



# Biological Bank Protection

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Göta älv, Foto: SGI

# Rip rap construction



# Biological bank protection

- Sweden
- Europe
- US / Canada



Foto: BAW

# Biological bank protection

- Material, plants, etc.
- Construction requirements,
- Design, slope, etc.
- Soil type
- Resistance
- Environmental impact

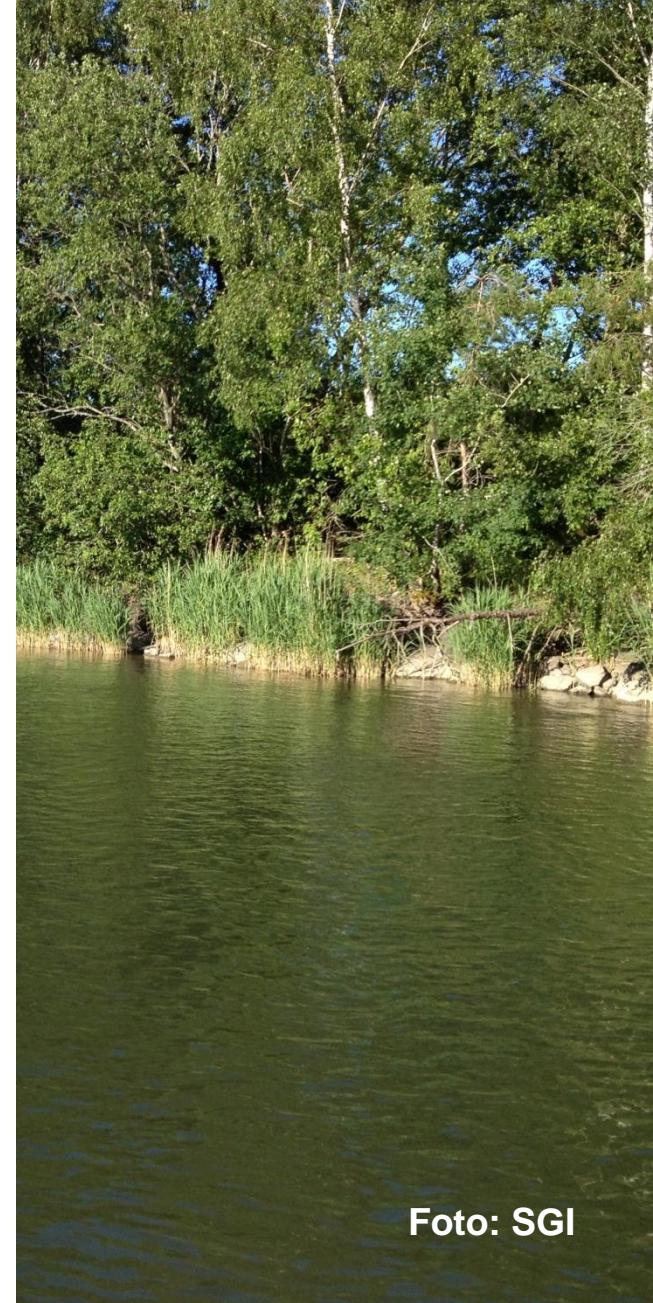


Foto: SGI

# Goal

- Existing bank protection methods
- Classify according to use
- Joint work between:
  - Swedish Agency for Marine and Water Management
  - Swedish Environmental Protection Agency
  - Swedish Transport Administration

