

# ·HYDROPONICS·

Case Study

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TROGU GIOVANNI



# HYDROPONICS

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*Is a method of growing plants using mineral nutrient solutions, in water, without soil.*

**1627** *Sylva Sylvarum* book by Francis Bacon

**1929** William Frederick Gericke coins “Hydroponics”

The term is constructed in analogy to *geoponica*, that which concerns agriculture, replacing, *geo*, earth, with *idro*, water.

# INGREDIENTS

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## Seeds

- Whatever kind of vegetable
- Even small trees in some cases

## Water

- Distilled water
- Filtered tap water  
(usually in an opaque tank)

## Nutrients

- Elements (Potassium, Phosphorus, Calcium, Magnesium...)
- Hydroponic solutions

## Substrates

- Expanded clay, Perlite, Gravel, Sand
- Rock wool, Wood fiber, Sheep wool
- Polystyrene packing peanuts

## Additives

- Humic acids

## Equipement

- PH and electrical conductivity meters
- Water pump
- Advanced equipement

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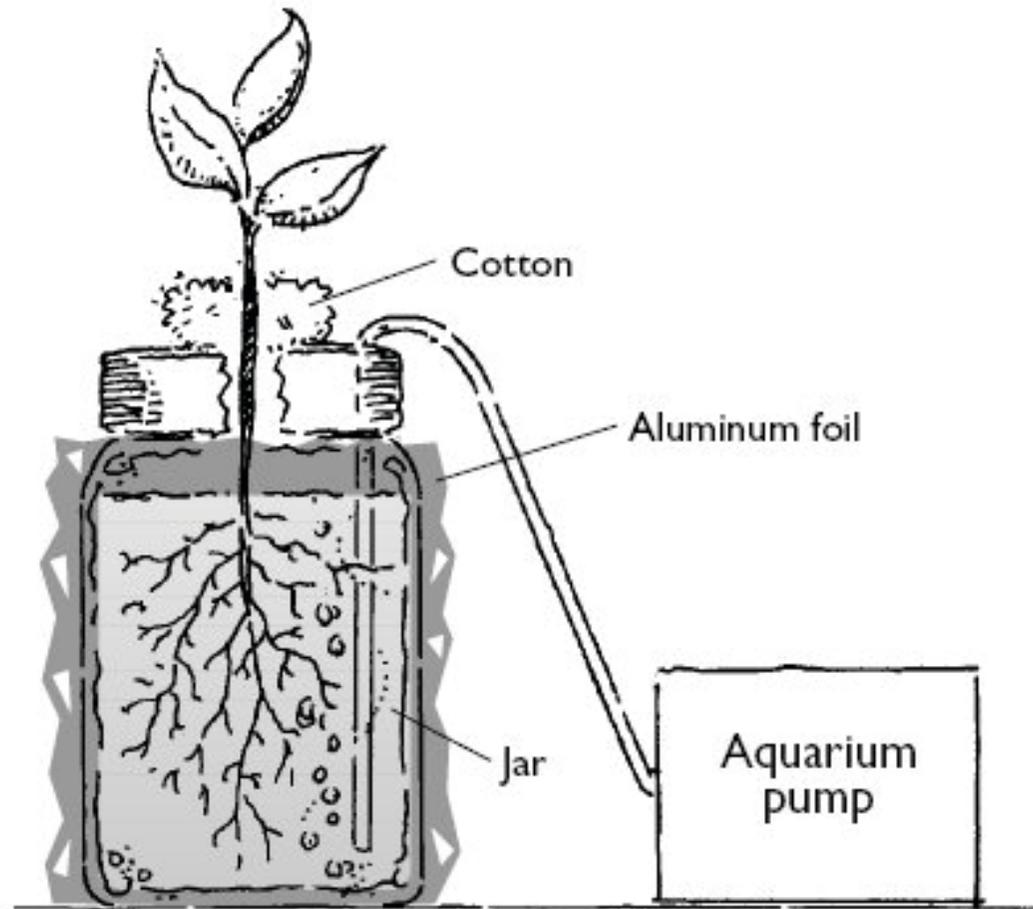
- PH and electrical conductivity meters
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- Advanced equipment



# WORKING PRINCIPLES

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*1930' Wake Island hydroponics for Pan American Airlines*



