The problem of water scarcity and the risk of desertification

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Cyprus is located at the southern end of the temperate zone within which Europe is located and near the northern part of the arid zone that includes the Sahara Desert in northern Africa. Therefore, it is at risk from even small movements of the boundaries of the above zones and should take measures to address this event.

Desertification, as defined by international conventions, is the degradation of land into arid, semiarid and dry arid areas resulting from various factors, including climatic variations and human activities. It is accompanied by a reduction in the natural potential of the land and a reduction in surface and groundwater resources and has negative impacts on the living conditions and economic development of the people affected by these events.

Droughts occur frequently in areas affected by desertification and are generally a natural feature of the climate of such areas. Occasional droughts (due to seasonal or interannual variations in rainfall) and long-term severe droughts can be caused or exacerbated by human impact on the environment, reduction of vegetation, change in the Albedo phenomenon (reflection coefficient of solar radiation), changes in local climate, the greenhouse effect, etc.

The highest rainfall on planet Earth occurs in tropical climates near the equator. The intense heat generated by solar energy in these places creates high evaporation, causing warm, moist air to rise. The moisture then cools and condenses in the upper atmosphere and falls back to earth as rain. In other words, for precipitation to occur, three things are needed: **Heat**, **humidity**, and subsequent **cooling** of the air.

High levels of heat and humidity we have in Cyprus, especially during the summer months in coastal areas. Could we simulate tropical conditions and have artificial rainfall throughout the summer? The answer is yes, since the only thing we lack is cooling, which we could get from seawater at greater depths, which is at a low temperature compared to the moist surface air.

There are two ways to implement freshwater production with the above techniques. 1) With water production units at the sea surface in coastal areas which will provide water to coastal agricultural units, or 2) In large coastal greenhouses which will evaporate seawater inside the greenhouses and produce all the fresh water needed for agricultural production. These greenhouses have already been tested, see Seawater Greenhouses. Examples of large-scale greenhouses that simulate tropical conditions, including rainfall, are the Eden Project in Cornwall, UK and Tropical Islands in Berlin, Germany. There is also the Rainforest exhibit, Zoo Atlanta, Georgia, USA.

Also in Cyprus, the Humid2Water research project was funded and completed, which aimed to investigate water production in Cyprus by simulating tropical climate conditions. More information here: <u>https://kronis.tech/research/</u>

Interesting links below:

https://www.seawatergreenhouse.com/technology

https://www.edenproject.com/

https://www.tropical-islands.de/en

https://zooatlanta.org/celebrating-ford-african-rain-forest/