

The Sahara Forest Project – a new source of fresh water, food and energy

A proposal for ameliorating the effects and causes of climate change

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The Sahara Forest Project aims to provide a new source of fresh water, food and renewable energy in hot, arid regions, as well as providing conditions that enable re-vegetating areas of desert. The Sahara is used here as a metaphor for any desert that formerly supported vegetation and could do so again, given sufficient water.

The lack of fresh water is the root cause of much suffering and poverty. Present methods of supply in arid regions include; over-abstraction from ground reserves, diverting water from other regions and energy-intensive desalination. None of these are sustainable in the long term and inequitable distribution leads to conflict. Climate change is tending to make dry areas drier and wet areas wetter. Since the 1980's, rainfall has increased in several regions, while drying has been observed in the Sahel, the Mediterranean, southern Africa, Australia and parts of Asia.

The growth in demand for water and increasing shortages are two of the most predictable scenarios of the 21st century. Agriculture is a major pressure point. A shortage of water will also affect the carbon cycle as shrinking forests reduce the rate of carbon capture, and the regulating influence that trees and vegetation have on our climate will be disrupted, exacerbating the situation further. Fortunately, the world is not short of water, it is just in the wrong place and too salty. Converting seawater to fresh water in the right places offers the potential to solve all these problems.

This ambitious proposal combines two established technologies – the Seawater Greenhouse and Concentrated Solar Power – to achieve highly efficient synergies. Both processes work optimally in sunny, arid conditions. Seawater Greenhouses have been built in some of the hottest regions on earth, Abu Dhabi and Oman for example, where they create freshwater from seawater, while providing cooler and more humid growing conditions, enabling the cultivation of crops all year round.

Concentrated solar power is increasingly seen as one of the most promising forms of renewable energy, producing electricity from sunlight at a fraction of the cost of photovoltaics. The process uses mirrors to concentrate sunlight to create heat which is used to drive conventional steam turbines to generate electricity. Less than 1% of the world's deserts, if covered with concentrating solar power plants, could produce as much electricity as the world now uses. By combining these technologies there is huge commercial potential to restore forests and create a sustainable source of fresh water, food and energy.

The scheme is proposed at a significant scale such that very large quantities of seawater are evaporated. Given that what goes up must come down, every drop of water evaporated will contribute to rainfall - somewhere. A 10,000 hectare area of Seawater Greenhouses will evaporate a million tonnes of seawater a day. If the scheme were located upwind of higher terrain then the air carrying this 'lost' humidity would be forced to rise and cool, contributing additional water to the mist or cloud. By using a location that lies below sea level, seawater pumping costs may be eliminated. There are a number of large inland depressions in Egypt, Libya, Tunisia and Eritrea for example. In each case, the prevailing wind direction is from the sea to the mountain areas inland.

Currently there are some 200,000 hectares of conventional greenhouses in Mediterranean region and this area has been growing at around 10% a year. Most of these, if not all, face water quality and availability issues and indeed many contribute to the depletion of ground water. By using greenhouses to create fresh water from seawater, the problem is reversed.