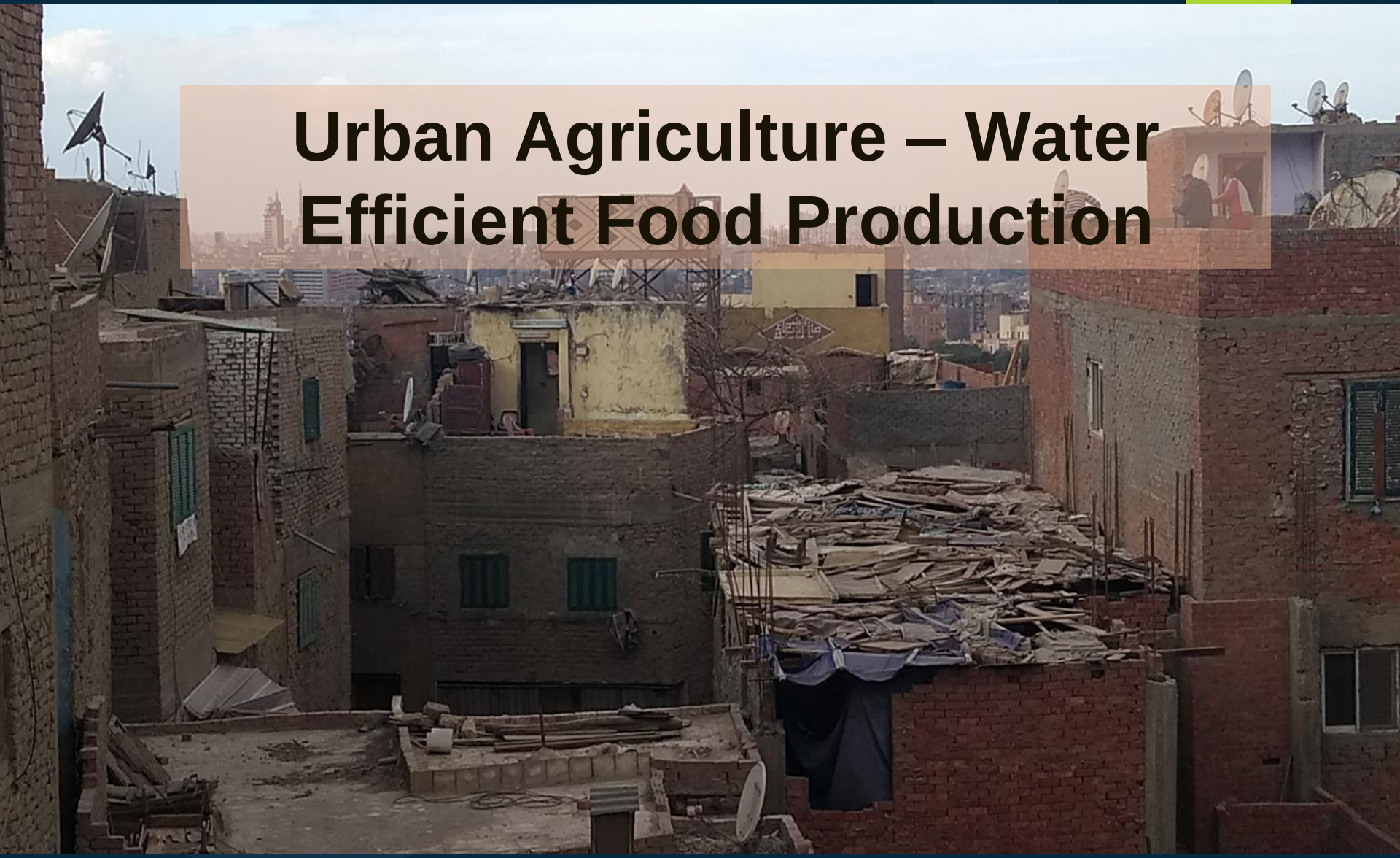
Urban Agriculture – Water Efficient Food Production



