MULTIPURPOSE USE OF LAKES AND RESERVOIRS

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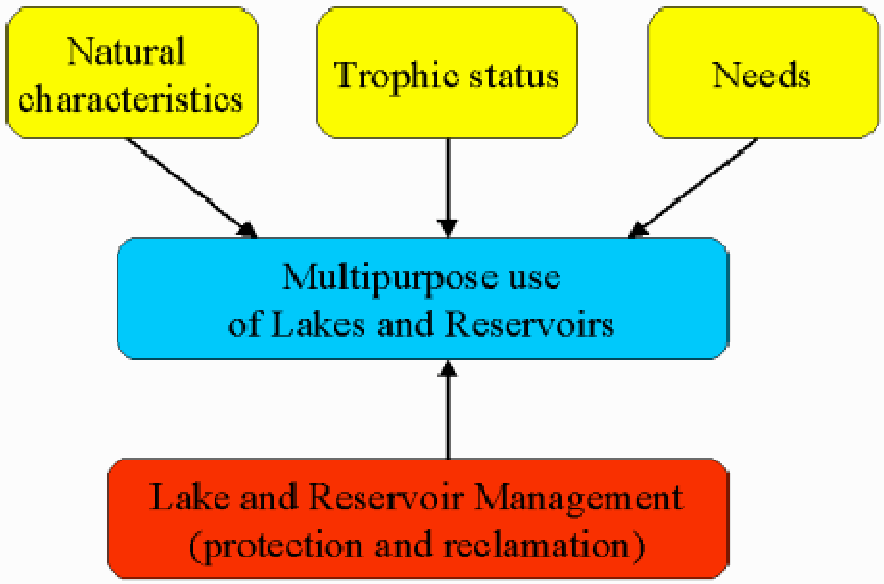
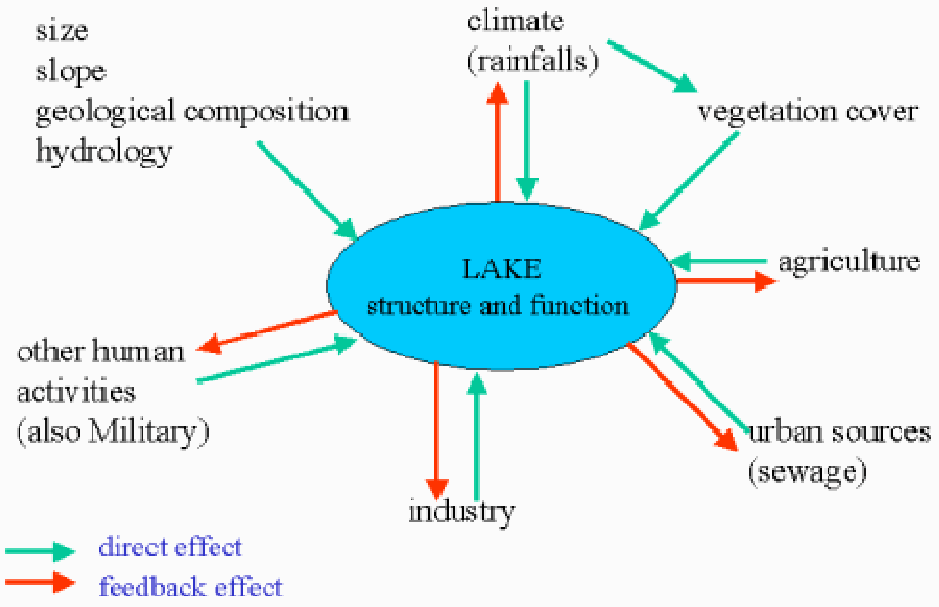
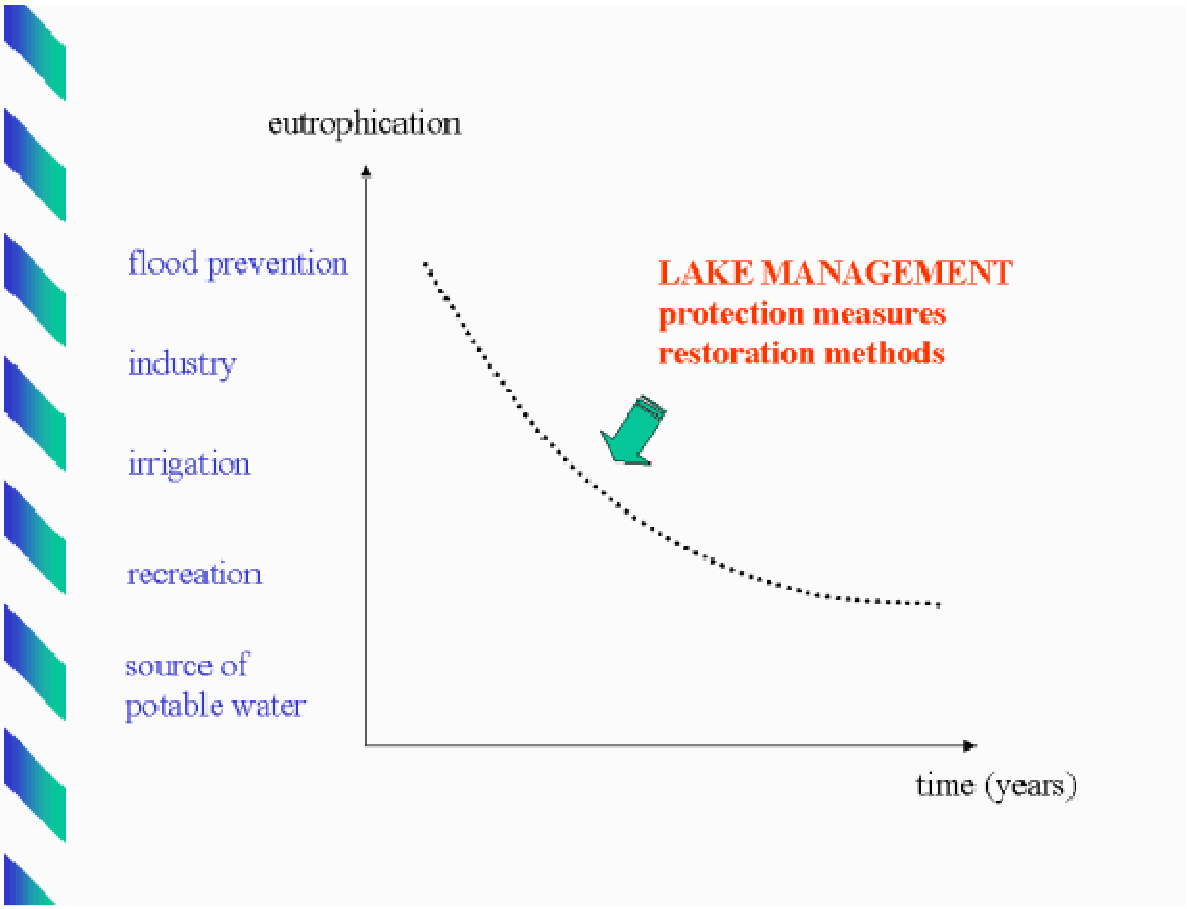

