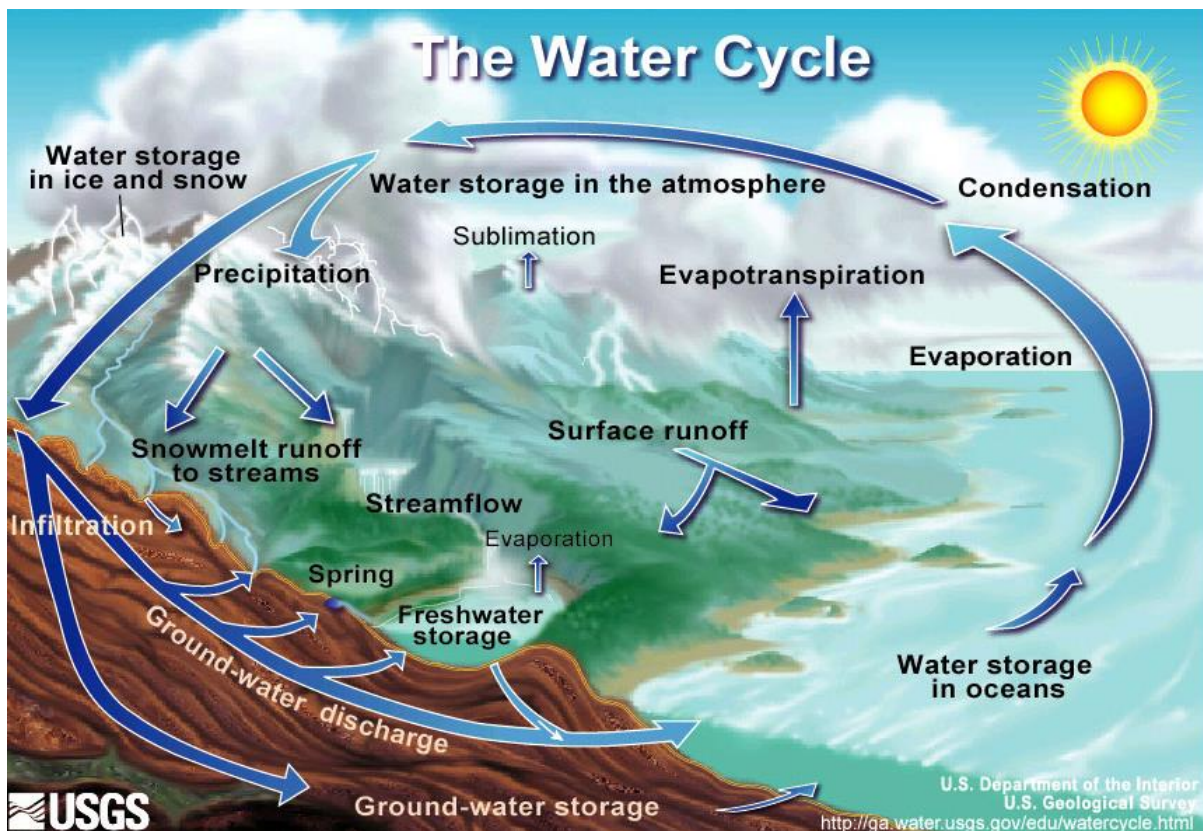


## Article 4 - Water water everywhere, less than 1% to drink.

Practically every day we hear of natural disasters, be that record breaking temperatures, worst flood in a millennium record, loss of crops due to hail, or forest fires in California, Australia, the Amazon forest, or even locally with the recent tragic forest fire that burnt 55km<sup>2</sup> in a matter of hours.

To some degree, all these events can be attributed to a broken water cycle.