*NASA's hydroponics system in space for space exploration*

# MAIN TECHNIQUES

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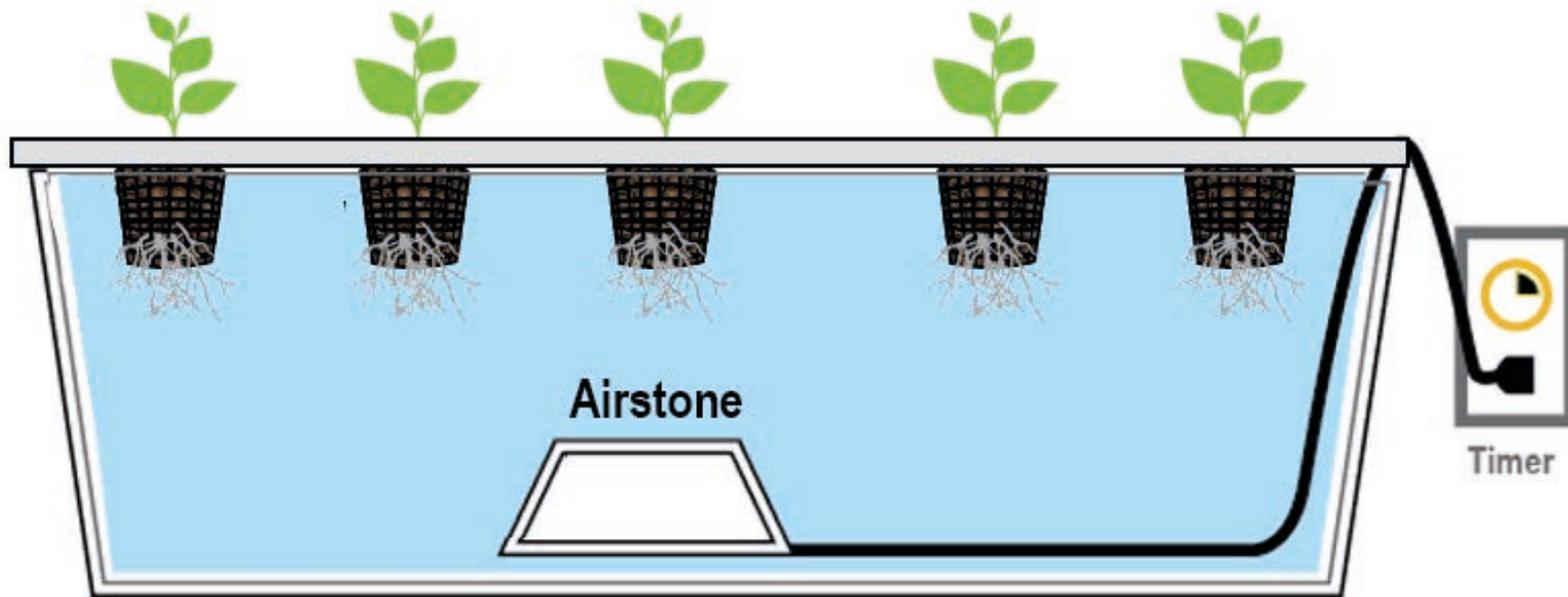
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- Static solution
- Continuous flow solution
  - Aeroponics
- Passive sub-irrigation