Natural characteristics
Trophic status
Needs
Multipurpose use of Lakes and Reservoirs
Lake and Reservoir Management (protection and reclamation)

WATERSHED - LAKE INTERACTIONS



Lakes and Reservoirs are utilized for:

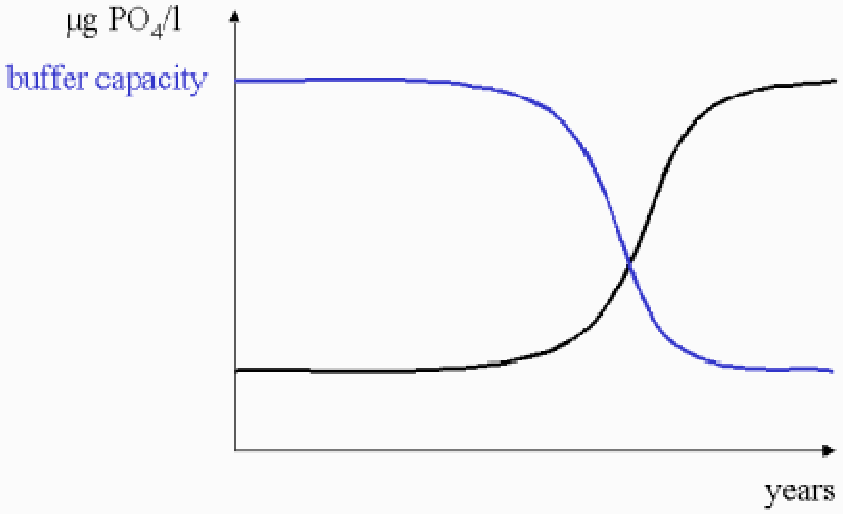
- Source of drinking water
- Electric power generation
- Irrigation
- Water for industry
- Flood prevention
- Downstream hydrological enrichment
- Recreation and Tourism
- Fishery
- Discharge of waste water
- Aquaculture
- Lakes have big biological diversity and are of high aesthetical and scientific importance


eutrophication
flood prevention
industry
irrigation
recreation
source of
potable water
LAKE MANAGEMENT
protection measures
restoration methods
time (years)

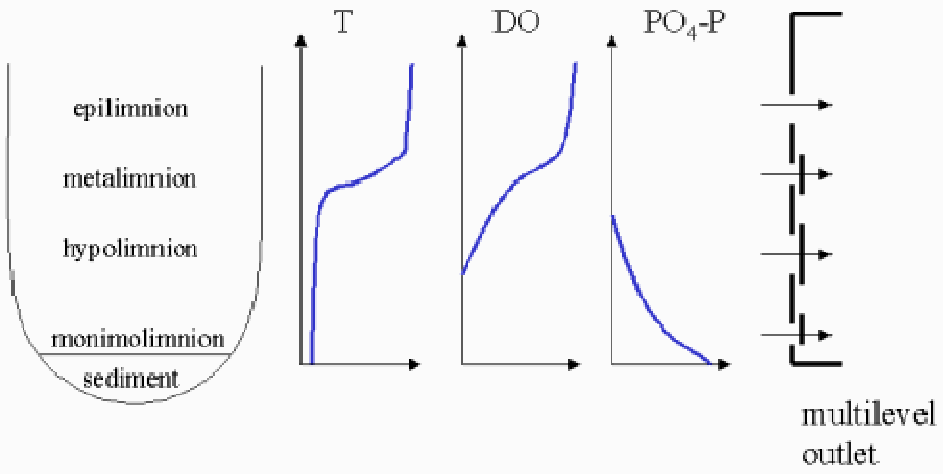
SLOVENIAN LAKES AND RESERVOIRS

AREA	LAKES	CHARACTERI-STICS	NEEDS
KARST	Vogršček, Klivnik, Mola, Vanganel	warm, shallow, high production., eutrophic	potable water, irrigation, fighting fires, fish farming
ALPINE	Triglavska, Krnska, Kriška, Blejsko, Bohinjsko	cold, deep, low production, oligo-mesotrophic	electric power gen., potable water, recreation and tourism, flood control
LOWLAND	Slivniško, Šmartinsko, Domajinci	shallow, high supply of nutrients, O2 depression, eutrophic	irrigation, flood control, fish farming

Buffer capacity



Stratification and manipulation of water quality



RESTORATION METHODS AND TECHNIQUES

- Nutrient control
  - external
  - internal
- Food web management

Reduction of the external loading

- Waste water treatment
- Restrictions in agriculture (use of fertilizers, erosion prevention, animal farming, forest management)
- Establishing buffer zones (created wetlands, created ponds, vegetated buffer strips)

Buffer zones – mechanisms controlling nitrogen retention

- Nitrification / denitrification
- Biological uptake
- Peat production
- Ammonia volatilization

