

Challenge of phytoremediation solutions in prevention of desertification and related climate change problems

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Problem identification



**Global
desertification
vulnerability
map**



→ 10-20% of the total world surface is under the threat of desertification

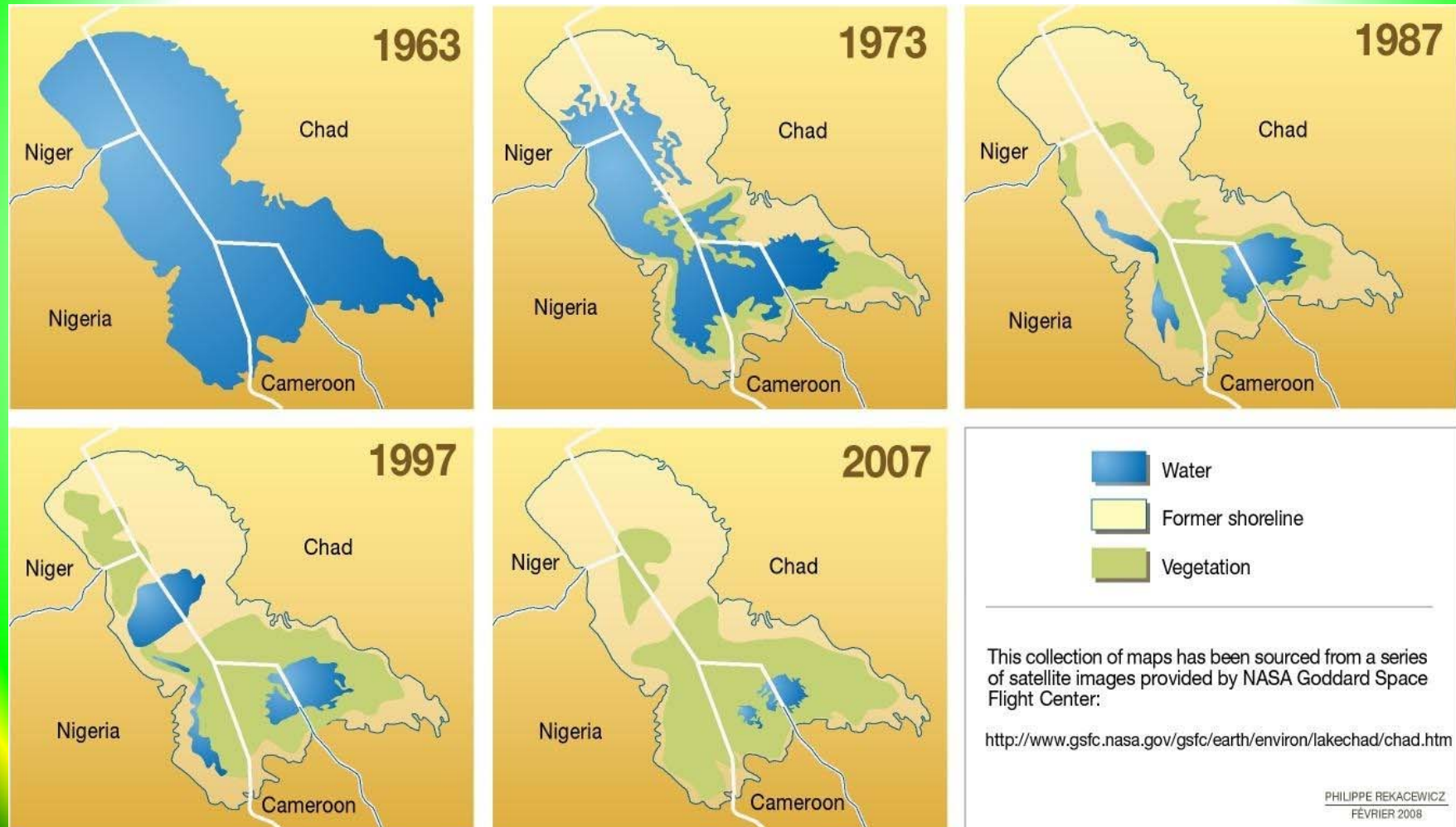
Miller Projection
SCALE 1:100,000,000
0 500 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000
KILOMETERS

