Nature-based solutions: treatment wetlands for different types of wastewater

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LIMNOS Ltd

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Working with nature to protect the environment

About the company

- Natural ecosystems for protection and restoration of environment (NBS since 1994)
- Team of 5 (multidisciplinary) + more
- Focused to water treatment and protection; wetland technology

Protection of water bodies (floating islands, vegetation strips)

Agricultural run-off mitigation

Landfill sanitation (wetland leachate treatment)

Sewage sludge drying reed beds

Pollution prevention in protected areas

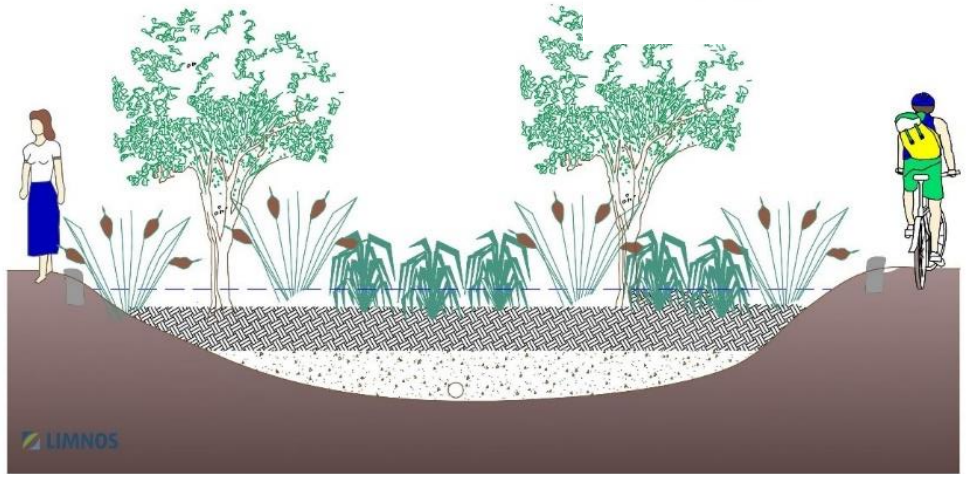
Constructed wetlands for wastewater treatment

Working with nature to protect the environment

Vision

- Support communities/watersheds in developing climate-resilient and multifunctional solutions; integrated local water management
- Protection of environment & natural heritage

- Key challenges:
  - reuse of nutrients (sewage sludge)
  - water reuse – increase of treatment efficiency by microorganisms intensification



Climate resilient infrastructure: Landfills

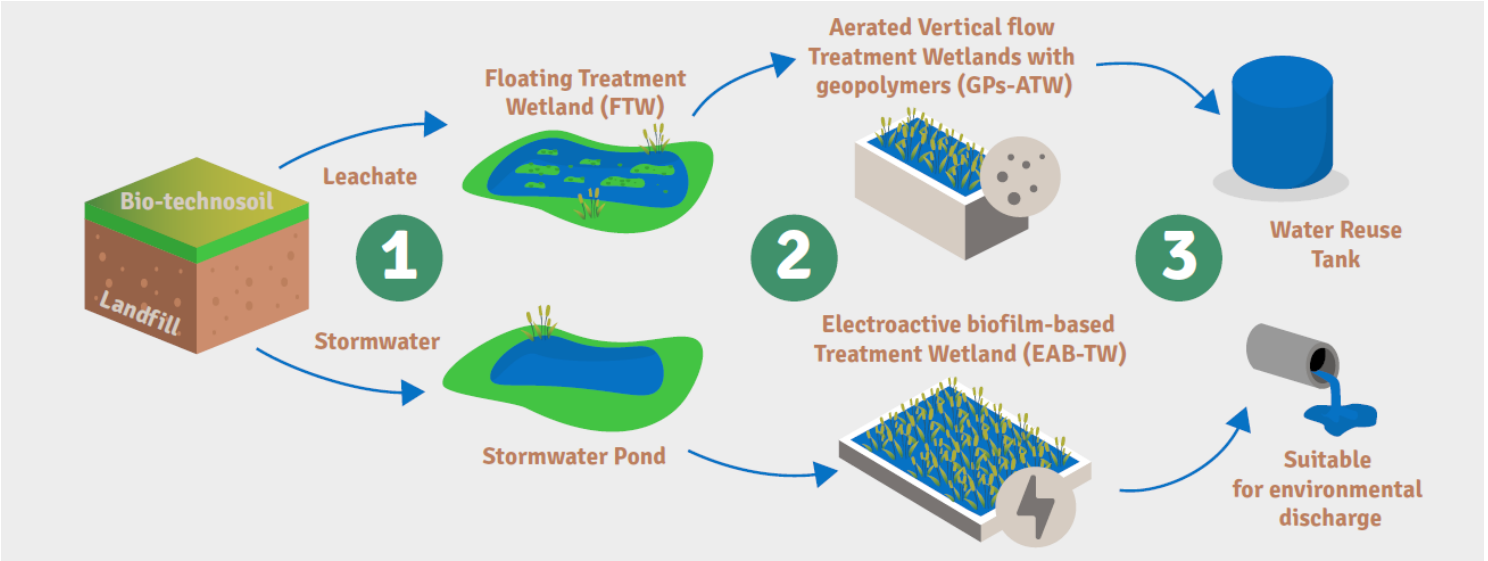
- Challenges:
  - Extreme weather events:
    - Landslide
    - Fire
  - Environmental impact
  - Energy consumption