Buffer zones – mechanisms controlling phosphorus retention

- Sedimentation of mineral particles to which the P is adsorbed
- Peat production
- Sediment adsorption
- Biological uptake

Buffer zones – mechanisms controlling toxic substances retention

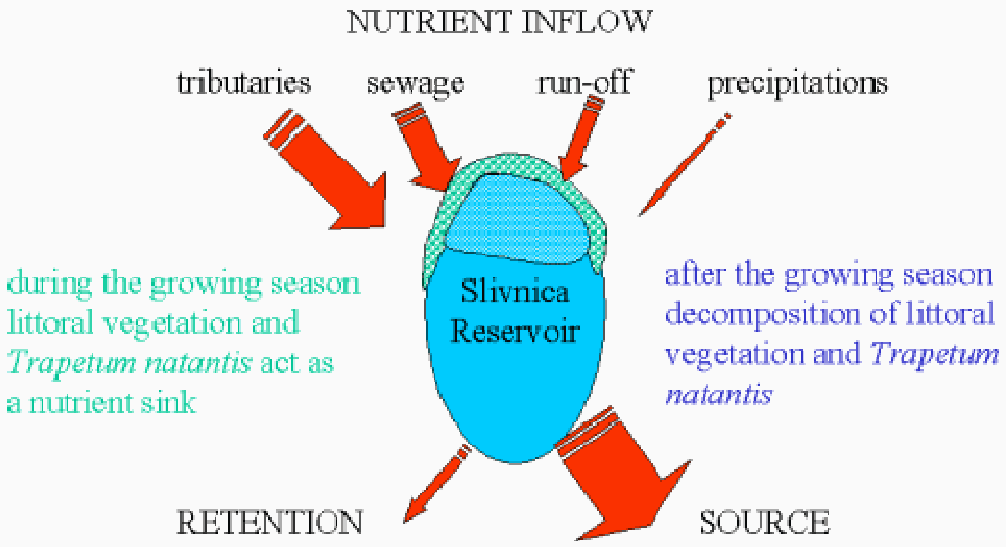
Metals:

- Adsorbtion (sediment, dissolved organic matter, biomass)
- Precipitation of undissolved salts
- Biological uptake

High-weight organic matter

- Volatilization
- Photochemical oxydation
- Sedimentation
- Sorbtion
- Biological decomposition

