assets.
- regenerative agriculture, re-wilding practices, permaculture, agroforestry, and agroecology
- blue-and-green-infrastructure, low-impact urban development, and redesigning cities to reduce heat island effects and improve soil sponge benefits.
- nature-preserve conservation with the understanding that Earth's boundaries and capacity for self-regulation are severely stressed in the Anthropogenic era. However, humans can play a vital part in ecological restoration, reinstating the system.
- floodplain and riparian restoration

The New water paradigm shift white paper is directly relevant to the UN Sustainable Development Goals Water (6) – Energy (7) – Food (2) – Climate (13) – Ecosystems (15) and is based on the **nexus of water, energy and carbon cycles,** integrating hydrology, food, ecosystems, and climate connection, because they lead to better outcomes of soil carbon absorption while securing clean water, food, biodiversity resilience, and climate stability. Carbon follows water. There is absolutely no question that when you're holding water in the landscape, you're putting carbon back in the landscape, and making it more productive.

IN THIS HOLISTIC CONCEPT THINKING WHEN WE SPEAK ABOUT:

- **WATER,** we speak Earth's water cycles being modified by humans.
- **ENERGY,** we discuss distribution of solar energy in the terrain, focusing on ground moisture and solar-powered vegetation's effect on climate. Renewable energy resources all depend on sun and water cycle. Forest-driven water and energy cycles are poorly integrated into regional, national, and global decision-making on climate change mitigation and land use management. Fossil energy also evolved due to the role of plants in the water cycle. Without plants, we would not have freshwater, so why are we stripping the soil bare in urban and farm lands?
- **ECOSYSTEMS,** we speak about soil biodiversity, plants, and essential part of people in the water cycle and the need for integrated cross-scale management of watersheds.

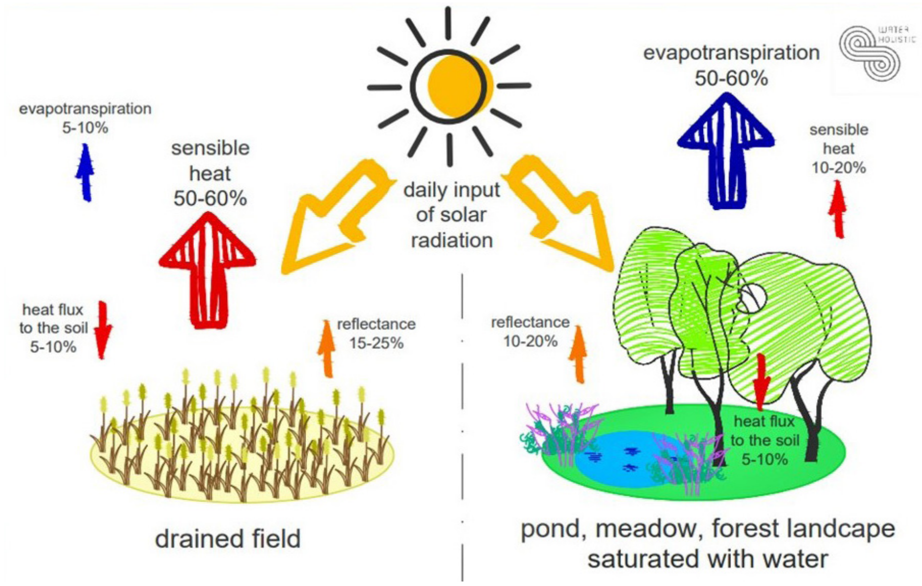
THE WHITE PAPER ALSO SUPPORTS OTHER SDGs:

1 NO POVERTY | 3 GOOD HEALTH AND WELL-BEING | 4 QUALITY EDUCATION | 8 DECENT WORK AND ECONOMIC GROWTH | 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE | 10 REDUCED INEQUALITIES | 11 SUSTAINABLE CITIES AND COMMUNITIES | 12 RESPONSIBLE CONSUMPTION AND PRODUCTION | 14 LIFE BELOW WATER | 16 PEACE, JUSTICE AND STRONG INSTITUTIONS | 17 PARTNERSHIPS FOR THE GOALS

KEY FINDINGS

1. Climate change has intensified due to the impact of land and watershed degradation and the associated acceleration of rainwater runoff, deforestation, vegetation cover decline, and groundwater recharge.
2. Land-use and land-cover changes alter hydrology. Conversion of natural land to agricultural and urbanized land reduces soil water infiltration, worsens water quality, increases overheating of the landscape, and accelerates surface runoff, disposing moisture from the continents out to the sea, raising sea levels. Moisture recycling decline, wetland loss, and deforestation drive the heatwaves.

