Sustainable Innovative Investment

Vertical Gardening Estimating Income and Environmental Potential

CEU CENTRAL EUROPEAN UNIVERSITY

This project is done by the student of the CEU and current employee of the FAO, Sevara Tosheva with the purpose of suggesting new investment in agriculture and for the university capstone project

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OBJECTIVE

The primary reason for the Vertical (urban) farming is to keep biodiversity despite the land and water scarcity in the region. The objective is to deliver the idea that, it is already time to move forward from the primitive agriculture system and start to investing in innovative agriculture. The traditional farming is not only unwise money spending but also it is waste of environmental resources like water and arable land. Moreover, traditional surface farming is not capable to meet upcoming challenges like increasing population.

For presentation please click here: https://prezi.com/p/d90a_x5zu0bn/

Introduction

Agriculture is major sector for the social wellbeing as well as economy in the Central Asia. Unfortunately despite the good environmental conditions(mostly sunny, cold days much less then hot days, moderate rain level, environmental disasters are rare), the agricultural situation in Central Asia is far from meeting international standards. Salinization, erosion of the soil causes land degradation. Over 47% of land is affected by soil salinization in Central Asia, which is declining the crop production.(van Djik et al 1999) The main reason for the high level of soil salinity is unwise irrigation system, where 90% if the water is wasted.(Jeffrey Hays., 2008). Water used for the irrigation evaporates leaving behind the salt, which may even increase the salinity over the time. High soil salinity makes the land infertile for the cropping (EPRS 2018). More than 70 villages and almost 50000 people live without any access for agriculture, meanwhile most of the rural population of the central Asia survives due to own farming. Most of the unaffected land is used for cotton planting which makes the main percentage of the country GDP. Due to limited food diversity, more than 55% of the population suffers from iodine and vitamin A deficiencies. The iodine deficiency among children make 39% and Anaemia both in children and adults has highest rate in Central Asia, (FAO., 2015) which decreases mental efficiency of people in these area.

According to WHO 2018., Asia contributes 55% of worlds stunning children under age 5 and 12% of this share belongs to Central Asia. The prevalence rate of anaemia among women of reproductive age is 34% in 2016 (FAO 2018a).

The World Bank group in Central Asia has invested $6.2billion for the reducing poverty and sustainable development in through the agriculture.

In this paper, I will suggest Vertical Gardening system- the smart and innovative investment in Central Asia, which can decrease the undernutrition level by considering the water and land scarcity. As it was earlier mentioned that only 7 percent of the land is irrigated in the area. These lands are mainly cotton, wheat croplands. As the scarcity of the land and water the farmers has no option for the food variety. Naturally, most of the farmers prefer planting cotton or wheat which price is relatively high and more profitable. This in it turn increases the price of the vegetables artificially, the population with low income cannot allow the must level variety of foods to remain healthy.

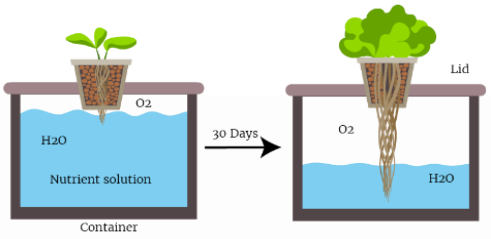
On average, we're growing in 16 days what otherwise takes 30 days in a field—using 95 percent less water, about 50 percent less fertilizers, zero pesticides, herbicides, fungicides," said David Rosenberg, chief executive and co-founder of AeroFarms.

Environmental Impact

It is the farming, which does not ruin the soil and does not waste the water. In this type of the farming, the plants are grown without soil or any aggregate mediums. It is growing the plant in air or in mist environment. In this system, the crops are highly secured, since in this way of farming no pesticides or fungicides are used which can effect on the nutrition quality of the plant. Also as there, no soil and the plant are safe from being effected by pests. The garden can be placed in anywhere, let it be the walls of the workplace, skyscrapers, home or any building. The option can be hybrid so plants can grow inside of the cowered buildings and grown in LEDs sensor climate control system, or in hotter days outside with sunlight. The both way has an equal effects, which will not harm the quality of the plant.

In indoor farming, the root of the plant is misted with water, nutrition's and oxygen. It has a closed loop system, which uses 95% less water to compare with field farming. Which is even less then latest dripping irrigation system. The LED lights gives for the plants the exact spectrum and frequency for their photosynthesis. In this way, it is possible to control the size, shape and nutrition level of the green thanks to razor-sharp data for which agricultural scientist take the control and tracking. Every harvest data is under the monitoring of the scientists. Once the seeds is placed in special cloth fabric, it takes 16 days until the plant is matured. The days can be even less depending the plant type. At the same time, this planting system is capable giving 390 times more yield than traditional farming system.

Traditional farming ruins the soil quality. Unwise irrigation system increases the salinity degree of the soil, the pesticide and fungicides burn the soil and it decreases the potential of the soil to give harvest as expected. The yield amount decreases year by year because of chemicals added. During the irrigation 90% of the water is wasted, meanwhile 70% of the water consumption is used for field watering. Just imagine if only 10% of the farming was done by applying vertical gardening technologies, how much water could be saved! Moreover, this way of the farming is capable to reduce carbon emission by 98% in located districts. It also helps to maintain the biodiversity, as variety of the greens can be planted in different layers. The chamber for the cloth where greens grow is made from recycled plastic.