Problem identification

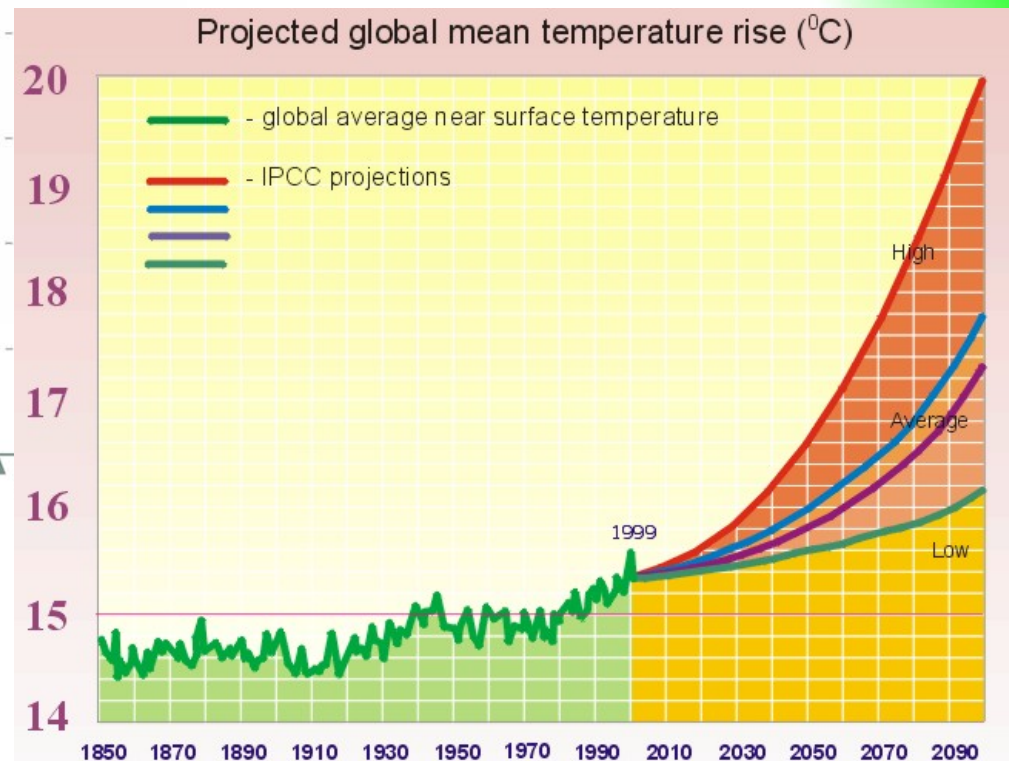
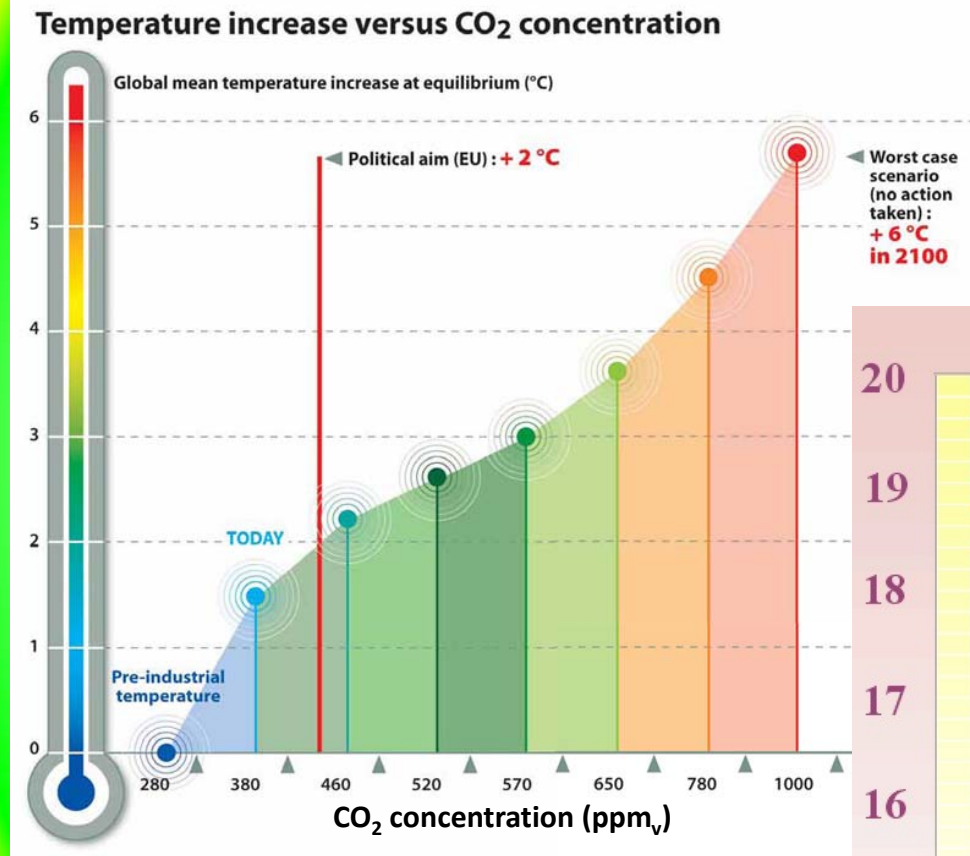