DISTRIBUTION OF SOLAR ENERGY

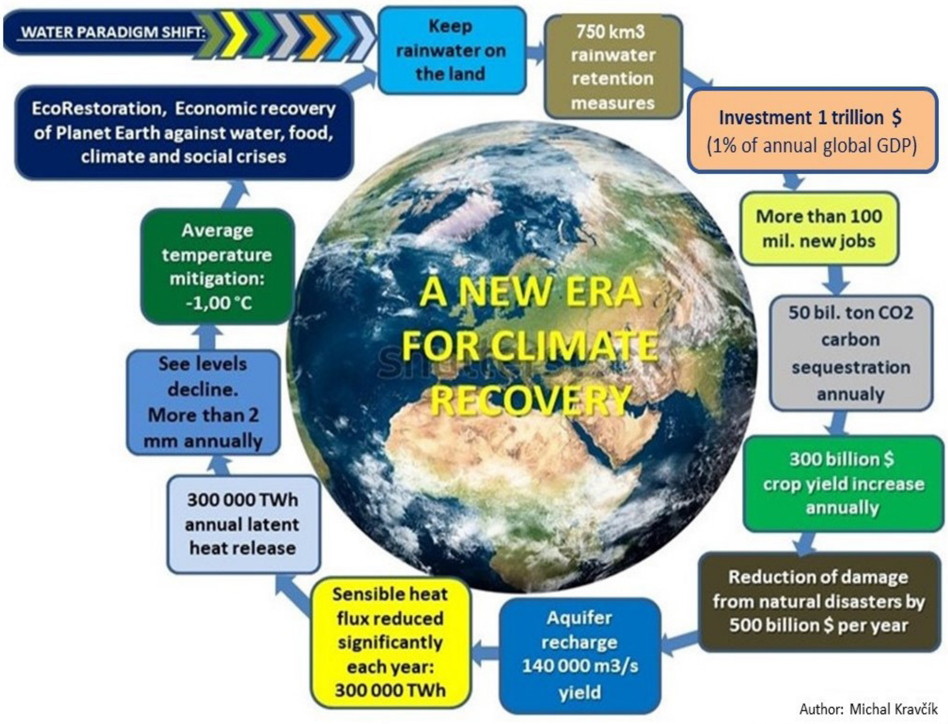


Scheme 1: In a well-watered country with lush vegetation, most solar energy is used to cool plants by evaporation and transform it into latent heat, which is transported by evaporated water to cooler layers of the atmosphere. With a lack of water in the landscape, vegetation suffers with the release of heat into the atmosphere due to the decrease in evaporation

3. The public sector and scientific institutions must systematically monitor changes in groundwater levels decline, the rise in average temperatures due to the soil degradation. Carbon footprint is not a sufficient climate risk indicator. Human heat island footprint will monitor the impact on evaporative cooling, moisture recycling and climate.
4. Adverse developments are still reversible and financially manageable, if we act now. National planning codes and landowners' systematic involvement in land rehydration, reforestation, and revegetation will improve soil moisture and watersheds, restoring the ecosystem function of water, plants, and soil.
5. Financing the water retention capacity restoration on land through decentralized soil remediation will restore terrestrial water cycles. The most effective global solidarity and the road to climate recovery starts with watersheds.

KEY SOLUTIONS

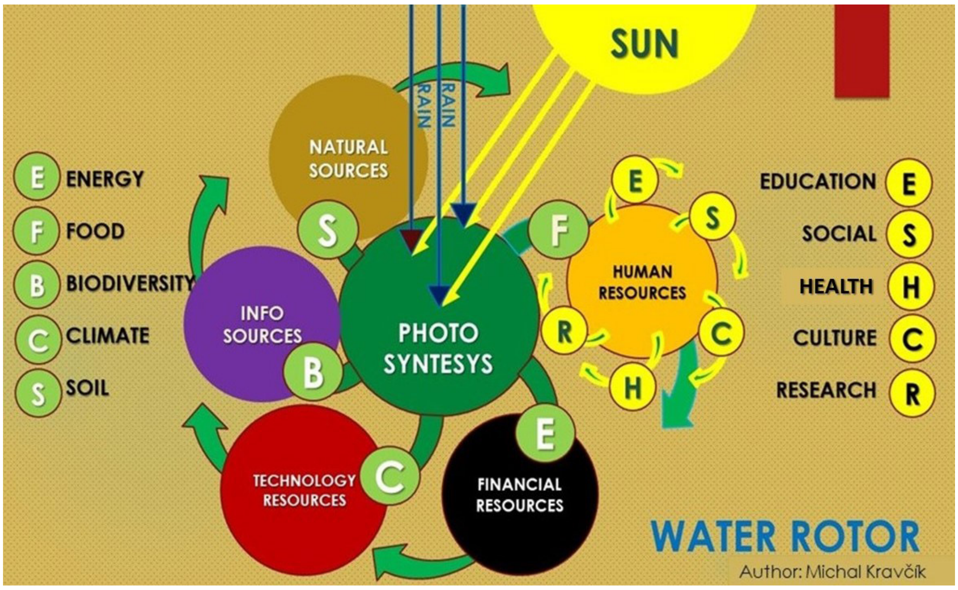
1. **To recognize the fundamental importance of water in the Earth's climate system and the profound impact of land use** and land changes on transforming the temperature conditions, hydrology, and biodiversity.
2. **To recognize that each plot of land, each square meter or acre of land impacts on the** total area of the continents of 136 million km² (excluding ice cover) in terms of climate stability and water circulation.
3. To adopt a **Global Programme of Action for Land Rehydration and Restoration**. Small water cycles – moisture recycling on land – will stabilize climate. The ecosystems will shut down unless we start restoring land up to scale. Conserving 30% of the land is important but insufficient to avert desertification in many regions. The individual UN Member States must reverse the tipping points through land restoration.
4. To research and monitor land use and land changes **(LULC) impacts on watershed hydrology** and rainwater capture and as drivers of urban and agricultural heat islands contributing to climate change.
5. To support the introduction of global, national and sectoral **financial solidarity** mechanisms between firms, public administrations, citizens, and land users who can **rehabilitate soil and climate.**



Scheme 2: New Water Paradigm shift provides global system solutions. Keeping rainwater on the land will renew small water cycle flow and moisture recycling, augment water resources, increase carbon sequestration, decrease temperatures, create new jobs, and mitigate climate risks, such as floods, droughts, and sea level rise.

WATER CYCLE INTERPRETATION AS A NEXUS OF HUMAN SOCIO-ECONOMIC TOOLS AND COMPLEX BENEFITS

Scheme 3: The water cycle is powered by Solar energy, Earth's rotation, and gravity. There would be bare ground without plants and soil, scorched by solar radiation. The global water budget balances water cycles on continents and oceans. The water cycle can be compared to the operation of the water rotor.



THINK GLOBALLY, ACT LOCALLY: THE SMALL WATER CYCLES REHYDRATE THE LAND SURFACE

1. **The water cycle's stability on land depends on land use,** the soil's health and moisture content, available rain, and vegetation. Total Earth's land surface amounts to 136 million km^2. Human spatial pressure on land altered the continents from intact to highly modified at global, biome, and ecoregional scales, profoundly impacting the hydrology and climate of the river basins.

