



POWER4BIO
REGIONS FOR
BIOECONOMY



Cross visit Czech Republic 30.11-1.12. 2020

Jan Mráz, University of South Bohemia

This project has received funding from the European
Union's
Horizon 2020 research and innovation programme
under grant agreement No 818351





Aquaponics as an example of long term sustainable food production

Jan Mráz

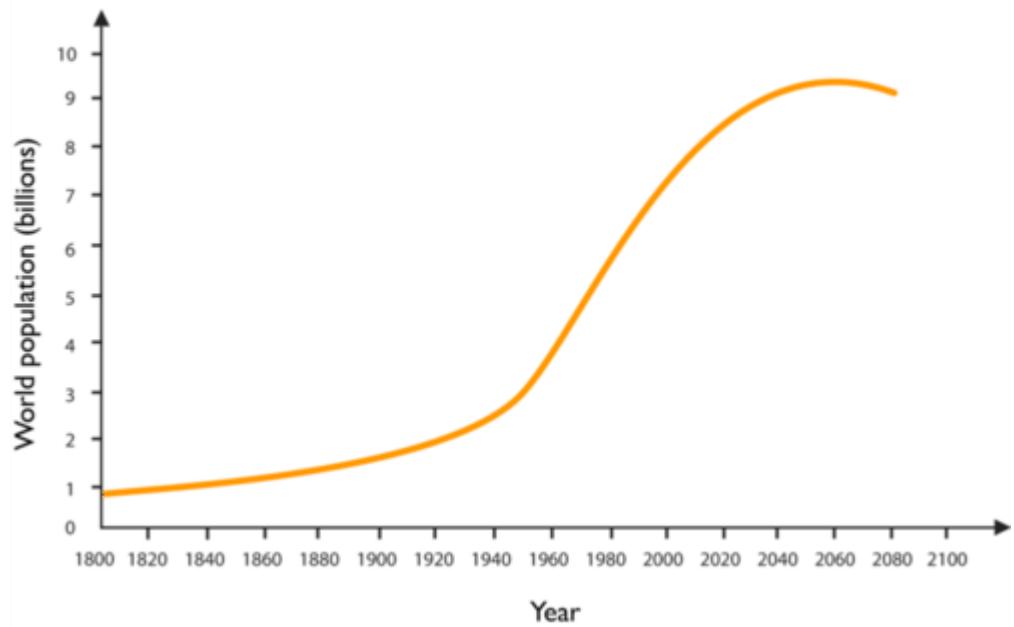


World megatrends

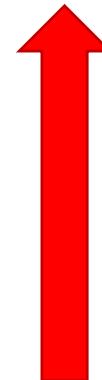
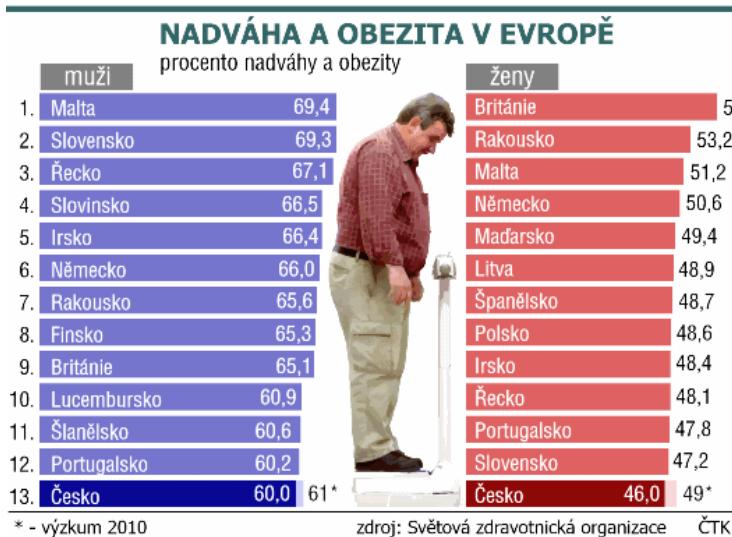


