



POWER4BIO

REGIONS FOR
BIOECONOMY



Cross visit Czech Republic 30.11-1.12. 2020

Jan Mráz, University of South Bohemia

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Aquaponics as an example of long term sustainable food production

Jan Mráz

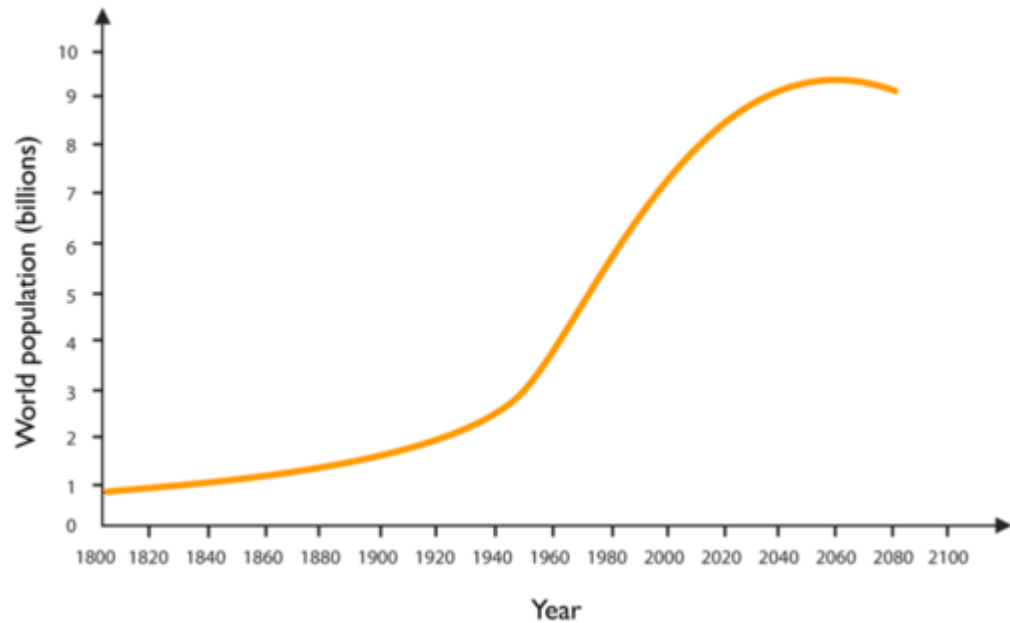


World megatrends

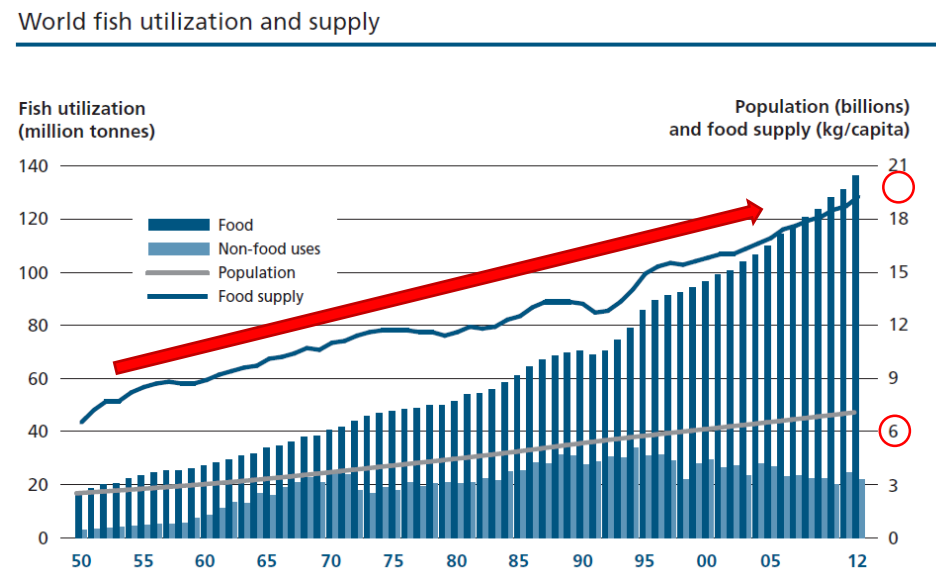
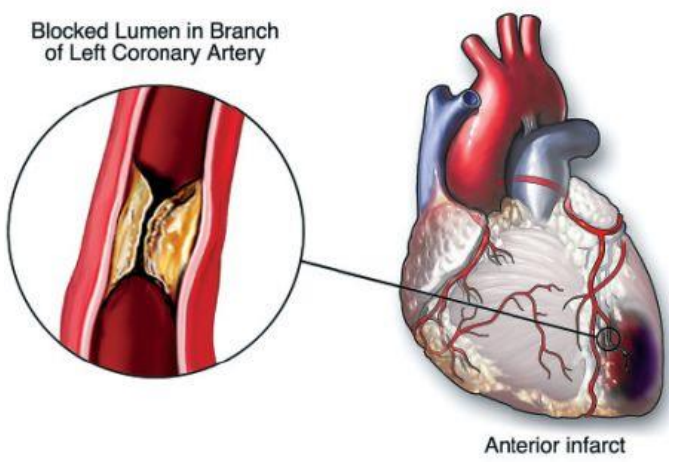
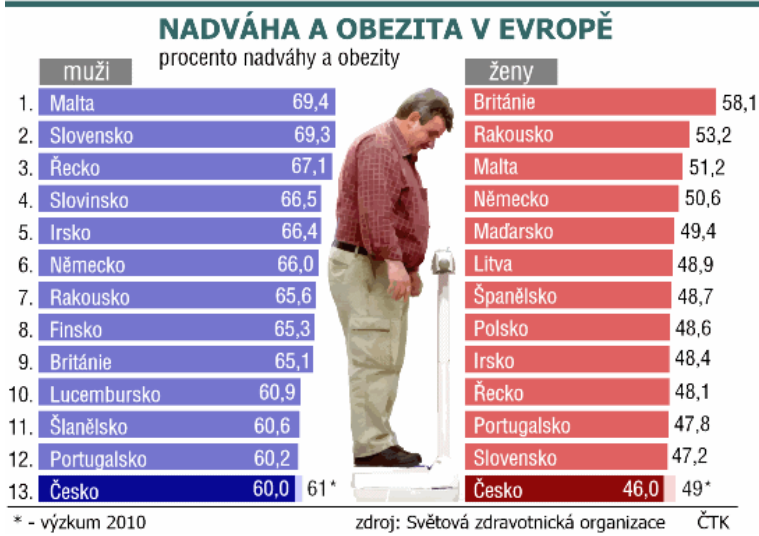


