



**est. 2019**

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**NARXOZ  
UNIVERSITY**

# Natural Solutions

Protection, management and restoration of natural ecosystems affected by industrial waste; while benefiting people and nature.





- **SKRI's work on NbS is recognized as a good practice under the UNECE Water and Industrial Accidents Convention. JEG meeting in October 2022;**
- **A commercial agreement with our partners from JSC "AK Altynalmas";**
- **Funded NbS project on pollution of mine tailings with our partners from Tauw Engineering Firm (Netherlands);**
- **Narxoz University received 300 million tenge from RG Gold as part of a 1% research contribution for the study of NbS, among other works**

# Example: Phytocapture



# Phytocapture

## Application for the industrial sector



# Dust suppression

- Expensive (annual costs \$10–20,000 per 1.5 km)
- Inefficient
- Scheduled maintenance
- Environmental impact: Chlorides leach from road surfaces. Corrosive to metals, damaging plant growth, altering the chemistry of nearby soils (further harming native vegetation) and toxic to aquatic life)



# Phytocapture helps companies comply with regulations and save money!

**Code of the Republic of Kazakhstan on subsoil and subsoil use Article 129: 2)** for financing research, scientific and technical and (or) development work in the amount of one percent of the cost of production

## **Environmental Code of the Republic of Kazakhstan**

Principles of the best available technologies: independent domestic and foreign experts in the relevant fields of application of the best available technologies; 3) focus on the best world experience;

**Requirements of the sanitary protection zone:** 40% of the territory is planted with vegetation

***Companies can use research funds to pay for sanitary zone requirements and save money!***

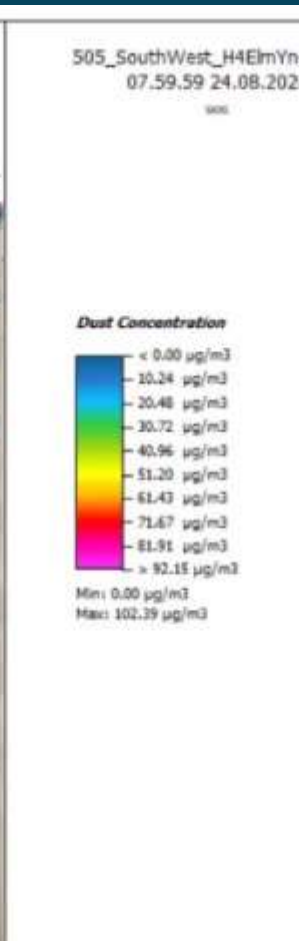
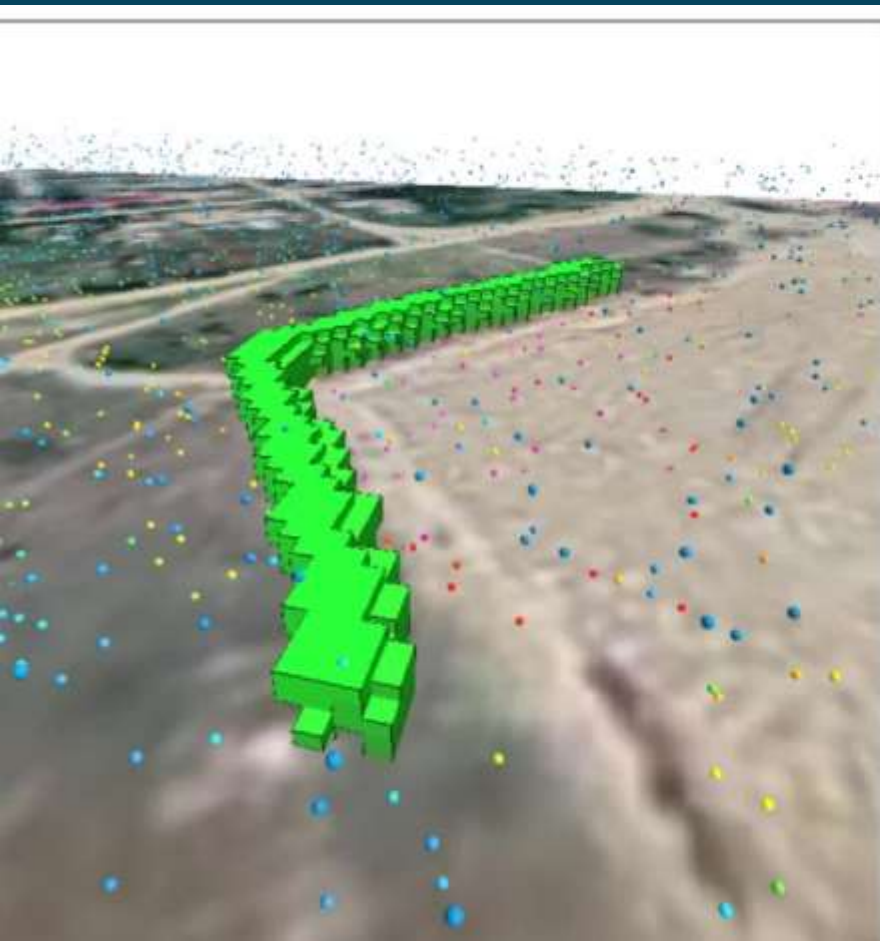
# GOLD MINE - AKSU





