

An aerial photograph of Lake Maggiore, showing the town of Verbania on the shore and the surrounding mountainous landscape under a blue sky with light clouds.

Limnological research on Lake Maggiore as a contribution to transboundary cooperation between Italy and Switzerland

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Verbania Pallanza***

The Institute of Ecosystem Study

Verbania Pallasza

Main research activities

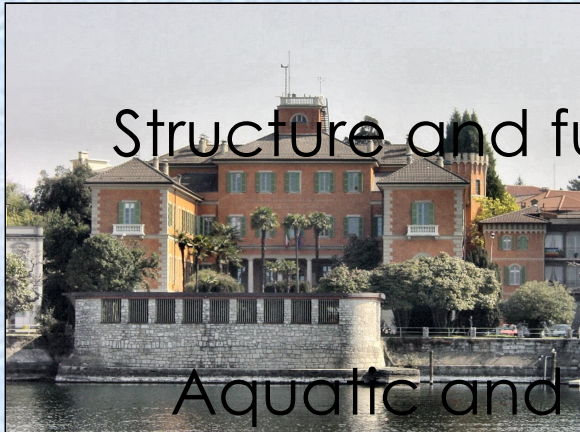
Structure and functioning of aquatic and terrestrial ecosystems

Pisa
Firenze

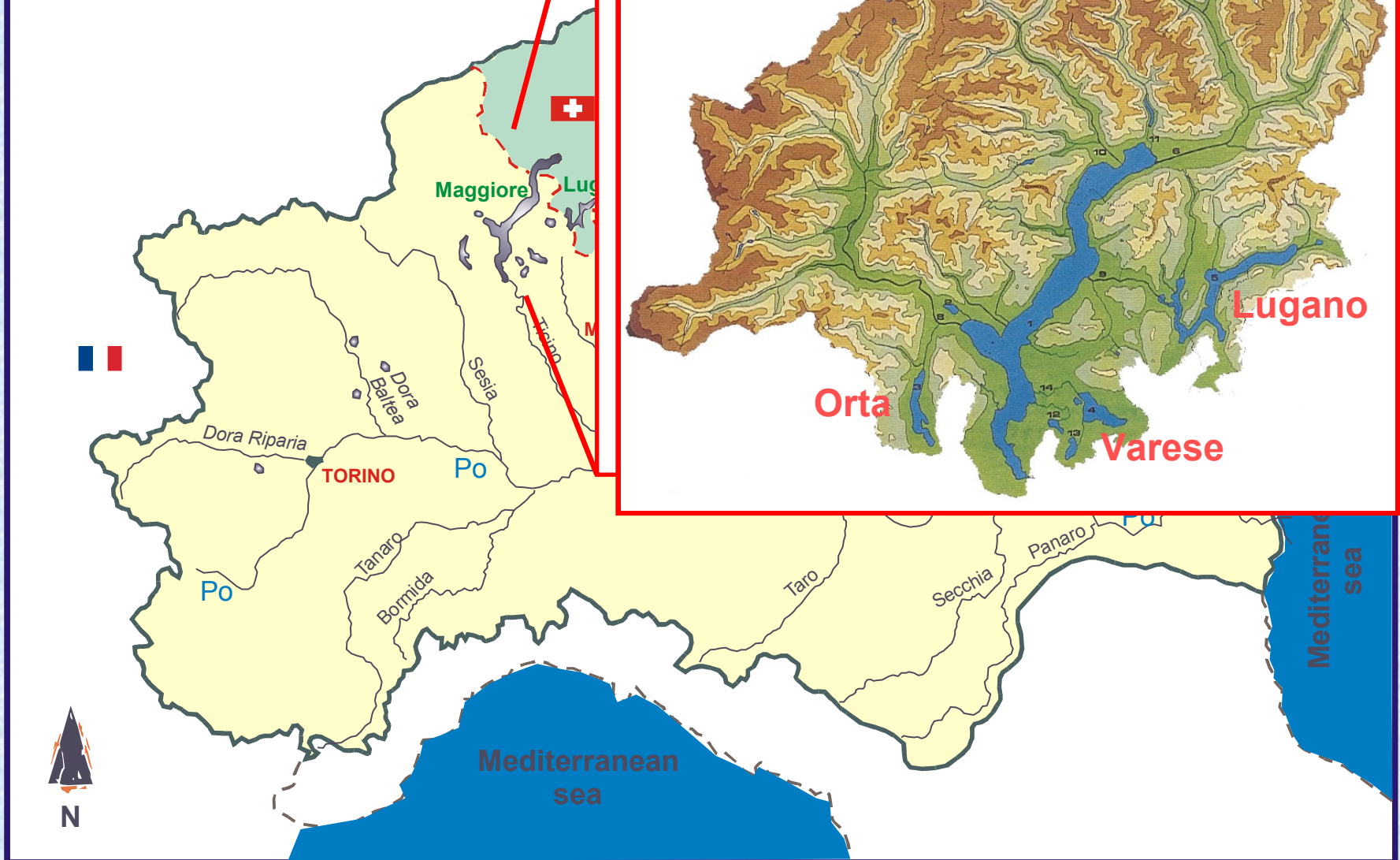
Aquatic and terrestrial ecosystems and global change