7.8 bilions

Human Population: Past, Present, and Future



World megatrends



World megatrends

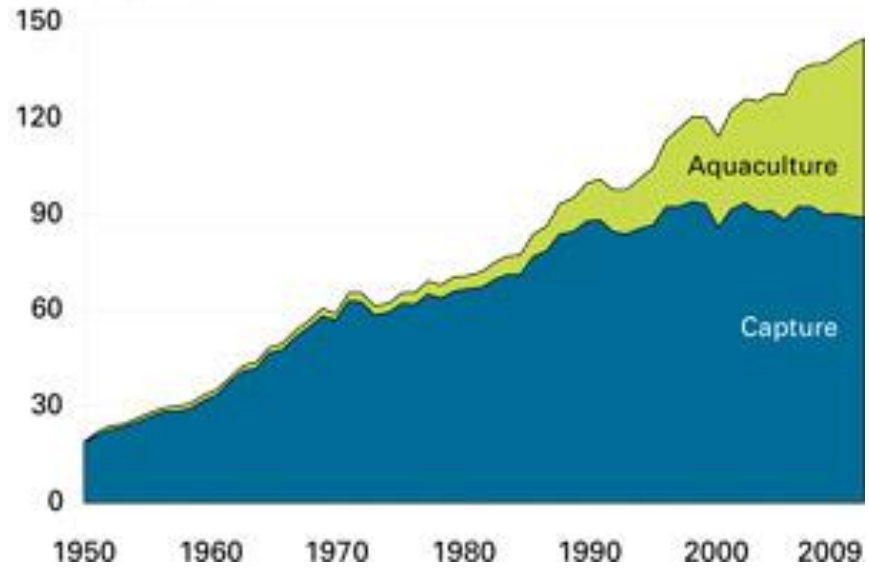


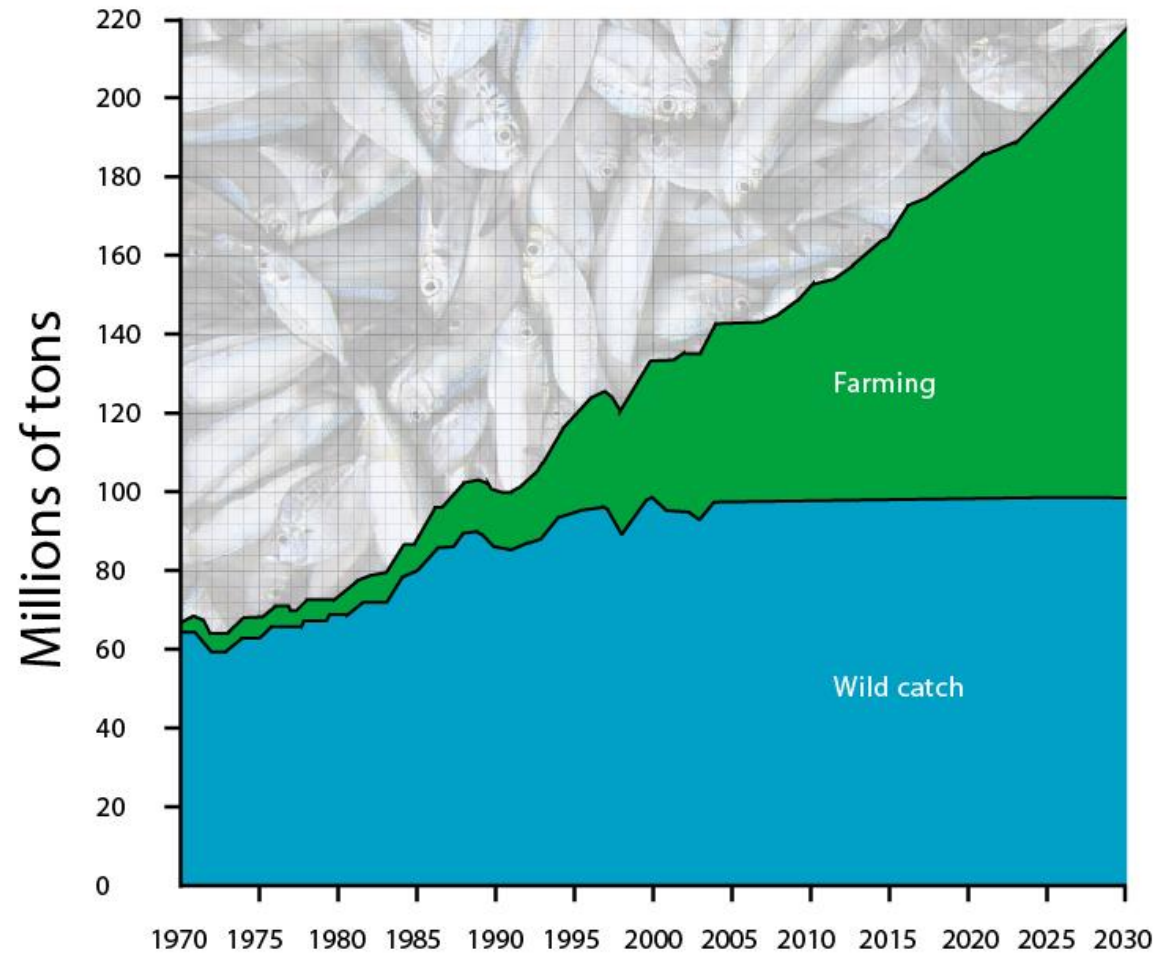


Introduction:

World fishery production

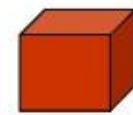
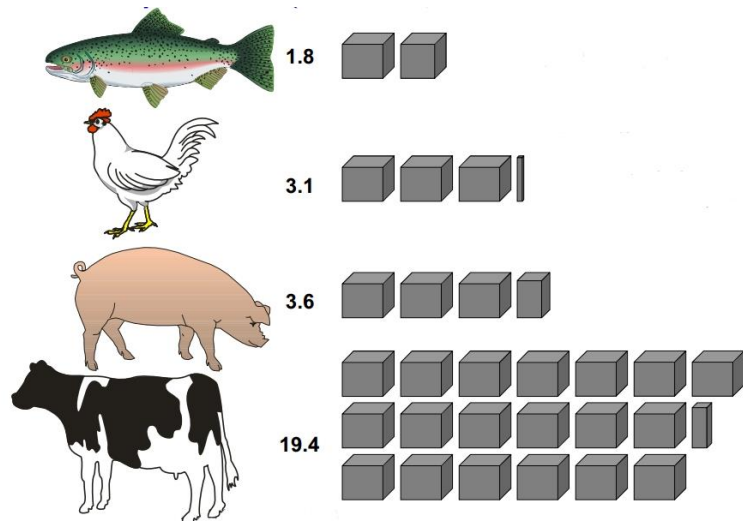
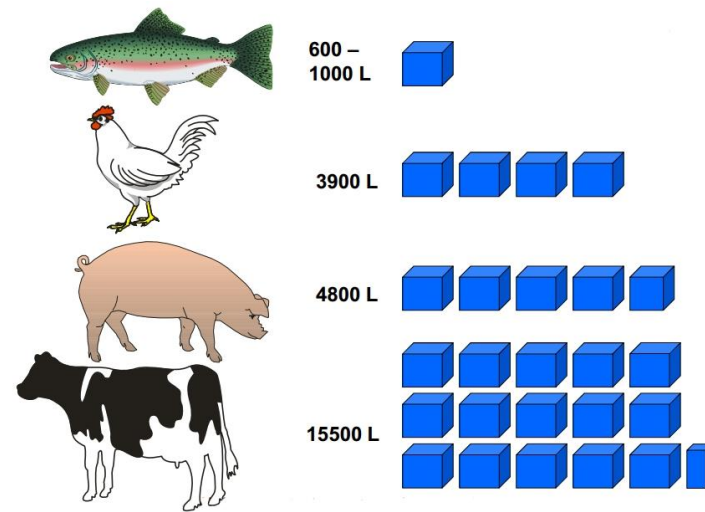
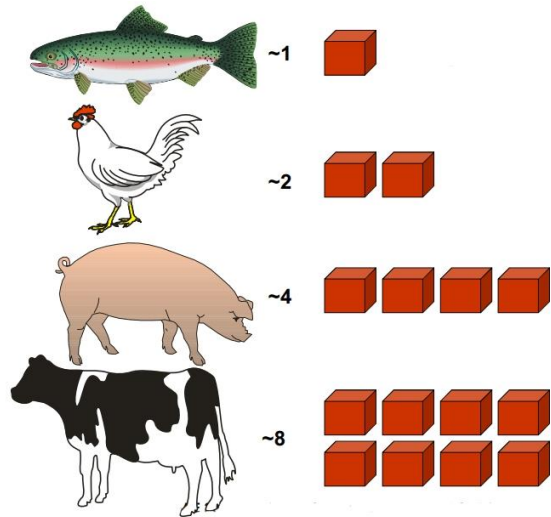
million tonnes