# SKRI Services Provided

1. Initial review (remotely or on site depending on needs);
2. Scientific modeling on a supercomputer of the interactions of a plant with the surface and atmosphere related to the external environment;  
Recommended options for the design of vegetable plantings
3. Barrier Implementation, Work Promotion



# Natural solutions for mine wastewater treatment in Central Asia



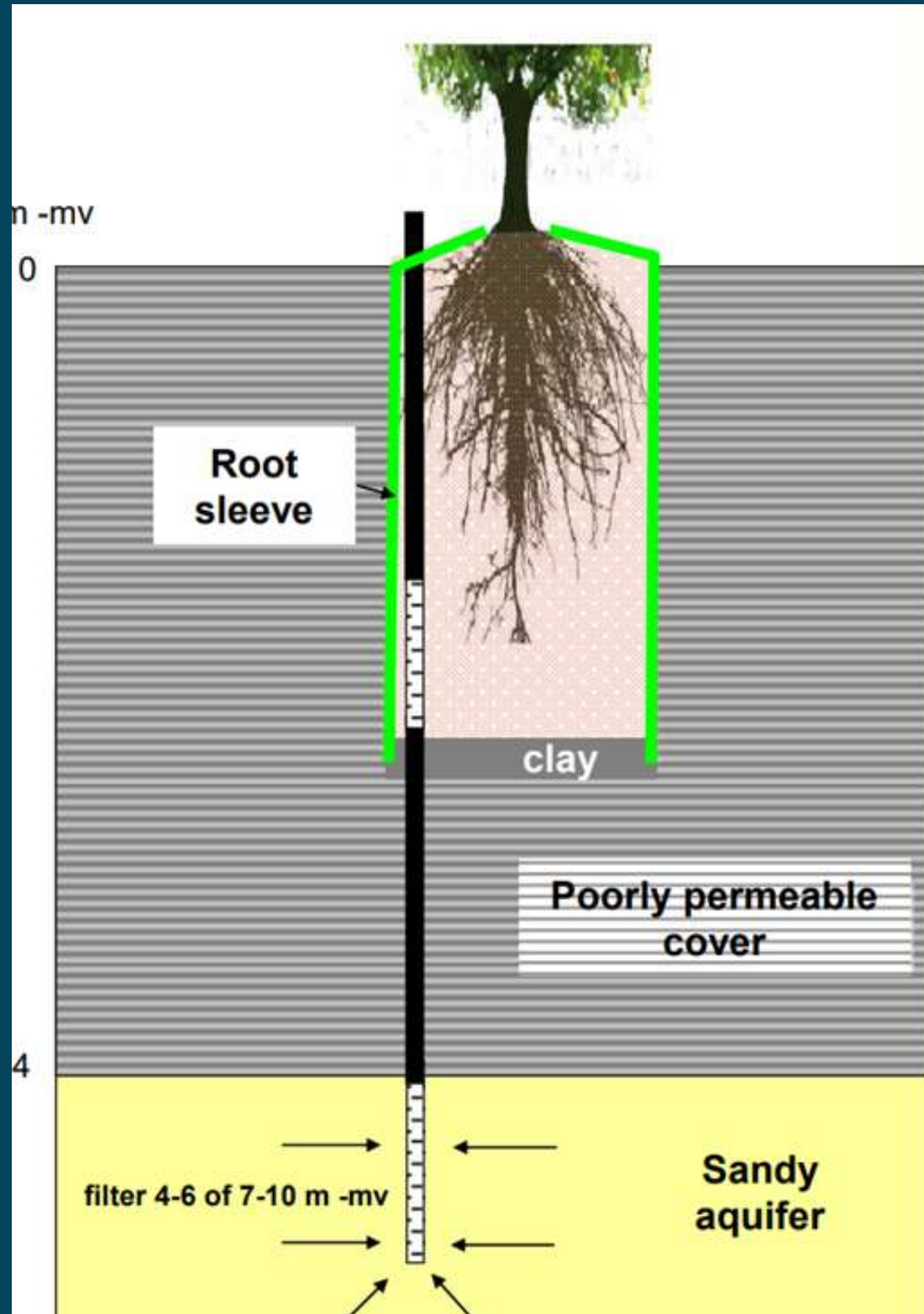
- Literature review of the world's best practices of nature solutions
- Site visit and preliminary design of nature solution for selected sites (Ak Tuz in Kyrgyzstan. One not yet selected site in Kazakhstan)
- Consultation/fundraising with international stakeholders for their application