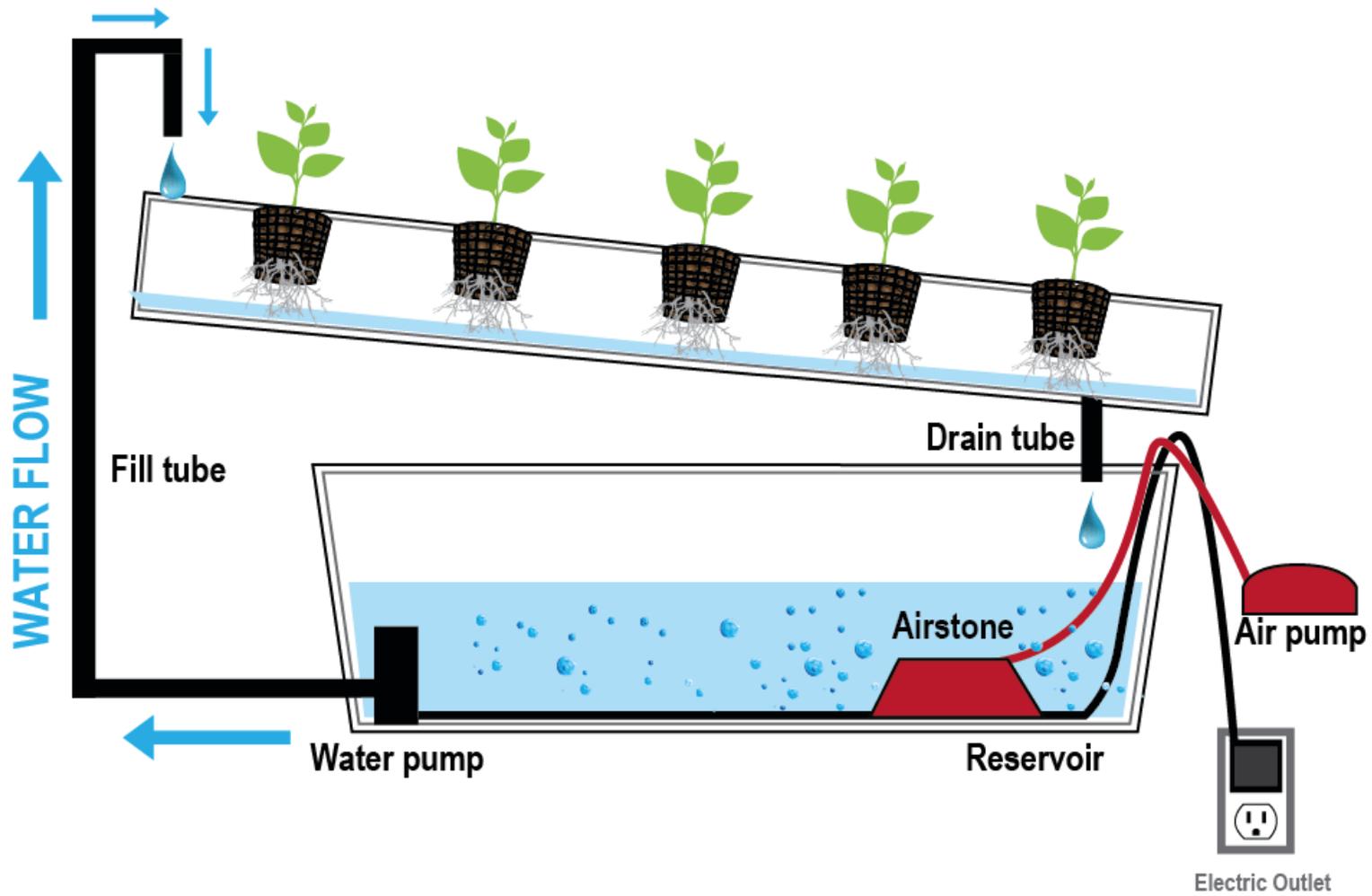
# STATIC SOLUTION

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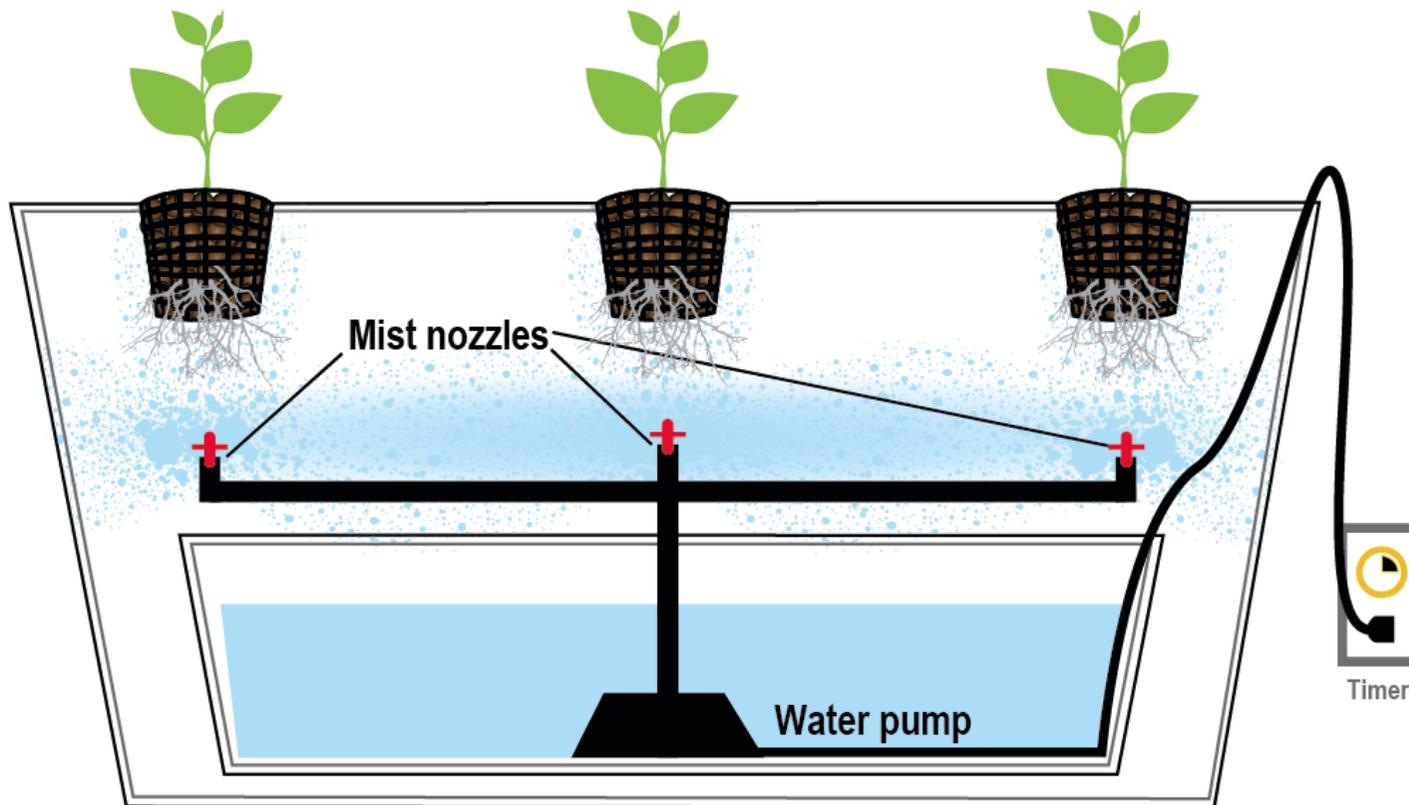
# CONTINUOUS FLOW SOLUTION



