

Proposal for the generation of a
MASTERPLAN
for the
LAKE IOANNINA



Fields of Activity

Environmental Technology

Lake Restoration



Public Pools



Plant Construction



Assembly & Operation



Mariculture



Project Team



Dipl. Ing. Stefan Bruns: CEO of Polyplan GmbH, expert for lake restoration



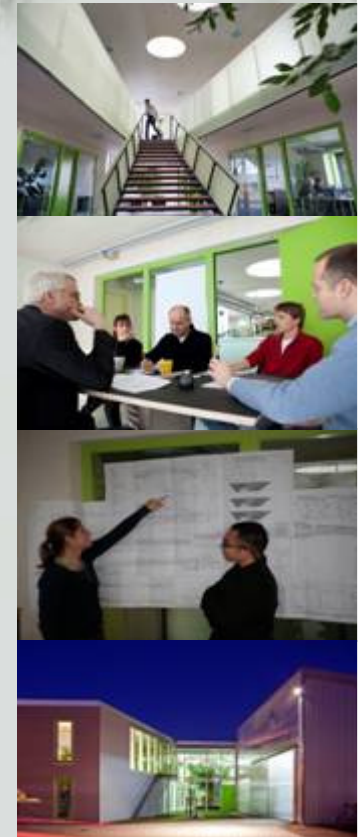
Georg Wolfram (PhD): Limnological expert



Karl Donabaum (PhD): Biological monitoring expert



Oliver Gralle: Expert for hydraulic structures and ecological water construction works