NBS: pilots in real environment (NW Spain)

With the contribution of the LIFE Programme of the European Union under grant agreement No LIFE20 CCA/ES/001795.

- Biotechnosoils
- Floating Treatment Wetland
- Aerated Vertical flow Treatment Wetland with geopolymers
- Electroactive based treatment wetland

PARAMETER	UNITS	18.01.22	20.01.22	1.02.22	2.02.22	9.02.22	10.02.22	THRESHOLD LIMITS*
DBO5	mgO2/L	76,0	103,3	110,0	113,3	126,7	153,3	40
DQO	mgO2/L	1.053,8	1.174,3	1.461,33	1.499,00	1.499,0	1.499,0	160
Ntotal	mg/L	938,00	715,7	861,7	864,3	836,3	833,00	15
F-	mg/L	7,51	10,04	8,62	7,41	0,11	11,39	6
Cl-	mg/L	1.348,6	1.374,9	1.572,5	1.639,2	114,2	2.789,60	2000



NBS for leachate treatment

NBS combined with aeration:

1. Floating Treatment Wetland
2. Aerated Vertical flow Treatment Wetland with geopolymers
3. Electroactive based treatment wetland

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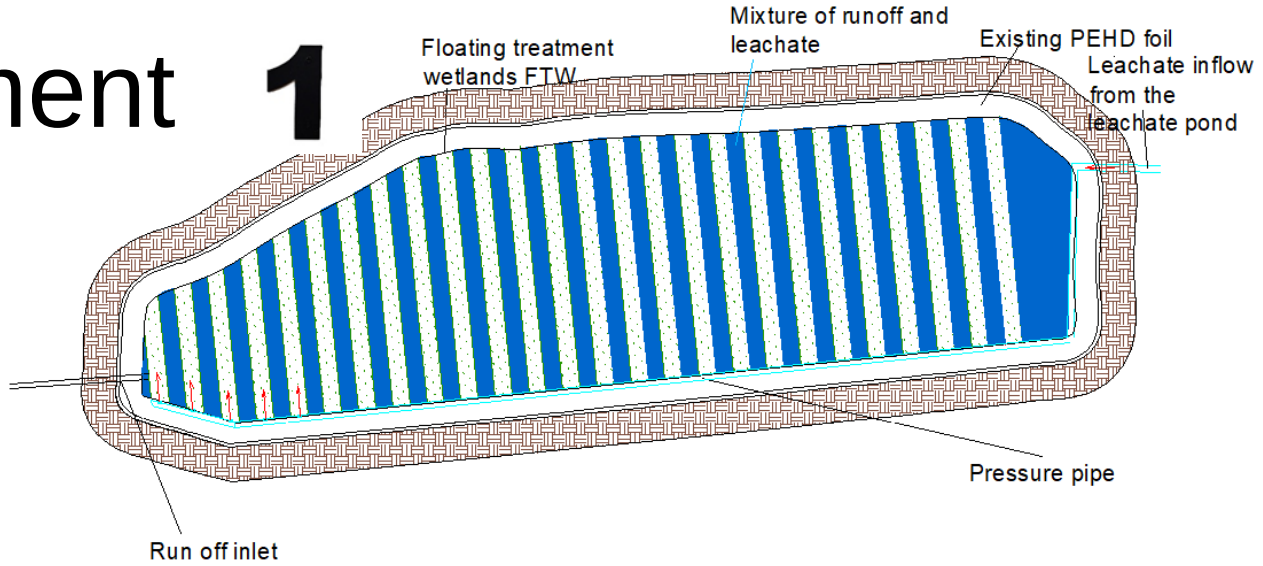

