



Wetlands beyond pollution control – thoughts on a circular economy

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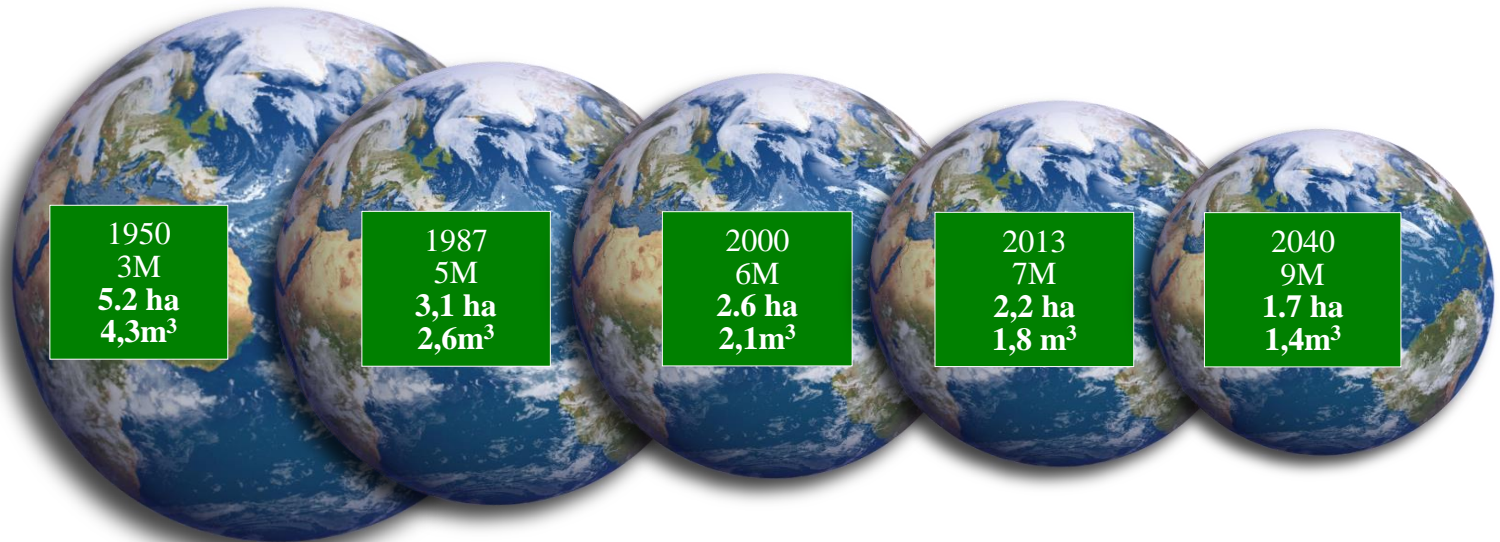
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Resources decrease



150 million tons/year N fertiliser produced by Haber-Bosch redox reaction consuming 1 barrel of oil per ton of reduced N

- **70 % lost to watercourses,**
- **7 billion humans are generating 32 million tons/year of properly reduced N,** contained mainly in urine