Lake Otterndorf



Lake Otterndorf



Lake Otterndorf

Combined biological
and Chemical water
treatment



Lake Geiseltalsee, Runstedter See



Tiefenwasserbelüftung







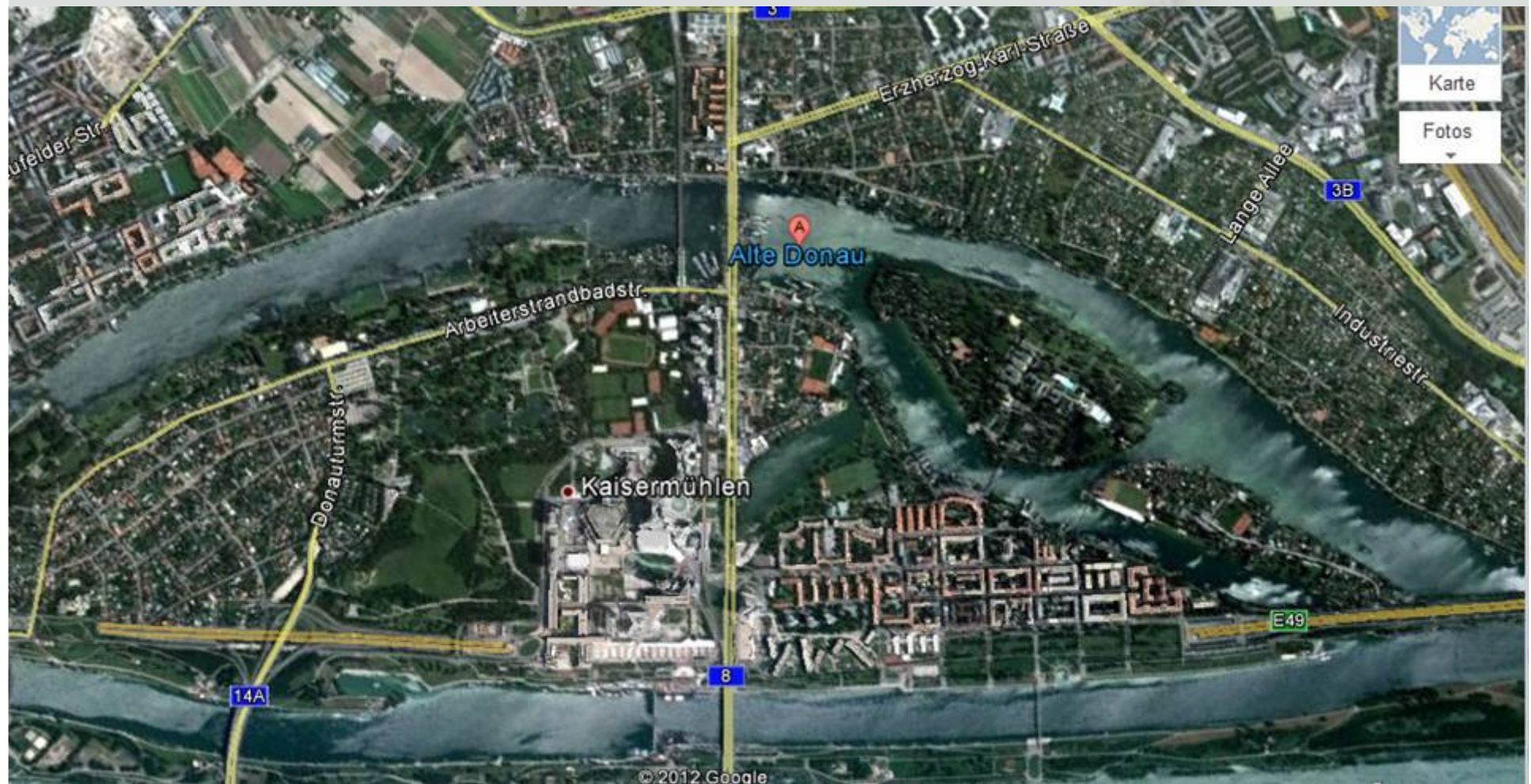
Lake Bellandur, Bengalore



Lake Ballandur, Bengalore



Lake Alte Donau



Lake Alte Donau



Riplox System,
introduction of NO_3 and
Lime milk to improve the
micro bacterial sludge
removal and the Binding
capacity of the sediment



Lake Alte Donau

The lake is used today intensively for bathing water sports etc.