7.8 billions

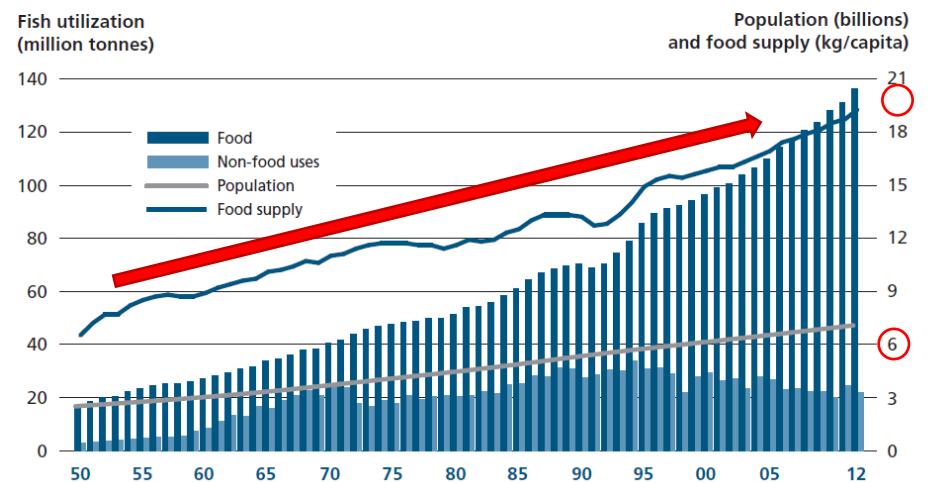
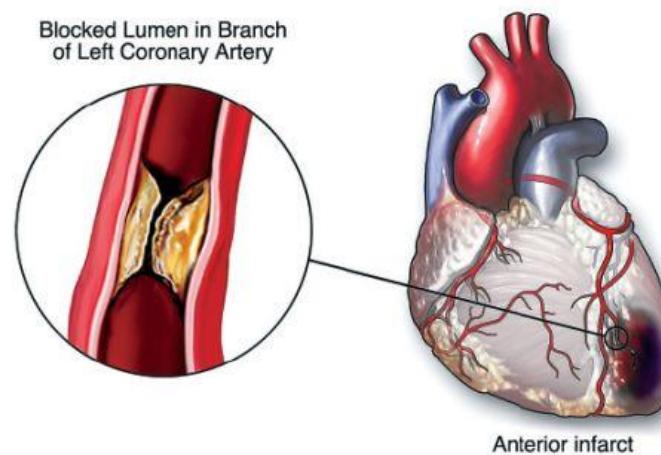
Human Population: Past, Present, and Future



World megatrends



World fish utilization and supply



World megatrends

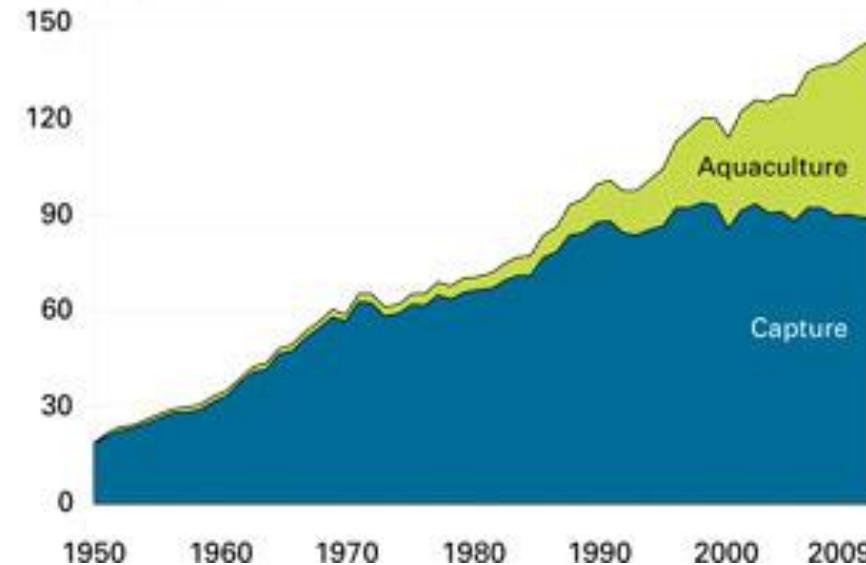




Introduction:

World fishery production

million tonnes

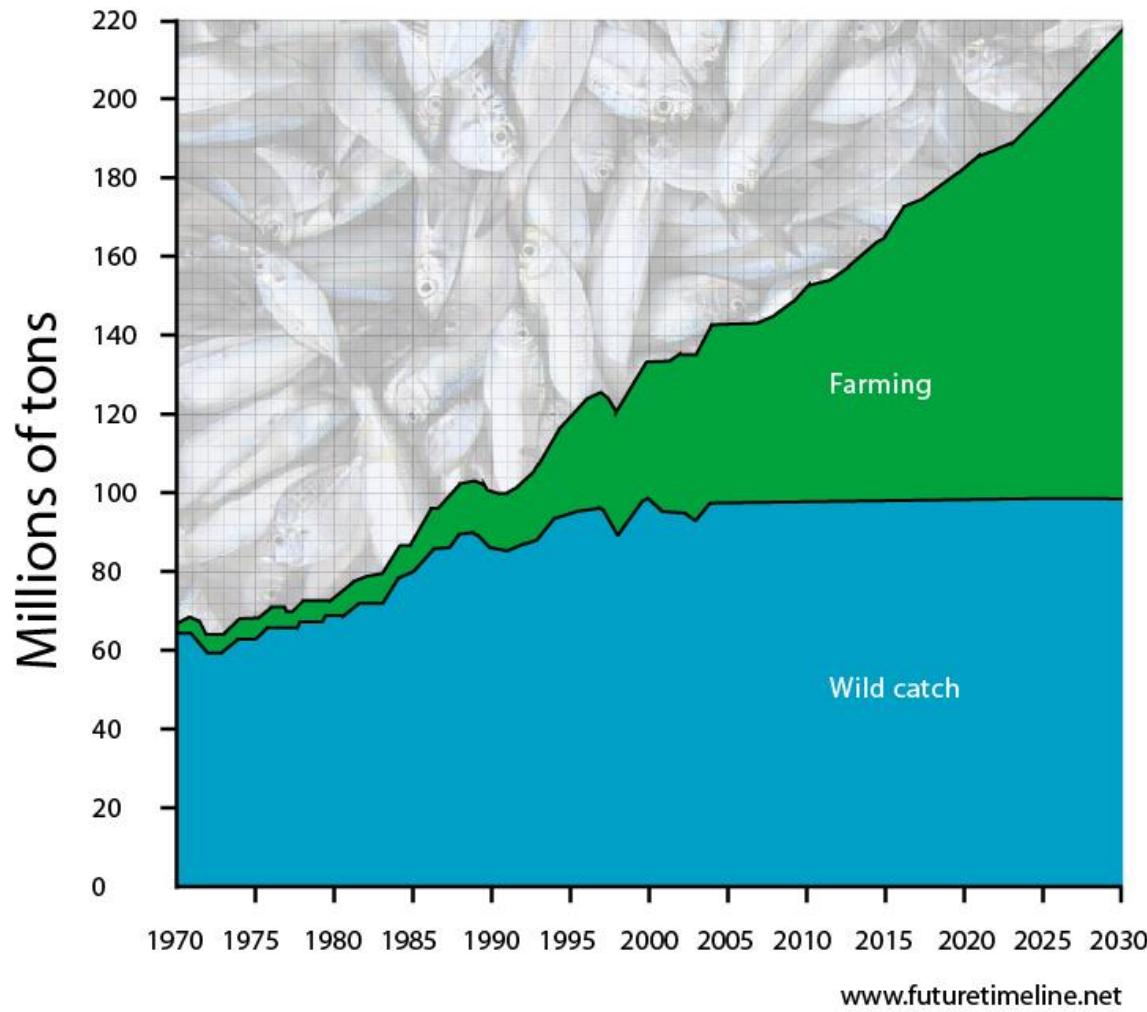




Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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

www.frov.jcu.cz

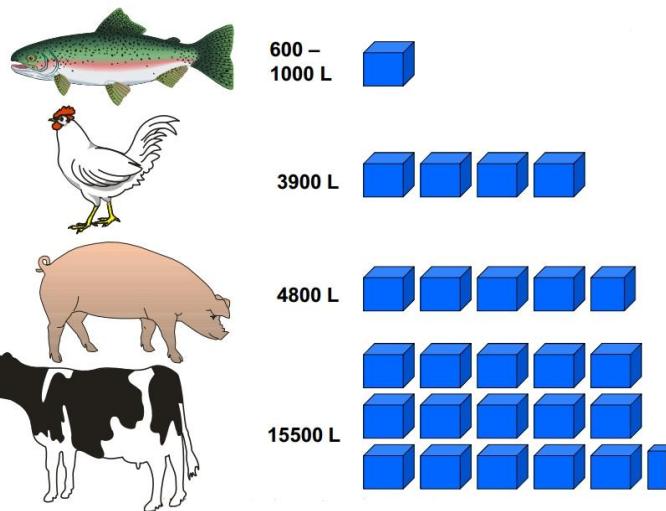
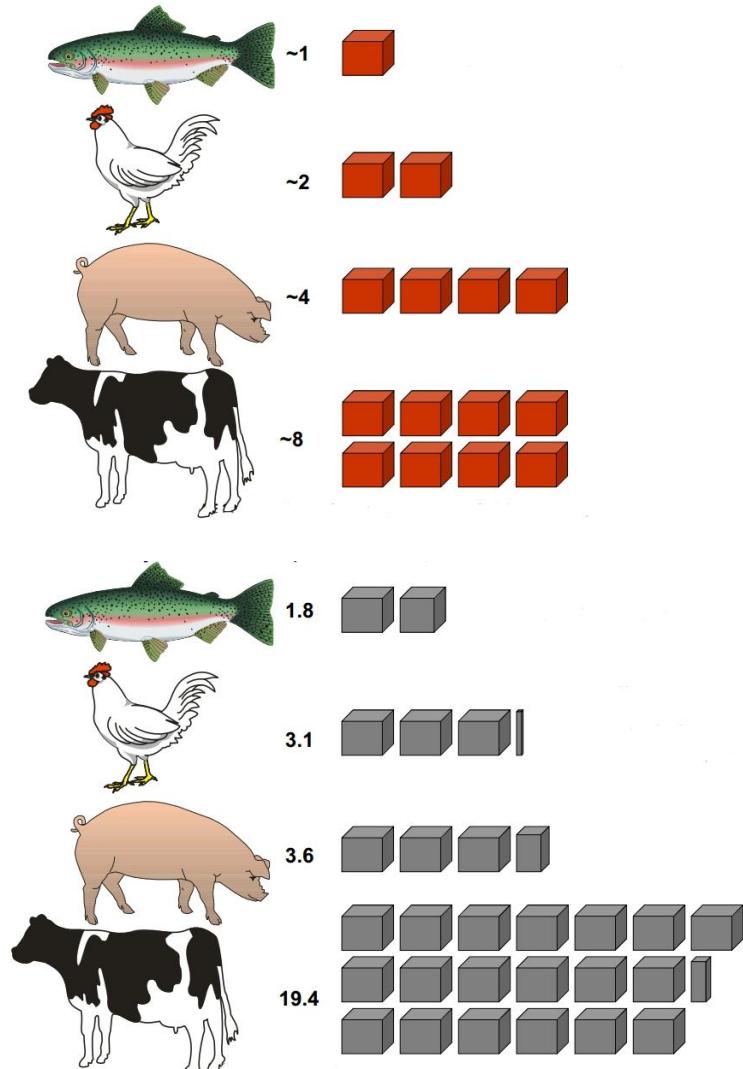