   Each landowner and community are stewards of climate and are responsible for climate change mitigation according to the size of their property because land management can affect drought and floods. Each square meter, each acre of soil is the primary soil climate unit that affects the small water cycle. Each land parcel is a micro-basin within its water catchment and watershed.

   Small water cycles recycle evapo-transpiration through plants and soil moisture. They generate mild, regional weather within each river basin. In these small cycles, rainwater that falls here stays around and returns to earth as rain, dew, mist, and fog. The power of the small water cycles originates from every inch of soil and depends on how the land is used. If the ground is overdeveloped and sealed by the concrete, the power of the water cycle is practically zero. The small water cycles are responsible for around 60% of the moisture area gets. The more moisture stays locally in plants, soil moisture, or wetlands; the less water volume feeds the large atmospheric rivers. The more water recycles in the small water cycles, the less extreme weather intensifies. Integrated land and watershed restoration will restore small water cycles. ACTION PLAN: Improved soil absorbency will ensure more available moisture on the ground to create evapotranspiration and mild rain, reducing drought risks and crop loss and preventing flooding risks.

   Contribution to the fulfillment of the SDGs:

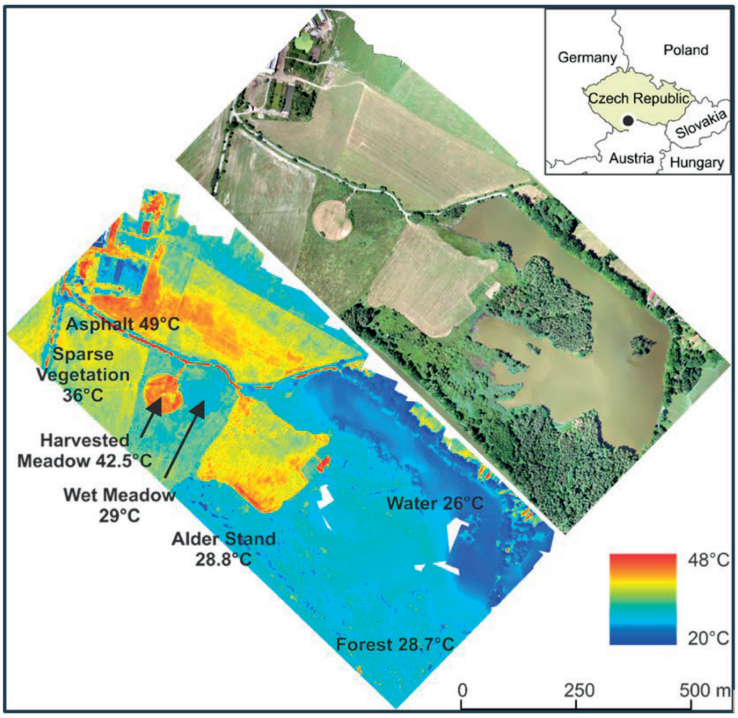
Scheme 4: The evaporation of water from the leaves of plants is sometimes mistakenly referred to as "water loss." However, the picture on the left shows that water is not lost but gets recovered. Moisture will remain in the landscape, with vegetation. Heavy air with water vapor rises slowly upwards, and after condensation of water vapor, the water returns back as fog, dew, or rain. We call this the small water cycle.

2. **Plants** are vital in regulating small water cycles and stabilizing local, regional, and global climates. They transform CO_2 into biomass, soil, and oxygen quickly and in large volumes. They facilitate the necessary evaporation of water from the landscape, cooling the surrounding environment, soil, and air. Photosynthesis is the engine of this process, and therefore, of the small water cycle ($6\ C0_2 + 12\ H_20 + SUN \text{-->} C_6H_{12}0_6 + 6\ 0_2 + 6\ H_20$), the energy source of the process is solar energy. Plants work hard at transpiration, and hundreds of water molecules evaporate for each carbon dioxide molecule and oxygen release. "Plants spend less than 1% from the sunshine on photosynthesis and 50 – 60 % on evapo-transpiration, transpiring water from roots through their leaves via stomata. Evapo-transpiration sustains the local rainfall feedback cycle (called small water cycle) and balances temperature differences. Dry surface does not cool itself by water evaporation, it overheats, air gets warm and ascends fast up taking humidity from around. 50 – 60% of incoming solar energy is released as sensible heat." On a sunny day, plant's fuel is recharged by sunshine – hundreds of watts per square meter. (Sun still powers up the plants and the photosynthesizing organisms when cloudy, but with less wattage, as clouds absorb the sun rays before they hit the ground).

   When students cover photosynthesis at school and Calvin cycle, the role of plant transpiration is often neglected. With land-use changes, there is a decrease in the vegetation cover of the landscape and drainage of the soil, which reduces the fundamentally active evaporative cooling of the landscape by vegetation. Therefore, **solar energy accumulates in the form of sensible heat**. This phenomenon is well recognizable in thermal imaging images of the landscape, both as a heat island in a built-up area and in open ground without water and vegetation. Clouds and cloudiness provide only additional cooling of the landscape. The surface of the leaves and external surfaces of plants is many times to an order of magnitude larger than the area of land on which they stand. The same applies to the length of the roots of trees and plants compared to the height of the plant itself. Thus, plants can move and retain moisture over long distances. **Forest transpiration adds water vapor to the atmosphere ~ about 200 molecules of H_2O emitted per each CO_2 molecule fixed, cooling the climate.** For more information on the role of plants in regulating the water cycle, please see the section on the biotic pump on the pages 10–12.