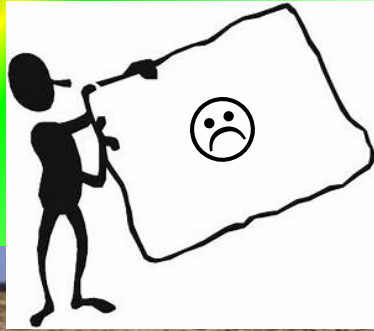


Obvious example – Lake Chad



Projections for future





Inevitable consequences



Any solutions?

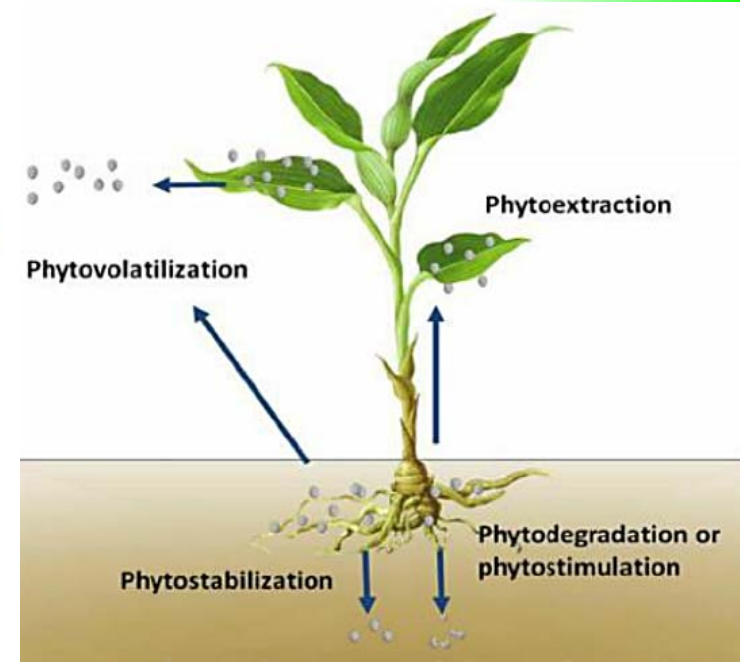
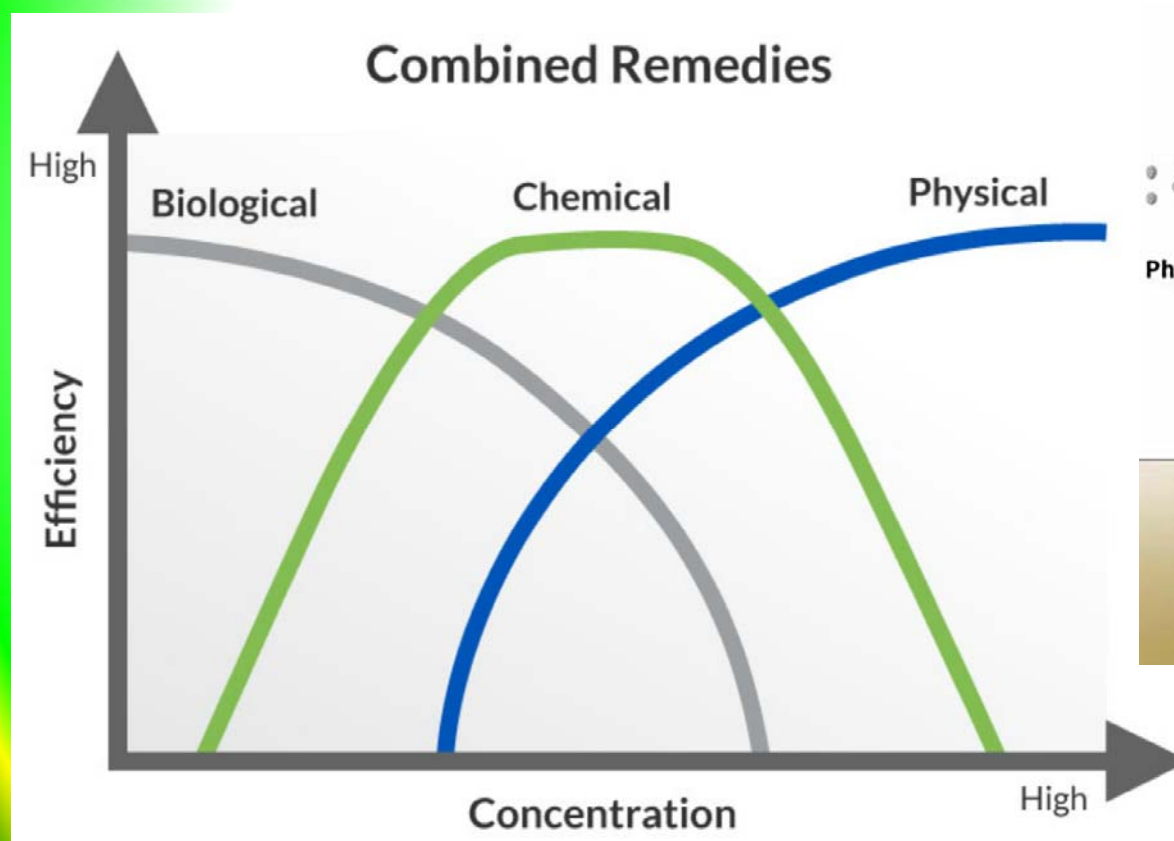




