Introduction: Revolutionary technology has been used to solve the problem of collecting Saharan groundwater for agriculture and everyday use. One of the world's largest and oldest aquifers, the Nubian Sandstone Aquifer, located in Egypt, Libya, Sudan, and Chad, holds more than 150,000 cubic kilometers of water. Freshwater is crucial for hydroponic vertical farming, which means that the Nubian Sandstone Aquifer's water source is a great fit for farming. However, before using the water, it must be processed and cleaned due to chemicals, radiation, and other contaminants. Nanofiltration membranes are efficient and cost-effective for filtering out these harmful elements. The process skips the need to add good ions back into the water, making it even more cost-effective than reverse osmosis. Once the water is filtered, it can be used for drinking, everyday use, and agriculture. Additionally, hydroponic vertical farming is possible using the filtered groundwater and nutrient solutions from DynaGro, FloraFlex, hydroponics.co.za, and Seeds for Africa. With this revolutionary technology, one hydroponic vertical farm can grow 276 plants at a time, with enough capacity to feed small tribes of 300 to 500 people. The hydroponic community greenhouse has up to 100 hydroponic vertical farming systems, equivalent to 27,600 plants at a time, with extra clean drinking water.

Explain parts of the solution:

Collecting Saharan groundwater:

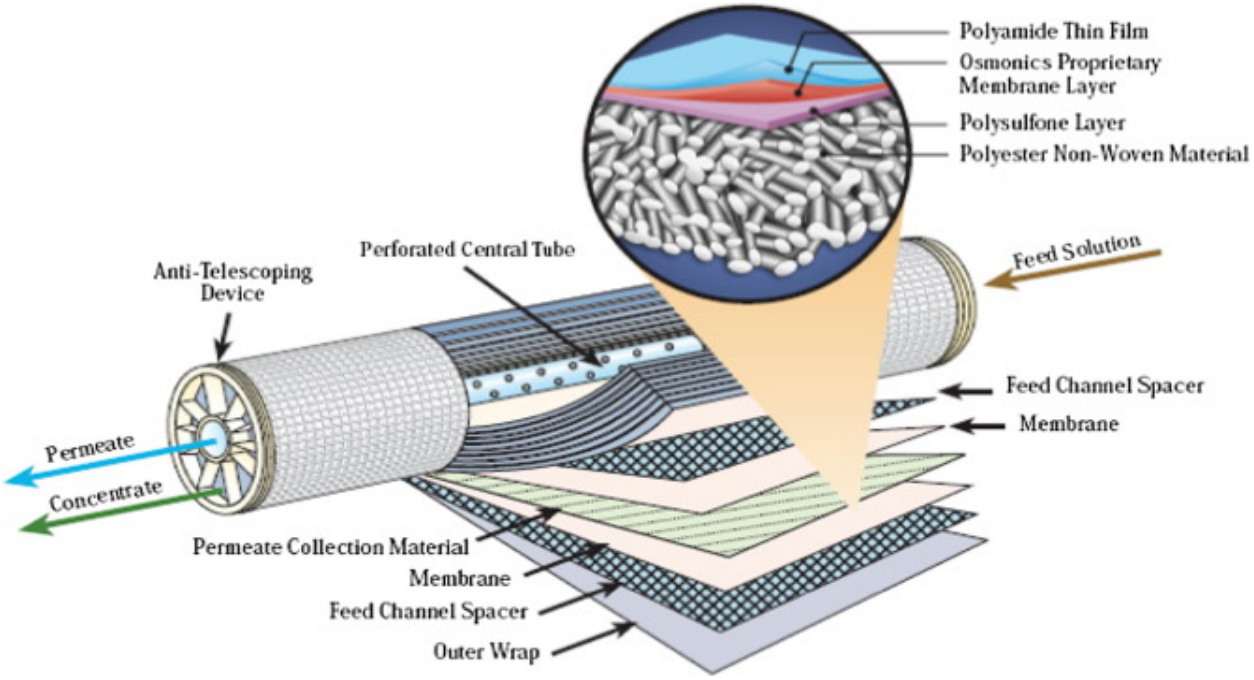
Africa is home to one of the world’s largest and oldest aquifers, The Nubian Sandstone Aquifer. This aquifer spans across four countries, Egypt, Libya, Sudan, and Chad. The aquifer has more than 150,000 cubic kilometers of water in its reservoir.

We use fresh water to sustain our hydroponic vertical farm. So by using the filter Nubian Sandstone Aquifer groundwater as our water source, we do not need to transport water to Egypt, Libya, Sudan, or Chad.

However, where is the water? Luckily across the four countries, there are thousands of wells and a few pipelines that contain the groundwater.

Nanofiltration Membranes:

Although the Nubian Sandstone Aquifer holds an immense amount of twitter, that water needs to processed and cleaned since it contains many chemicals. Nanofiltration membranes are a efficient and cost effective way to filter large amounts of water.



The nanofiltration membrane is composed of many different layers of thin hair-like fibers. There are different parts to the membrane such as the Permatee Collection Material and the various layers to that.