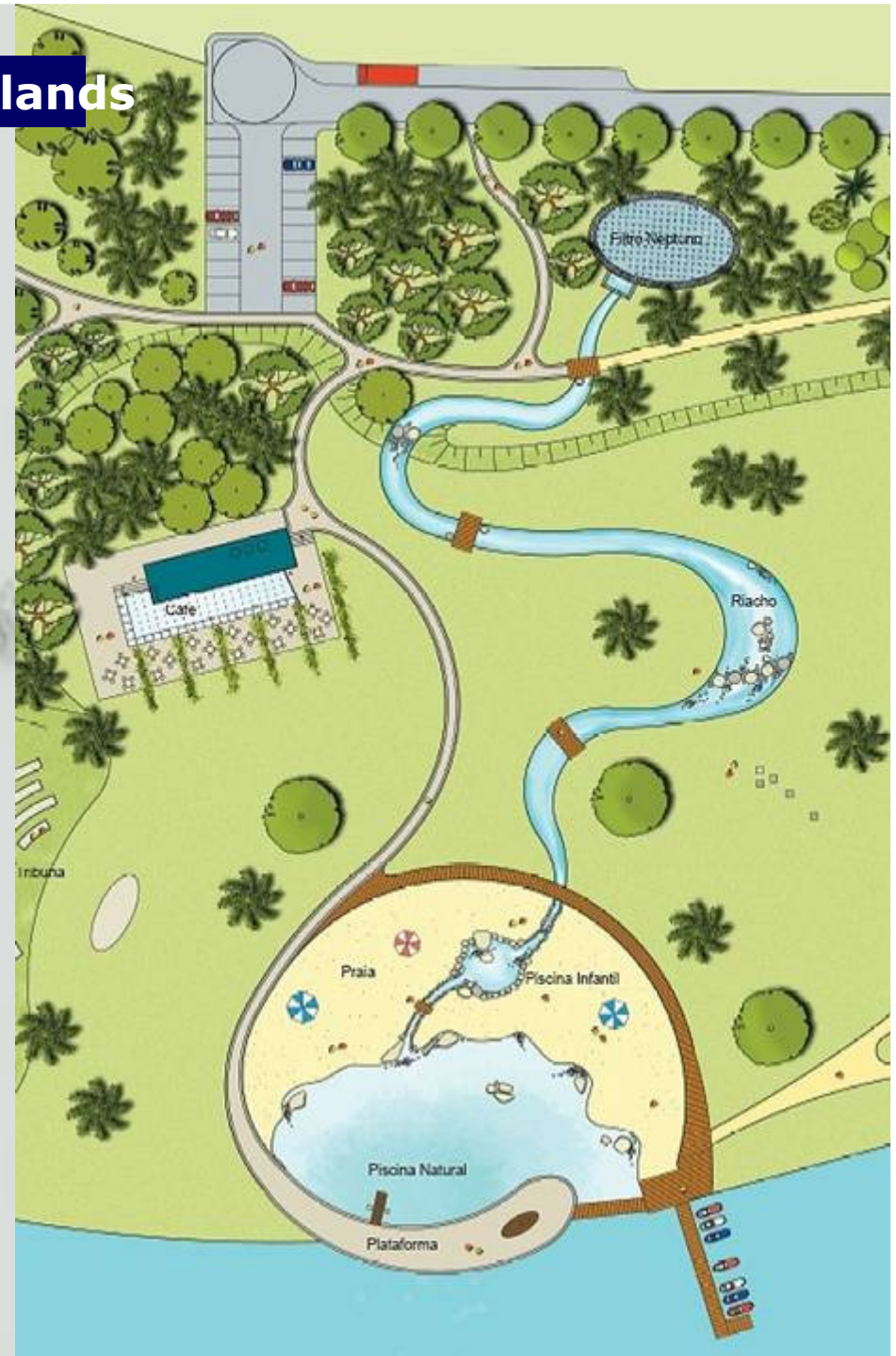
Lake Azul and Lake Verde Azores islands



Lagoa de Santiago

Lake Azul and Lake Verde Azores islands

Deep water flushing pipe,
retention areas in the catchment
area, Design of a natural pool

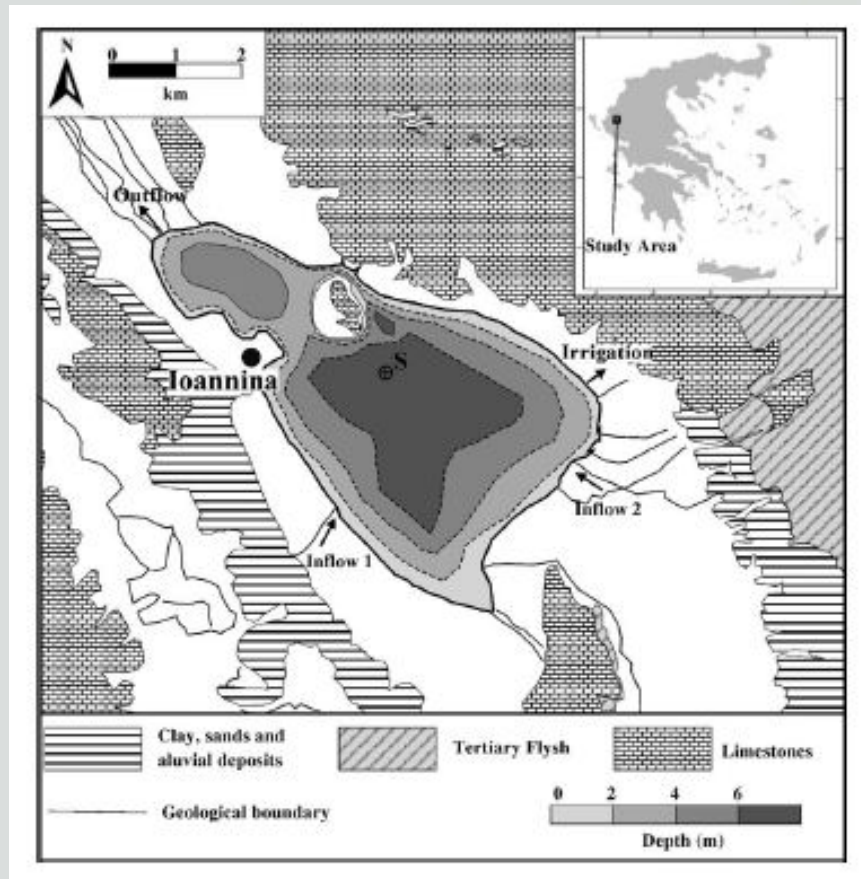


Lake Ioannina: Status

- High biodiversity (listed in the Natural special Conservation areas under the European Community Council Directive on the conservation of natural habitats and wild fauna and flora [Habitats Directive, EC, 92/43])
- Important for
 - Biodiversity
 - Tourism
 - Recreation
 - Fishing
 - Irrigation