Dr. Tina Jaskolski

Cairo 2050

Surplus of population in Greater Cairo Region 02

2006	16 million inhabitant
2020	20 million inhabitant
2050	30 million inhabitant

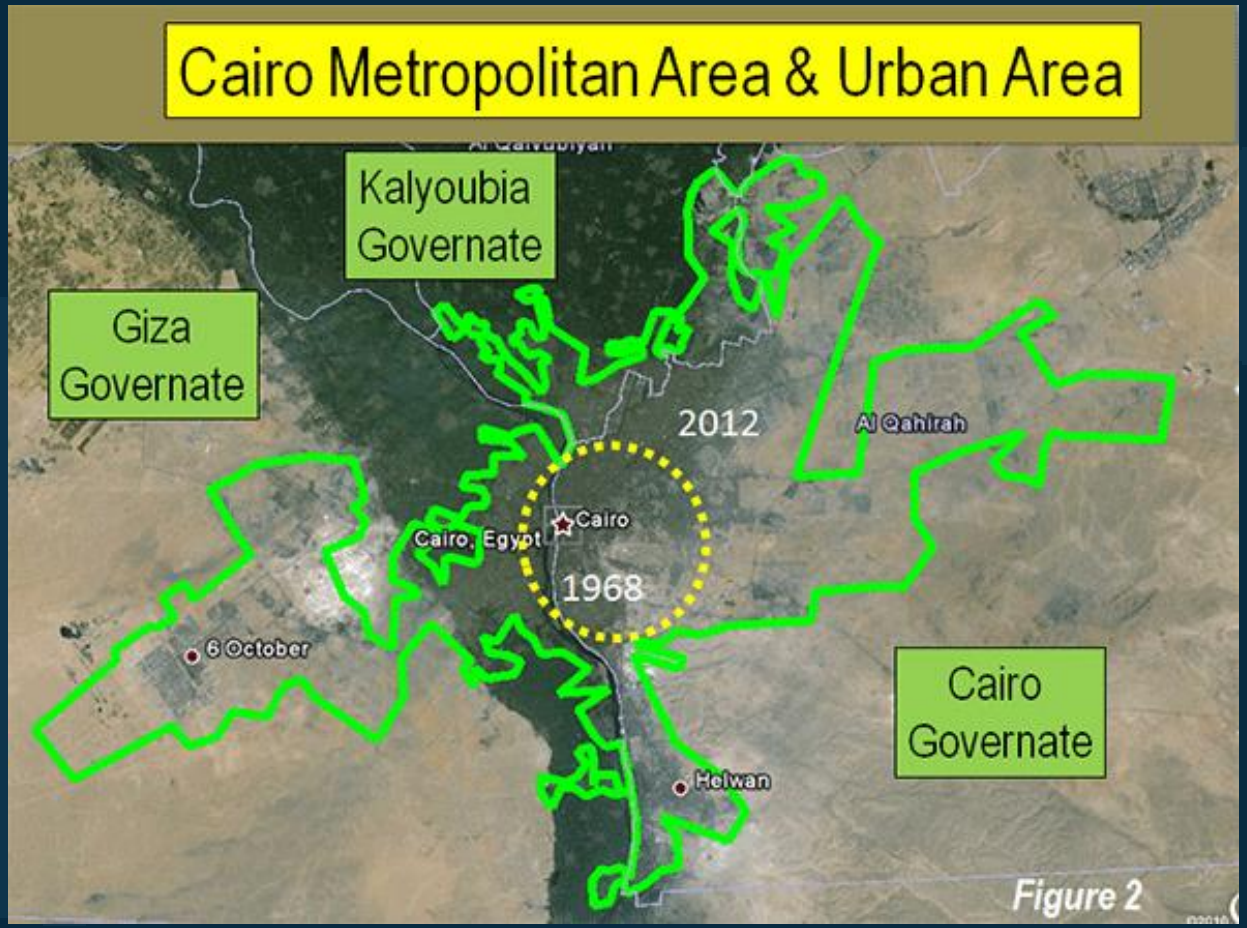
The region accommodates : 22% of total population of Egypt

: 43% of total urban population of Egypt




- GOPP 2009

Urbanization and Urban Expansion



- Source: World Cultures

Global Food Security in an Urbanizing World

By 2050, **2/3** of the world's population will live in urban areas.

In the next 20 years,

of the world's population growth will occur in developing nations.

80%

of food for cities comes from domestic sources in rural areas.

The poorest households in the developing world spend

60-80%

of their incomes on food.