These nanofiltraion spiral membranes are able to filter out all solutes except monovalent ions. This may seem like a set back at first but monovalent ions like sodium, potassium and iron, are usually in water.

During reverse osmosis, the filter used filters out everything except water. This means the good ions must be added back into it. With nanofilters, we can skip that step all together making it much more cost effective. Additionally, nanofiltration is much more efficient than reverse osmosis too.

Filtering Saharan groundwater:

Unfortunately, the water over the thousands of years in the reservoir contains chemicals, radiation, and other contaminants, leaving it unsafe to drink or use for agriculture.

The immense amount of contaminants is why we use a nanofiltration membrane because it is the most precise when filtering out contaminants and radiation in water.

After the water is filtered, it goes into the water tank, where it can be for drinking, everyday use, and agriculture.

The water used for the farms goes into a basket or bucket to be mixed with liquid nutrients. Ensuring there is no contamination between the clean drinking water and the water for the farm.

Growing produce by creating a hydroponic greenhouse:

Using the filtered groundwater from the Nubian Sandstone aquifers, we can use it for hydroponic vertical farming systems. However, before adding the filtered groundwater, it is time to add the nutrient solution, which adds optimal nutrients for plants to grow.

Since creating a nutrient solution from scratch is challenging, we are considering partnering with DynaGro, FloraFlex, hydroponics.co.za, and Seeds for Africa to supply us with nutrient solutions. With the nutrient solutions, add the solution into the filtered groundwater and mix it thoroughly before adding it to our farming system. The farming system includes three pipes on the right wall in the middle of each layer to make it easier to pour the hydroponic trough.

We are also partnering with local hydroponic supply shops for the seeds in the hydroponic vertical farming system to support our solution.

Once the water and nutrient solution is all set, it is time to add the germinated seeds. These seeds are placed into the hydro cups in the hydroponic vertical farming system.

To germinate the seeds, place seeds of any kind on a moist paper towel or cloth. Ensure the paper towel or cloth is damp, or the germination may not happen. The time duration for germination may depend on the crop grown.

Once we have the vertical farming system, all that is left is to monitor the farm. In the hydroponic vertical farming system, there is a built-in pH test and thermometer that does not involve any source of electricity, making it more accessible.

To drain the water, there are an additional three pipes used to release the water. The system must be drained and re-added with water approximately every two weeks.

All of these steps apply to every hydroponic vertical farming system in our hydroponic community greenhouse.

Results of our solution:

Using one hydroponic vertical farm, we can grow 276 plants at a time using a 3-inch (12.4 cm) diameter hydro cup. The number may vary between the plants, but the model fits 276 plants.

As a result, this number is enough to feed small tribes with about 300 to 500 people. If you use more than one hydroponic vertical farm, more people can be fed.

However, since it is a greenhouse we can fit up to one hundred hydroponic vertical farming systems! Also, equivalent to 27,600 plants at a time! With this

Our solution also includes extra clean drinking water because not all of the water is for the farms.

QNA:

How big is the hydroponic vertical farming system?

Width: 2 ft (61 cm)
Length: 3 ft (91 cm)

Height: 6 ft (1.83 cm)

How many layers are in the hydroponic vertical farming system?

In the system, three layers containing 92 hydro cups.

How is the Nubian Sandstone Aquifer groundwater transported?

The groundwater can be transported by bucket or vehicle.

How big is the hydroponic community greenhouse?

It is 3500 sq.ft or about 325 sq.meters. This creates enoughs pace for all one hundred farms and people.

How is this funded?

It is going to be funded by donations.

Who will be growing or monitoring the plants?

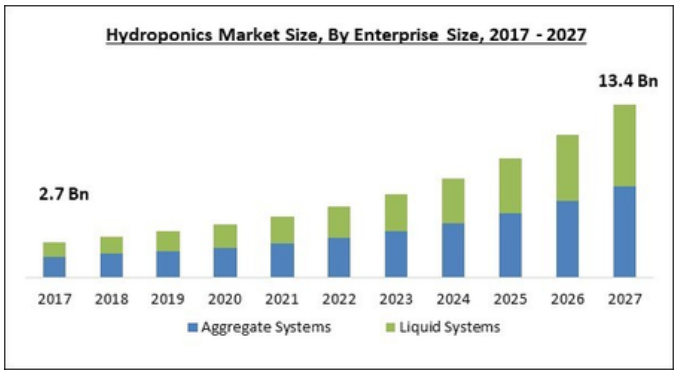
In our vision, the communities help pitch-in in the growing and care of the plants.

Market:

The global hydroponics market was valued at USD 2.58 billion in 2021. It is expected to reach USD 13.61 billion by 2030. The world's population is increasing, adding approximately 200,000 people daily to the global food demand. The amount of fertile land is also decreasing, and production costs are rising as crops are lost to pest infestations and natural disasters. Growing worries about food availability, security, and environmental degradation will create more opportunities for the industry to thrive. Although adoption of hydroponic systems has been slow, money is starting to be invested in the industry worldwide.