Sassari

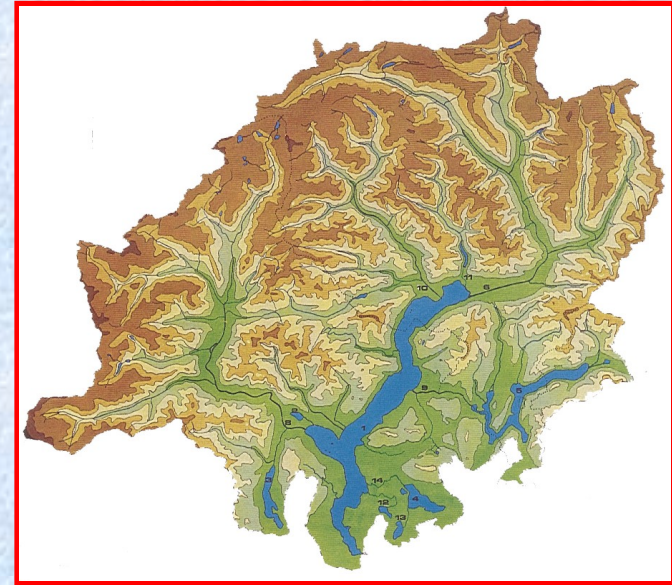
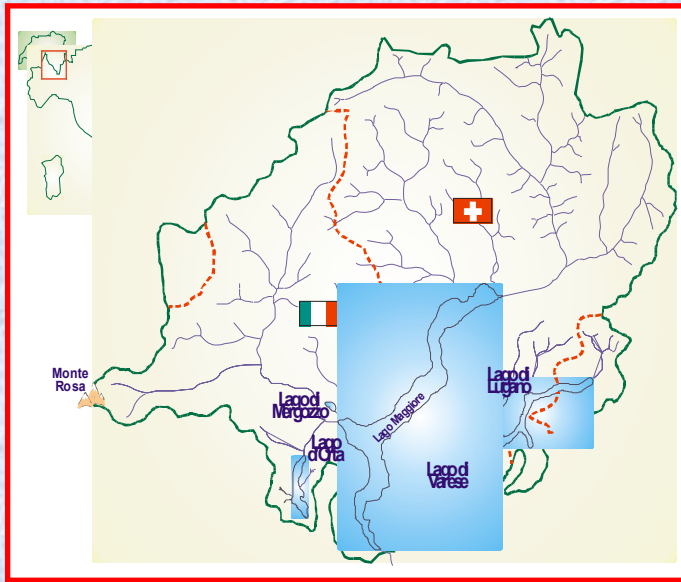
Soil quality and ecology



River Po watershed



Characteristics of the watershed



- Well developed hydrography, with 32 natural and artificial lakes and 14 main tributaries
- Mild climate (heat-regulating effect of the lake and sheltering effect of the Alps), but damp, with high atmospheric precipitation (1700 mm/y)
- Just over 50% of the drainage basin is in Switzerland, while 80% of the lake is in Italy
- 670,000 residents (200,000 near the shore line) + 30,000 temporary residents (visitors)

Lago Maggiore morphometric and hydrological features

| | |
|----------------------------------|----------------------|
| drainage basin area | 6599 km ² |
| lake area | 212 km ² |
| lake volume | 37 km ³ |
| mean level | 194 m a.s.l. |
| max depth | 370 m |
| mean depth | 177 m |
| drainage basin / lake area ratio | 31.1 |
| theoretical renewal time | 4.0 years |