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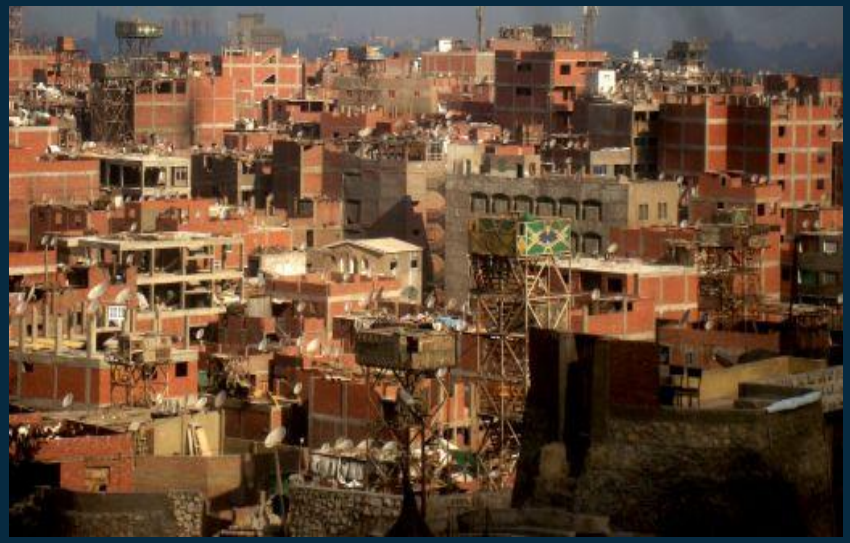
EGYPT: Post harvest losses of up to 50% in transportation, CO_2 emissions



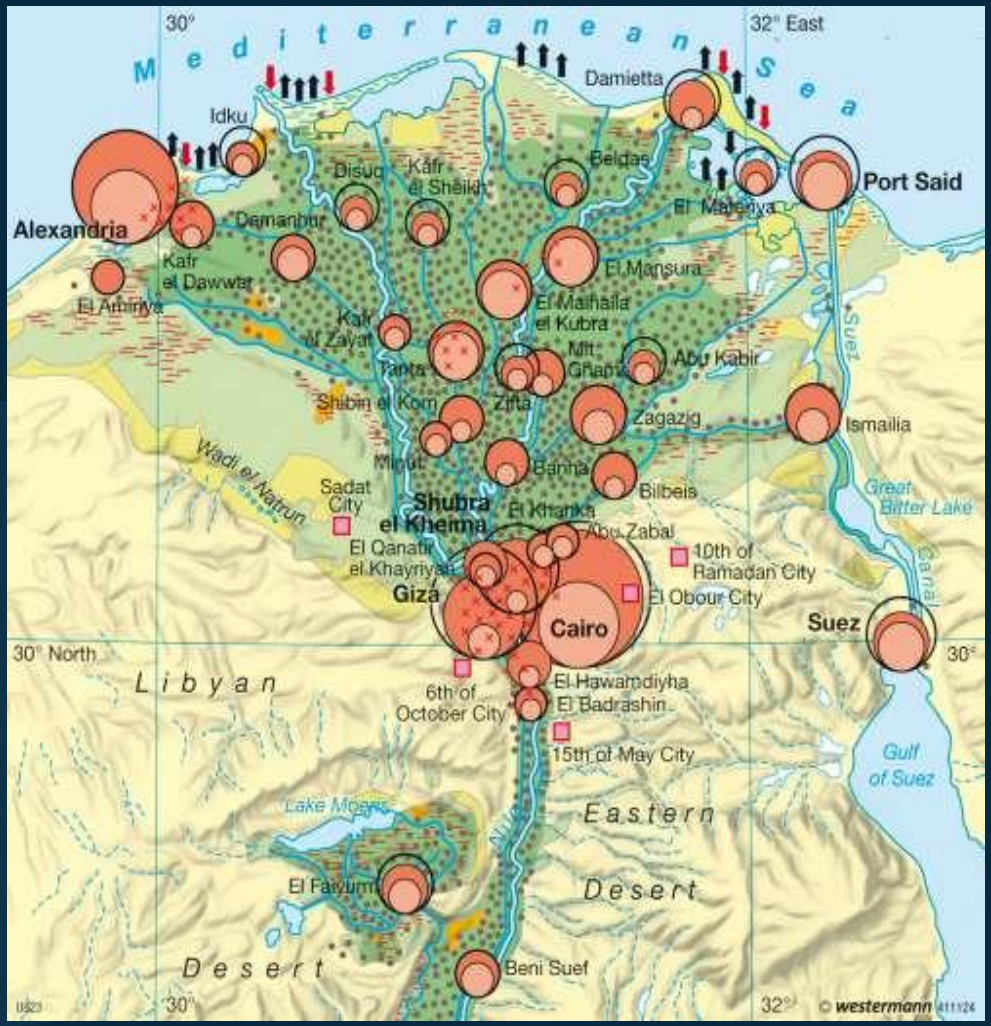
Aerial View – Informal Area

- Source: GIZ.