$150 \times 0,3 = 45 \text{ Mtons/year} \dots\dots$

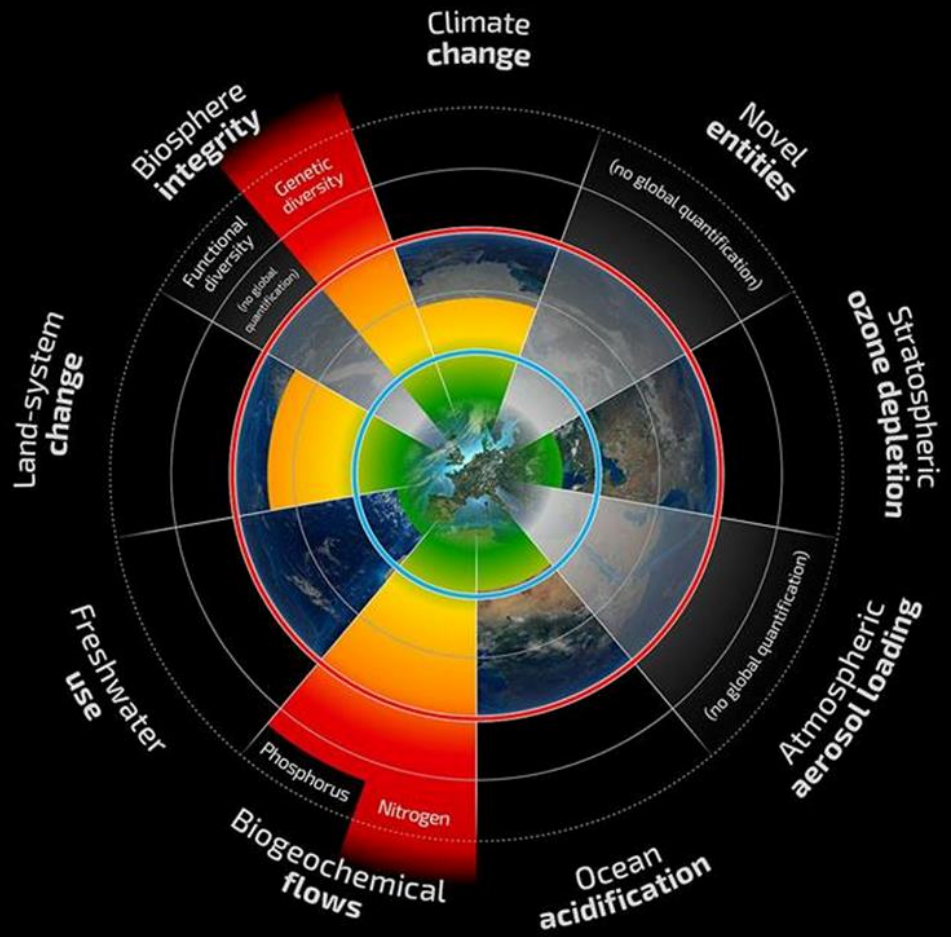
Re-thinking agriculture

$45 - 32 = 13 \text{ Mtons/year}$ still to

be produced from N2

Planetary Boundaries

A safe operating space for humanity

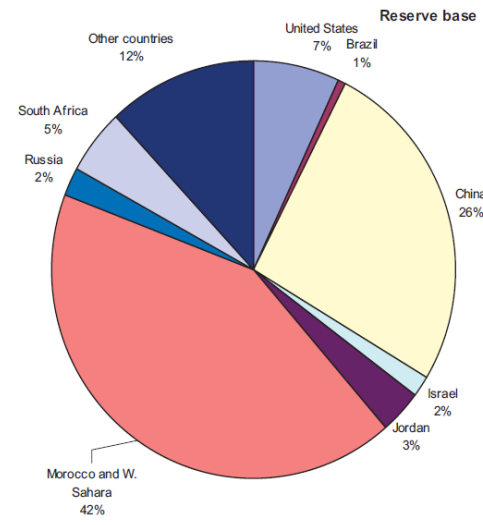
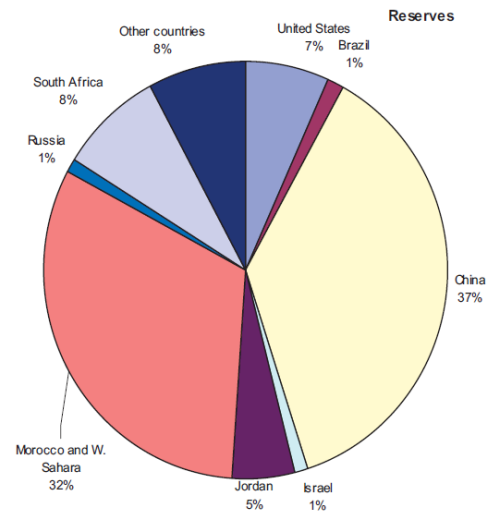
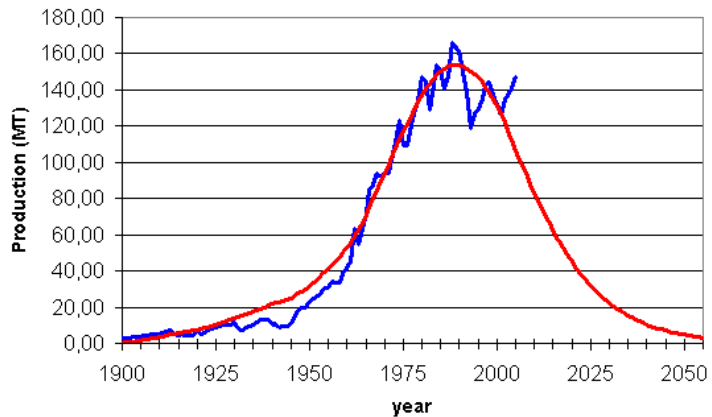


- Beyond zone of uncertainty (high risk)
- In zone of uncertainty (increasing risk)
- Below boundary (safe)
- Boundary not yet quantified

Source: Steffen et al. Planetary Boundaries: Guiding human development on a changing planet. Science, 16 January 2015. Design: Globalia