Lake Ioannina: Morphology

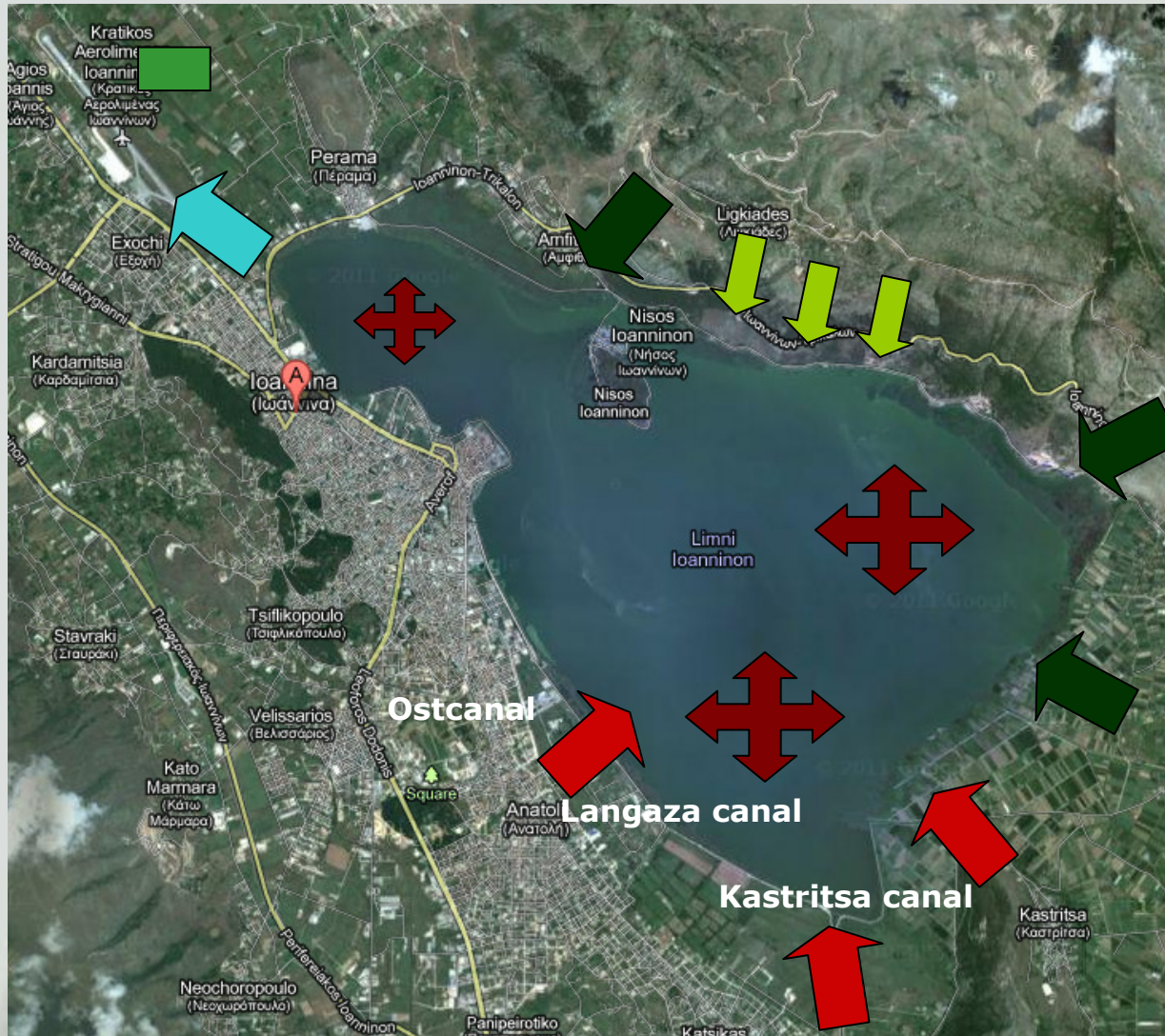


(Papatheodorou 2009)

- Max. length: 7.9 km
- Max. width: 5.4 km
- Surface area: 22 km²
- Average depth: 4.5 m
- Max. depth: 9 m