   Contribution to the fulfillment of the SDGs:

Scheme 5: This thermal imaging image clearly reveals heat islands (urban or landscape) in a country where, on a sunny day, instead of cooling by vapor of an average value of 100 mg of evaporated water from a square meter per second (240W/m^2), this energy is released in the form of sensible heat, i. e. heating the soil and surroundings. *HESSLEROVÁ, P., POKORNÝ J., et.al. Daily dynamics of solar radiation surface temperature of different land cover types (2013).*



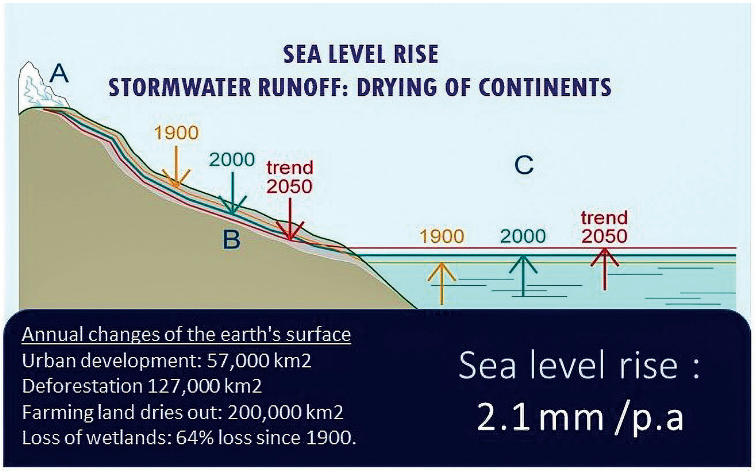
3. **The soil** is the uppermost part of the Earth's crust and land, formed through the contact and interaction of the biosphere, atmosphere, lithosphere, and hydrosphere under the conditions of existing relief. It consists of both organic and inorganic components. Different regions and parts of the world have various types of soil. The primary function of soil is providing nutrients to plants, making it productive. However, the soil also performs other complex functions. **Together with water and plants, soil facilitates the circulation of water, nutrients, and carbon and the transformation of solar energy in the environment**.The complex functions of the soil also include accumulating water, carbon, and nutrients; transforming rainwater by soaking it up and mediating the transformation of solar energy into latent or sensible heat; decomposing biological material and forming nutrients; and distributing rainwater into infiltration, accumulation, or surface runoff, as well as accumulating, protecting, or releasing nutrients and carbon from the soil.
   Contribution to the fulfillment of the SDGs:

4. **The importance and role of rainwater.** Rainwater is a vital source of water in the environment. It plays a crucial role in water circulation by affecting the soil gravitationally and through evaporation from the landscape and plants. Water in the water cycle undergoes constant changes in state (most often from liquid to gaseous or solid) and constantly changes its location and duration of stay. It works together with minerals and living organisms. Thanks to the high heat capacity of water, it facilitates heat transfer both horizontally and vertically, including in oceans and seas, as well as from the ground to higher atmospheric layers such as the upper troposphere, where it safely passes and subsequently returns to earth. Each piece of land has its basic water budget for the year, determined as the product of the average annual precipitation and the land area. Other contributions to the land's water budget include groundwater and water from streams. The efficiency of the water cycle on a piece of land depends on the soil's water retention capacity, surface structure, soil health, and vegetation cover. 100% of continental rainfall passes through the land, whether it be forests, agricultural land, roads, or built-up areas.

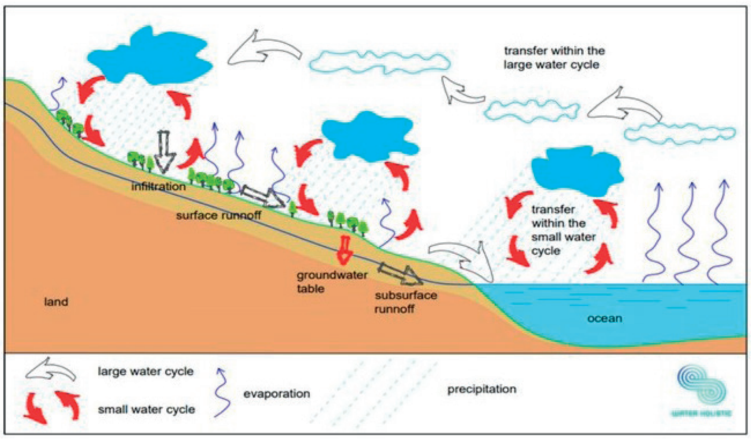
   Contribution to the fulfillment of the SDGs:

BALANCE OF SMALL AND LARGE WATER CYCLES, IMPACT ON WATER TABLES DECLINE, AND SEA LEVEL RISE

While a large water cycle represents the circulation and exchange of water between continents and oceans, small water cycles occur either over continents or oceans. The large water cycle in a steady state ensured a balanced water supply to the oceans by river network and air humidity without rising ocean levels. The new water paradigm brings the interpretation and description of the links between small and large water cycles. Long-standing land-use changes in favor of agriculture and urbanization, the reduction of soil cover, the deterioration of soil biology, and the advancing drainage of land on the continents have several consequences. These include the growth of surface runoff, a decrease in the flow of rainwater into the soil, a reduction in the evaporation of water from the land, the development of heat islands over the dried-up landscape, and groundwater levels decline. Ocean and sea levels, on the other hand, are rising.