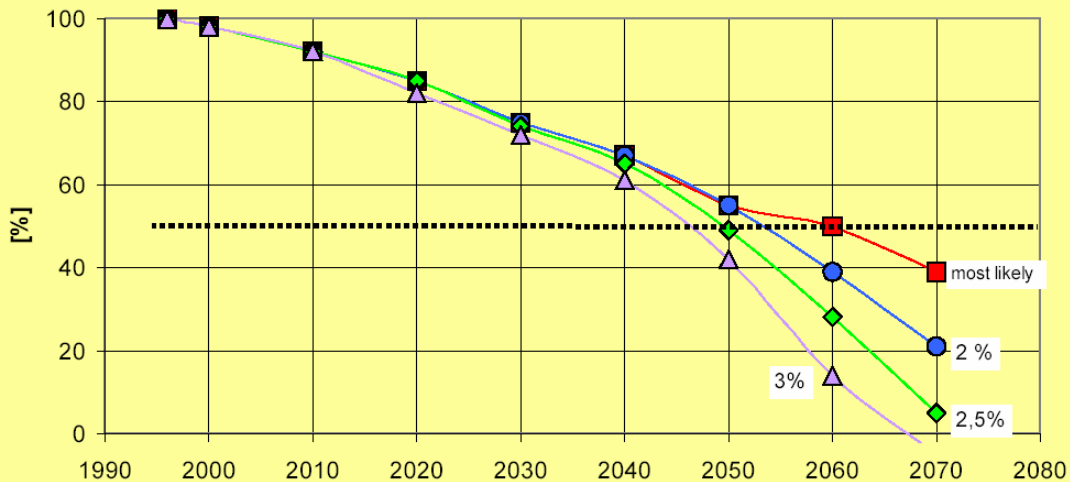
The Phosphorus Peak

World rock phosphate production

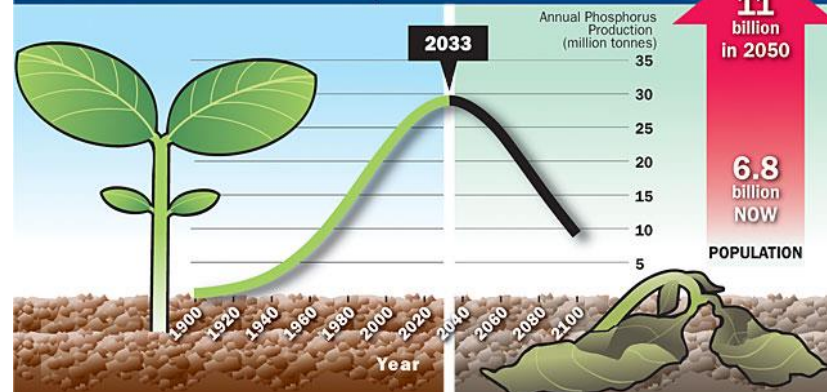


Lifetime of phosphate reserves at different scenarios

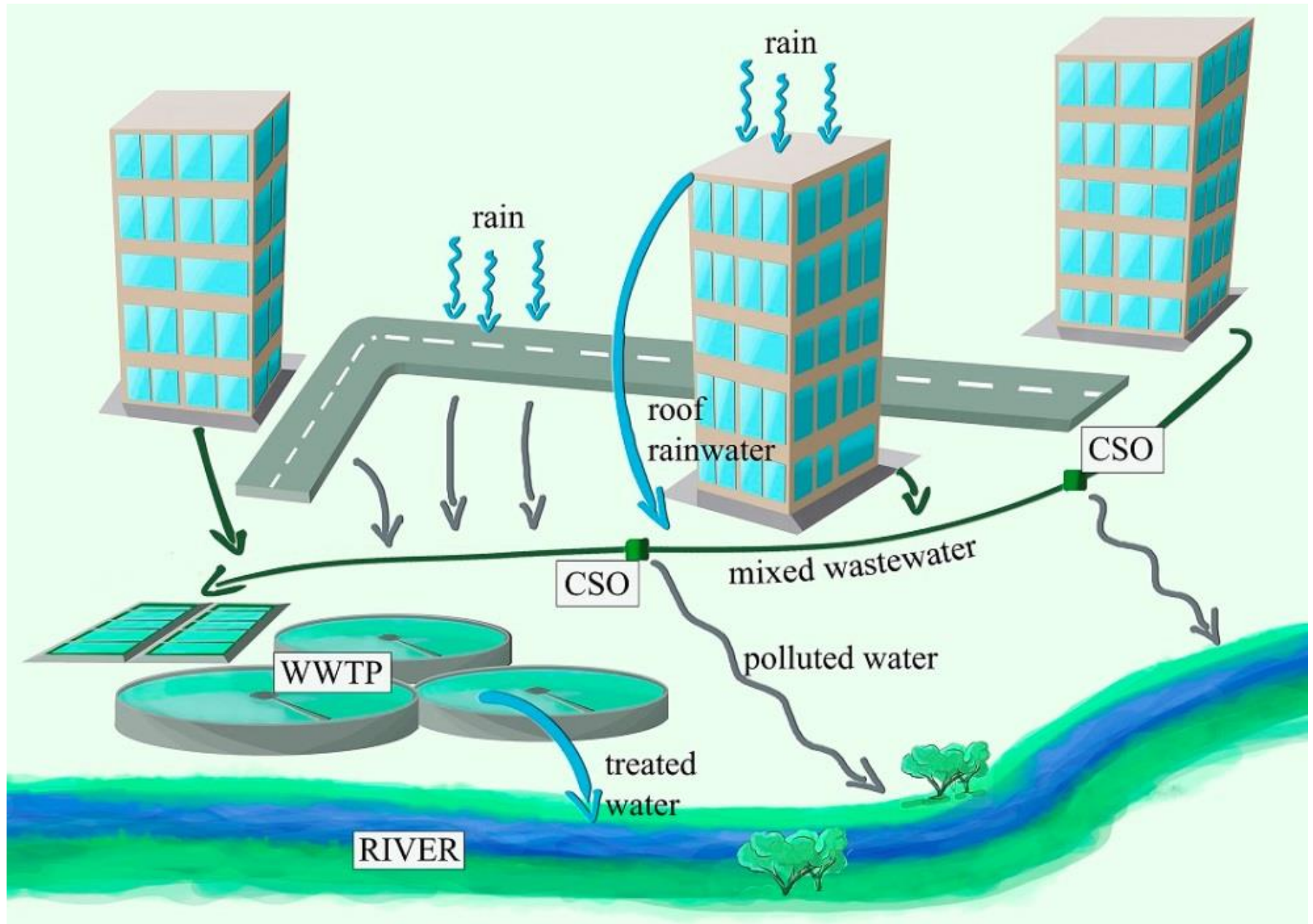
(parameter: yearly increase of phosphate consumption based on 7,000,000 t P₂O₅ reserves)