Lake Maggiore resources and uses of the waters

| | |
|---------------------------------|----------------------------|
| Environmental value | high |
| Hydraulic regulation | present |
| Tourism recreation | 15 Million y ⁻¹ |
| Bathing | high |
| Drinking | present |
| Public navigation | high |
| Private/recreational navigation | high |
| Water for agriculture | high |
| Sport fishery | high |
| Professional fishery | high |
| Hydroelectric production | Artificial lakes, outlet, |



Management of the lake and its watershed

1882



International Commission for
the Fisheries in Italian Swiss
waters



1946



International Commission for
the outflow regulation



1972



International Commission for
the protection of Italian Swiss
waters (CIPAIS)



Total catch (2004-2006) :

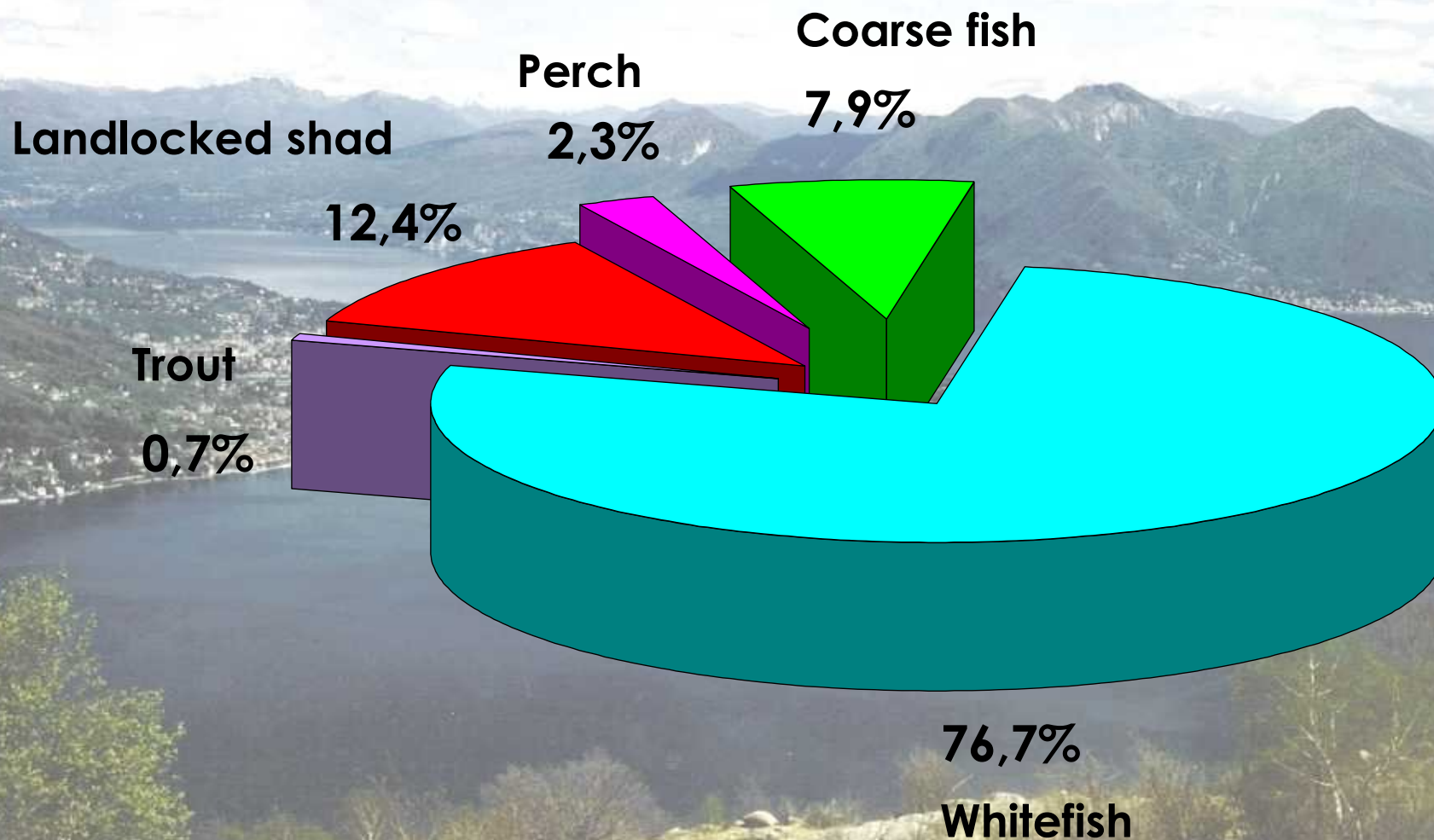
120 tons whitefish + shad
15 tons coarse fish + perch + trout



1882



International Commission for
the Fisheries in Italian Swiss
waters





1946



International Commission for
the outflow regulation

Water level fluctuations: flood

Floods are the historical threat in the Lago Maggiore area, because of the high amount of precipitation. Main hydrogeological damages are in the watershed, but flooded material on the lake surface causes problems to the navigation.