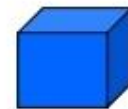


www.futuretimeline.net

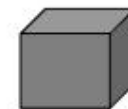




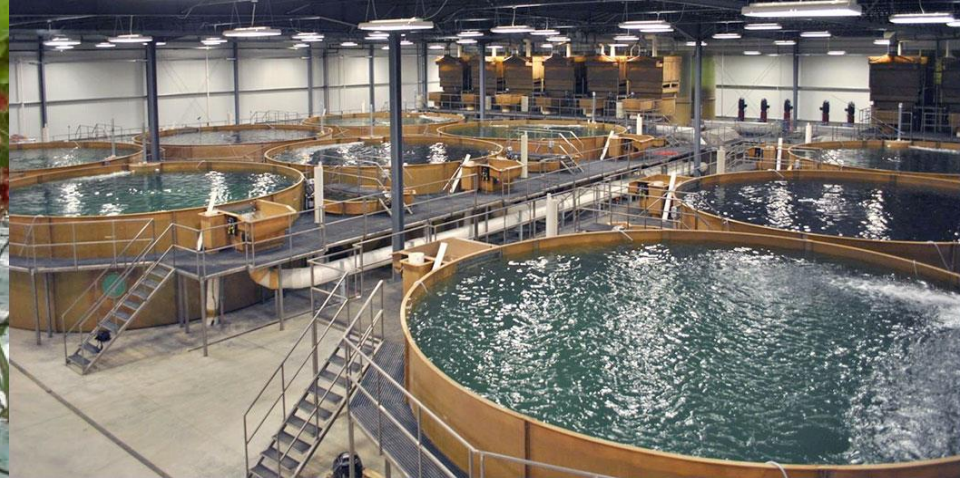
Feed conversion



Water consumption



Production of greenhouse gasses
(kg of equivalents to CO₂)

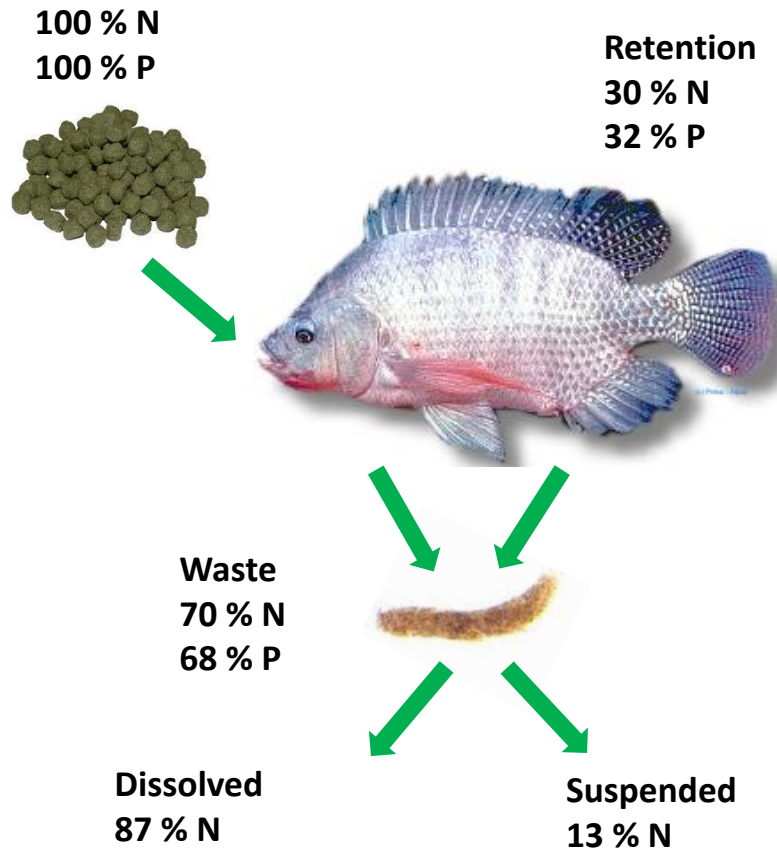


- Hydroponics

- low need of water
- soilless
- no weeds and diseases
- close to consumption
- optimal conditions
- fast growth
- even quality

- Aquaculture

- low need of water
- no need of ponds, streams or seas
- close to consumption
- optimal conditions
- fast growth
- even quality



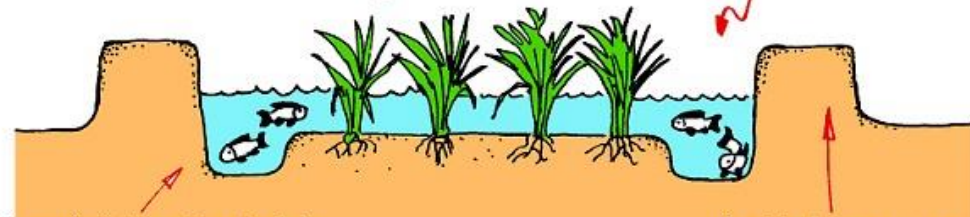


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v Českých Budějovicích
University of South Bohemia
in České Budějovice
Czech Republic

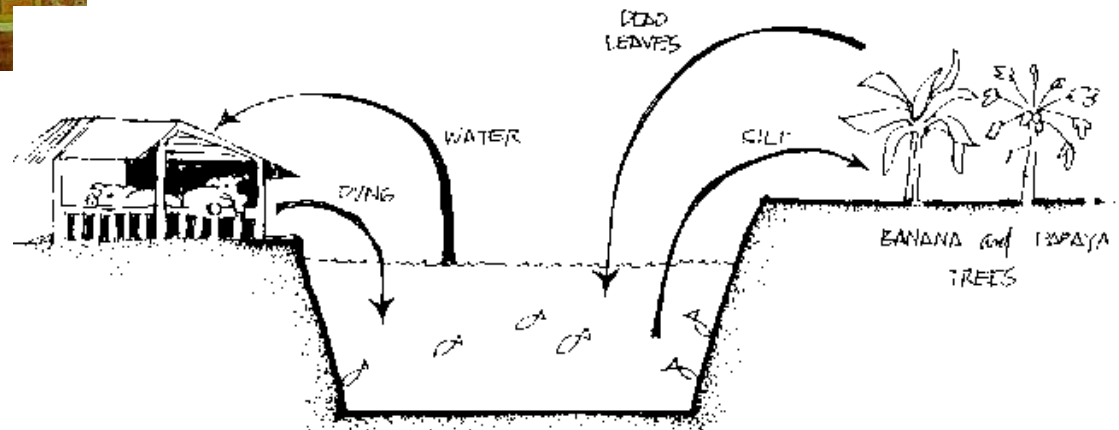
the fish help the rice thrive by providing organic fertilizer, eating insects and circulating oxygen throughout the plants...