Preventive actions



Phytoremediation



Phytoremediation



GLYCOPHYTE



Description	<i>Armeria maritima</i> (sea thrift)
Moisture	Dry
Soil	Sand, SALTY
Height	3-20 cm
Vegetation	Many seasons

Salinity stress

Halotolerant plant growth promoting rhizobacteria:

- Increase the K^+/Na^+ ratio;
- Avoid translocation of toxic Na^+ under saline conditions;
- Increase the antioxidative systems in plants;
- Decrease the excessive ethylene production in plants caused by salinity stress;
- Eliminate the negative effect of ethylene on roots;
- Production of phytohormones increases overall plant growth and also alters root characteristics;
- Phytohormones increase the size of aerial parts of plants;
- Production of osmoprotectants;
- Salinity stress tolerance;
- Exopolysaccharides bind toxic Na^+ and restrict Na^+ influx into roots;
- Soil aggregation due to production of exopolysaccharides;
- Enhance uptake of water and nutrients;
- Increase root adhering-soil;
- Limiting Na^+ entry into roots and facilitating shoot-to-root Na^+ recirculation

Halotolerant plant growth promoting rhizobacteria

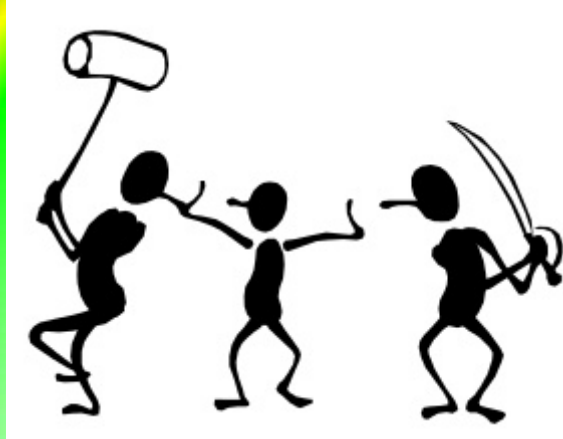
HALOPHYTE



Description	<i>Lolium perenne</i> (perennial ryegrass)
Moisture	Dry
Soil	Sand, COMPACT
Height	15-50 cm
Vegetation	Many seasons