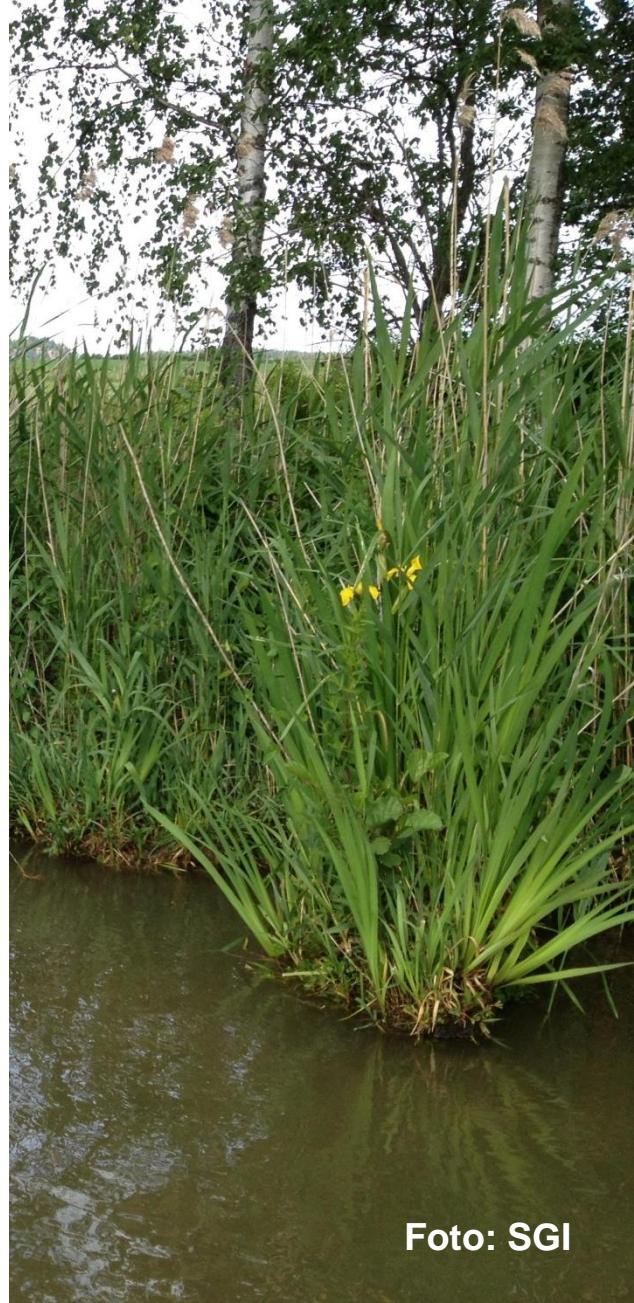
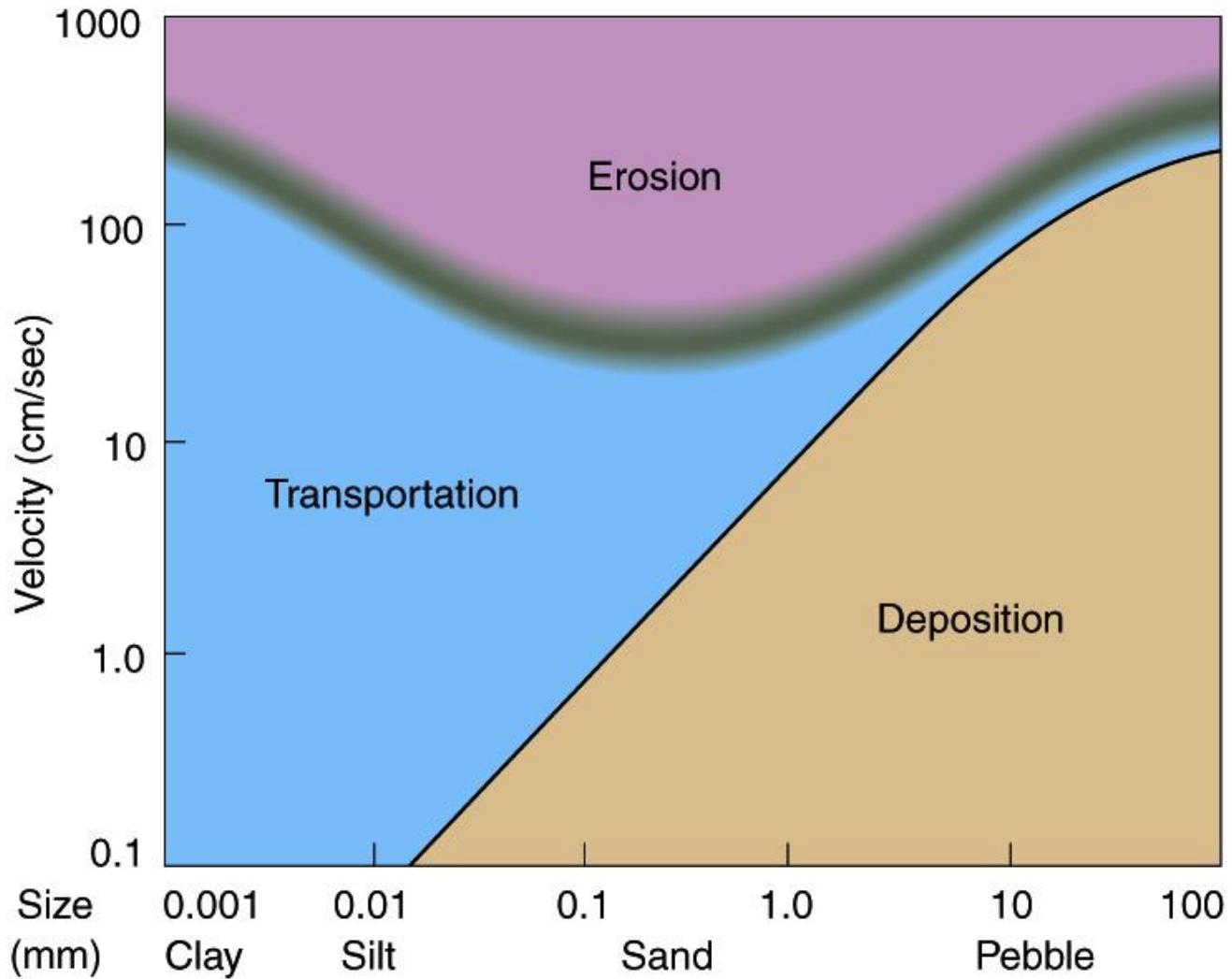