...which means the farmer has to buy less fertilizer and pesticide



this small ditch provides the fish with a habitat during the dry season

the dyke helps ensure an adequate water level





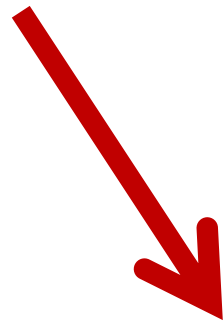
O_2



CO_2



Rich in nutrients



CO_2



**Rich
in nutrients**

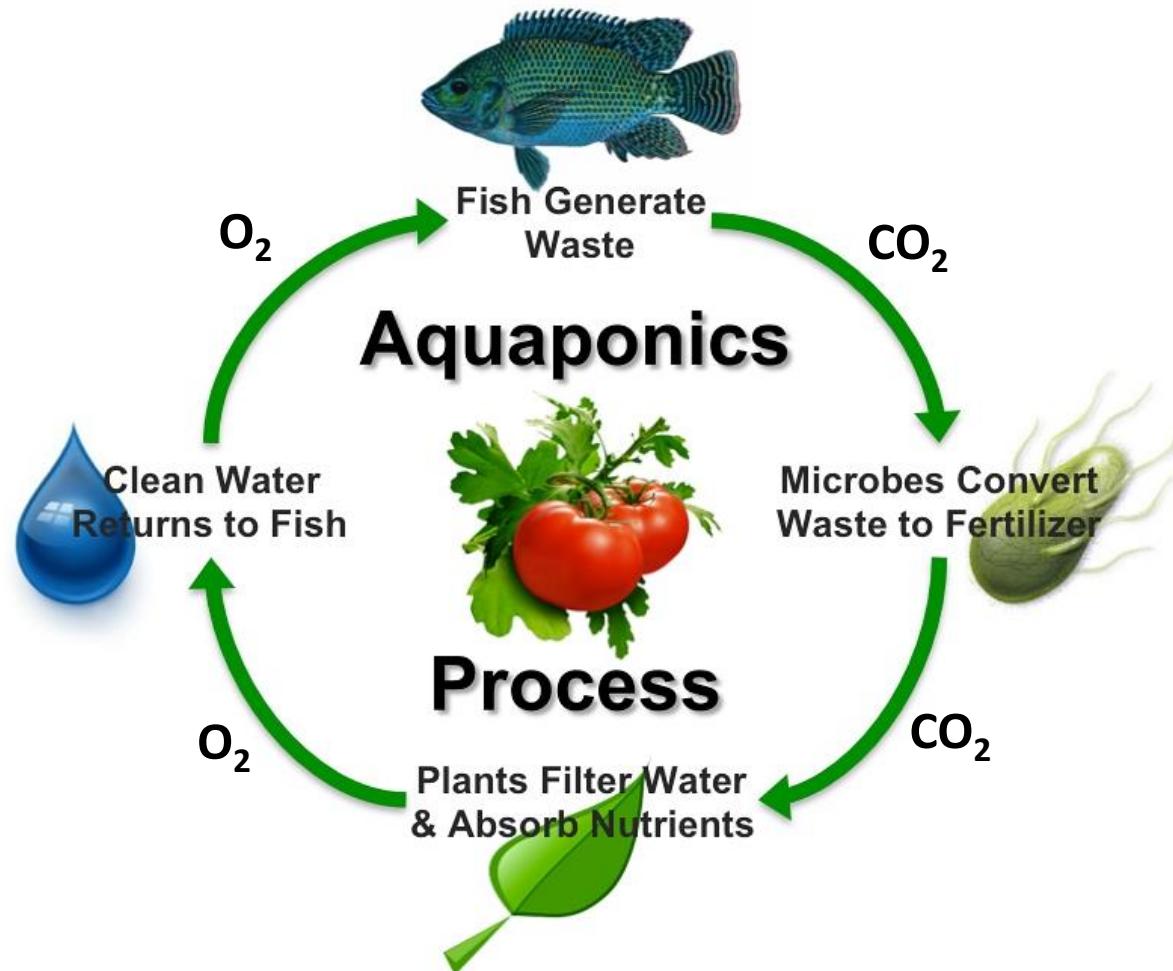


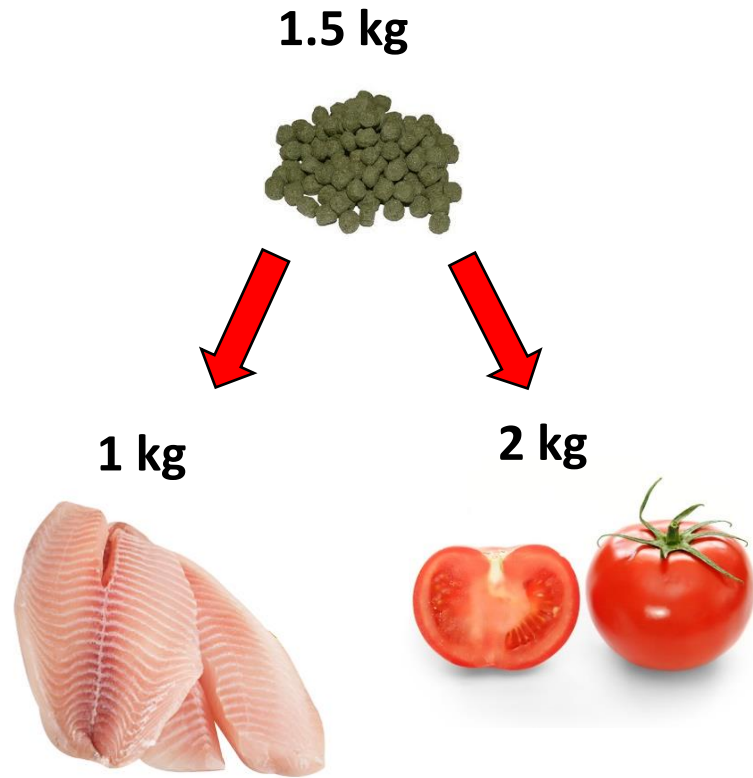
O_2





Aquaculture + Hydroponics = Aquaponics







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2 THE GLOBE - AQUAPONIC SYSTEM

AQUAPONIC FARMING IS A TECHNIQUE THAT COMBINES THE CULTIVATION OF FISH WITH THE GROWING OF VEGETABLES. THE FISH PROVIDE RICH FERTILIZER FOR THE PLANTS AND IN RETURN, THE PLANTS CLEAN THE WATER FOR THE FISH. THE FISH AND THE PLANTS CO-EXIST IN A SYMBIOTIC RELATIONSHIP.

COLD SEASON
HARVEST



CARROTS PEAS



LETTUCE



CABBAGE



BROCCOLI



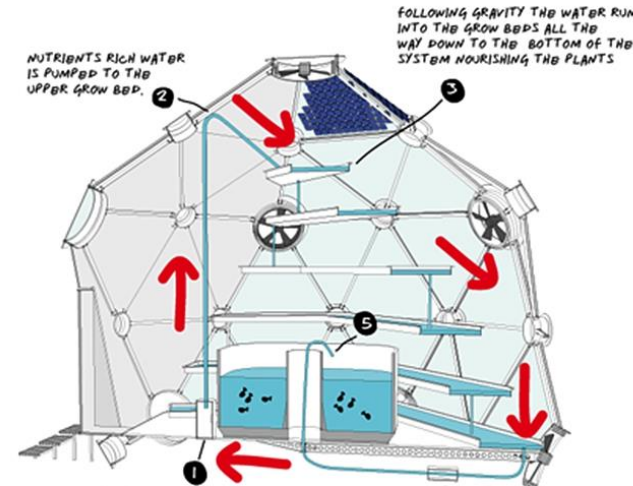
SWISS CHARD



SPINACH



GREY FISH