Classification: Shallow polymictic lake

Lake Ioannina: Impacts



(google maps)

Hardly cleaned
wastewater

Agricultural
watershed

Sediment
nutrient loads

Lake Ioannina: Ecological and trophic state

- At least three decades of eutrophication (Vareli 2009)
- Only short time recovery after Treadment plan 1995-1996 (Kagalou 2008)

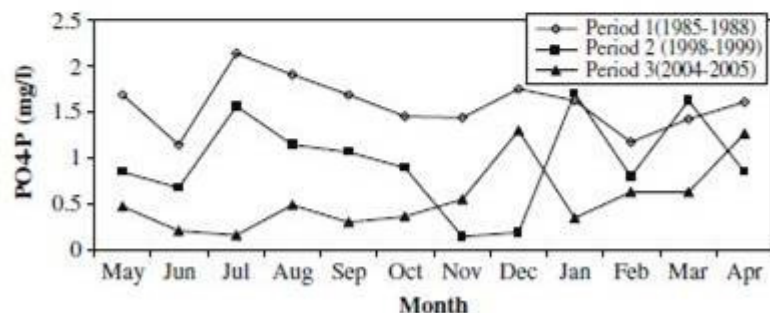
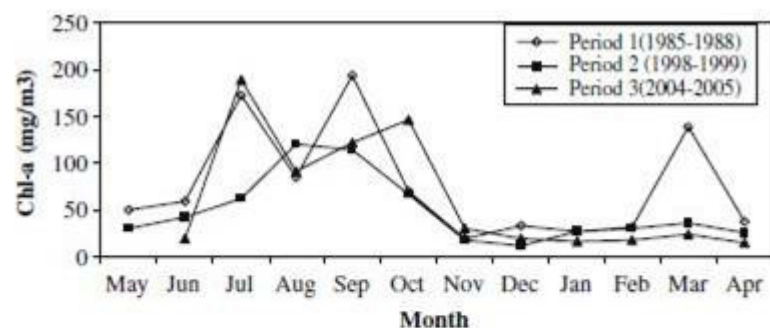
→ Until today: **Hypertrophic state**

- Decline of submerged vegetation attributed to anthropogenic pressure (Papastergiadou 2010)
- Higher pesticide concentration than many other greek lakes (Konstantinou 2006)
- Sink for nutrients; e.g. high P concentrations in the pore water of the sediment: $>16\text{mg/l}^{-1}$ (Romero 2002)

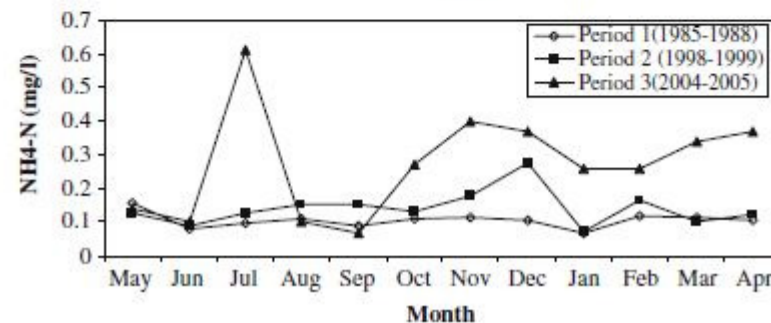
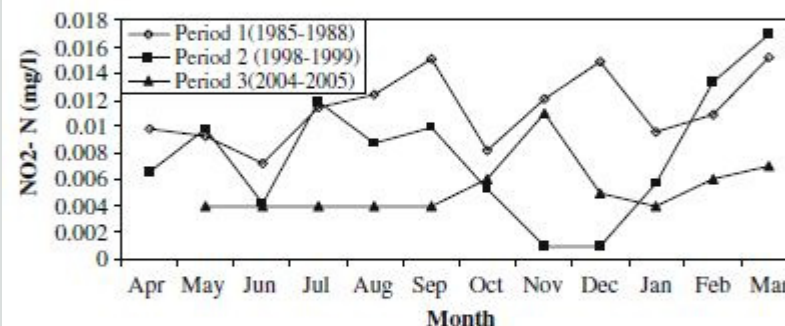
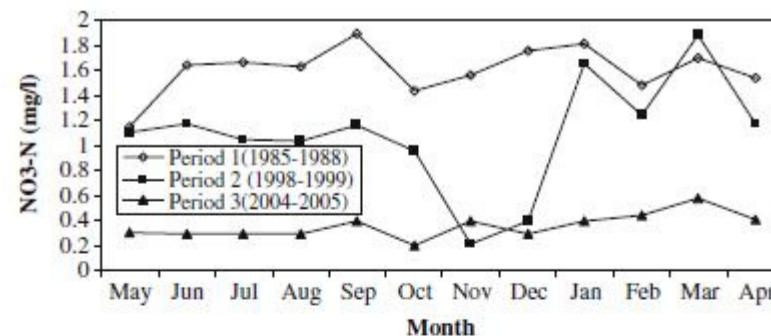