Foto: SGI

# Water flow

Hjulström  
diagram



# Ship generated waves



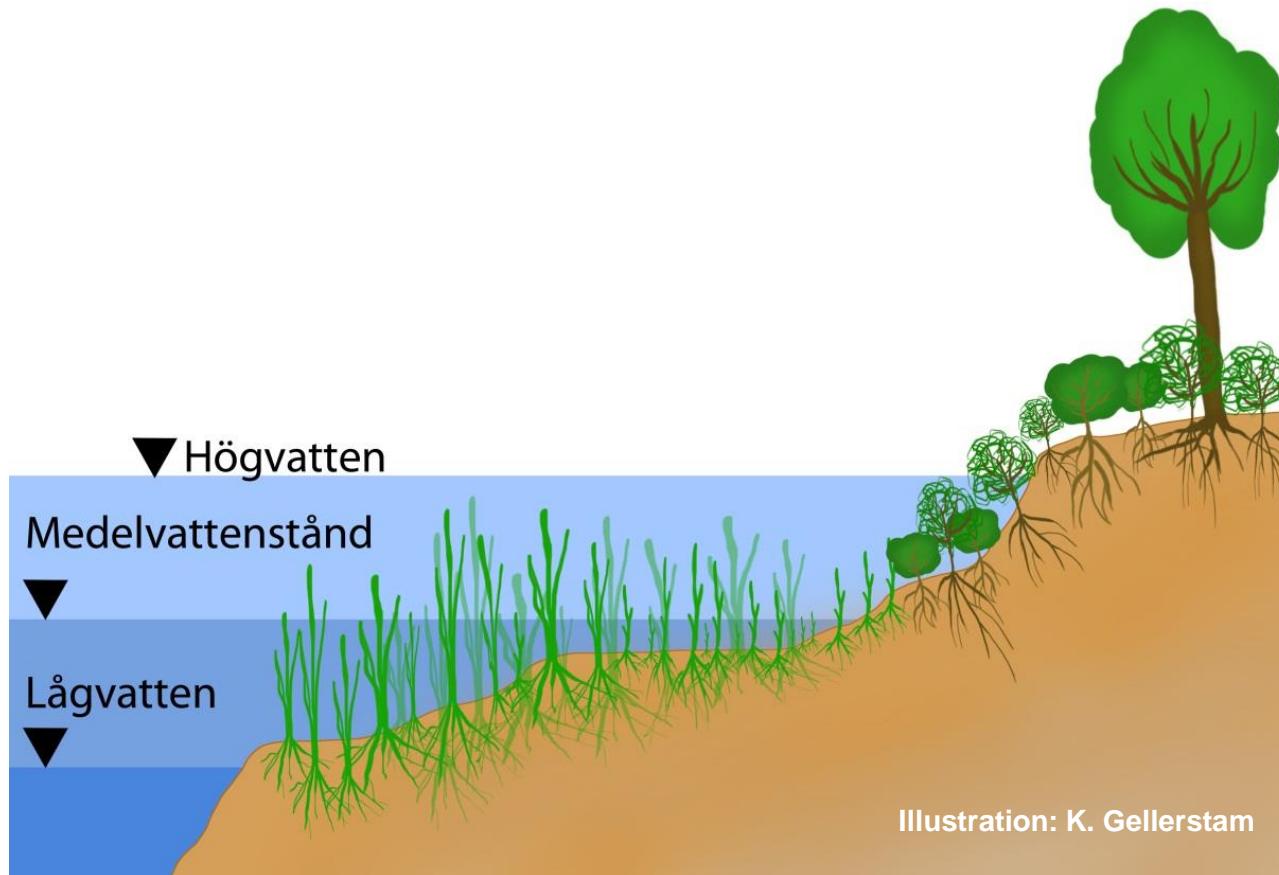
Foto: SGI

# Ice induced erosion

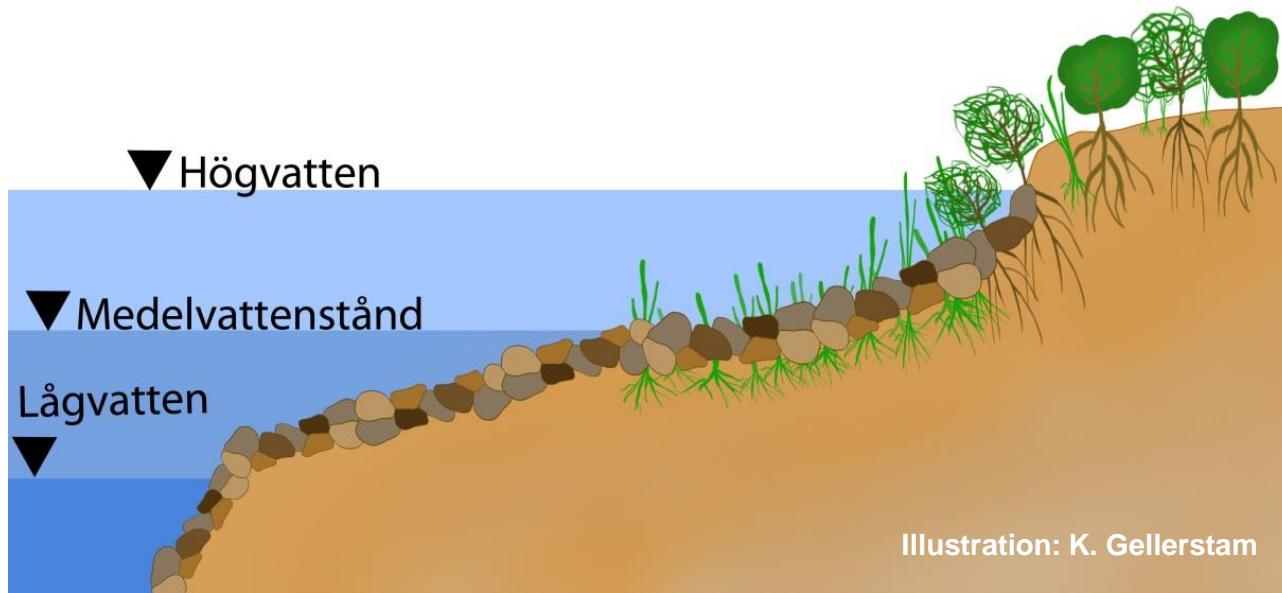


Foto: SGI