# wood wells (Tauw Engineering Firm)

- BTEX Groundwater Pollution Control at DOW Benelux, Terneuzen, The Netherlands;
- Control of groundwater pollution by chlorinated hydrocarbons;
- Phytoisolation: geohydrological barrier to pollutants;
- Phytostabilization: immobilization of pollutants by adsorption;
- Phytoextraction: removal of contaminants by absorption and excretion;
- Poplars, eucalyptus, willows



# Wood wells



# Reactive Biosorption Mat (Tauw Engineering Firm)

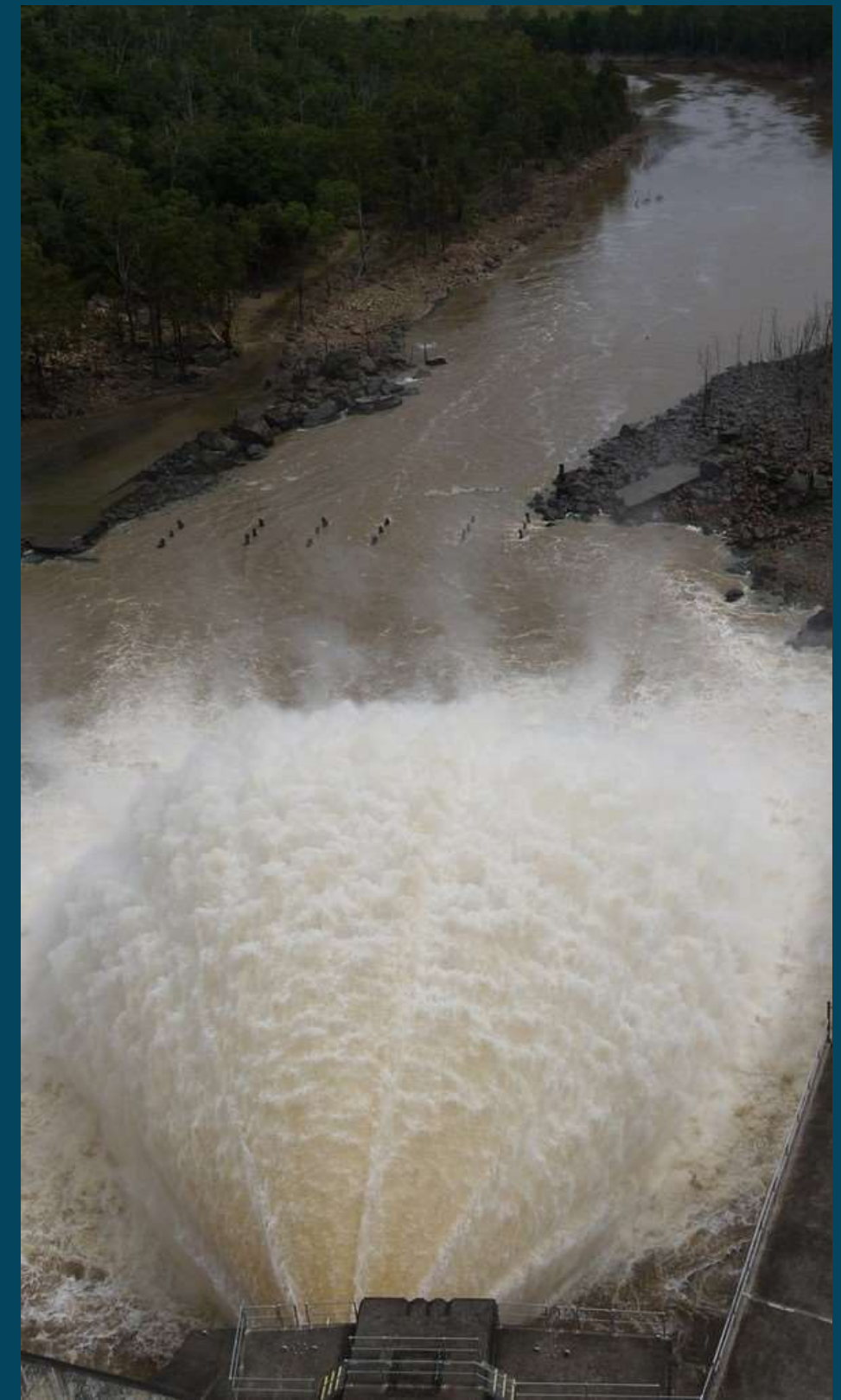
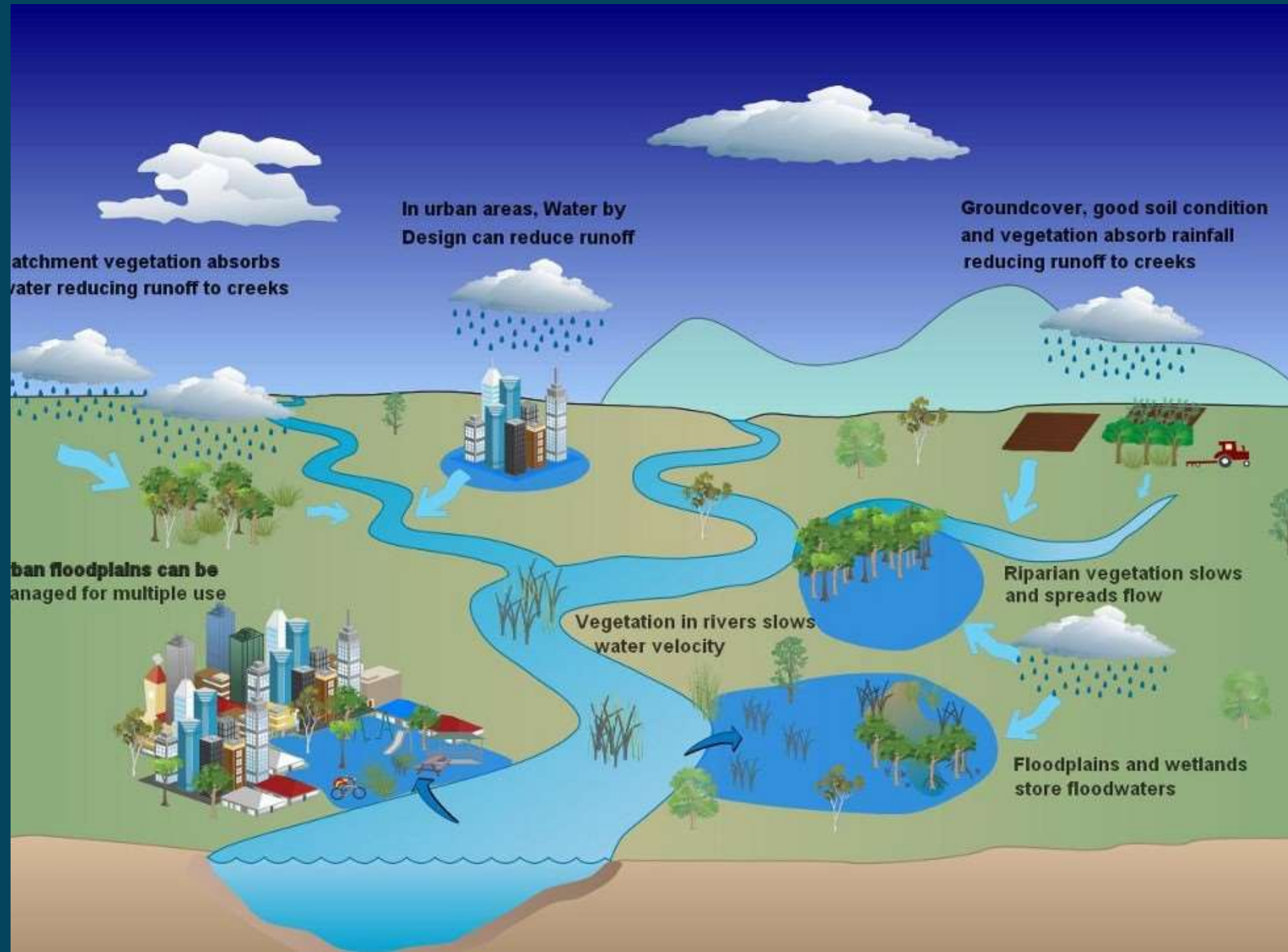
- A polluted canal near Ghent, next to an old asphalt plant, Belgium;
- Pollution with aliphatic and aromatic hydrocarbons;
- Jet mat with biochar and peat;
- Reducing pollutants substances from 85 to 100%;
- Replacement every 10 years



# Biosorption Reactive Mat



# Natural solutions to prevent and mitigate tailings disasters



# Conclusions and future work

- Natural solutions require space and time to work
- Further commercialization of natural solutions (water, air and soil);
- Exploring expanding phytocapture work with other business partners and deepening our work with current partners such as AK Altynalmas JSC.



**Thank you for your attention!**

**Research Institute Sustainable Kazakhstan "Providing technical solutions to the world's most pressing sustainability challenges"**

If you are interested, please contact us!:

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