Lake Ioannina: Ecological and trophic state

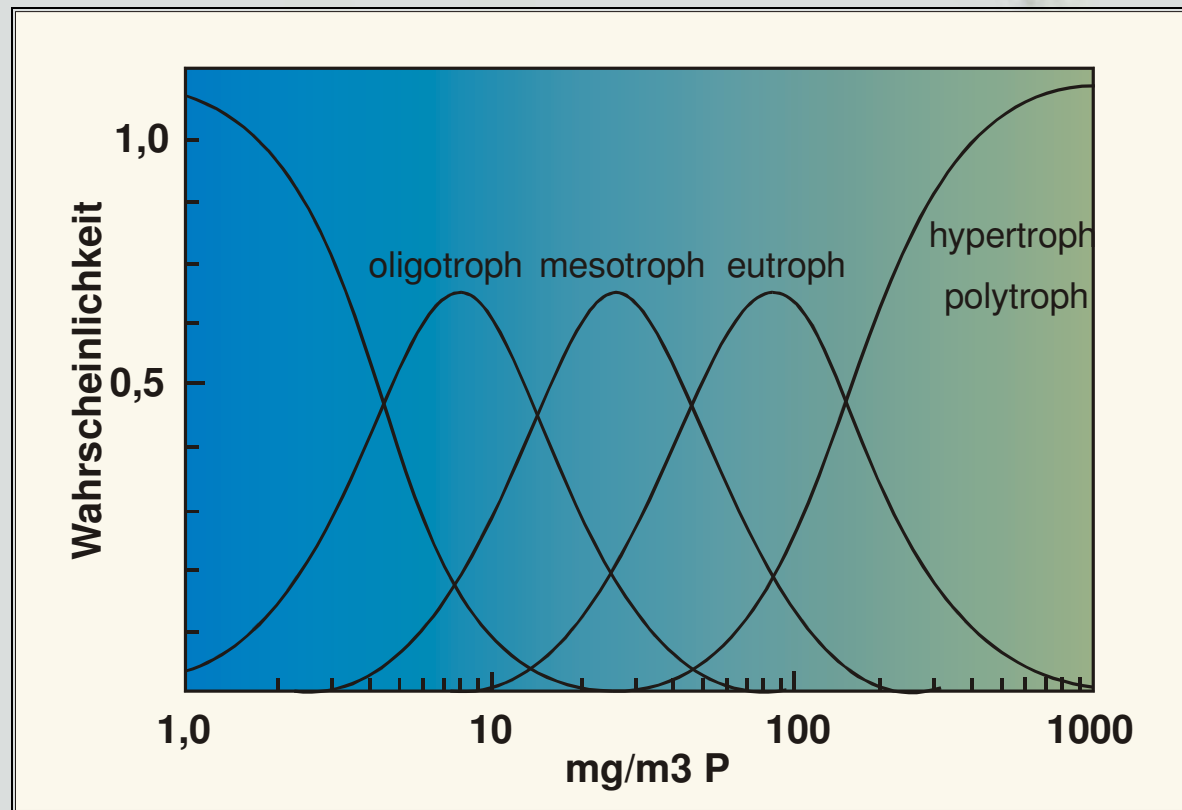
Nutrient loads 1985 - 2005



(Papastergiadou 2010)



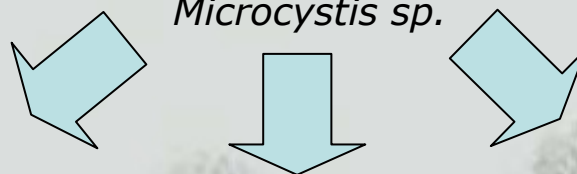
Lake Ioannina: Ecological and trophic state



Lake Ioannina: Regular cyanobacterial blooms



Microcystis sp.