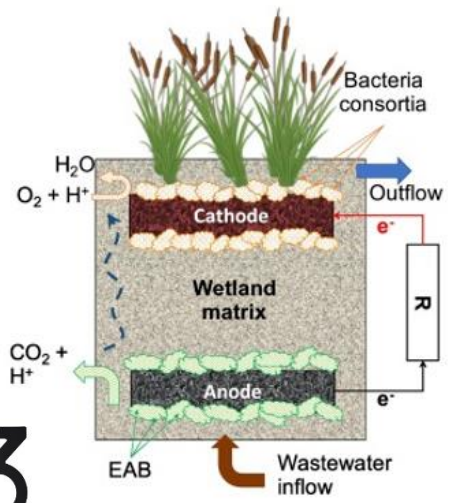

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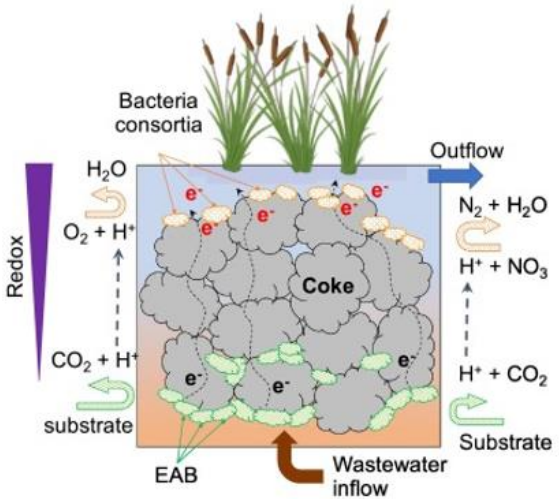


Parameter	Treatment efficiency
COD	>90%
TN	15-60%
N-NH4	>90%
TP	20-30%
TSS	80-95%