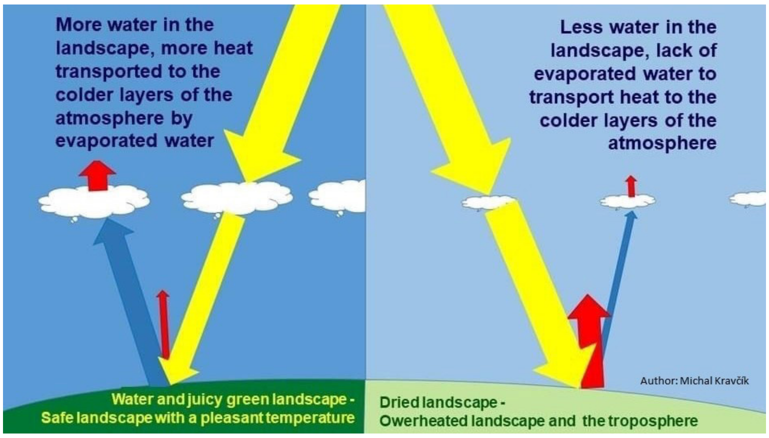


Scheme 6: Worldwide, there is no data that demonstrates exactly how much rainwater is lost from small water cycles annually from the continents to the oceans. Research in the nation of Slovakia shows an annual loss of 250 million m^3 through stormwater runoff drainage. Based on the assumption that Slovakia has an average rate of dehydration from degraded landscapes, it follows that globally there could be a loss of 750 km^3 of rainwater a year, which had previously been included in small water cycles. This corresponds to a resulting 2.1 mm rise per year of ocean levels. Here we may find a direct link between the drying of the continents and rising sea levels. Also contributing to the rising levels is fossil water that is pumped from underground and not returned to the hydrological cycle, but instead made to flow to the oceans; this annual increase is 0.8 mm. Since 1993, sea levels have risen annually by 3.3 ± 0.4 mm, which corresponds to the estimated total volume of water drained from the continents.



Scheme 7: The large and small water cycles on land and oceans.

THE ROLE OF PLANTS AND WATER IN A DISTRIBUTION OF SOLAR ENERGY IN THE LANDSCAPE AND ATMOSPHERE



Scheme 8: Scheme of heat fluxes in the atmosphere with sufficient water and vegetation in the landscape (left part of the picture) and lack of water and vegetation in the landscape (right part of the picture)

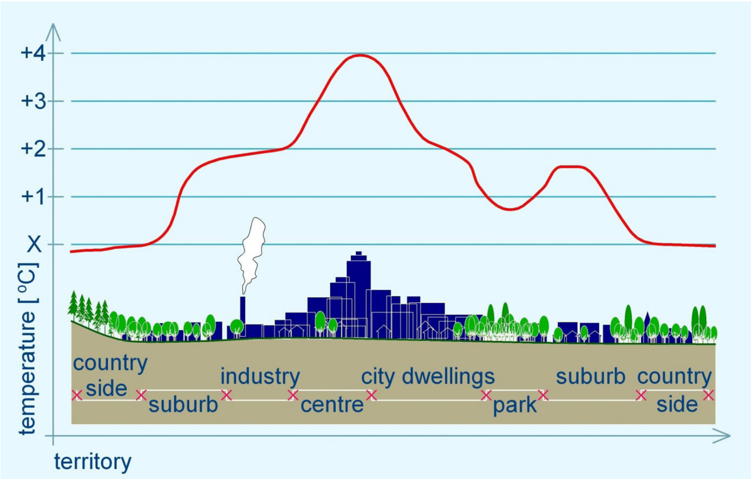
Life on land is powered by the sun and gravity. Water, managed and recycled by plants, and the living (biotic) principles are the processes that enable living systems to build and evolve. Hydropower will remain renewable only if the plants, wetlands, and living organisms ensure a positive rainfall feedback loop.

Humans act as if rain is an endlessly renewable resource. That is different from increasing desertification! Governments and their people must understand that water returns over land thanks to evapotranspiration through vegetation, the regoliths, natural soil sponges, and wetland systems. In interaction with the sun's energy, the water-carbon cycle is the cornerstone of life on Earth. The sun provides energy for photosynthesis and evapotranspiration, which allows plants to grow and produce oxygen. The sun powers up plant life. People usually understand that photosynthesis is essential for plants to grow and for crops to produce yields, but they often forget about the critical role of a plant's transpiration. For every carbon dioxide molecule received, several hundred water molecules transpire through the stomata of plant leaves (except succulents). It is paramount that the UN water conference attendants do not separate water vapor transpiration from photosynthesis. Water is vital to life and allows the transport of nutrients and substances in the bodies of organisms.

The water cycle begins with evaporation when the sun warms the soil. This causes chemical and biological processes in the ground, vegetation growth, and water evaporation into the atmosphere. The water vapor then merges into clouds, which move and eventually condense, returning water to the Earth's surface as rain, snow, or dew. When rain lands on the soil, it soaks into it. Water accumulates there and flows through the springs into streams, rivers, and eventually to the sea. Plants use the water that remains in the soil through photosynthesis. It is the most ingenious biomass factory, the essential food chain for the animal kingdom and humanity. Some rainwater superficially drains during more intense precipitation if the land is degraded. There is much less water penetrating the soil. This dampens the processes of photosynthesis on the Earth's surface, does not bind carbon to biomass, and less solar energy is consumed to evaporate water into the atmosphere. It is also a major source of flooding. Drained areas overheat, relative humidity decreases, cloud cover drops, less fog and dew, and more solar energy stays as sensible heat. Less moisture and clouds result in less solar radiation absorption.

Temperature extremes increase day to night; temperatures differ between dry and moist surfaces. In a dried-out country, there tend to be higher temperature extremes, including morning frosts.

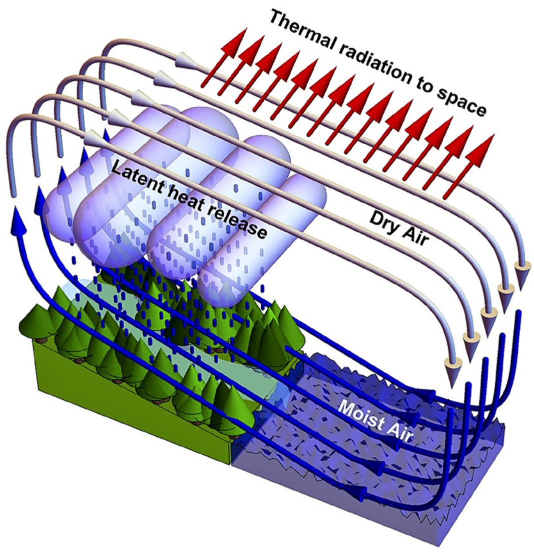
In a growing forest, the afternoon temperature can be, for example, 22 degrees Celsius, morning temperature 18 degrees Celsius, so the average is 20 degrees Celsius. When the forest turns into fields or urban development, the afternoon temperature is 28 degrees Celsius, and the morning temperature is 12 degrees Celsius; the average temperature is again 20 degrees Celsius. However, average temperatures also increase over time. During April, the number of days with morning frost rises due to the higher flow of heat into the atmosphere (less greenhouse effect). In this context, we can give an example that in the region of Třeboňsko in the Czech Republic, an increase in solar energy input of 5% has been recorded over the past 14 years.