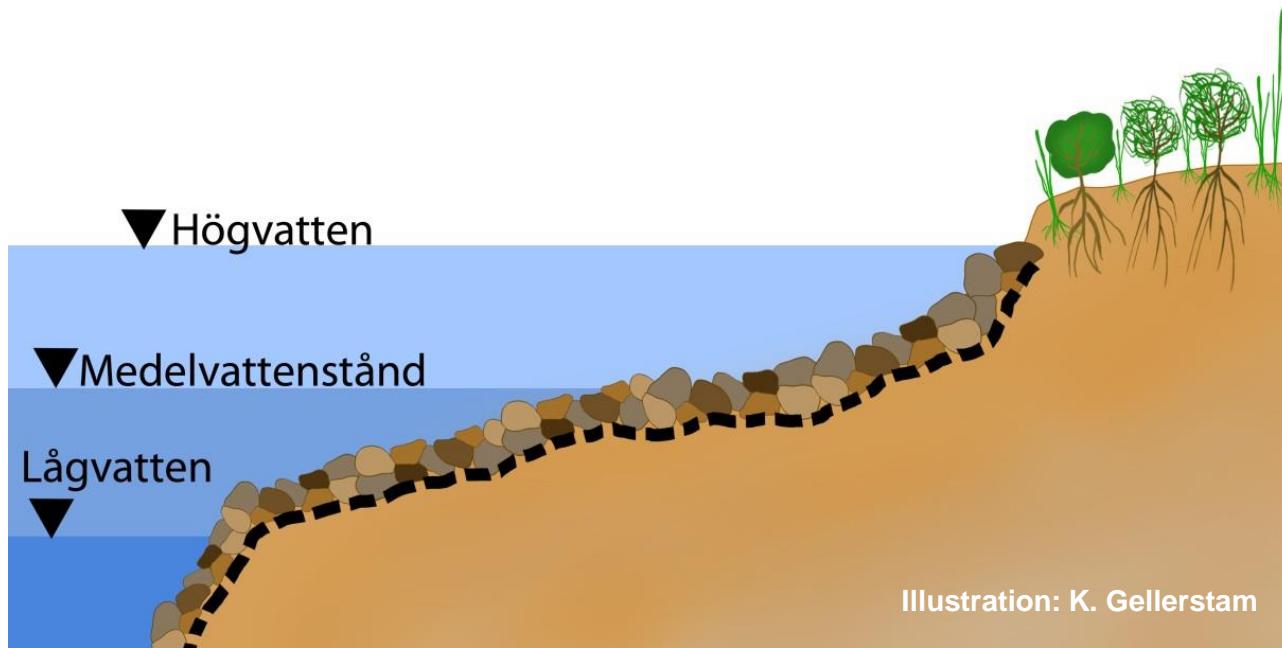
# Biological bank protection



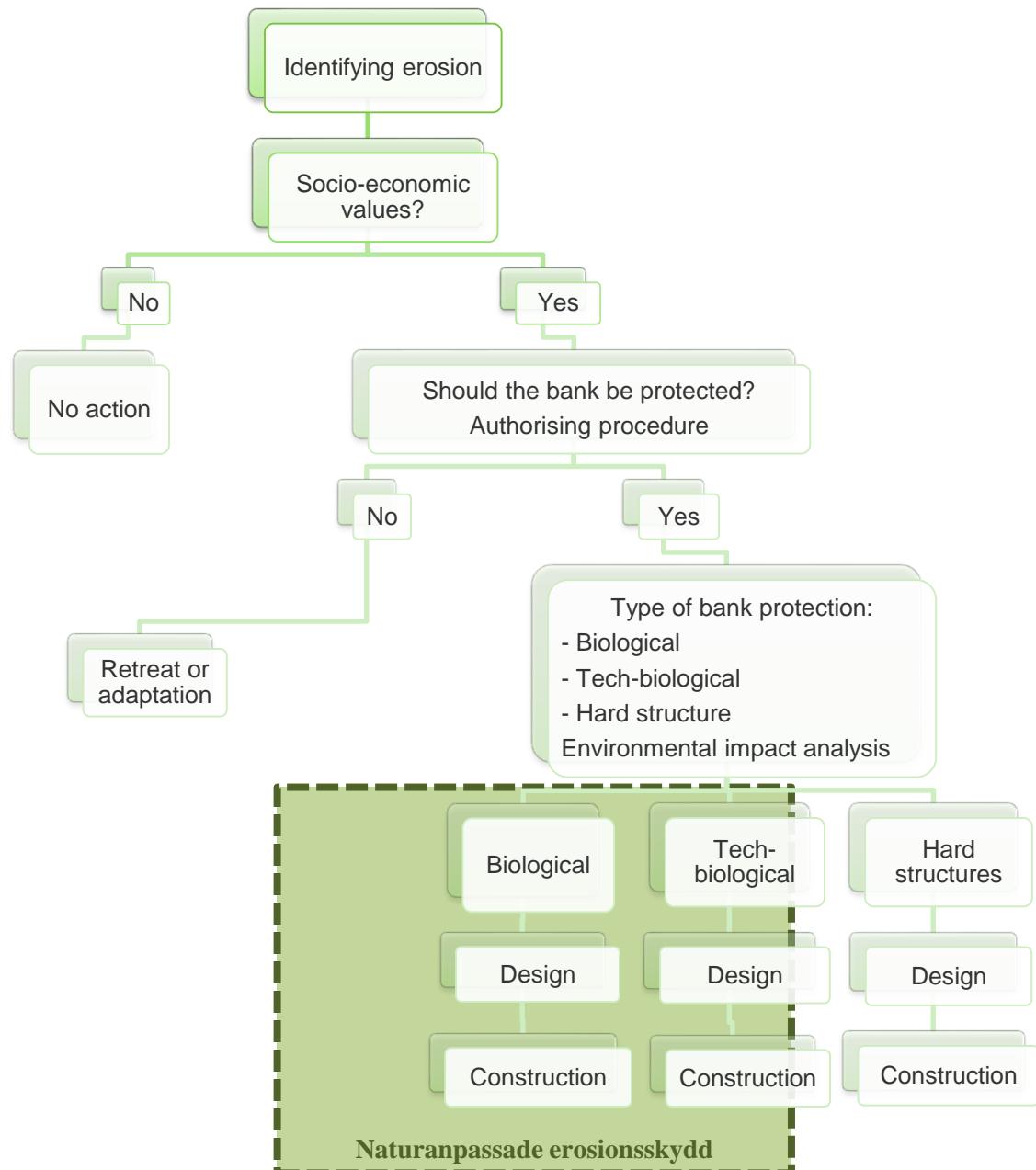
# Technical-biological bank protection



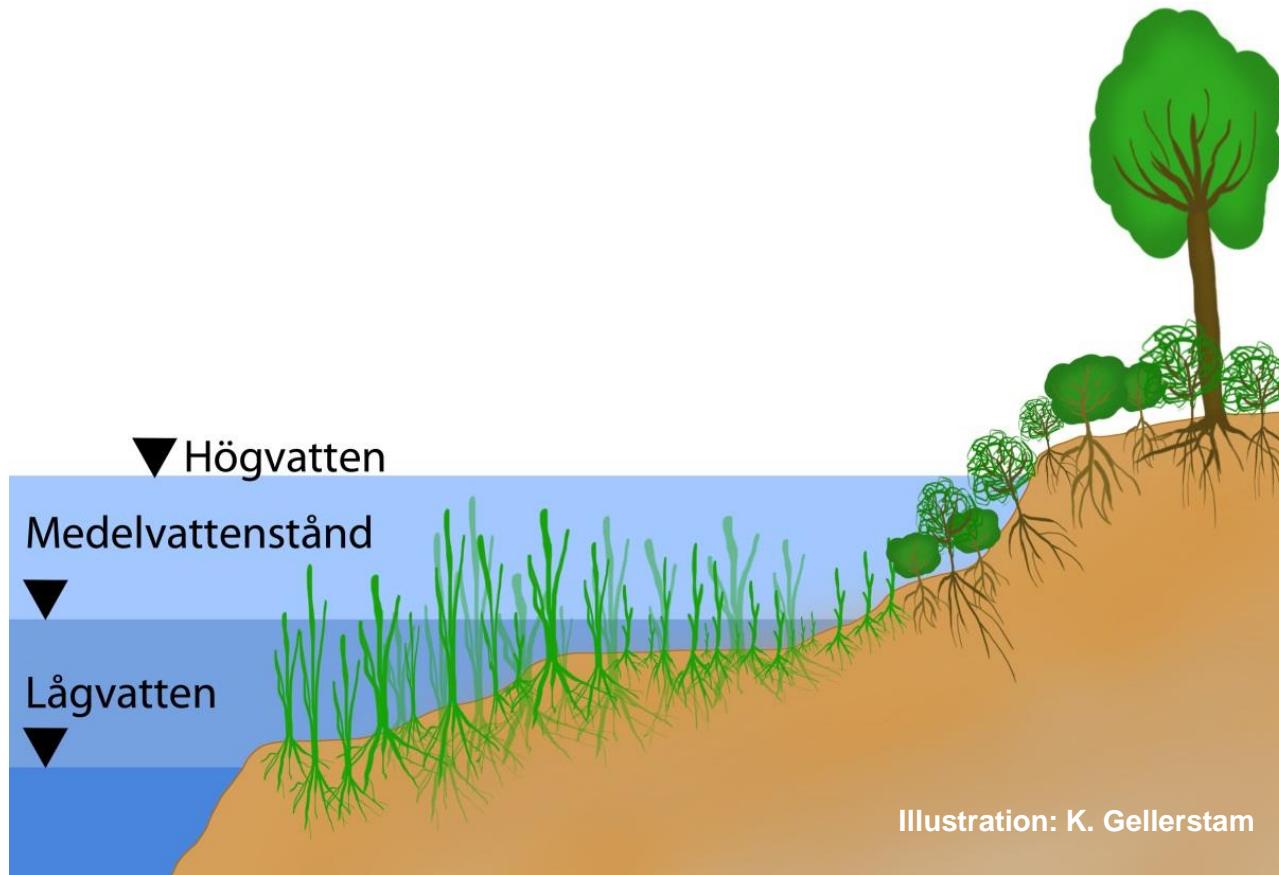