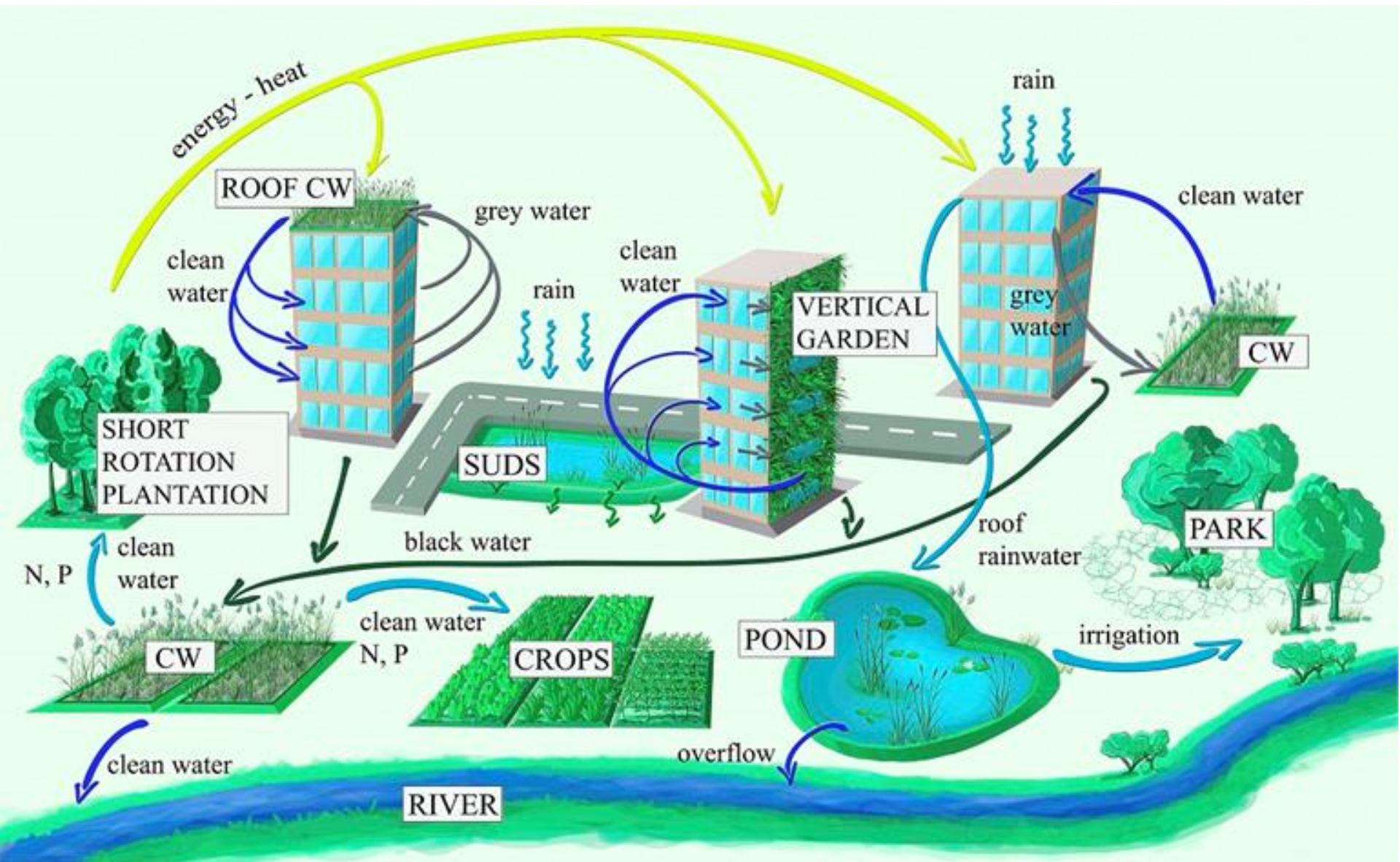


NO PHOSPHORUS, NO FOOD



CURRENT COMMON URBAN WATER MANAGEMENT





HOPEFULLY THE FUTURE URBAN WATER MANAGEMENT

Nature- based systems for «new water» production

- GREYWATER RECYCLING

Nature- based systems for Rainwater Harversting

Nature- based systems as Ecosystem Services tools

Nature- based systems for POPs removal in effluents for reuse

Nature- based systems for nutrients recovery and biomass production

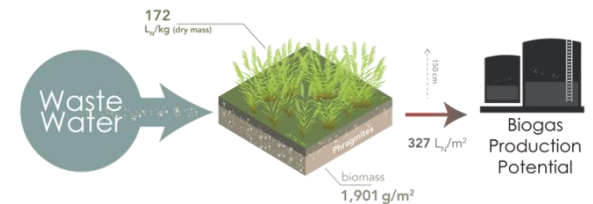
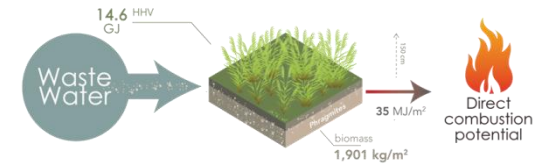
ROOF WETLANDS