Scheme 9: The most intense heat islands are formed above the most drained and reshaped earth's surface. See also: **The impacts of greenery on urban climate and the options for use of thermal data in urban areas** Hesslerová , Jan Pokorný, 2021

ACTION PLAN: Support rainwater retention measures, green-and-blue infrastructure, and nature sequence farming practices and agroecology, and agroforestry. Encourage reforestation and afforestation of degraded lands using appropriate tree densities, to foster groundwater recharge by improving infiltration, preferential flow and reducing losses through soil evaporation.

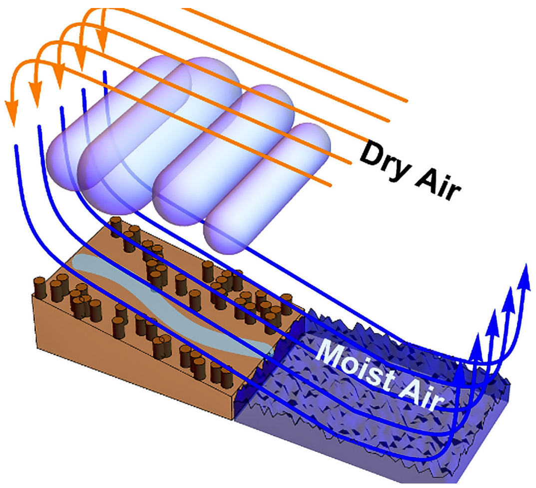
BIOTIC PUMP PRINCIPLE – FLOW AND EXCHANGE OF THE AIR MOISTURE BETWEEN CONTINENTS AND OCEANS



Scheme 10: In the wet regime, a healthy natural forest is obviously associated with an abundant water cycle. When forest degrades, so does the water cycle. Less forest, less river flow

Humans are dependent on the weather and water cycles over land. Freshwater, a life force necessity, is continuously removed from the ground by river runoff. Natural forests draw atmospheric moisture from the ocean to any distance inland, functioning as a biotic pump, and in so doing, compensate for the gravitational runoff of fresh water, generate rainfall, and maintain optimal soil moisture content. Deprived of forests and wetlands, the land will turn into a desert that does not recycle oceanic moisture, thus breaking the primary feedback loop necessary for life. Forests make rivers.[7]

The biotic pump concept explains how restoring the small water cycle (i.e., enhancing evaporation of rainwater) can enhance the large water cycle, which determines how much moisture is imported from the ocean. This influx, which in the steady-state is equal to the river streamflow, determines among other things how full the rivers are. Not incidentally, the mightiest rivers on Earth are where the vegetation is flourishing. This biotic mechanism of atmospheric moisture transport works as follows. Evapotranspiration moistens the atmosphere. The more humid the atmosphere, the greater the probability of the ascending air motion and precipitation due to the pressure changes associated with condensation in the ascending air. Ascending air motion is not possible without a horizontal air inflow, which brings additional moisture. Evapotranspiration regulates atmospheric humidity and thus controls moisture inflow from the ocean inland. Recent data analyses confirm that atmospheric moisture convergence (i.e., the net moisture import) increases upon land re-greening at a comparable rate to the increase in evapotranspiration (approximately 0.4 mm/year on a global scale). [reference: Makarieva et al. 2023 GCB, https://doi.org/10.1111/gcb.16644, Cui et al. 2022 https://doi.org/10.1038/s41561-022-01061-7]



Scheme 11: Change of air circulation induced by deforestation causes river flow to decline and the water cycle to become erratic. In this dry regime, it appears that the additional trees would steel the scarce river flow.

Scheme 12: The lack of water and vegetation forms a thermal barrier on the land and limits the flow of water vapor from the atmosphere above the ocean to the atmosphere above the land (the principle of the 2nd thermodynamic theorem also applies – the biotic pump acts from the land to the sea, because the dried land is overheated).

INSTITUTIONAL SUPPORT FOR LAND RESTORATION AND RENEWAL OF SMALL WATER CYCLES

1. **Monitoring of small water cycles and integrated planning.** Changes in land use and soil condition need to be regularly monitored. Land use changes have occurred on a large scale over decades. Monitoring water circulation and impact assessments involve five key indicators (see page 17) of soil health and climate stability. Monitoring enables the evaluation of risks and the proposal of appropriate adaptation and management measures in river basins to restore small

water cycles and reduce flood and drought risks. The soil and landscape structure assessment at the local level is the basis for integrated planning, which creates space for the participation of local communities and stakeholders and the preparation of action plans. It allows for assessing soil conditions and changes in land use within individual states, river basins, and municipalities, as well as their impact on the hydrology and climate of the river basins.

Contribution to the fulfillment of the SDGs:

2. **Maintaining and restoring small water cycles in the ecosystems** involves sustainable care for the landscape structures, soil, and integrated rainwater management. Each square meter of land and every drop of rainwater counts. The goal is to restore and ensure sustainable water circulation in the country, closing water cycles over short distances. The key is to implement nature-based decentralized adaptation and management measures extensively throughout all landscape structures with good care for soil and land. Each plot of land will support ecosystem functions that benefit the catchment area, the entire watershed, and the regional and global climate. The excellent water retention capacity of the soil and landscape structures on individual plots represents a decentralized public infrastructure.