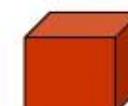
Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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

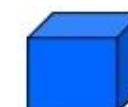
www.frov.jcu.cz



Feed conversion



Water consumption



Production of greenhouse gasses
(kg of equivalents to CO₂)



(Kloas et al., 2011)



- Hydroponics

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

- Aquaculture

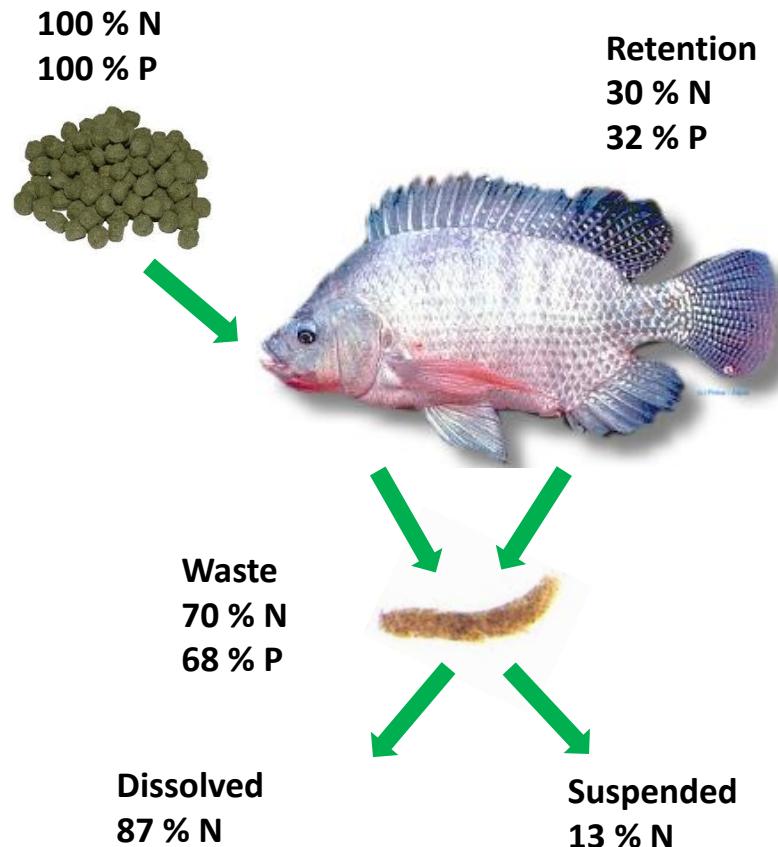
- low need of water
- no need of ponds, streams or seas
- close to consumption
- optimal conditions
- fast growth
- even quality



Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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

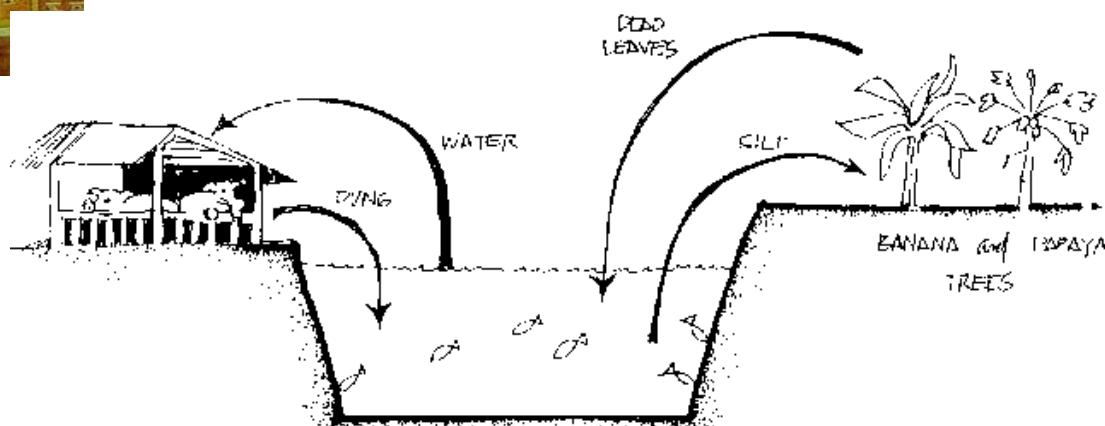
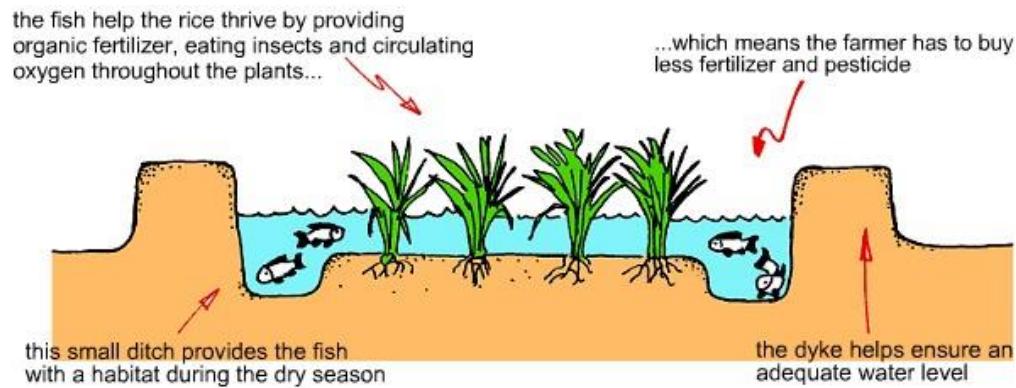
www.frov.jcu.cz





Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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





Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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

www.frov.jcu.cz



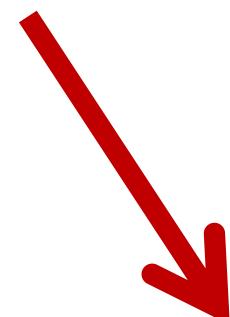
O_2



CO_2



Rich in nutrients



CO_2



Rich
in nutrients



O_2



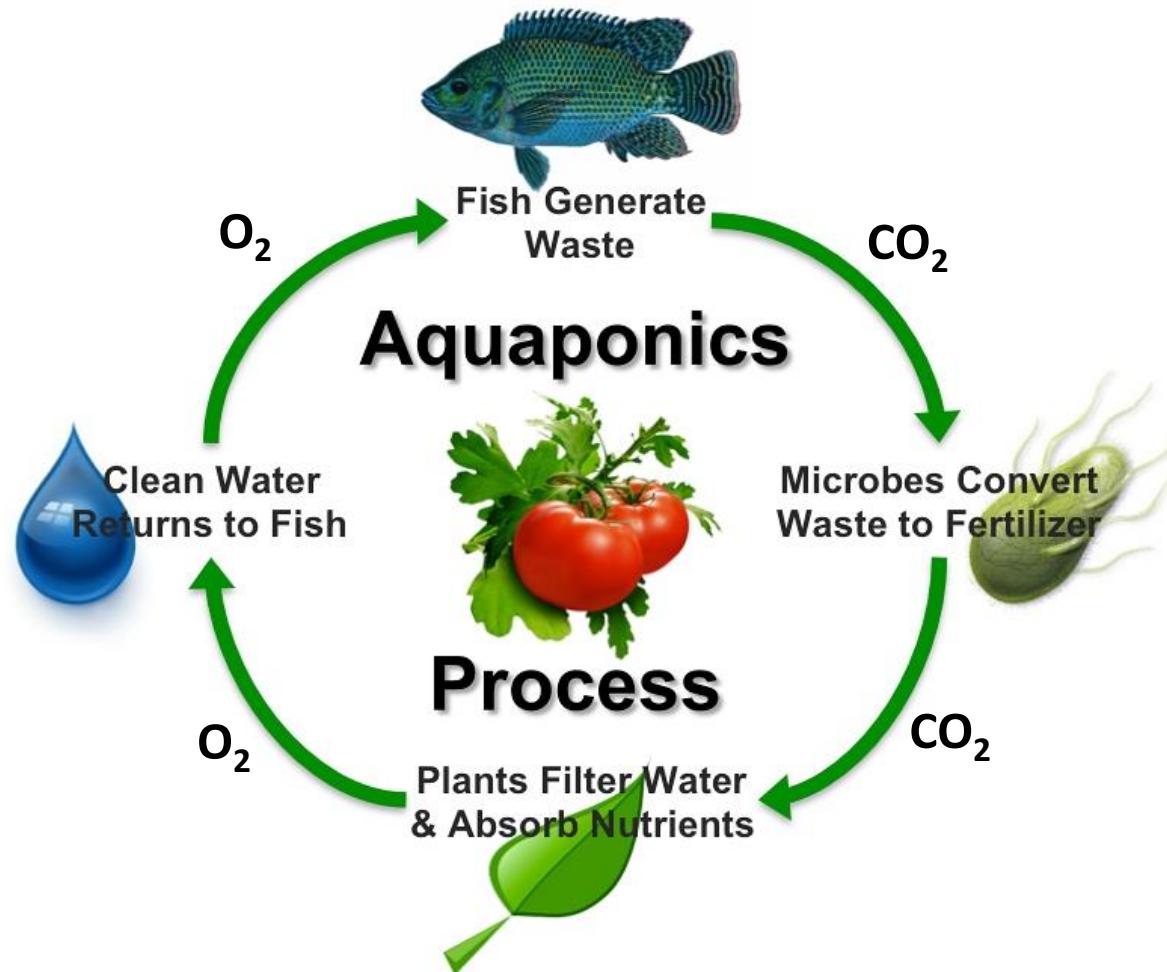


Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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