INDOOR TWs

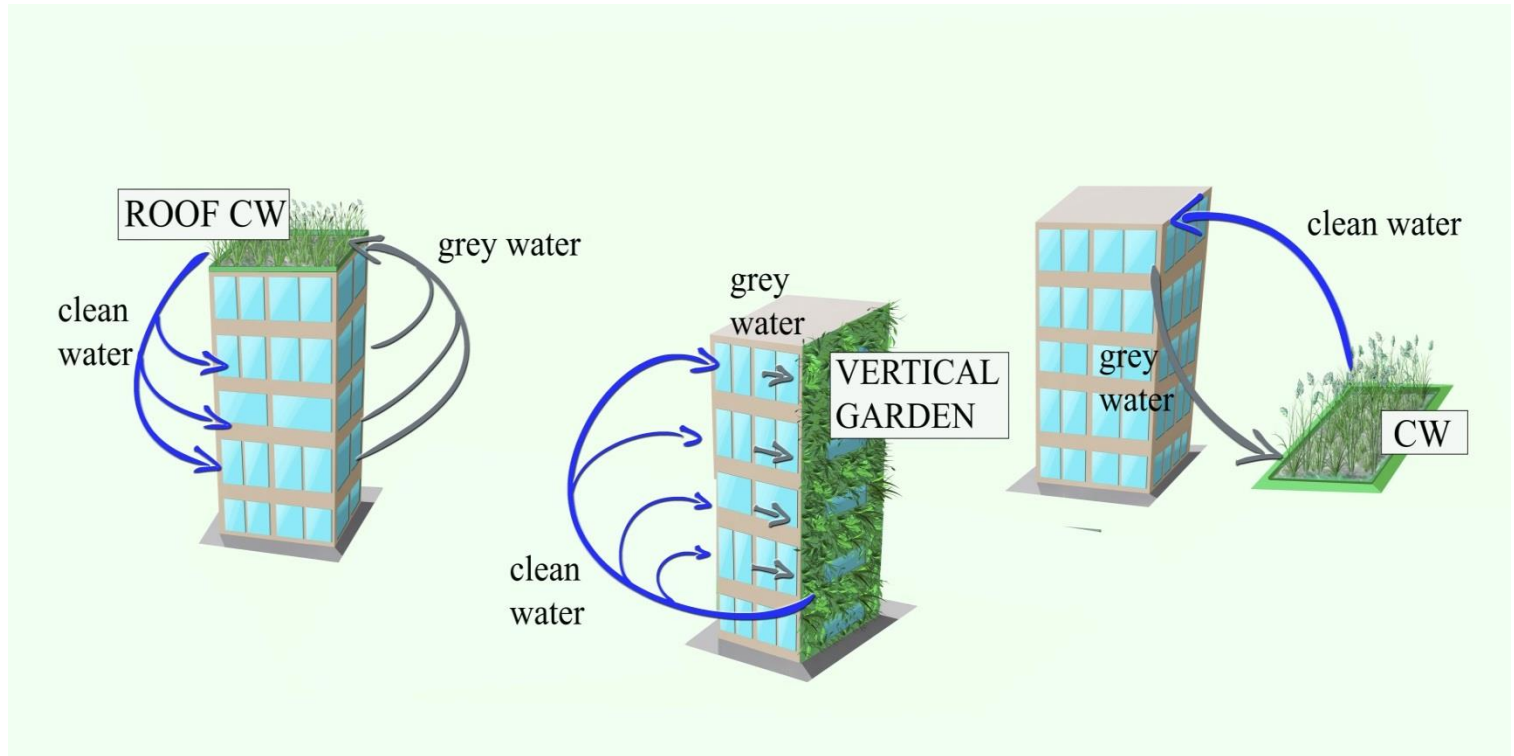
GREEN WALLS

CSO TWs

**WATER QUALITY
FLOODING RISK REDUCTION**



NBS for greywater





Preganzion Social Housing 280 pe (Italy)





**Hostel campus of the College of Engineering,
Pune (India)**



NaWaTech

Natural Water Systems and Treatment
Technologies to cope with Water
Shortages in urbanised Areas in India



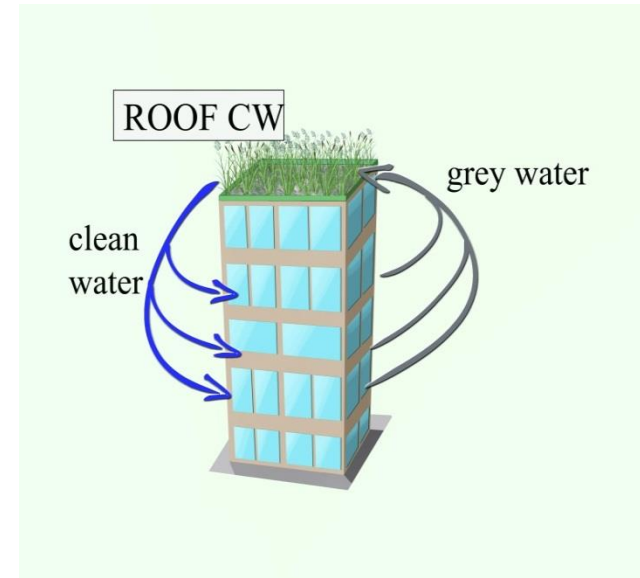


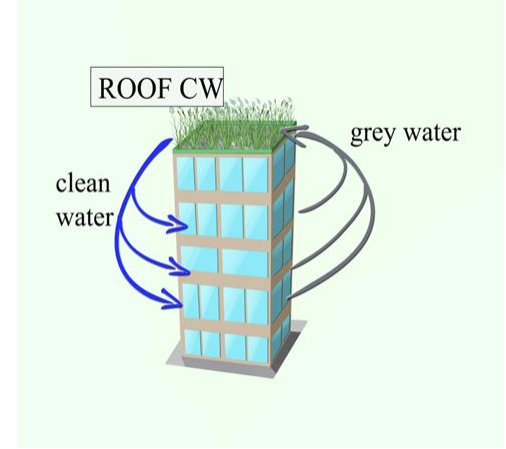
Westbank, Palestine





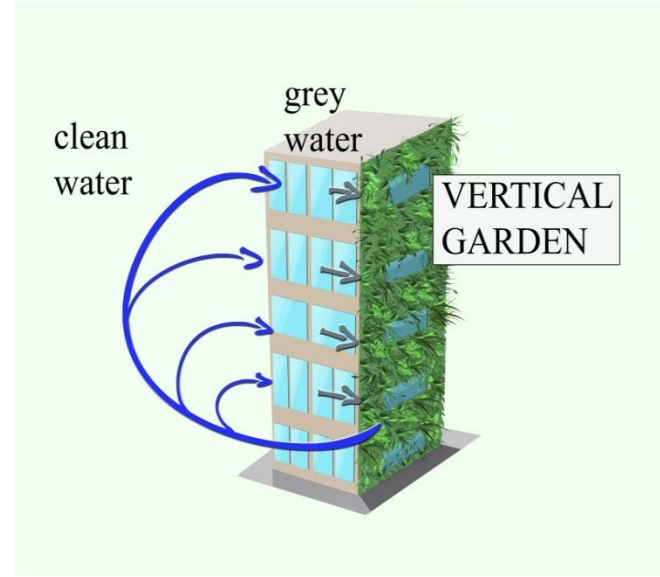
San Francisco Public Utilities Commission:
“Living Machine”