Bivalves: *Anodonta cygnea*



Prussian carp: *Carassius gibelio*



Water

WHO limits for Microcystin	Microcystin concentrations in:			
	Edible species		Drinking water	Recreational water
	higher	high	higher	lower

(Vareli 2009, Papadimitriou 2009)

Lake Ioannina: MASTERPLAN

Working Packages

1. Data research
2. Data survey
3. Mapping of catchment area
4. Model calculations
5. Delineation of restoration measures
6. Elaboration of the Masterplan



MASTERPLAN: Final aim

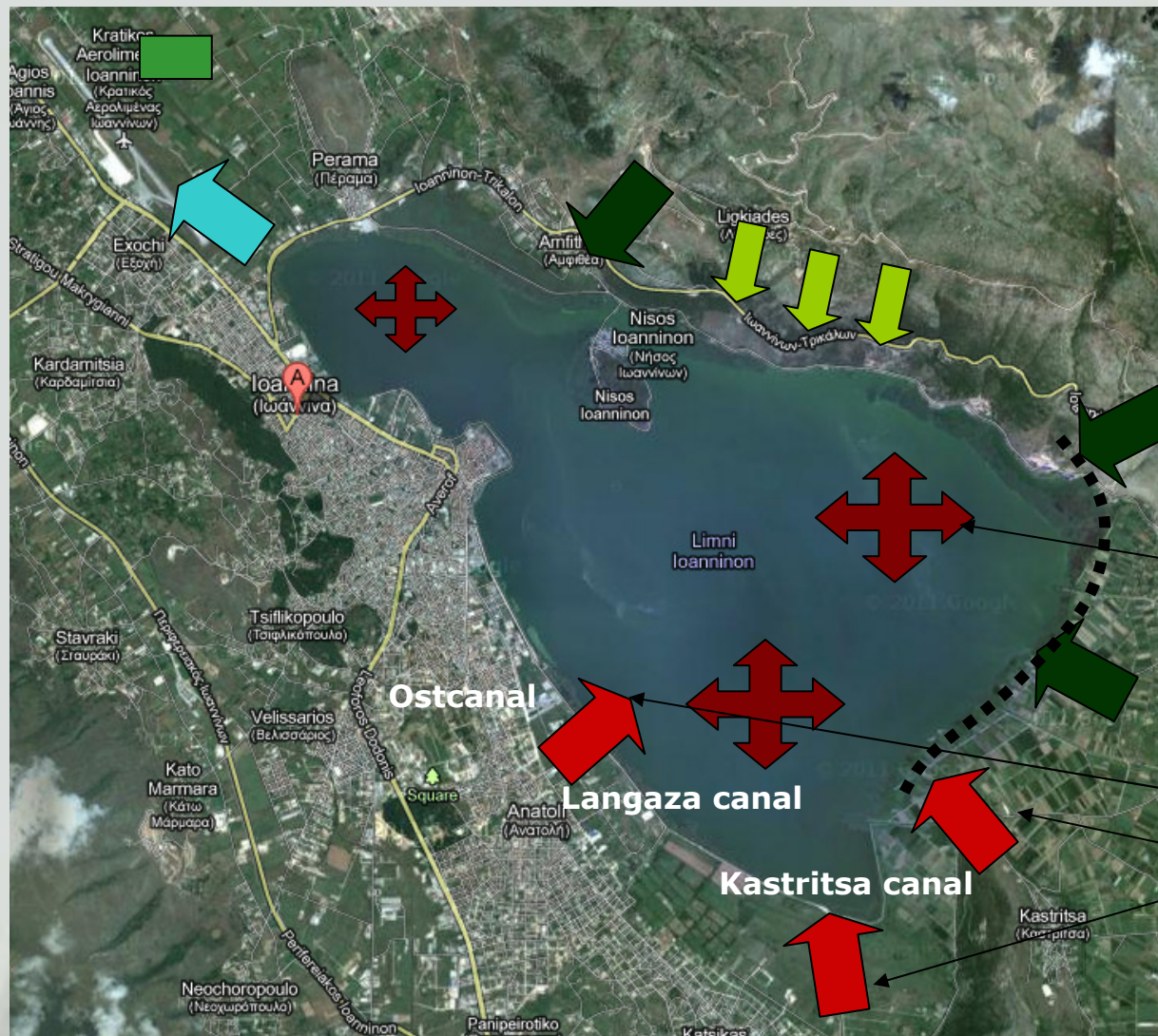


Turbid and plankton dominated state



More clear and macrophyte dominated state

Lake Ioannina: Options