Access to Green Space

- Cairo informal areas
- Densely packed neighborhoods
- Concrete dominates
- Open and green spaces are rare

Urbanization Delta

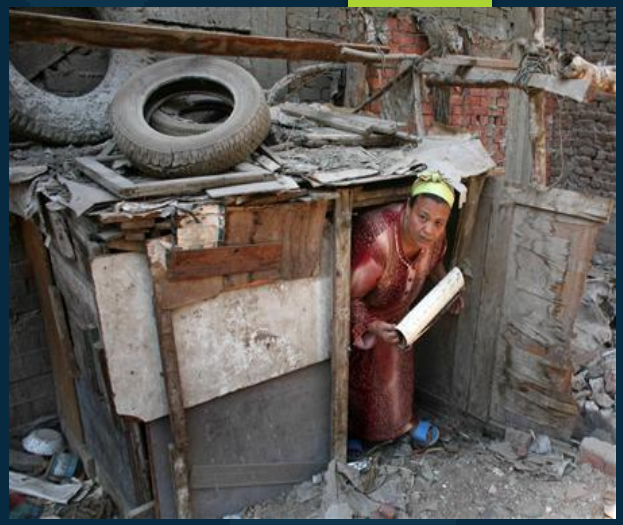


- Source: Diercke International Atlas.

Source: Baltimore Sun

Building rooftop farms in Egypt





- Neglected
- Used as dumpsites
- Hubs for rodents and pet houses
- Residential areas for the underprivileged
- Filled with satellite dishes and small wooden structures
- Planted (in a few cases)

Rooftop Gardening

"Simply refers to growing of plants on the roof of a building"

Cairo Governor 2019: All of Cairo's rooftops should be green in order to reach Egypt 2030

Objective: *"To foster sustainable utilization of neglected rooftop space especially in urban areas to increase food security while saving on the precious non-renewable resources."*

Benefits of green roofs

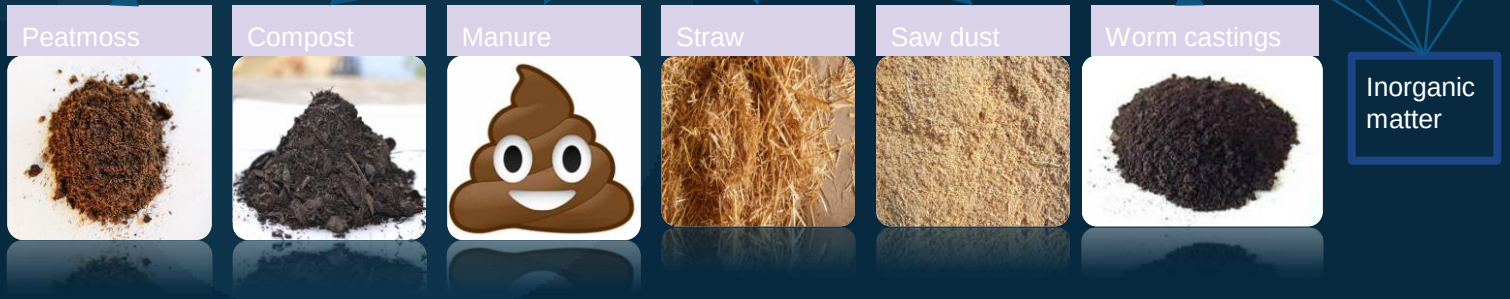
Economic Prosperity	Social Responsibility	Environmental Protection
- Increase local food production - Income from organic products - Increase in property value - Reduce building energy costs	- Health - Aesthetic value - Exercise & recreation - Education & awareness - Fresh Food	- Improve air quality - Increase biodiversity - Reduce heat-island effects - Reduction in waste - Hydrological benefits - Reduced carbon footprint in foods