   Contribution to the fulfillment of the SDGs:

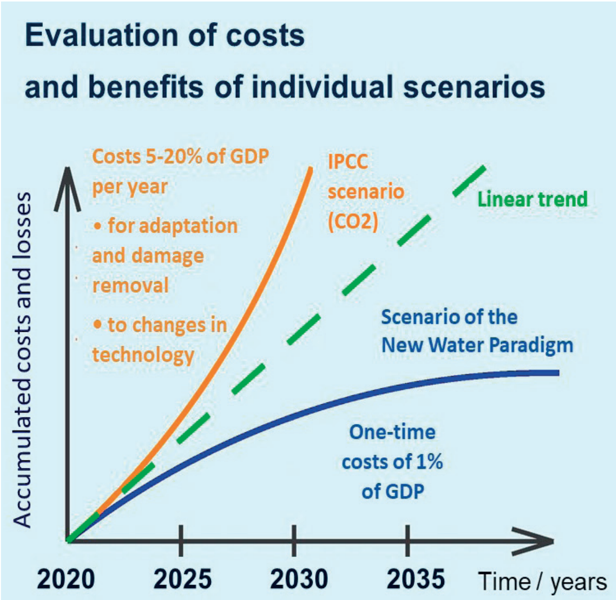
3. **Financing the maintenance and restoration** of small water cycles in the country is an integral part of the solution. Regardless of ownership and use, every piece of land contributes to the Earth's global climate system. Therefore, it is necessary to ensure a robust solidarity mechanism based on the principles of subsidiarity, which will provide financial support for implementing adaptation measures and sustainable soil management practices. Such a system is the assessment and financing of soil and landscape ecosystem services. Such funding should support the decentralized protection of soil and the restoration of water resources by local communities and stakeholders with the support of public policies. Such financial support is a transparent and fair motivation for landowners and users because their land contributes to the stability of the Earth's climate system. The private sector, citizens, and public sector can finance such a solution, which is also financially efficient and supports employment in every region and community.

   Contribution to the fulfillment of the SDGs:

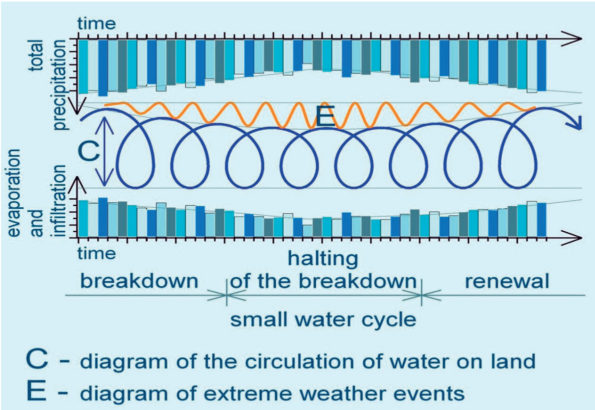
FROM GLOBAL ACTION PLAN TO LOCAL ACTION PLANS

Territorial level of action plan	Examples of Action Plans – see references as well	Target of increase water retention capacity within 15 years
Global Action Plan (GAP)	GAP 2015	750 km^3
National Action Plan (NAP)	NAP Slovakia 2010	250 000 000 m^3
Regional Action Plan (RAP)	RAP Kosice region, Slovakia 2018	60 000 000 m^3
Community / village / city / local action plan (LAP)	Bioklimatický park Drieňová Muloon Institute, Australia	From 100 000 m^3 and more in the cadastral area
Individual / Citizen Action Plan	A citizen of the planet	100 m^3

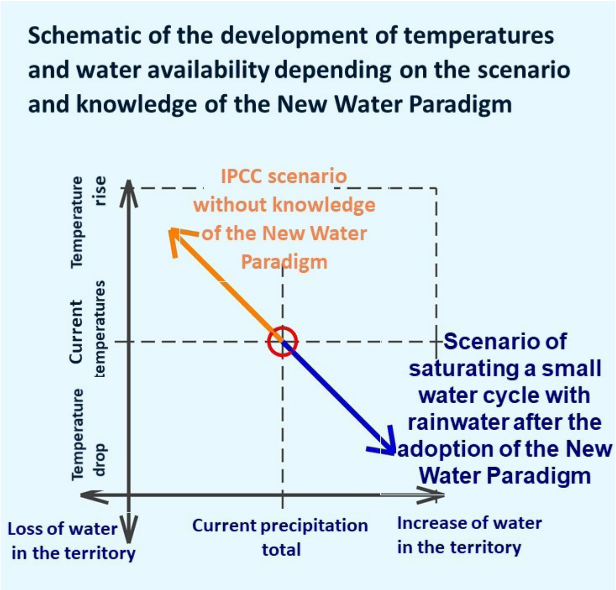
1. As a first step, it is necessary to slow down to stop the decrease in water retention capacity due to changes in its use. New public policies for urban development and agriculture will help.
2. By preparation and implementation of the adaptation (nature based solutions, new landscape features, new water retention measures, new water holdings, blue and green infrastructure) and management measures (regenerative agriculture, rainwater harvesting in cities, communities, in forest, and agricultural land) we will increase significantly lost water retention capacity.



Scheme 13: Evaluation of costs and benefits of individual scenarios of green investments in climate change adaptation