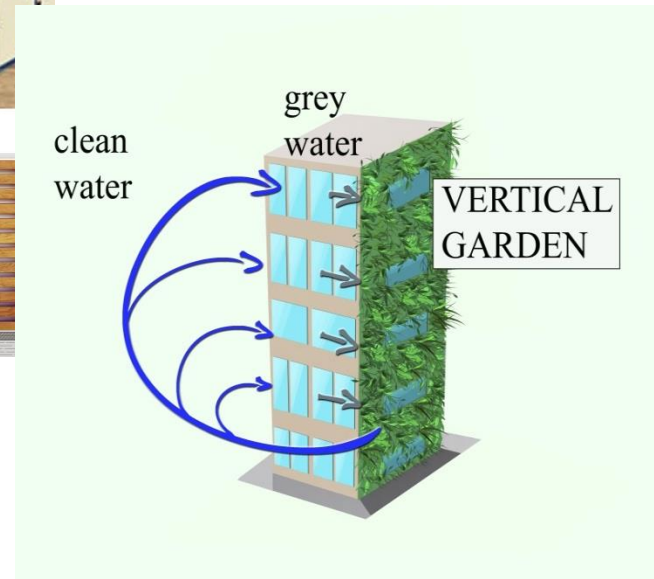




NBS for Greywater recycling

**Rooftop VF CW
Resort in Grumentu
community, Serengeti
(Tanzania)**

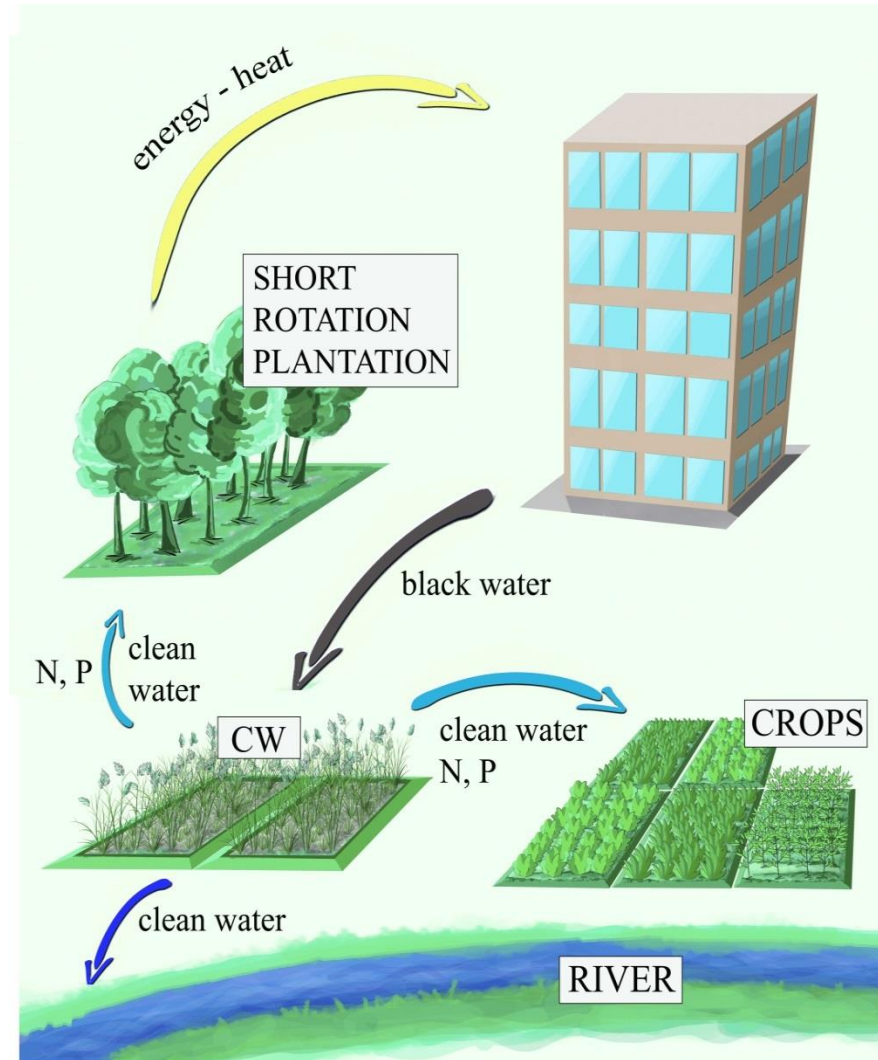


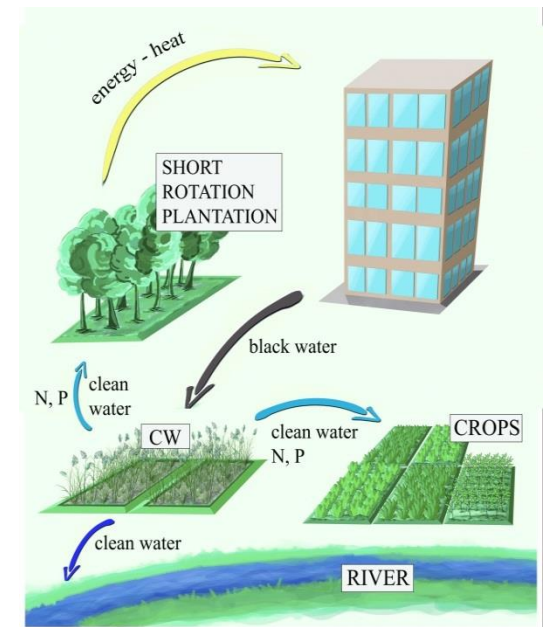


Marina of Ragusa (Italy)