www.frov.jcu.cz

Aquaculture + Hydroponics = Aquaponics

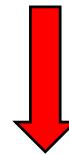
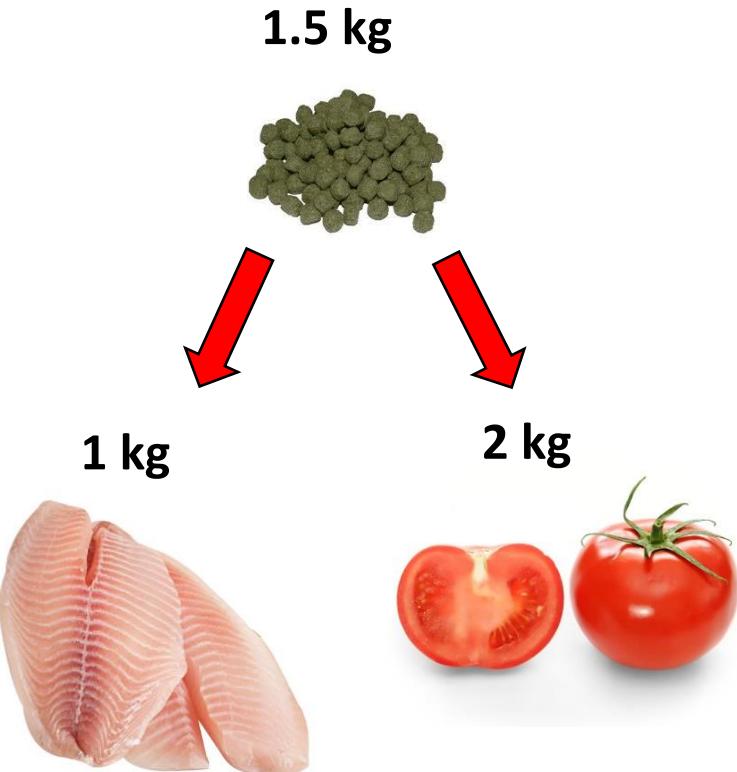




Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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

www.frov.jcu.cz





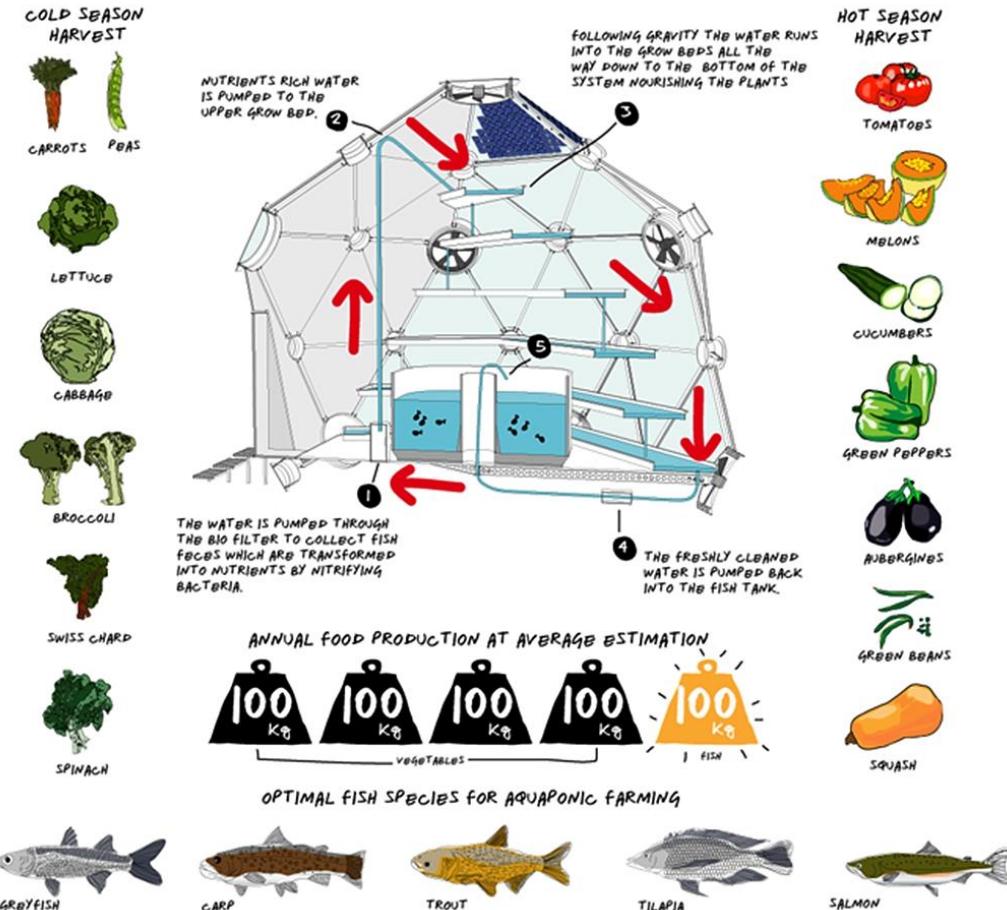
Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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