Financials

To avoid the exaggerated results all costs are going to be calculated for one square feet of planted area. I assume that this is the most accurate way of measuring the financial potential of the project, and the layers of the garden can multiply the result.

Profitability

Relying on the statistics provided in agrilyst 2017, traditional farming gives 8.71 pounds of harvest (salad leaf) per month in one square feet. Robert Colangelo, CEO of the Green sense Farms, reported that the they were able to take 12 pounds of salad per week from one square feet. Being based on these data, which is obtained from several sequences, I assume that it is the most accurate data for the calculations. I used retail price of the salad that is almost the same in all US markets.

$$8pounds\ x\ \$3.99\ x\ 12months = \$31.92(\text{annually})$$

$$12pounds\ x\ \$3.99\ x\ 4weeks\ = \$191.52$$

Costs

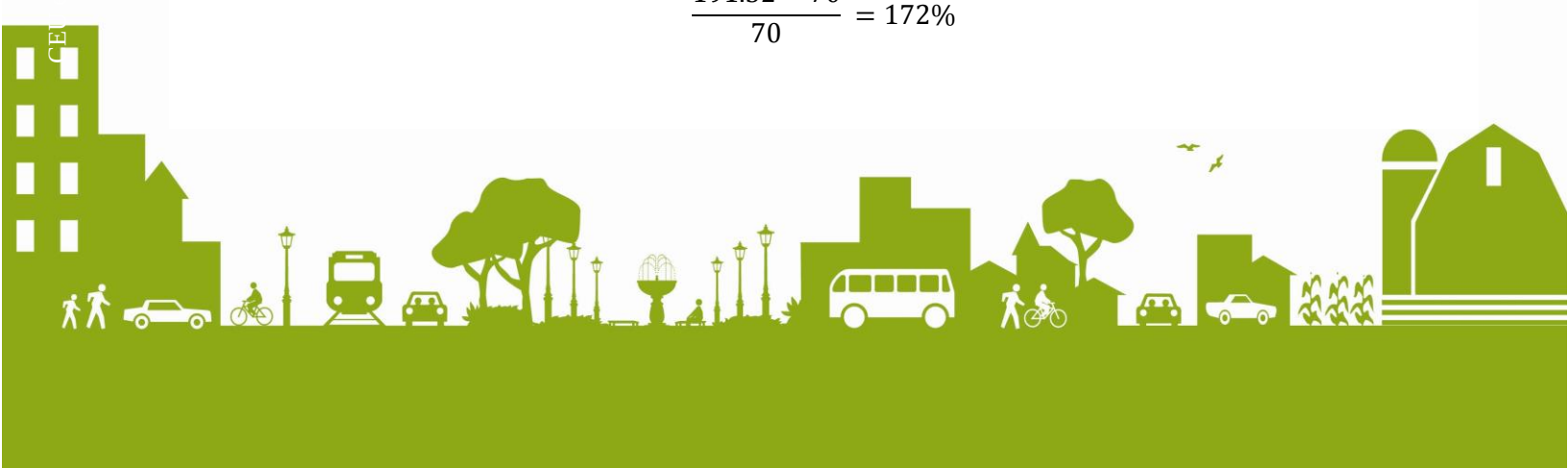
These are approximate costs for launching 1 square foot vertical aero gardening. Some costs are calculated annually and monthly as their weekly costs are very unmeasurable. The costs are taken from American community consumers market and costa are realistic. There is also extra OTHER cost which may include administrative , maintance and sudden expenses.

LED bulb	**$10**
Plastic pot(container)	$8.6
Stainless pipe kg	$5
Variable Costs	
Water	$3.9
Cloth fiber changed every 3,4 weeks	$1.68x4
Labor	$8
Electricity **OTHER**	$10.512(annual) +$18 TOTAL $70

Return On Investment

Above I have indicated the sale from salad which is $191.52 I consider it as a gain from investment, meanwhile the cost of our investment is equal to $70.

$$\frac{191.52 - 70}{70} = 172\%$$



Summary

If to think about upcoming unpleasurable climate change, we realize that it is already time to change the farming method. The traditional surface farming is waste of environmental resources. Instead land could be used for increasing the forests in our planet to balance the ecosystem, as vertical gardening cannot be a good option for trees or other deep root plants. By applying urban aero-vertical farming we could save not only natural resources, but also, we could provide the food security for the increasing population.

In Central Asia, people rarely consume greens, herbs, and various vegetables. And it is very common to see children with hard iodine deficit and even grown up people. Because of these countries' economies are hardly depend on agricultural products like cotton and wheat, the farmers prefer not to plant vegetables or greens. Plus, due to the salinity level of the soil the planted vegetables are not always healthy.

Once vertical gardening is applied in Central Asia, I truly believe that the social and economical impacts are going to be more than expected.

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