HOT SEASON
HARVEST



TOMATOES



MELONS



CUCUMBERS



GREEN PEPPERS



AUBERGINES



GREEN BEANS



SQUASH

ANNUAL FOOD PRODUCTION AT AVERAGE ESTIMATION



OPTIMAL FISH SPECIES FOR AQUAPONIC FARMING



CARP



TROUT



TILAPIA

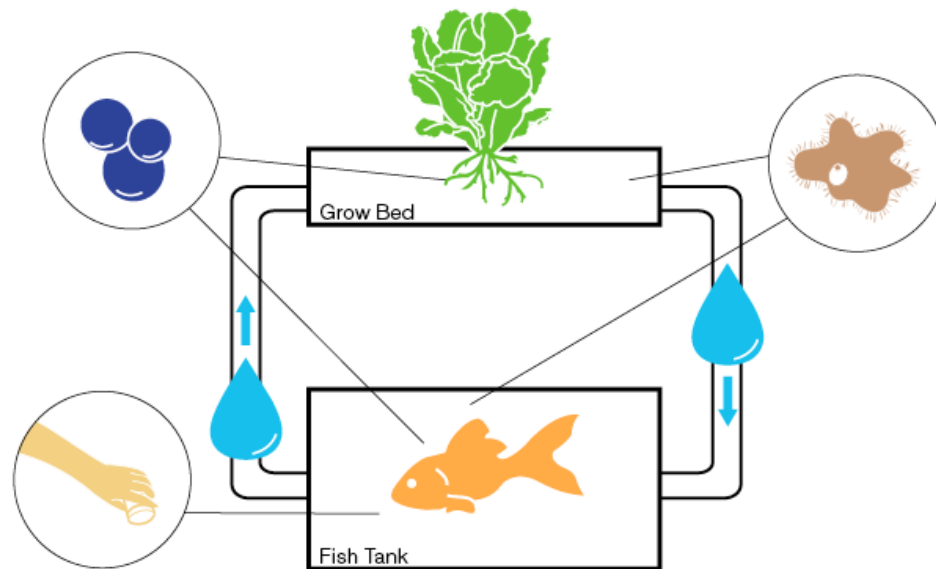


SALMON

https://www.youtube.com/watch?v=OvHVLHZiXHk&feature=player_embedded



Aquaponics – how it works



- Fish produce waste, ammonia (toxic)



- Microbes convert ammonia to nitrites and nitrates



- Plants use nitrates and other nutrients from water



- Water is cleaned and oxygenated through growbeds



- Clean and oxygen rich water goes back to fish tank



Aquaponics - plants

- They don't invest energy in root growth
- Continual excess of nutrients
- Excess of CO_2 , NO_3^-
- Warm water
- No weeds



Aquaponics – design

- Drip irrigation
- Media-Based Growbed (Ebb and Flow)
- Raft System
- NFT (Nutrient Film Technique)
- Towers, VertiGro
- Aeroponics