(google maps)

Lake Ioannina: Options

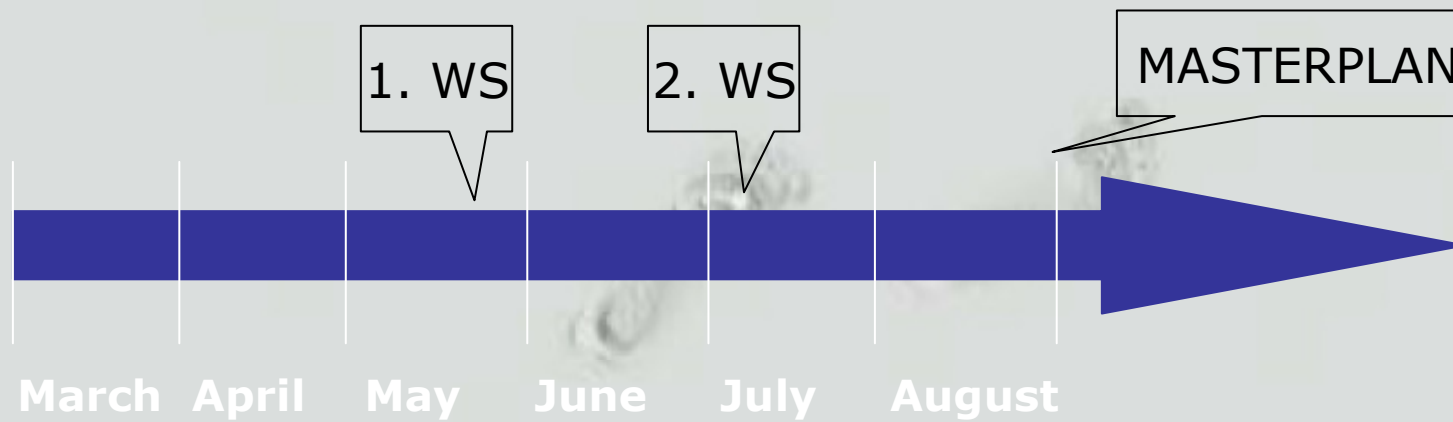


Langaza canal



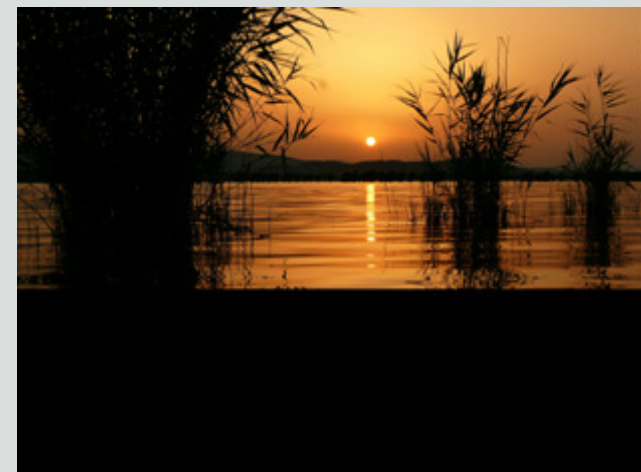
POLYPLAN

MASTERPLAN: Time schedule



MASTERPLAN: Main Focus

- Description of feasible measures that will reduce the actual nutrient inflow by modifications in the catchment area and also in the lake down to a level below the tolerable Phosphorus input.
- High value on environmentally sound, sustainable and local installations, respectively procedures.
- Special focus on the depiction of socio-economic sustainable solutions for the local fishery industry.



Thanks for your interest