# Hard structures, Rip-rap



# Methodology



# Biological bank protection



# Natural vegetation Rönne å



Foto: SGI

# Natural vegetation Suseån



Foto: SGI

# Salix



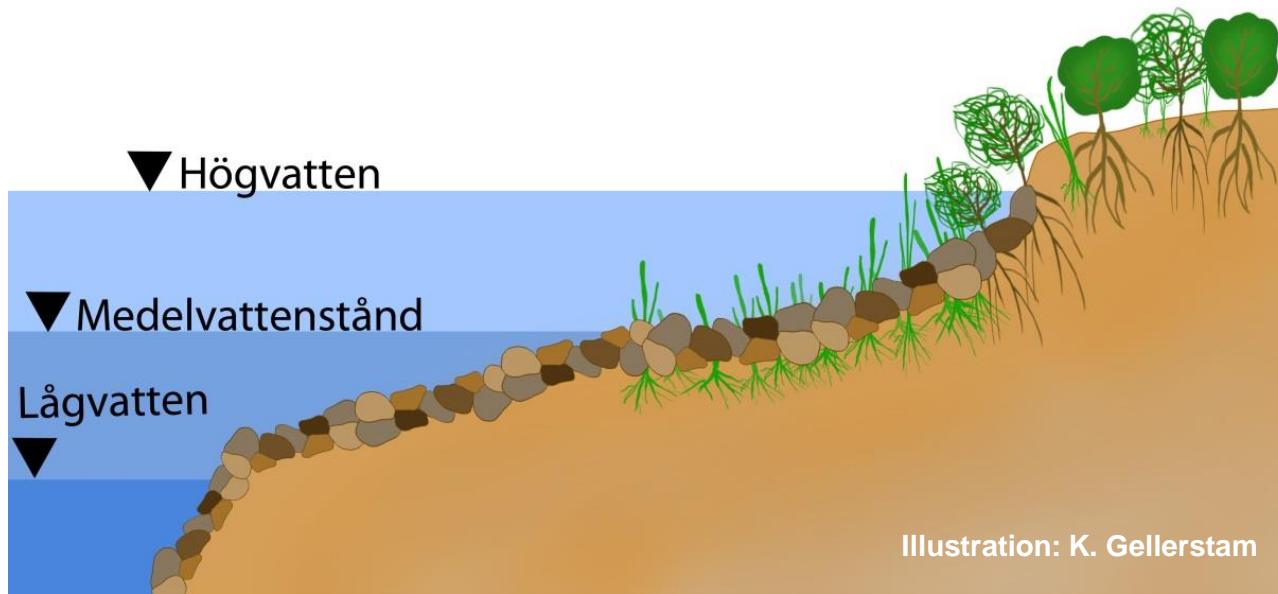