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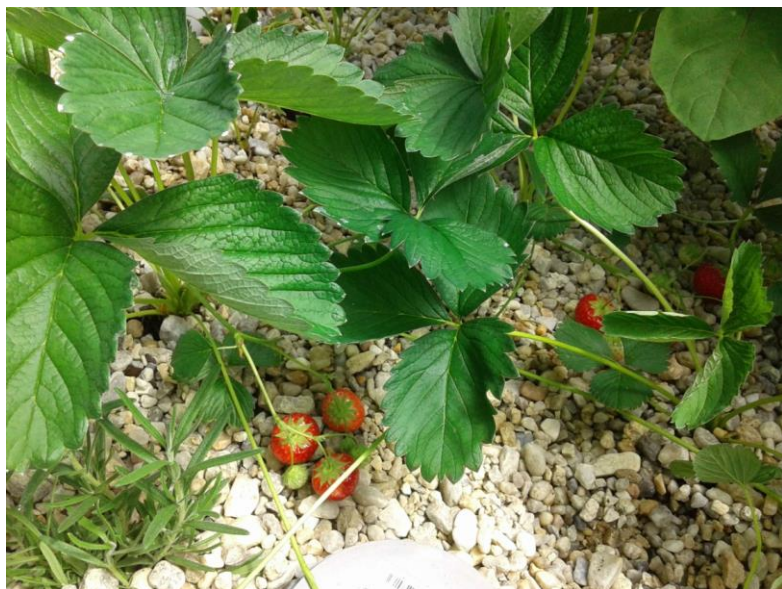
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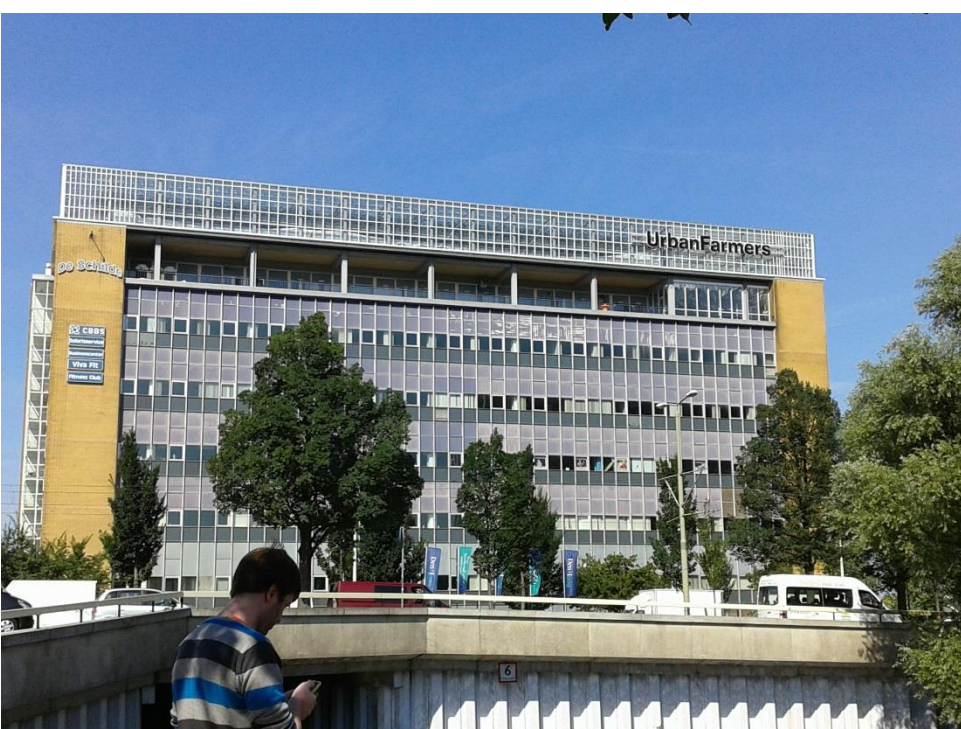






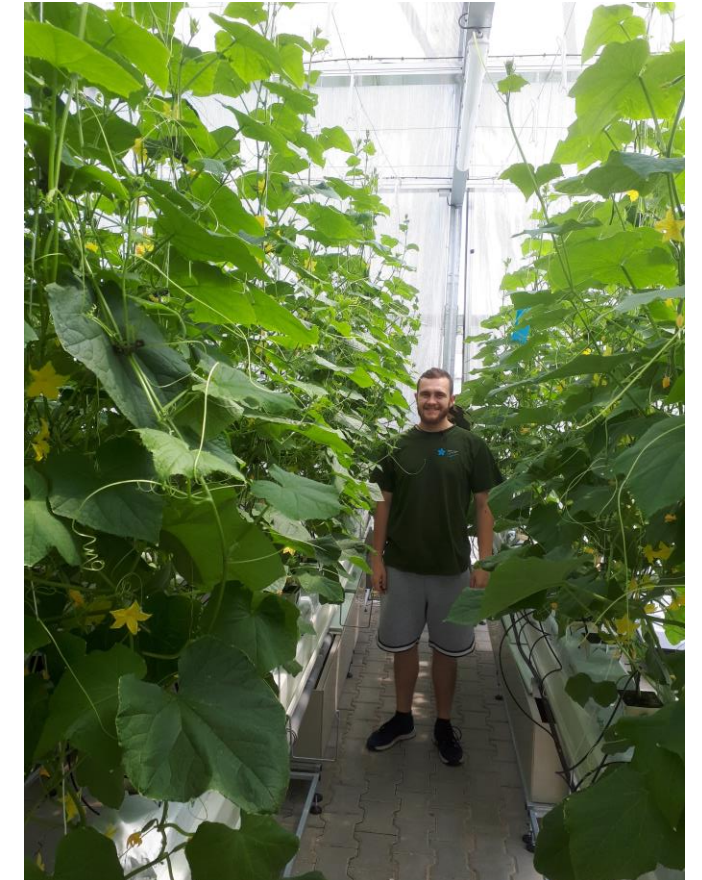
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CONOMY

Aquaponic research center at FFPW, USB



6 x independent RAS
4 x types of hydroponic systems
(each with 6-12 replicates)

Future or today reality?