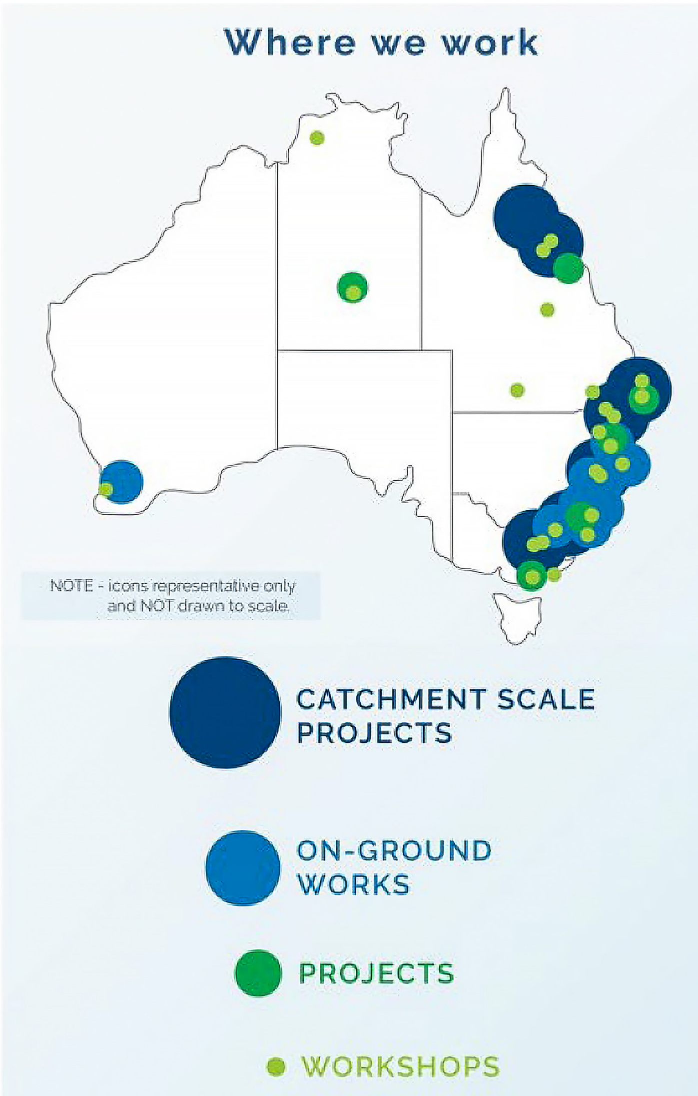
Scheme 14: Interpretation of climate recovery potential due to renewal of small water cycles on continents and systematic increase of water retention capacity of soil and landscape structures. Rainwater, plants, soil and sustainable land management secure sustainable water. The more moisture stays locally in plants, soil moisture, or wetlands; the less water volume feeds the large atmospheric rivers. The more water recycles in the small water cycles, the less extreme rainfall occurs.


Schematic of the development of temperatures and water availability depending on the scenario and knowledge of the New Water Paradigm
IPCC scenario without knowledge of the New Water Paradigm
Scenario of saturating a small water cycle with rainwater after the adoption of the New Water Paradigm
Temperature rise
Current temperatures
Temperature drop
Loss of water in the territory
Current precipitation total
Increase of water in the territory

Picture: Example of adaptation measures in Košice, Slovakia (before, after implementation and now)

EXAMPLE OF GOOD PRACTICE

In Australia, the not-for-profit, **The Mulloon Institute** is leading the charge in Australia to inform farming communities of the benefits to land and productivity that the *New Water Paradigm* brings. The Mulloon Rehydration Initiative is restoring 50 km of creek running through 20 properties and covering 20,000 hectares. Based on the pioneering work of Peter Andrews OAM, this project has seen the return of water, biodiversity and productivity to the system.



Scheme 15: "The United Nations named the not-for-profit Mulloon Institute in 2015 as one of five global demonstrators of sustainable, productive and profitable farming systems".
See UN recognises unique Australian farm built around Natural Sequence Farming as sustainable - ABC News

KEY INDICATORS OF SOIL HEALTH AND CLIMATE STABILITY

- They include: water retention capacity of soil and landscape structures; agrochemical parameters of the soil; the proportion of vegetation cover of the soil; soil erosion and soil sealing rate; the content of organic material in the soil; heat impact (sensible heat foot print)
- The above indicators need to be evaluated on an annual basis, as well as their trends
- Based on this assessment, we can determine the level and rate of risk, as well as the level of improvement in soil and rainwater management. We can also determine the level of risk reduction if sustainable adaptation and management measures are implemented in a given area

KEY MILESTONES OF THE STUDY "WATER FOR THE RECOVERY OF THE CLIMATE – A NEW WATER PARADIGM" BETWEEN 2007 AND 2022

2007 – formulation and publication of the study "Water for the Recovery of the Climate – A New Water Paradigm" by a team of authors. Developing broad international cooperation of organisations and individuals in the field of restoring ecosystems, soil and water resources.

2008 – presentation of the study "Water for the Recovery of the Climate – A New Water Paradigm" at the World Expo in Zaragoza, Spain.

2009 – Košice Civil Protocol on Water, Vegetation and Climate Change (and COP15). The author's team received the Award of the Minister of the Czech Republic. „Presentation of New Water Paradigm – key role of water in the climate of the Earth.on Green Week in Brussles – Climate Change: act and adapt.

2010 – government interdepartmental economic Program of Landscape Revitalization and Integrated River Basin Management of the Slovak Republic with the definition of the target value of increasing the water retention capacity of the country by at least 250 million m^3 for repeated set up target of retention and containment of rainwater. During the initial year, 488 municipalities and towns and 10 thousand workers were involved in the implementation of the measures and reached the target of 4%.

2015 – formulation of the Global Action Plan for the Restoration of Natural Water Cycles and Climate.

2018 – approval of the Landscape Restoration Programme of the Košice Self-Governing Region in the Slovak Republic with the definition of a target value for increasing the country's water retention capacity by a minimum of 60 million m^3 for the repeated retention and containment of rainwater in the territory of the region with 440 municipalities and towns.

2019 – The European Commission presents an ambitious plan – the European Green Deal. SIM4NEXUS – participation of co-authors of the study in an international scientific project.

2021 – formulation of the concept "Soil – Carbon and Water Bank of the Landscapes", which proposes to extend the state policy in the field of soil protection of the Slovak Republic to the evaluation and financing of ecosystem services of soil and landscape; we support all SDGs.

2022 – presentation of the concept "Soil – Carbon and Water Bank of the Landscapes" at the world expo EXPO DUBAI, at the FAO, the European institutions, as part of the interdisciplinary dialogue on soil, water and climate; the IPPC's sixth assessment report included for the first time a chapter on the water cycle.

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