Foto: SGI

# Salix



Foto: SGI

# Tech-biological bank protection



# Rip-rap and vegetation



Foto: BAW

# Rip-rap and plants



Foto: SGI

# Geotextile and vegetation



Foto: SGI

# Geotextile and vegetation



Foto: SGI

# Gabions and vegetation



Foto: SGI

# Tech-biological bank protection Lerån, Lerum



# Logs and roots



Photo:

Washington State Aquatic Habitat Guidelines Program  
Integrated Streambank Protection Guidelines, 2003

# Roots and logs, Ätran

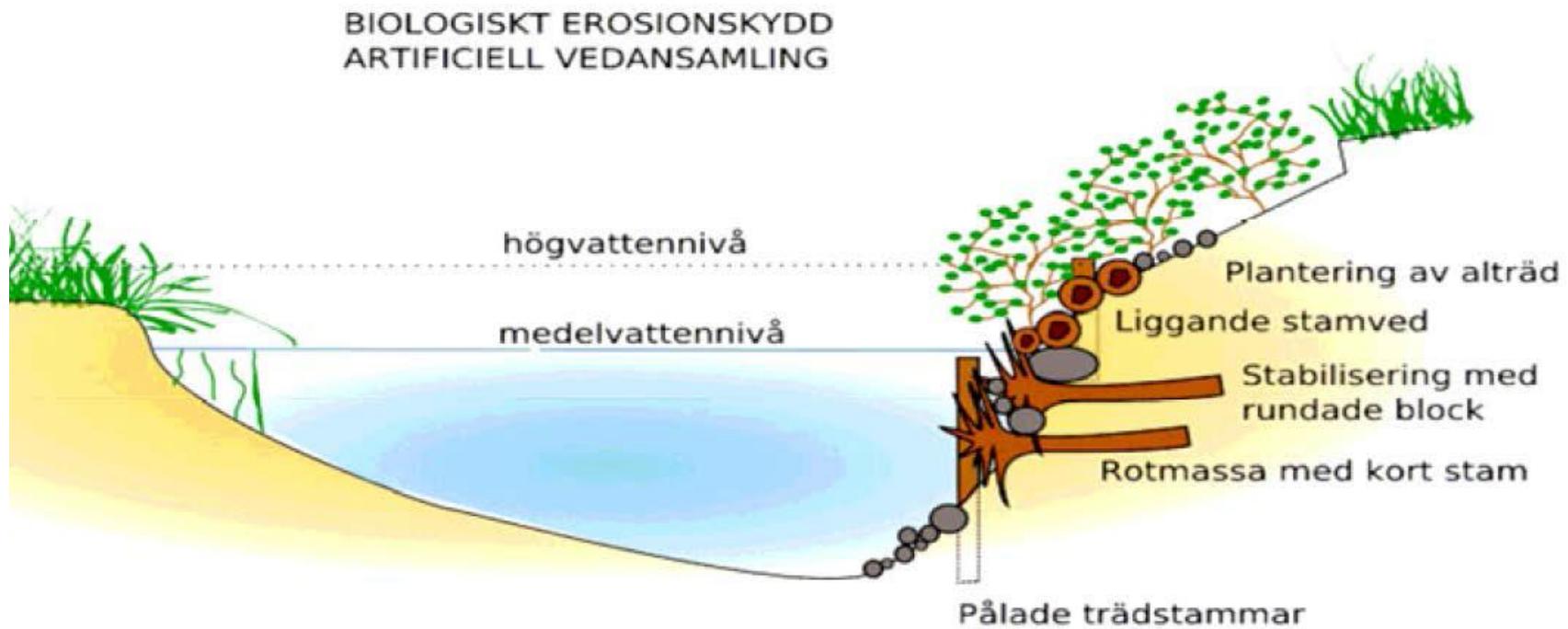


Illustration: Swedish Agency for Marine and Water Management

# Roots and logs, Ätran





Thanks!