Plants for rooftop gardening

Rooftop growing media

1. Organic matter
2. Inorganic matter
3. Air
4. Water

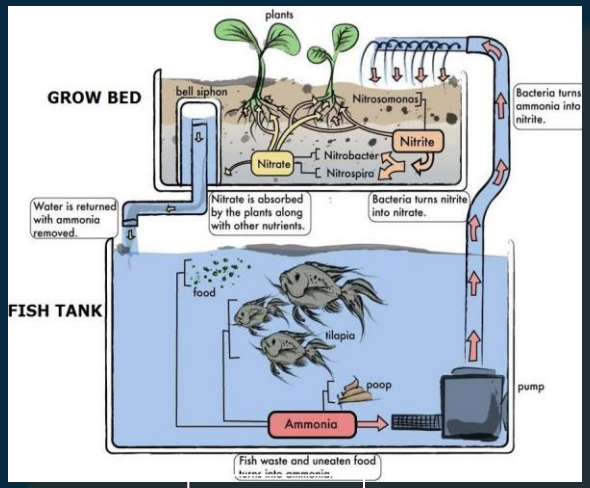
Organic matter



Inorganic matter

AUC Rooftop Gardening Research Program since 2013

Potted plants



Aquaponics system

Vertical garden

Herb planters

Extensive garden

Raised bed planters

Raised bed planters

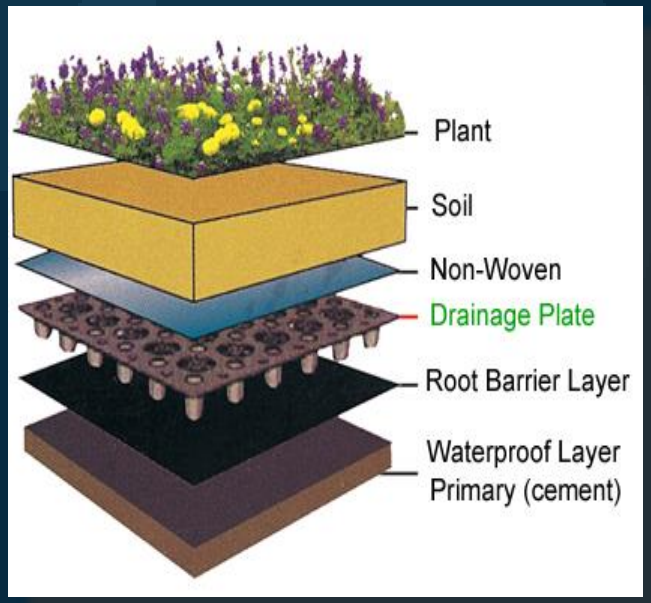
- Easy to contain the soil
- Beds that meet the needs of your plants
- Ease of preparing soil mixtures with all desired properties
- Easy to control weeds and pests
- Easy to manage drainage

Vertical garden

- Maximize the limited space
- Increase accessibility
- Produce healthier plants
- Increased productivity
- Create a micro climate
- Improve air quality