② THE GLOBE - AQUAPONIC SYSTEM

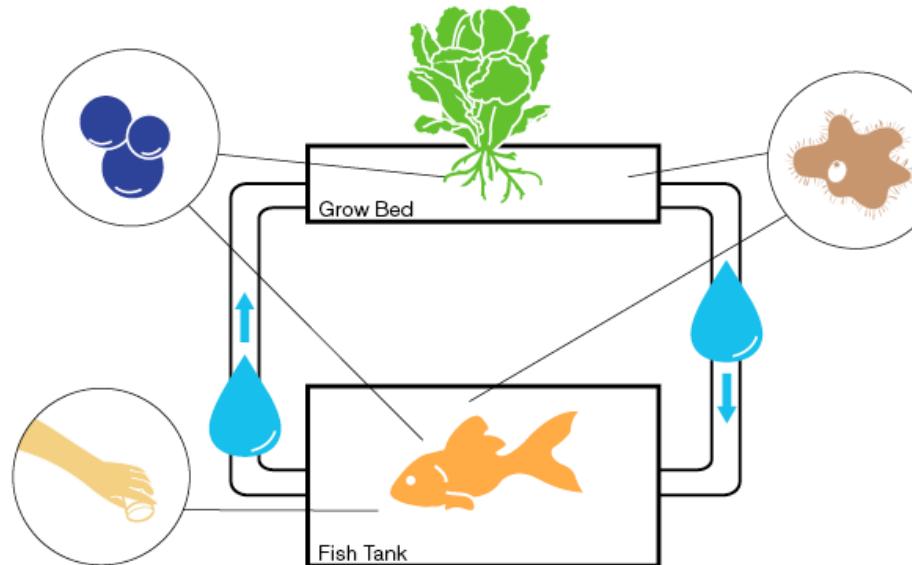
AQUAPONIC FARMING IS A TECHNIQUE THAT COMBINES THE CULTIVATION OF FISH WITH THE GROWING OF VEGETABLES. THE FISH PROVIDE RICH FERTILIZER FOR THE PLANTS AND IN RETURN, THE PLANTS CLEAN THE WATER FOR THE FISH. THE FISH AND THE PLANTS CO-EXIST IN A SYMBIOTIC RELATIONSHIP.



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





Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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

www.frov.jcu.cz





Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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

www.frov.jcu.cz





POWER4BIO
REGIONS FOR
BIOECONOMY

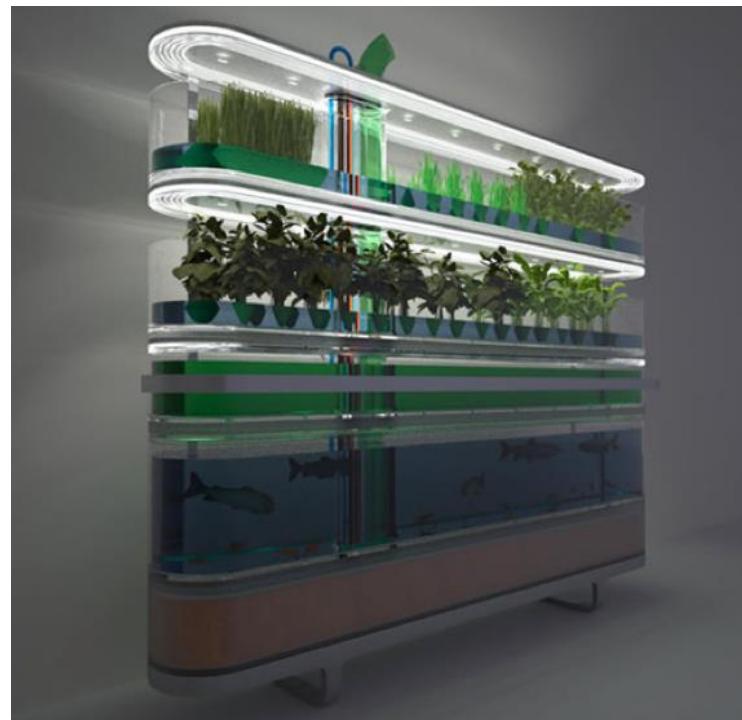




Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

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







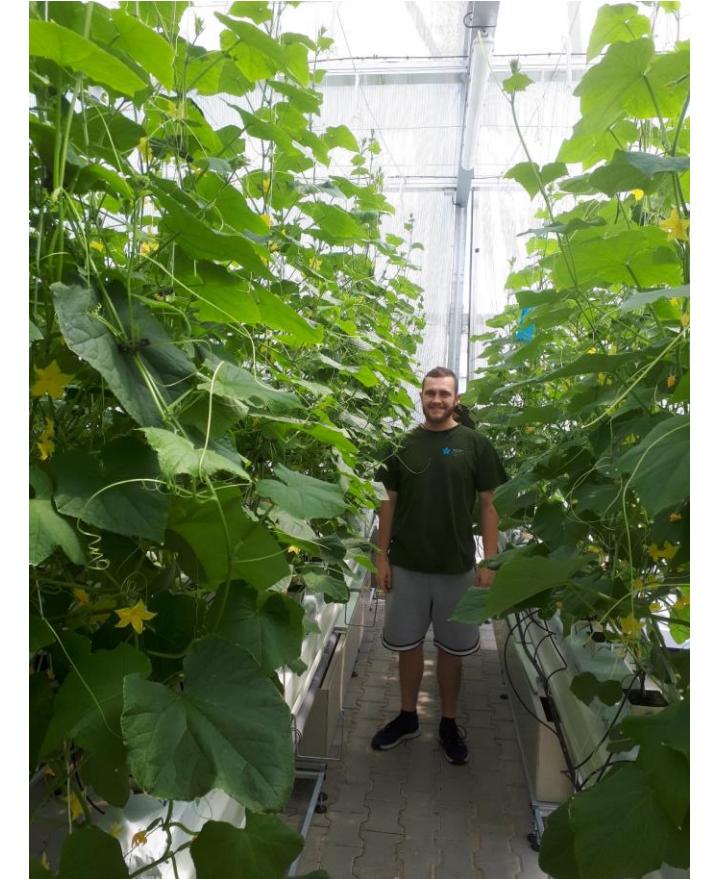
WER4BIO
IONS FOR
ECONOMY



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?