The water cycle is simply the natural movement of water around the planet; from the oceans/seas, water evaporates into the atmosphere and with the right conditions, clouds form and then at some point, the water falls as rain, hail, or snow to the earth to replenish the surface and sink into the below-ground reservoirs (aquifers), before returning to the sea/ocean via rivers, and springs. Additionally, there is evapotranspiration (evaporation and transpiration) taking place from land masses, from forests and lakes, urban and rural areas. It is estimated that around 86% of rainfall that remains on the island is lost back into the atmosphere via evapotranspiration.



On our blue planet, the seas and oceans contain just over 97% of the earth's water, leaving about 3% as freshwater. However, of this 3%, 2.5% is unavailable as it's locked up in glaciers, polar ice caps, the atmosphere, and soils, or is highly polluted or too deep underground to be affordably extracted. This leaves about 0.5% left for us to thrive on; to drink, to grow crops, to hold in reservoirs, and strangely enough, to flush our toilets with!

Unfortunately, man's impact on the planet is reducing water availability even further; some estimates indicate that 600 million tonnes of freshwater is being lost (no longer accessible to us) annually from the water cycle due to our stewardship of the terrain.

The water cycle is the most important factor in reversing anthropogenic (impact from man's activity) climate change. Yes, even beyond the reduction in atmospheric CO2 concentration which, some argue is a false promise of a single metric. Gaia, our planet, is a biome of dynamic synergistic ecosystems that has evolved to support life over 4 or so billion years, and although CO2 is a greenhouse gas, it makes no sense to concentrate on one metric (CO2) when the system is dynamic and based on multiple systems interacting in synergistic relationships with each other.

On the other hand, the water cycle interacts with all aspects of Gaia. Water is a magnificent element; it cleans, transports (e.g. nutrients in the body), dilutes, absorbs huge amounts of heat, hydrates, is conductive (allows electricity to pass), is a medium for mobility (e.g. a yacht), and much more.

Water is, with little exception, is a base prerequisite for life; where there is water, life can form.

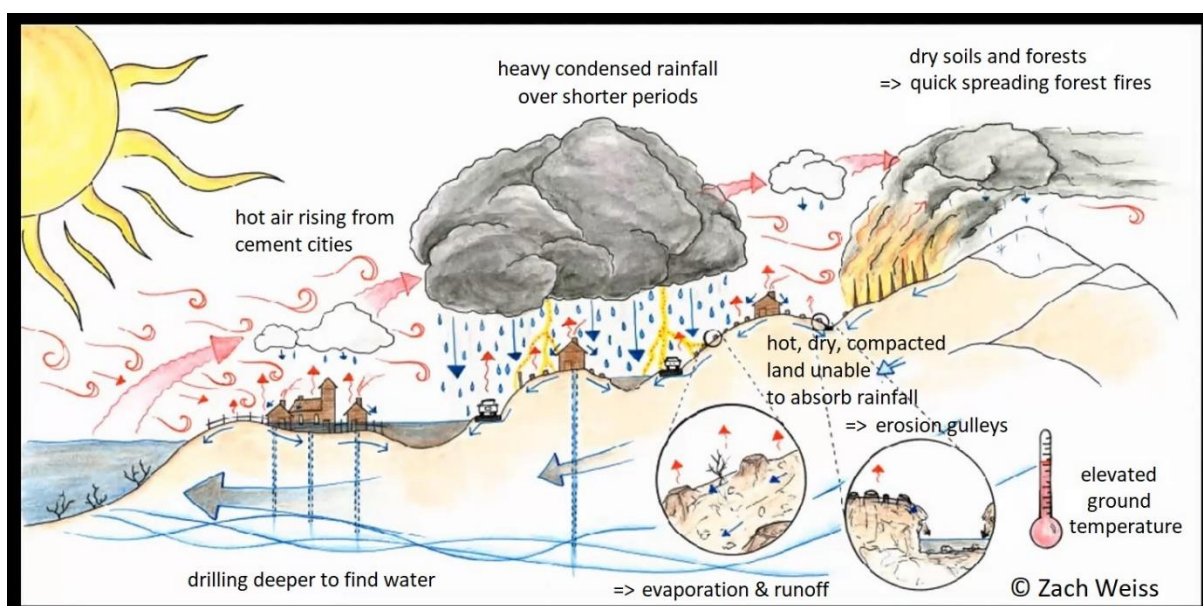
The significance of water cannot be understated, and should be considered when establishing policy, regulations, directives, funding, and so on; in essence each nation, region or area has been provided with a free bank account from Nature - a bank account not based on a financial currency but based on water (a water account if you will).