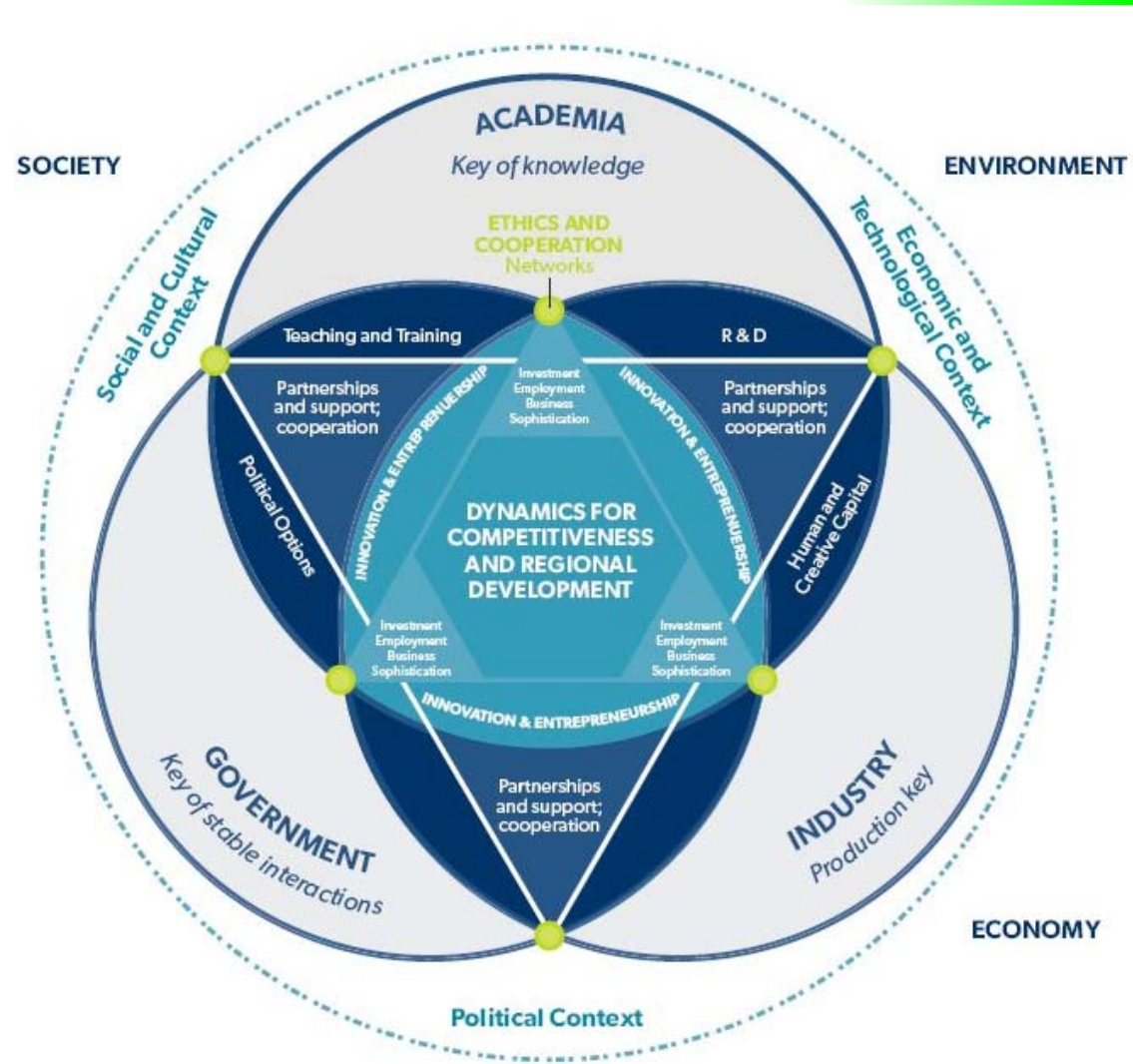
Phytoremediation





Triple Helix concept

→ The Triple Helix concept of **university-industry-government** relationship initiated in the 1990s



Acknowledgements



Linnéuniversitetet



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EIROPAS SAVIENĪBA
Eiropas Reģionālās
attīstības fonds

IEGULDĪJUMS TAVĀ NĀKOTNĒ

Thank You!



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