Soubor Úpravy Zobrazit Historie Záložky Nástroje Nápověda

Doručené – Seznam Email Poslouchej rádio online! Aquaponics Map

https://www.google.com/maps/d/viewer?mid=1d6WLM-XV4rA-Wm9IGuaEZvnjZnA&hl=en_US&ll=48.268303950640394%2C18.154563906249905&z=4

Hledat Sign in

Aquaponics Map

Detlef's Aquaponics

Western Aquaponics

Baw Baw Community Gardens Aquaponics

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

Made with Google My Maps

Map data ©2017 Google Imagery ©2017 NASA, TerraMetrics Terms 500 km

Mozilla Firefox se zdá startuje pomalu. Zjistit, jak ho zrychlit Přistě už neinformovat.

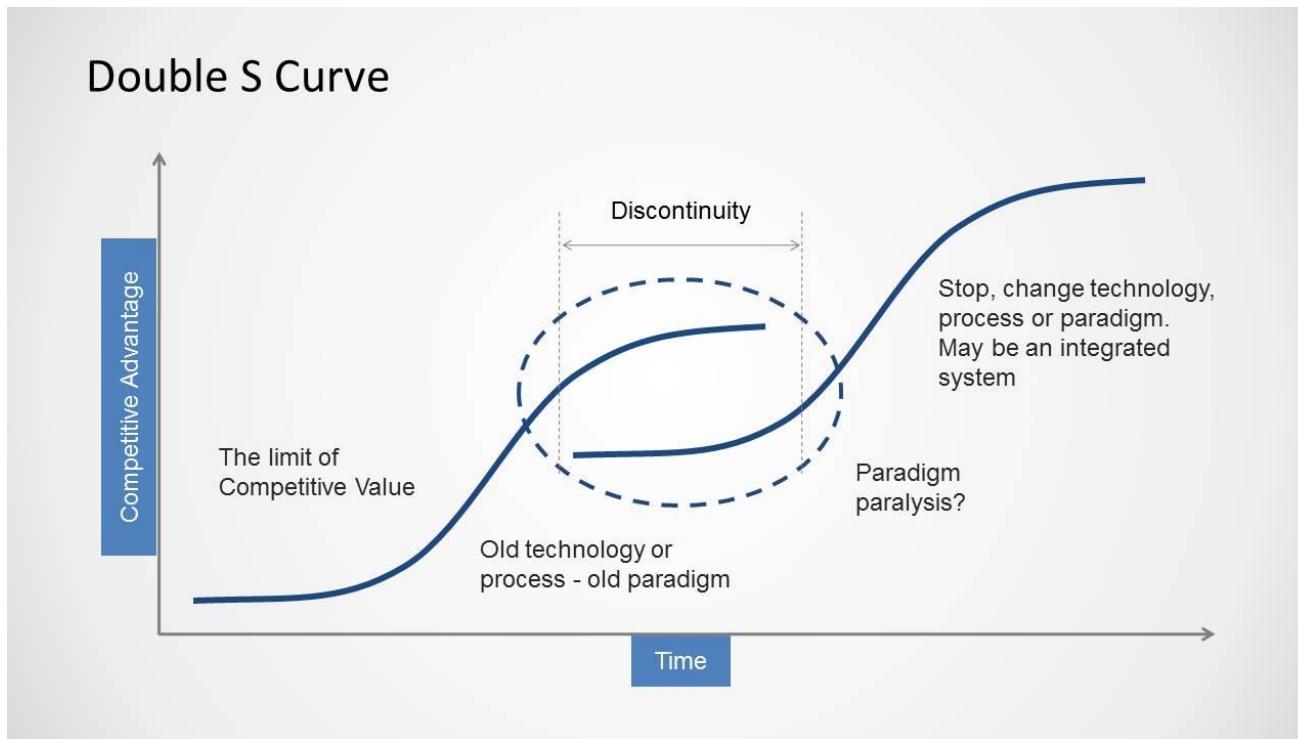
CS 9:39 21.9.2017

A screenshot of a Google My Maps interface titled "Aquaponics Map". The map displays satellite imagery of Europe and North Africa, with numerous red location pins scattered across the continent, primarily concentrated in Western Europe (UK, Ireland, France, Germany, Italy) and Southern Europe (Spain, Portugal). A single yellow location pin is visible in Portugal. The map includes labels for various countries and bodies of water like the North Sea, Baltic Sea, and Mediterranean Sea. The legend on the left side lists several aquaponics projects with their corresponding icons and names. The bottom of the screen shows the standard Mozilla Firefox toolbar and status bar.

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

Jan Mráz
University of South Bohemia
Faculty of Fisheries and
Protection of Waters



POWER4BIO
REGIONS FOR BIOECONOMY

This project has received funding from the European
Union's
Horizon 2020 research and innovation programme
under grant agreement No 818351