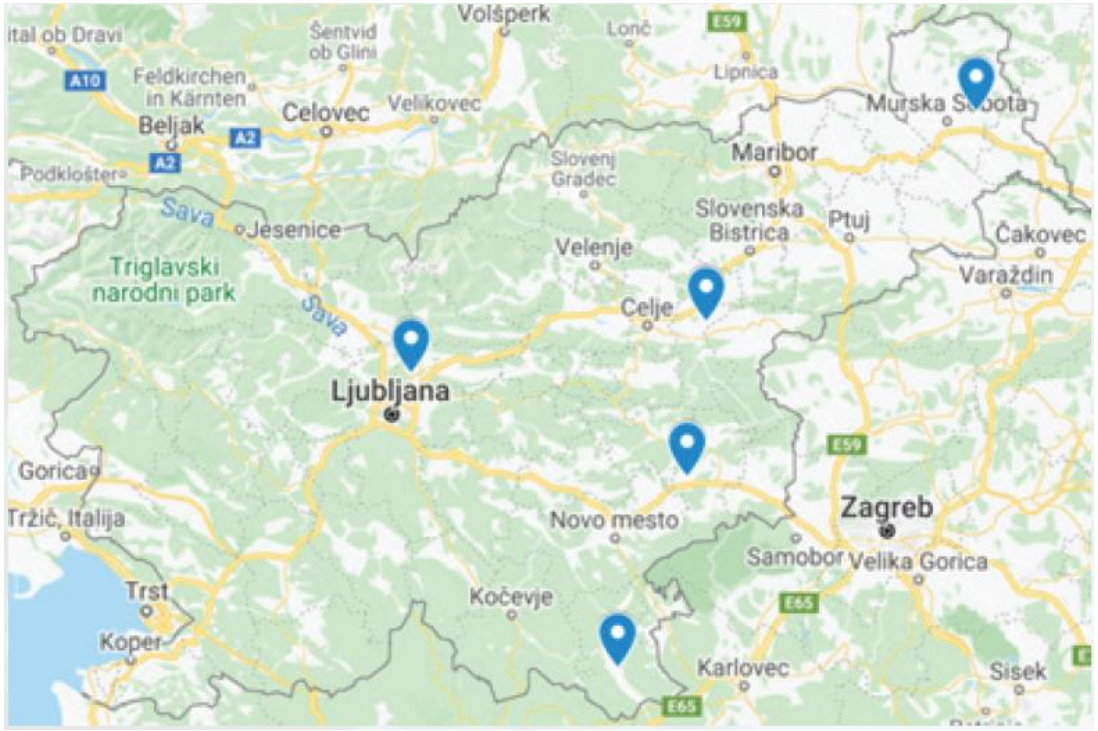
2

LIFE GREEN ADAPT

Constructed ecosystems for agricultural run-off mitigation and surface water protection

Constructed ecosystems are developed and tested as a part of drainage ditches (based on nature's self-cleansing abilities and represent a sustainable approach to reducing the env. burden on water resources).

- 5 pilot locations
- Monitoring of treatment efficiency
- High efficiency in organic pollutant removal (nutrients)