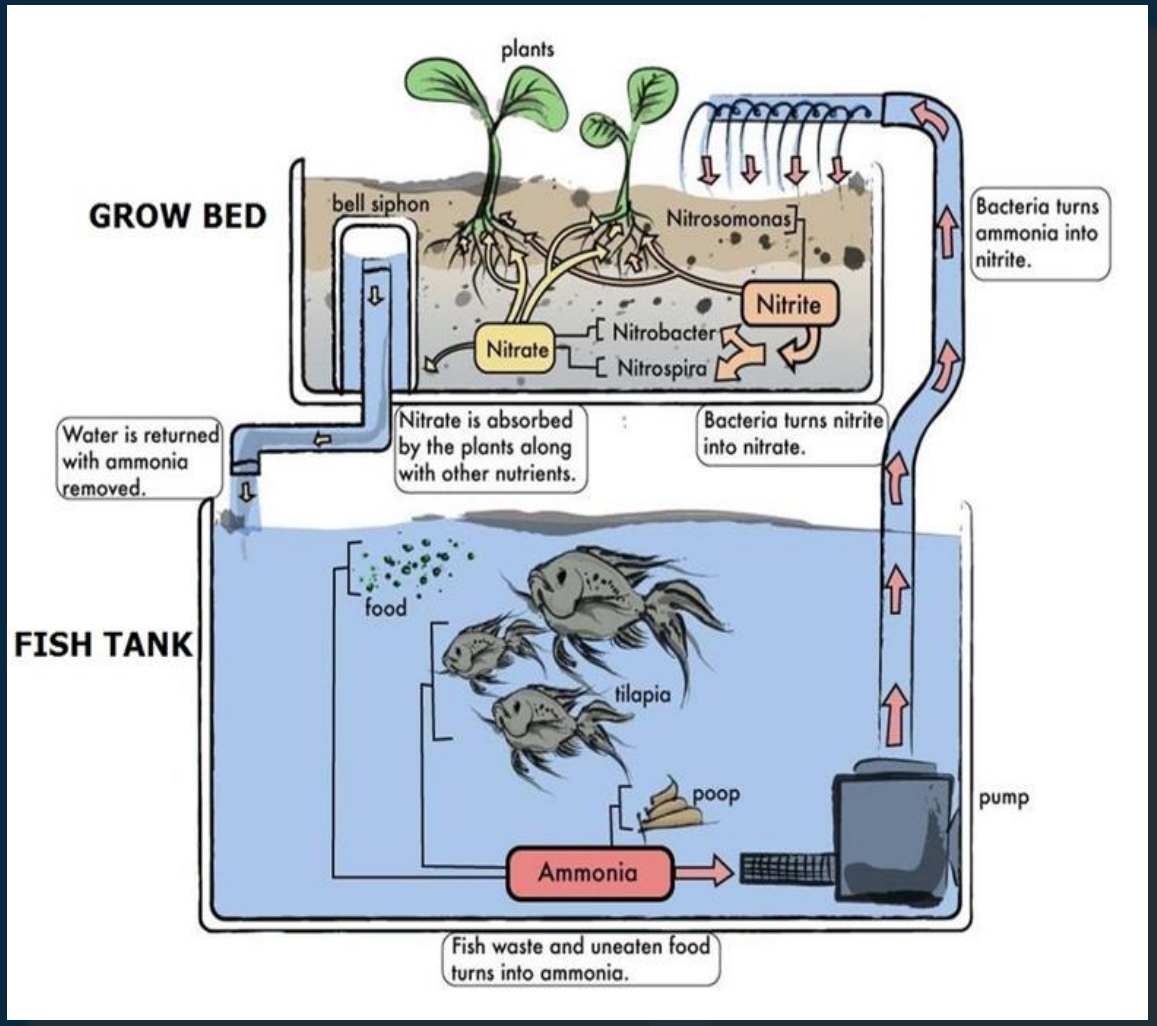
Extensive roof gardens

- Low management requirements
- Low water requirements
- Succulents



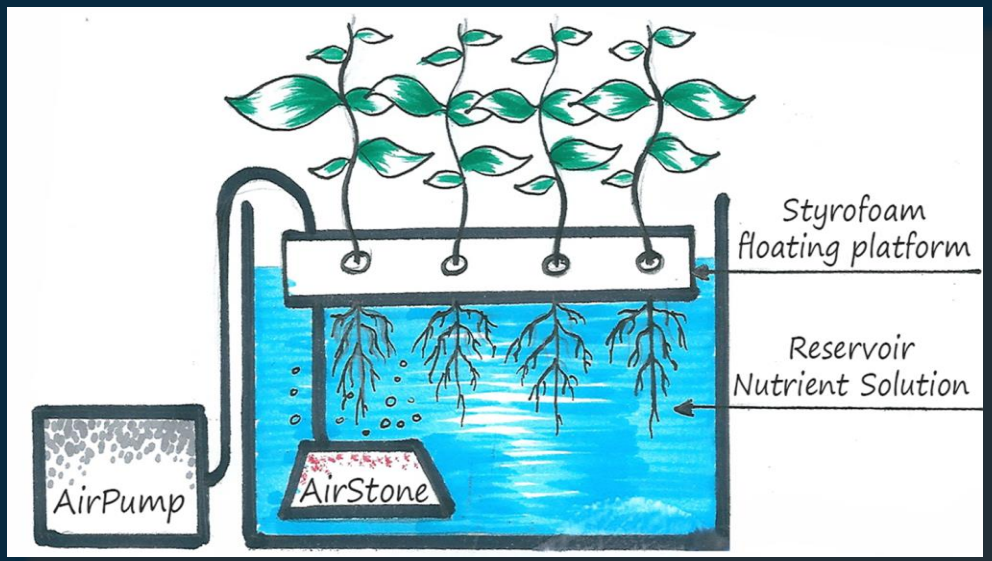
Aquaponics system

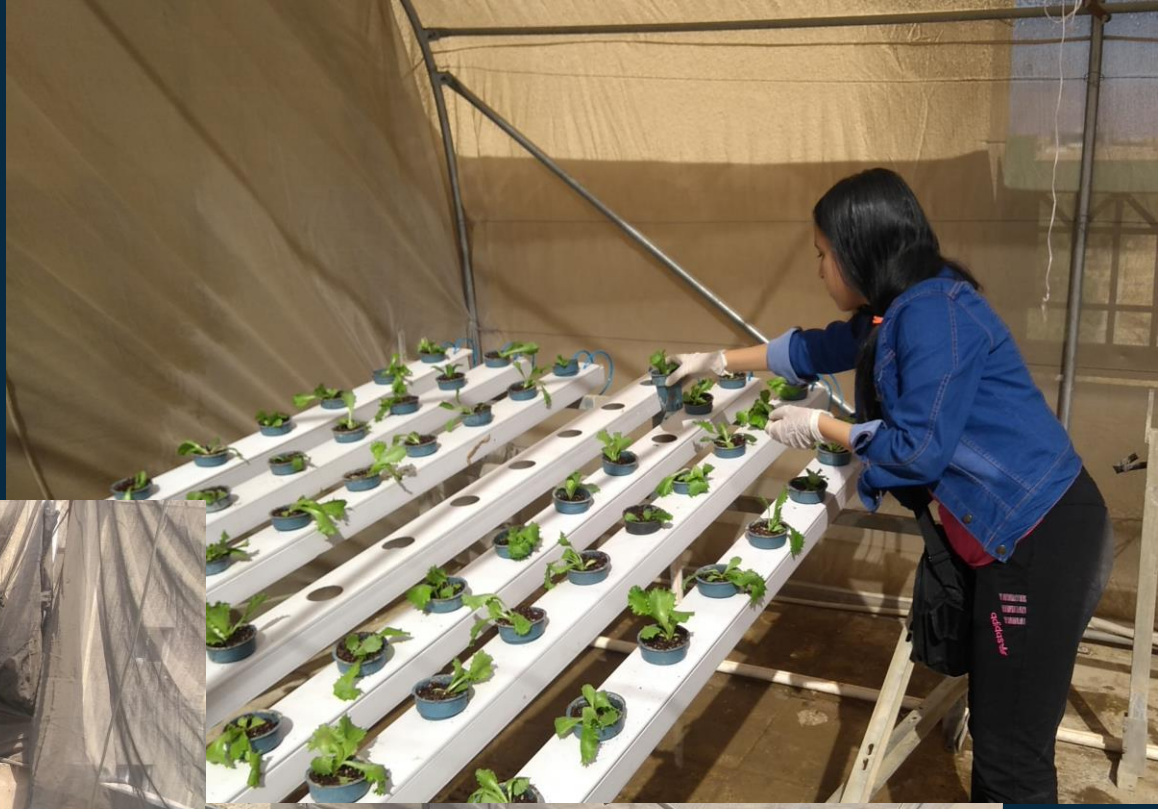
- Fish + plant growth
- Saves water
- Nutrient provision
- Closed loop system – No wastage
- Fish production + Food production
- Reduced carbon footprint



Hydroponic systems

- Soil-less plant growth *(plants + Nutrient medium – Soil)*
- Low risk of soil borne diseases/pests
- Production +70%
- Save up to 90% of water
- Pumps (water / food /energy)