This life currency is found both above ground (as found in the vegetation, rivers, lakes and dams (or even an ice sheet)), and below ground (in soil, biology, underground rivers, and aquifers. It's interesting to note that there is over 1000 times more freshwater stored below ground than in all the world's rivers, lakes combined (though not all is accessible)!

*Water productivity* is the ability for us to work with water in a way that it helps us become more productive (to thrive). *Water productivity* is possible where we can access/influence it; in rainfall, evapotranspiration, aquifer recharge and runoff.

Therefore, our activities on the earth's surface will determine whether we are depleting our *water productivity*, or replenishing and growing it, and this will reflect the ability of that region to grow and sustain life.

## Depleting Water Cycle

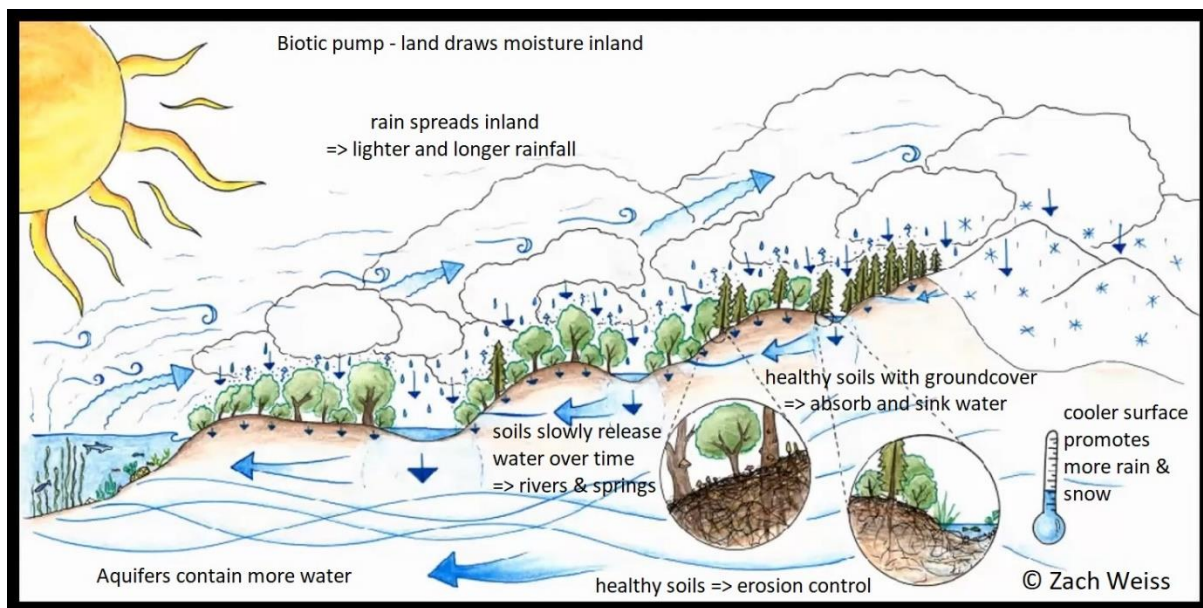


In Cyprus, as in many areas around the world, currently our land is becoming increasingly arid while we are needing to drill deeper to find water; both indicators of a depleting water cycle.

Take this to a global level; the less water found on and in land, the more water will be found in the seas/oceans and atmosphere, and therefore the more prone to sea-level rise and superstorms (due to drier/hotter land vs 'wetter' skies) we are.