# AEROPONICS

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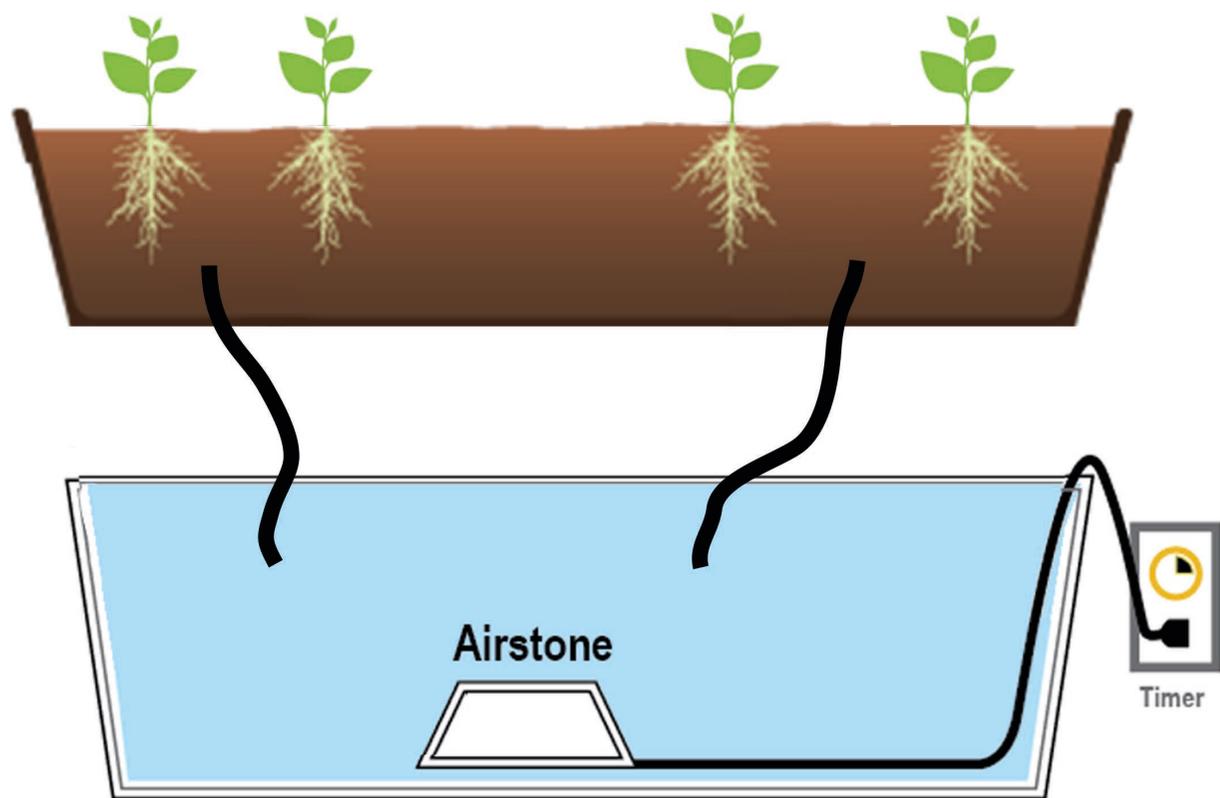
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# PASSIVE SUB IRRIGATION