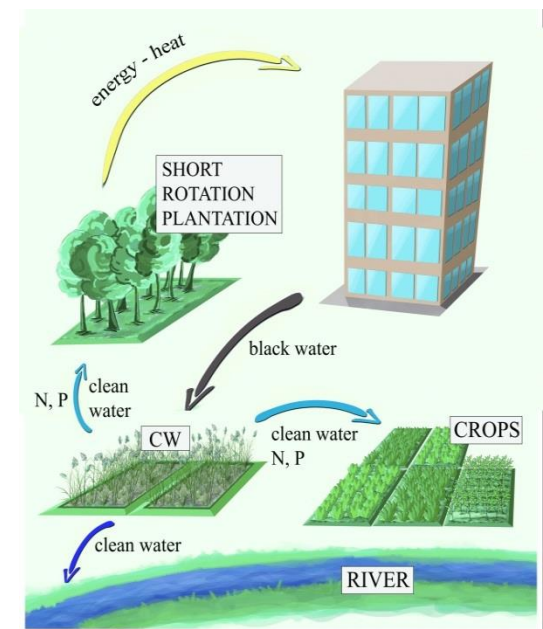
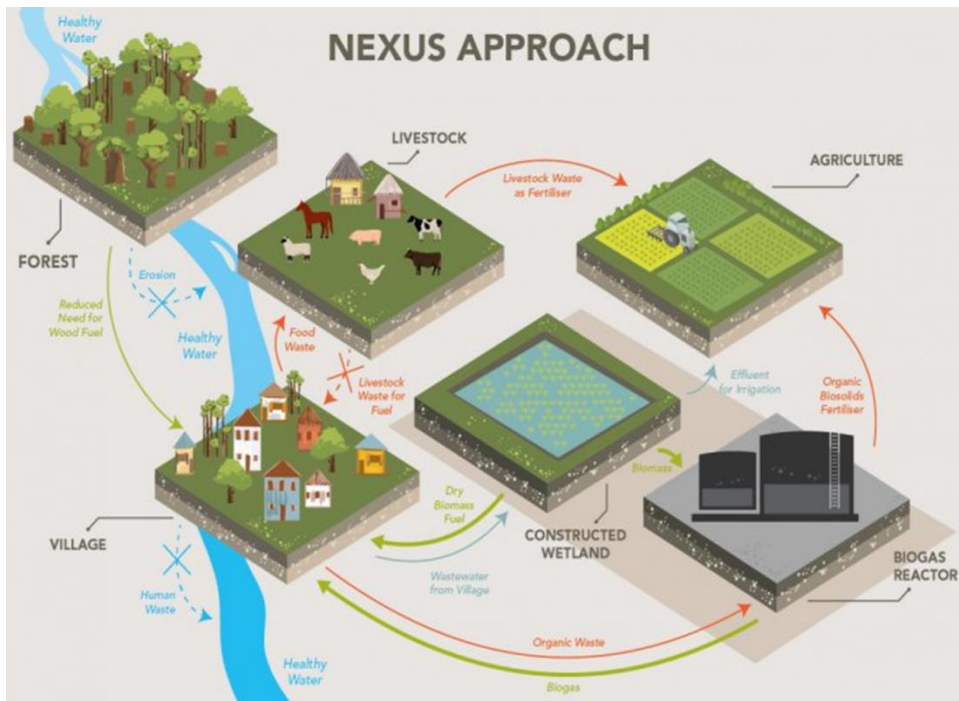


Food-Energy-Water

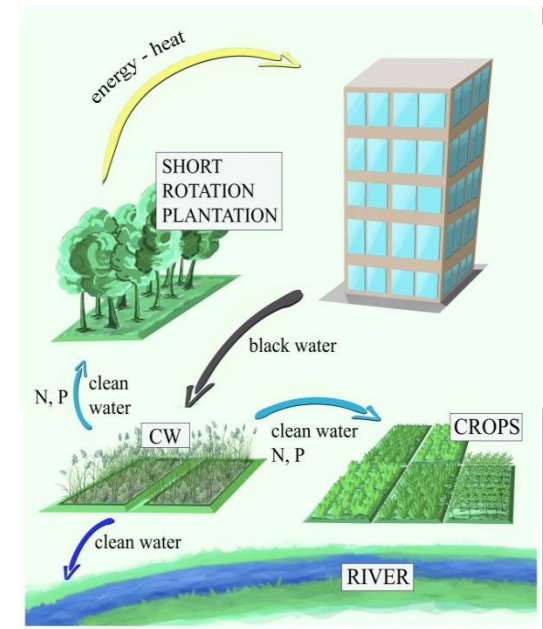
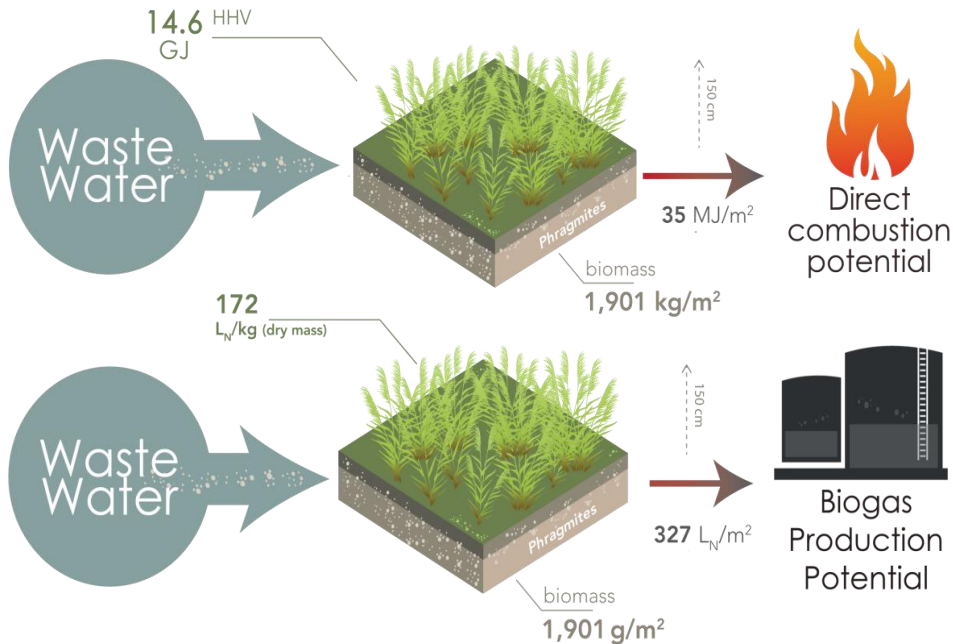