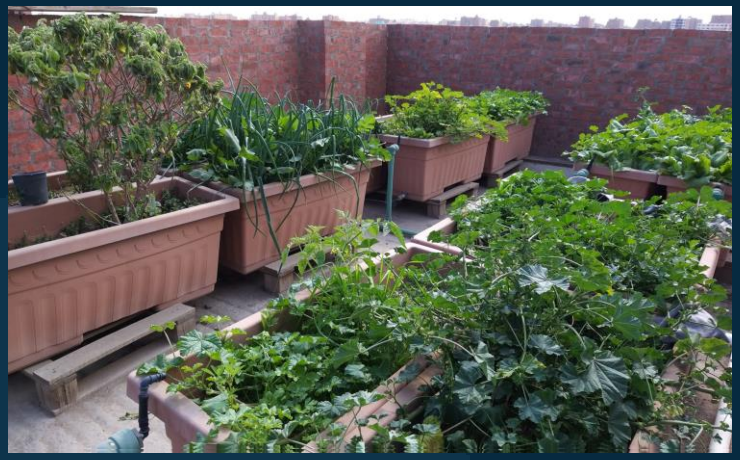




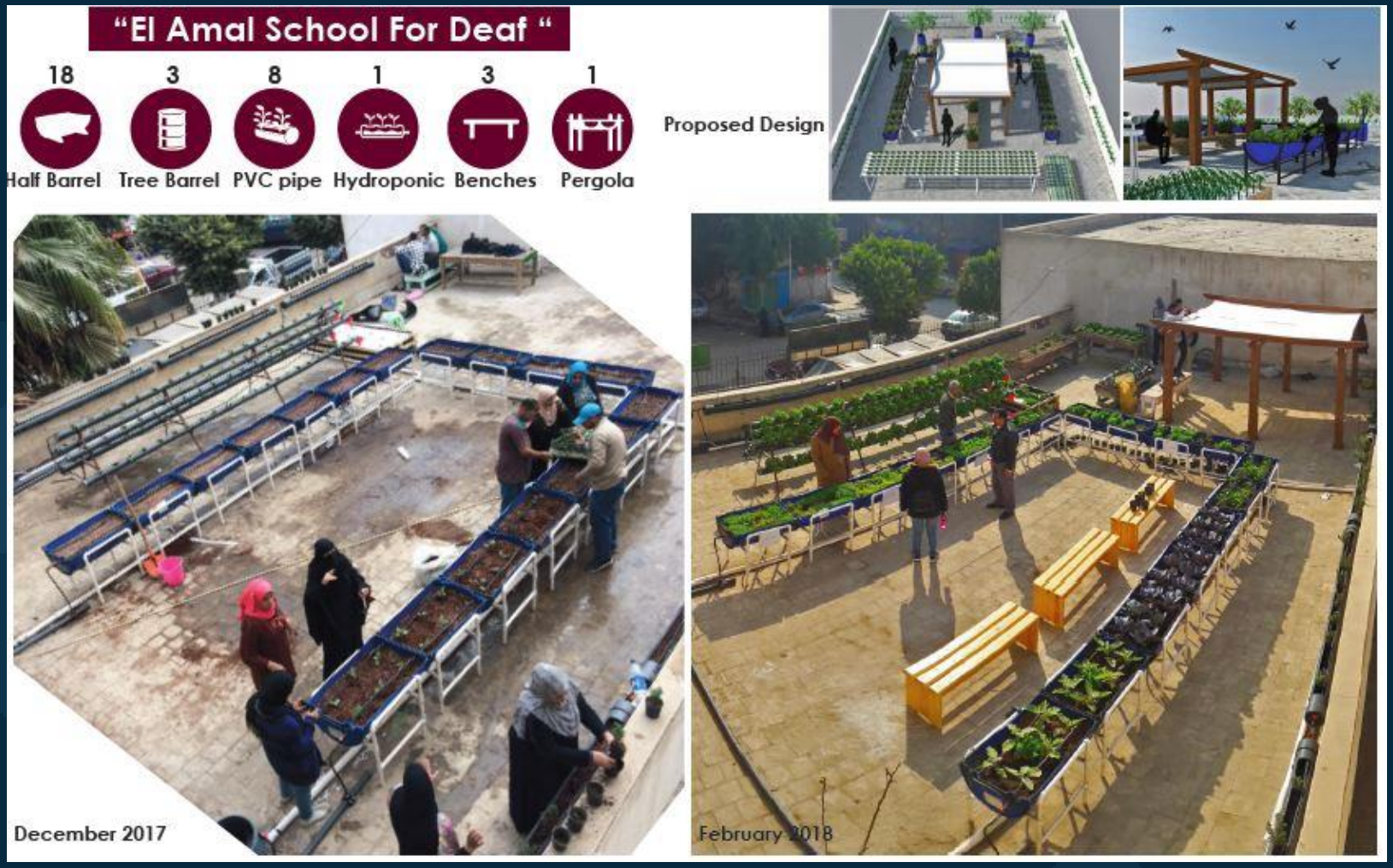
Saft El Laban, Zahraa

- Challenges:

Maintenance, ownership, sharing of produce, fluctuation of personnel (knowledge transfer)




El Amal School for the Deaf

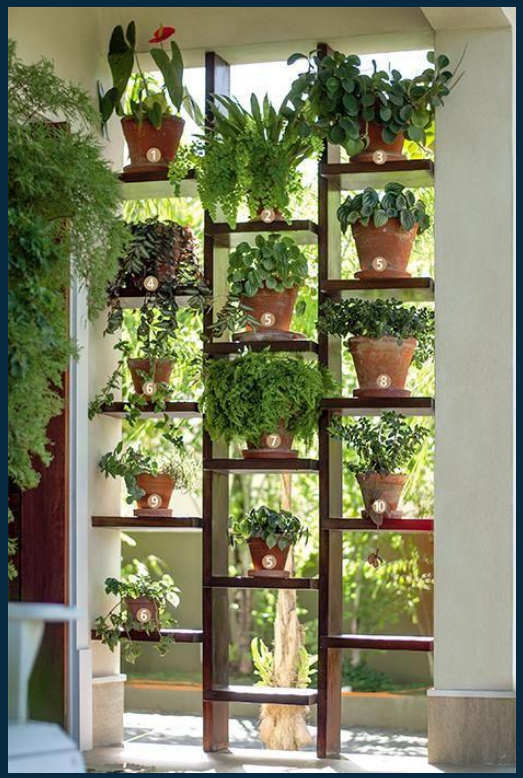


Green Walls

- Food production
- Insulate and protect walls
- Greener, more pleasant spaces
- Greywater filtration analysis

- Two strategies:
  - Pocket design
  - Pipe design

Food Producing Green Walls



Conclusion

Green roofs contribute to:

- Saving water and making use of each drop of water by using different systems: hydroponics and aquaponics
- Food security by producing food for the household or productive/commercial roofs
- Saving energy by using small pumps and insulation
- Reduce the temperature of the building
- For widespread upscaling need affordable models that are easy to run and maintain