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# IN ARCHITECTURE

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*SelgasCano at Venice Biennale*

# SCALE: INTERIORS

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*Malthus in-home aquaponics unit*

# SCALE: INTERIORS

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*Indoor Garden and Compost by Ferber and Dieckmann*

# SCALE: INTERIORS

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*Minigarden project*

# SCALE: BUILDING

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*Jean Nouvel and Patrick Blanc One Central Park in Sydney*

# SCALE: BUILDING

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*Tall Green Home in Vietnam*

# SCALE: INTENSIVE

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*Extensive hydroponic farm*

# HYDROPONIC vs SOIL FARMING

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- Space saving
- Water saving
- No weeding
- More control
- Fast growth

- Initially cheaper
- Self regulation
- Easier to manage

# CONSIDERATIONS

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- World soil stress
- Increasing population
  - Natural cycles

# WORLD SOIL STRESS

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## **Non Arable land**

Actual total amount of cultivated land is 11% of the world land

# WORLD SOIL STRESS

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**Over fertilized land**

# WORLD SOIL STRESS

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## **Global water stress**

25% of the world's population lives in areas of physical scarcity

# WORLD SOIL STRESS

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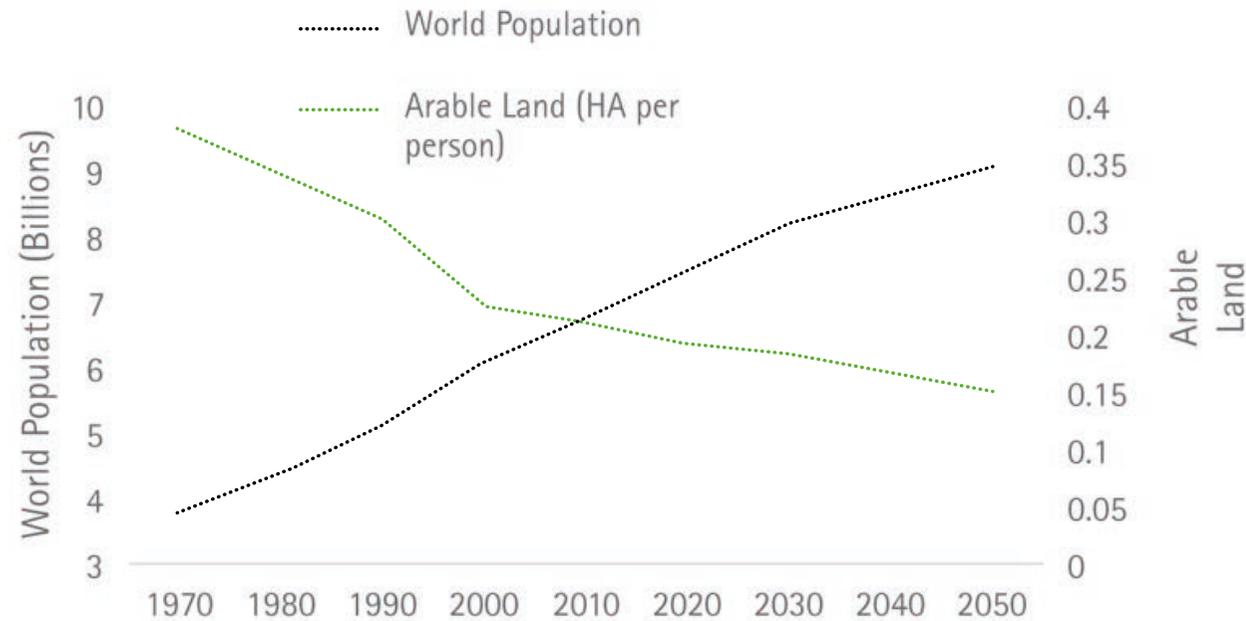


**Global land scarcity**

# INCREASING POPULATION

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## Global water stress

How are we going to plan our future?  
Is hydroponics the final solution?  
Is it a technology just for extra-ordinary cases?  
Is it going to be integrated in future cities?  
At family scale? At city scale? At regional scale?

# NATURAL CYCLES

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## Main consequences of substitution of traditional farming with hydroponics:

- **No more natural recycling.** It cuts out the production from the natural farming cycle.
- **Artificial final product.** Because of lamps for irradiation, industrial nutrients and distilled water.
- **Stop impoverishment of the soil** due to traditional herbicides, pesticides and intensive culture.
- **Field abandonment.** To give the soil back to nature and re-establish the balance anthropization and natural environment.