The slow adoption of hydroponic systems is due to farmers' lack of hydroponics knowledge and adoption. Due to high costs, farmers and others find it challenging to use hydroponic farming. Using synthetic fertilizers and crop protection chemicals has hurt the hydroponics market. The current hydroponic crop model only considers high-value and quickly growing crops like lettuce, basil, and tomatoes. Slow-growing grains and vegetables earn less in the hydroponic industry.

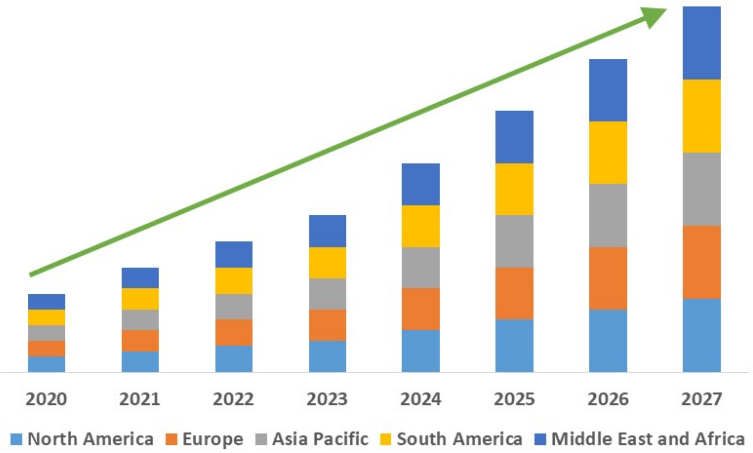
There are two types of hydroponic systems, aggregate systems and liquid systems. Aggregate systems use drip irrigation to provide a nutrient solution and are expected to grow 8.6% by 2030. Aggregate systems are currently the highest contributor to the hydroponic market. Liquid systems have plants exposed to the nutrient solution directly without any other growing medium. They are better for the environment because the nutrient solution is recycled, but they are much more expensive for farmers.



https://www.researchandmarkets.com/reports/5571302/global-hydroponics-market-size-share-and-industry

North America is the most significant shareholder in the global hydroponics market, and their market is expected to grow 6.5% by 2030. The demand for hydroponic farms is driven by the need for tomatoes in the United States. Europe's hydroponic market is expected to grow 8.20%, generating USD 2,723.23 million by 2030. Australia is engaged in growing crops like tomatoes and cucumbers, but the market is dominated by lettuce. 90% of the lettuce consumed in Australia is grown hydroponically. Produce grown hydroponically in Australia is exported to

Malaysia, Singapore, Hong Kong, and Taiwan. The climate in South Africa is perfect for growing any vegetable. However, the country's market for fruits and vegetables is restrained by a lack of water for irrigation and significant crop losses due to soil diseases. The main crops grown in South Africa using hydroponic systems are tomatoes, cucumber, and lettuce.



https://www.databridgemarketresearch.com/reports/global-aquaponics-hydroponics-systems-and-equipment-market

In conclusion, the hydroponics market is expected to grow significantly due to the increasing global population and decreasing fertile land. The industry faces challenges such as slow adoption, high costs, and limited crop options. However, the demand for hydroponic farms is increasing, especially in North America, Europe, Australia, and South Africa. Although there are challenges, the hydroponics industry has a promising future, and investment in the sector is expected to increase in the coming years.

https://straitsresearch.com/report/hydroponics-market#:~:text=Market%20Overview,techniques%20in%20agriculture%20is%20hydroponics.

Impact:

Hunger and dehydration are somee of the world's biggest problems. By implementing our solution in Africa specifically, we can conquer dehydration, hunger, infant mortality rates, and disease prevention due to lack of food and water, and support local businesses.

Our solution is sustainable because it does not rely on any electricity, making it more cost-effective than other solutions.

Across Libya, Chad, Sudan, and Egypt, approximately 23+ million people are hungry and dehydrated. With our solution, we can feed and hydrate those in need. In addition, our solution can also help others around the world.

Conclusion: GreenGenie offers a sustainable and cost-effective solution for producing fresh produce using hydroponic vertical farming systems. We have addressed the challenge of water scarcity in Egypt, Libya, Sudan, and Chad by collecting water from the Nubian Sandstone Aquifer through nanofiltration membranes, which filters out all solutes except monovalent ions. Our system is designed to produce clean drinking water as well as nutrient-rich water for our hydroponic vertical farming systems. With one hydroponic vertical farm, we can grow up to 276 plants, and with up to one hundred hydroponic vertical farming systems, we can produce enough food to feed small tribes of up to 27,600 people. Our partnerships with local hydroponic supply shops, seed suppliers, and DynaGro, FloraFlex, hydroponics.co.za, and Seeds for Africa for nutrient solutions ensure that we can provide the best possible growing conditions for our plants. With our solution, we can contribute to improving food security and reducing water wastage while providing nutritious, fresh produce to our communities.