Alternatively, if all nations were to have their own 'Amazon Forest', then they would secure large quantities of water, taking a greater percentage of water from the other parts of the water cycle, while securing the future of their generations.

### Regenerative Water Cycle



Therefore, key to our 'sustainability' as an island, or community, is to interact with the water cycle in a way that will cushion the falling rain, slow the water, and allow it to sink into the ground; in other words, to build our *water productivity*.

### Nature Based Solutions

The most sustainable interventions that have proven themselves in various climates and locations around the world work with nature and could be loosely be brought together under the umbrella title of Nature Based Solutions (NBS).

NBS can encompass the practices of agroecology/permaculture, agroforestry, regenerative agriculture, Silvopasture, regenerative aquaculture and a myriad of other titles, yet they all share common underlying principles of designing and developing projects and practices that work with nature.

NBS are found all over the world, and in many cases, with indigenous people who have lived on the land for generations, or who have long gone, but their technology would still be effective today (recently uncovered is a 2000-year-old water filtration system that used crystalline quartz and zeolite as part of their filtration method; these are commonly found in filtration systems today). Alternatively, in Cyprus we have the World's Healthiest Olive Oil (Atsas Extra Virgin Olive Oil) which comes from a farm near the Skouriotissa Mine, which is only about a decade old, that was designed and developed by Sir Nicolas Netien using these principles.

NBS are designed around the location and the natural environment, and could be anything from terracing the land, or placing obstructions (e.g. check dams/gabions) in rivers and streams in order to slow (not totally stop) water, and to spread the water. Decisions of what to plant where, next to what (for mutual beneficial exchange), building the organic matter in soil and avoiding tilling are just some examples. Most of the work is upfront (including the need for funds and labour) but typically in time these are minimised or eliminated altogether. Fortunately, today the EU is now pushing funding towards sustainable farming under the EU Green Deal.

One example is from Water Holistic, who, with EU funds, implemented around 100,000 of such interventions (see pictures) in a forest area in the Torysa River Basin, Slovakia, in 2005; these are still holding strong and have cumulatively negated the need for a dam to be built, which can be hard to believe.

### **It's all about the Soil**

Soil is an amazing symbiosis of biological life and minerals, which differs from 'dirt' in that it contains biology. The more soil biology (sometimes referred to as Soil Organic Mass (SOG)) there is, the more holding capacity of water the soil provides (some estimates indicate that a 1% increase of SOG in the soil can hold an additional 150,000 litres of water per hectare), which then mitigates runoff of the topsoil (the productive part of the soil).

Soil biology is part of the food web, which consists of 5 trophic levels that include plants/trees, bacteria/fungi, nematodes, all the way up to predator animals; it's a symbiotic relationship. Additionally, carbon is one of the building blocks of life, so the more trees, plants, and biology we have, the more atmospheric CO<sub>2</sub> we absorb and pass on into the other forms of life.

With biodiverse forests or agricultural practices such as agroecology, we have multiple layers of activity/functions with the basis of ensuring water security; when rain falls and we provide ground cover (trees, bushes, cover crops), it hits the plants rather than the bare soil, avoiding compaction and disruption of the soil. The soil itself contains a healthy biology which absorbs, filters and releases over a long period, water. This then rejuvenates our rivers, increasing biodiversity and life along the way.

With a well-established system, we would likely have streams and rivers running throughout the year, increasing the water table in the aquifers (note: currently, the agricultural sector (<3% GDP) in Cyprus uses around 90% of all pumped groundwater), negating the need for large infrastructure such as dams.

Additionally, the vegetation also provides a cooler microclimate (think about a summer day and standing under a tree), and increases biodiversity, which all enhance the ability for rain to fall (trees/plants 'seed' the atmosphere with micro-biology (e.g. bacteria) that attract water droplets that form clouds/rain) and we then end up establishing a regenerative water cycle.

It's a WIN – WIN – WIN situation.