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PROGRAM RAZVOJA PODEŽELJA

Evropski kmetijski sklad za razvoj podeželja: Evropa investira v podeželje

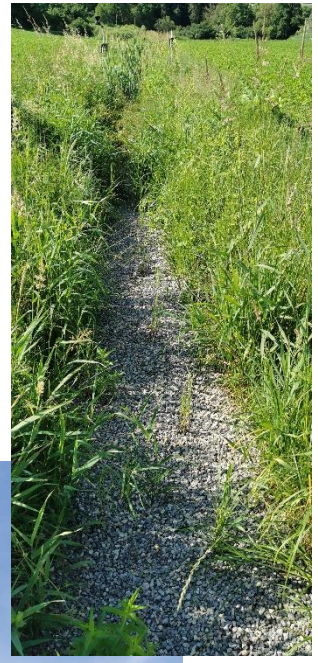
Constructed ecosystems – units tested

Sub-surface bed

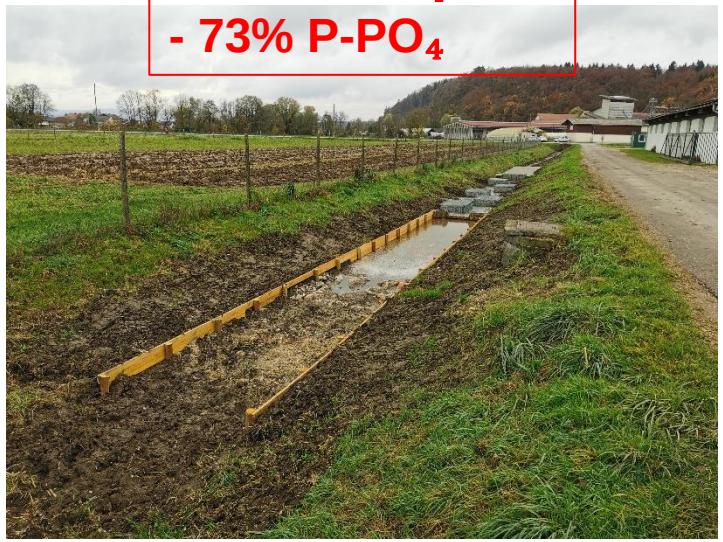
2-stage ditch

Meandering section

Sedimentation pond



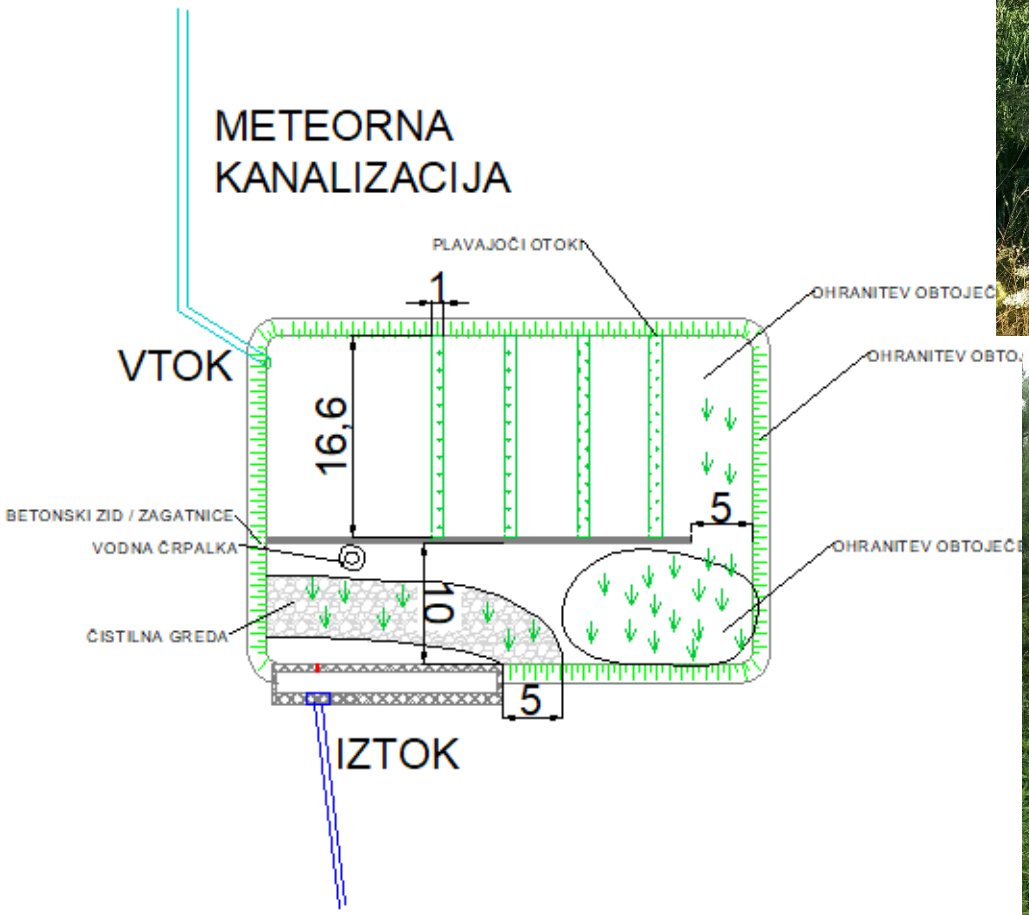
- 91% COD
- 43 % TSS
- 78% $N\text{-}NH_4$
- 73% $P\text{-}PO_4$



Constructed ecosystems – upgrade

Co-natural regulation of the storm water retention tank (waste processing plant):

- Current pollution load high; treatment insufficient
- Aim: install a CW + constructed ecosystem
- Multipurpose effects:
  - Water retention
  - Treatment
  - Ecosystem support&recovery (Natura 2000)
  - Biodiversity and visual improvement of the landscape
  - Water reuse – microorganisms applied to waste (challenge)



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