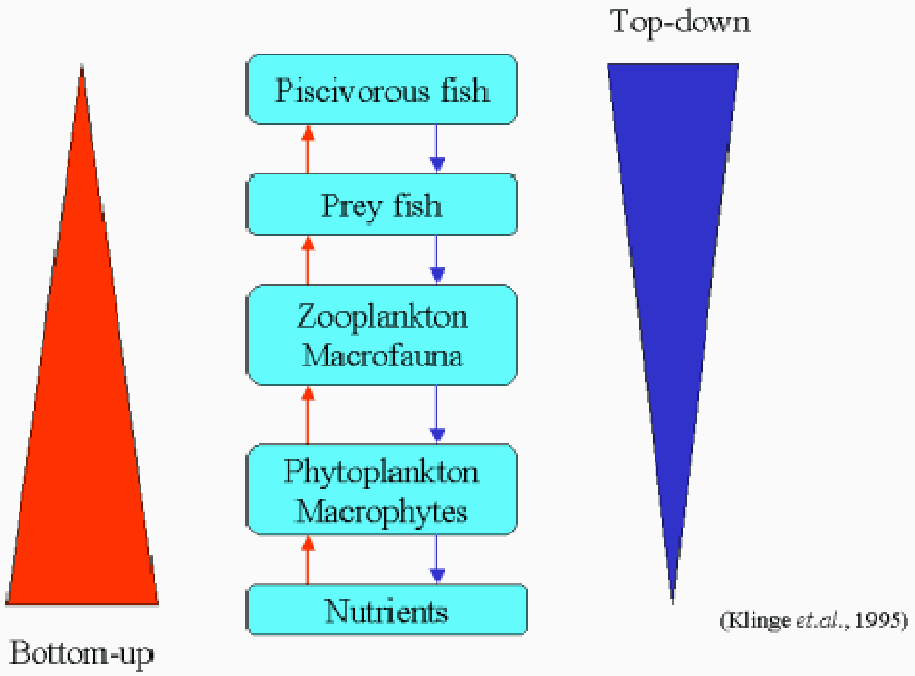
Case study – Slivnica Reservoir



Intervention in the lake ecosystem

- Aeration of water
- Diversity of hypolimnic water
- Precipitation of phosphorus in the lake
- Direct reduction of the biomass concentration in the lake
- Aeration of sediment
- Removal of sediment
- Covering of sediment
- Admission of unpolluted water

Food web management

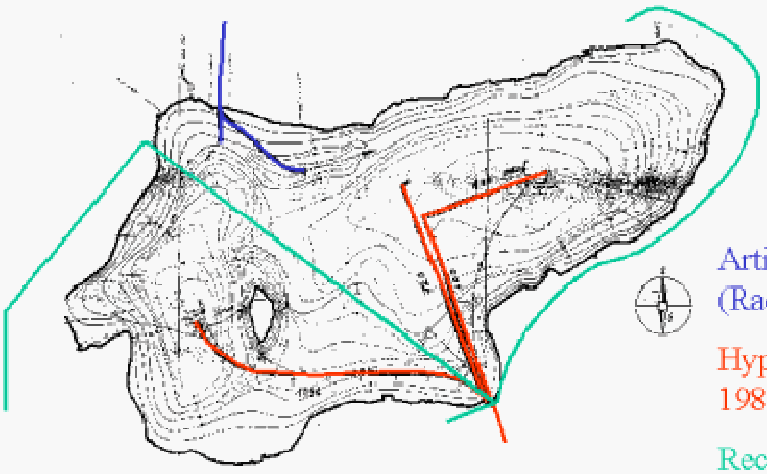


Conclusions

- All activities in the lake watershed can influence the structure and function of Lakes and Reservoirs and therefore have to be planned carefully.

- The lake environments offer us a wide range of opportunities for use. They are also of big strategic importance for every country. Therefore we have to use and manage them reasonably.

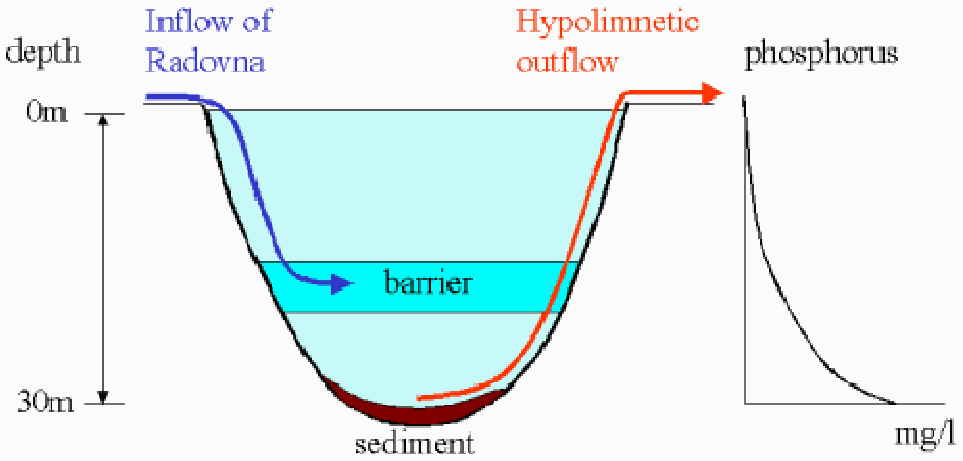
Lake Bled reclamation measures



Artificial inflow (Radovna), 1964

Hypolymentic outflow, 1980-1981

Reclamation of sewer system, 1982


depth
Inflow of
Radovna
Hypolimnetic
outflow
phosphorus
0m
barrier
30m
sediment
mg/l