Fonte: flore.unu.edu



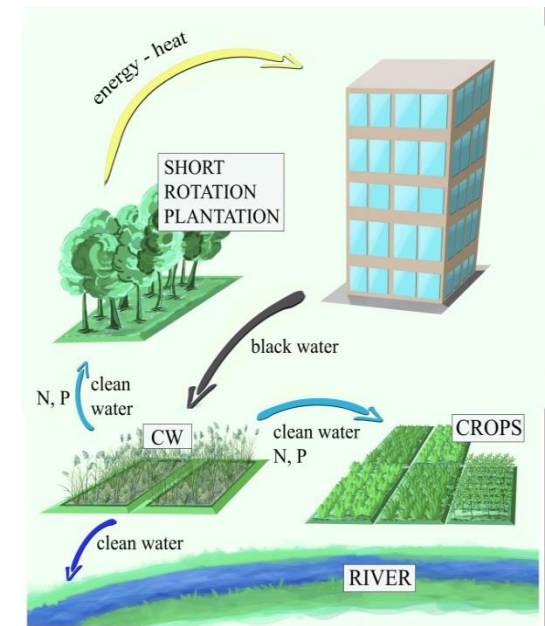
Source: flore.unu.edu



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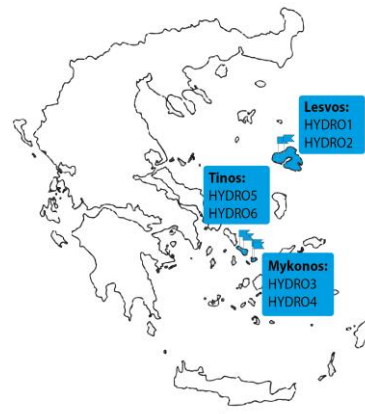
**Nimr Water Treatment Plant
Wetland System for oilfield water
(Oman) – 350 ha, 115.000 mc/d**



13 species for energy, fibers/textile, fodder, biochar,



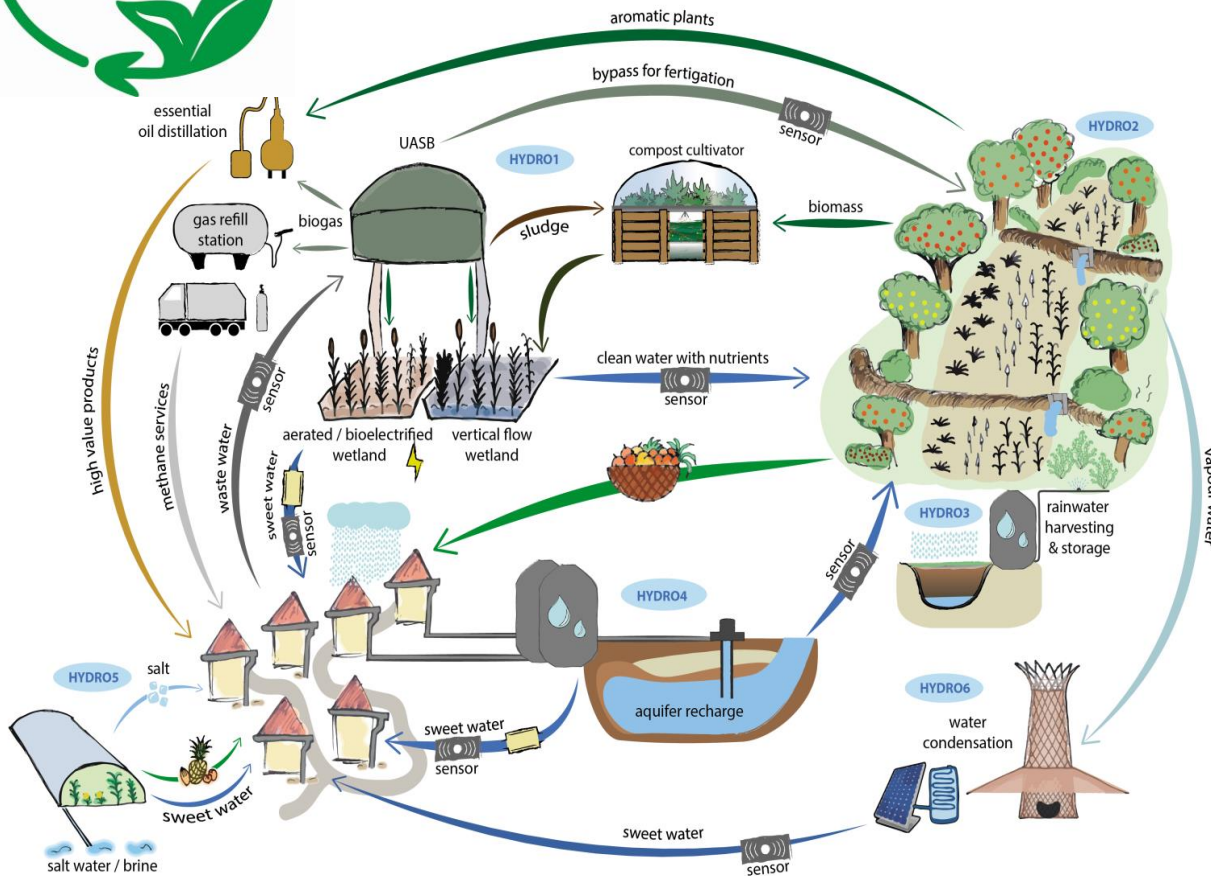
Food-Energy-Water prossimi passi ...



alchemia
nova



E molti altri...



In a circular, sustainable water management **Constructed Wetlands** will play a key role, even more than presently. Given the predicted modifications of the entire water management some adaptations will be necessary, requesting research and development of new types and new applications of wetlands:

- as effective **effluent factories**,
- in **urban landscaping**, including plants choice,
 - integration **into buildings**,
- hygienisation of water and **breakdown of organic trace pollutants**.



Den Aardkloot van water ontbloot, na twee zijden aante sien.

“a proficient lecture is not filling up a bucket, it’s lighting a fire”

thanks for your attention!!!

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GLOBAL
WETLAND
TECHNOLOGY