The screenshot shows a Mozilla Firefox browser window displaying a Google Maps page titled "Aquaponics Map". The browser's address bar shows the URL: https://www.google.com/maps/d/viewer?mid=1d6WLM-XV4rA-Wm9IGuaEZvnjZnA&hl=en_US&ll=48.268303950640394%2C18.154563906249905&z=4. The map itself is centered on Europe and the Mediterranean, with numerous red location pins indicating aquaponics projects. The pins are densely clustered in Western and Central Europe, including the UK, France, Germany, and Italy, and are more sparsely distributed in Eastern Europe and the Mediterranean basin. A left-hand sidebar lists several categories of projects, each with a red location pin icon:

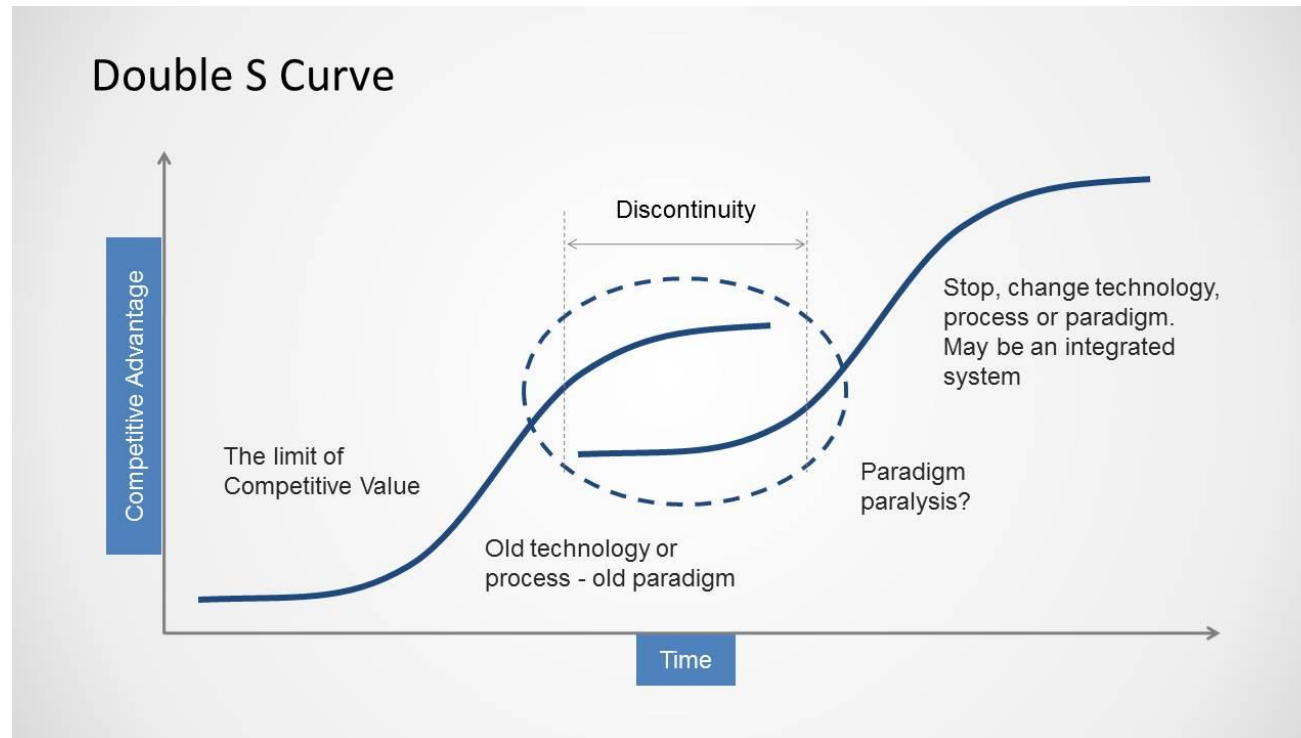
- Detlef's Aquaponics**
- Western Aquaponics**
- Baw Baw Community Gardens Aquaponi...**
- Warragul Regional College Aquaponics**
- Haranaka Aquaponics**
- Brazil**
 - Aquaponia em aquário pequeno**
 - Top Fish & Plants organicos**
- Camada sem título**
 - Aquaponic Munhoz**
- Capa sin nombre**
 - I.E.S. Joaquín Romero Murube**
 - Grow Bristol**

At the bottom of the browser window, the Windows taskbar is visible, showing the time as 9:39 on 21.9.2017. The system tray includes icons for network, volume, and power, along with the text "Zjistit, jak ho zrychlit" and "Přístě už neinformovat."

Challenges



- Beginning, lack of experience
- Philosophy as motivation
- Lack of research and legislation
- High initial costs and risk of failure
- The market doesn't know about it



POWER4BIO website and social media



www.power4bio.eu



@power4bioproject



@power4bio



@power4bio

Thank you for your attention

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