Pallanza 17/10/00 ore 15:00. Livello 197,85 (max 197,94)





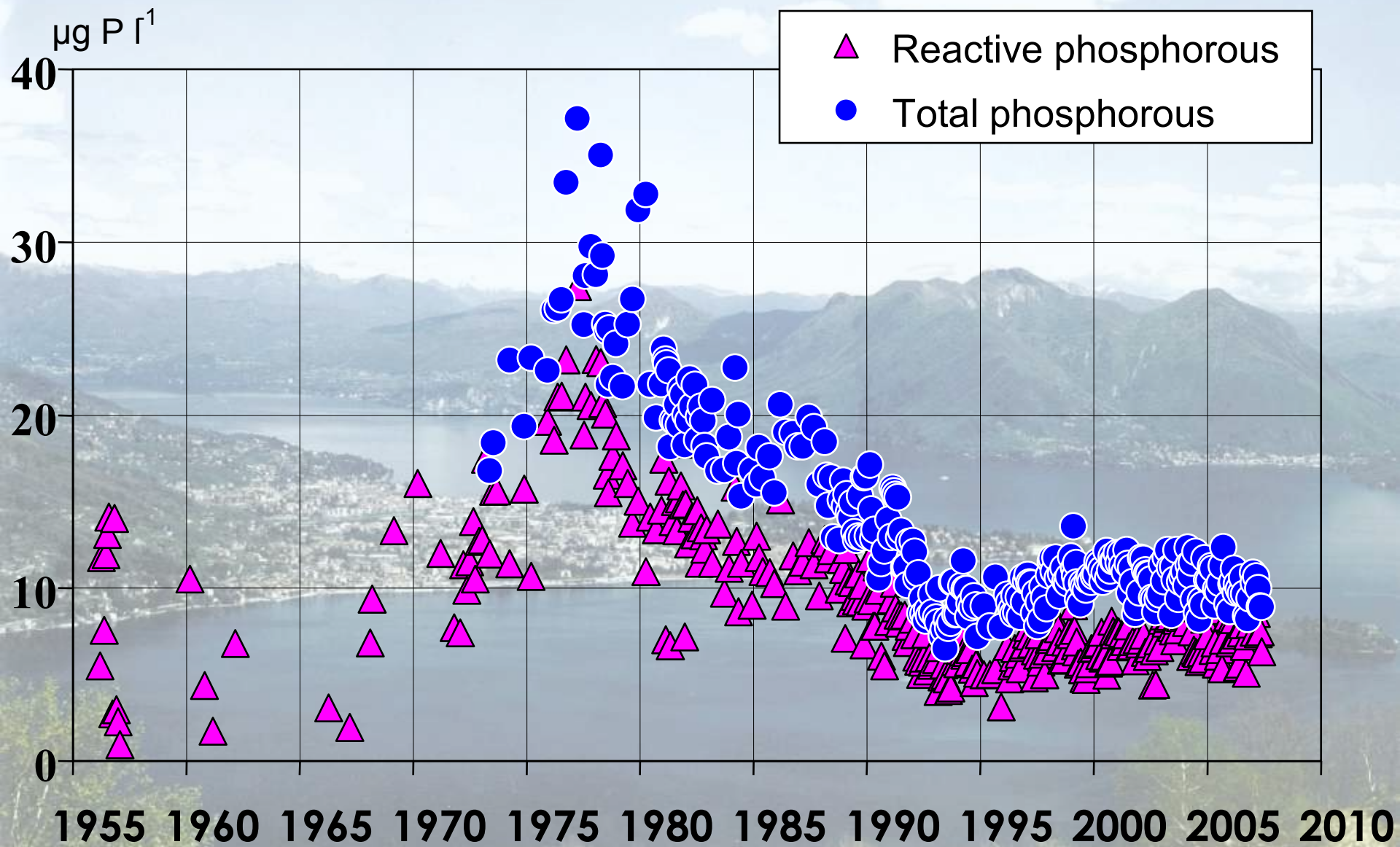
1882



Lake trophic evolution

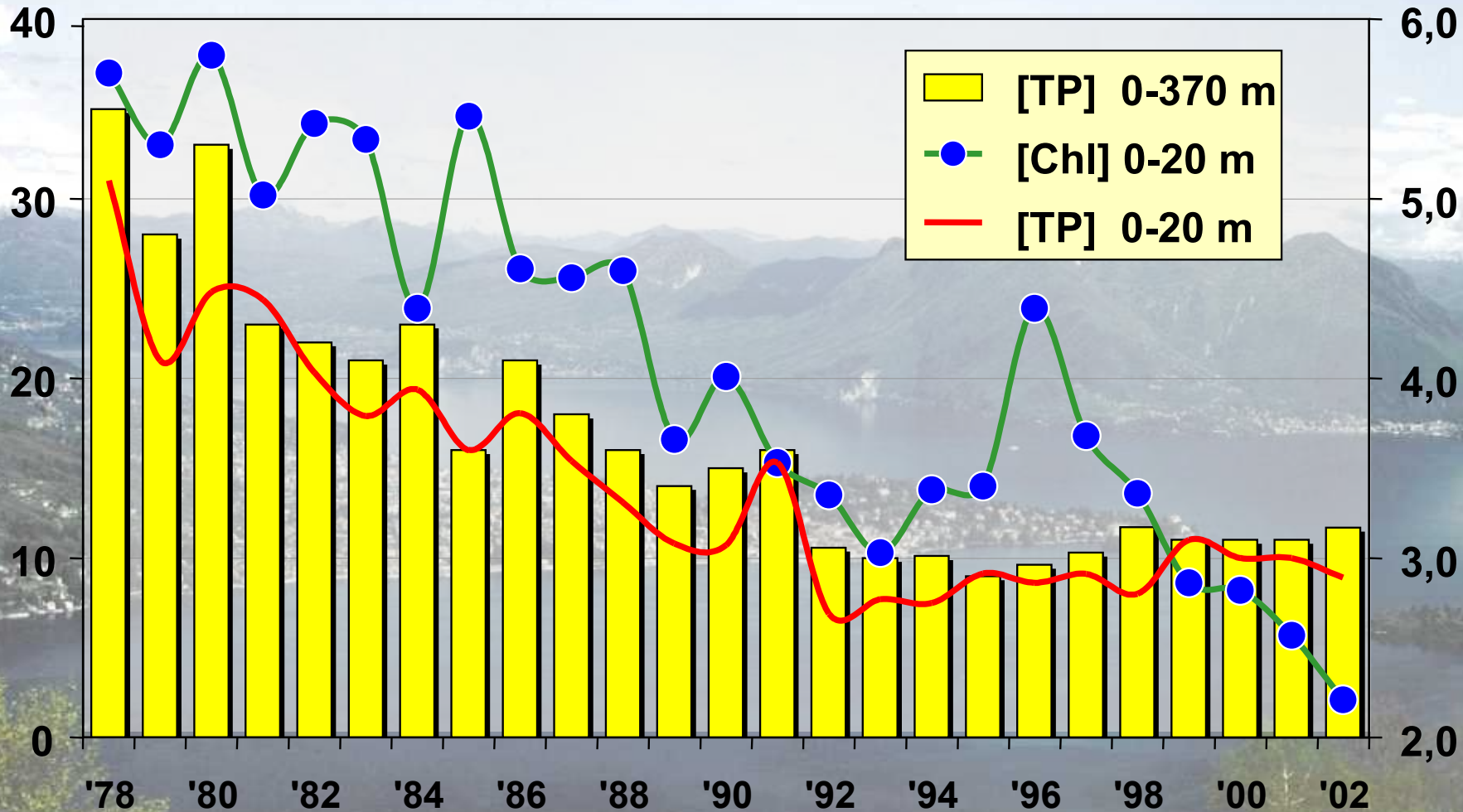
International Commission for the Fisheries in Italian Swiss waters

| | | |
|---------------|----------------------------------|--------------------------|
| Up to Fifties | Low algal productivity | OLIGOTROPHIC |
| 1960 – 1969 | Increase of algal productivity | MESOTROPHIC |
| 1970 – 1980 | Further increase of productivity | MESO-EUTROPHIC |
| 1981 – 1990 | Slight decrease of productivity | MESOTROPHIC |
| 1991 – 1997 | Strong decrease | MESO-OLIGOTROPHIC |
| Since 1998 | Low biological productivity | OLIGOTROPHIC |

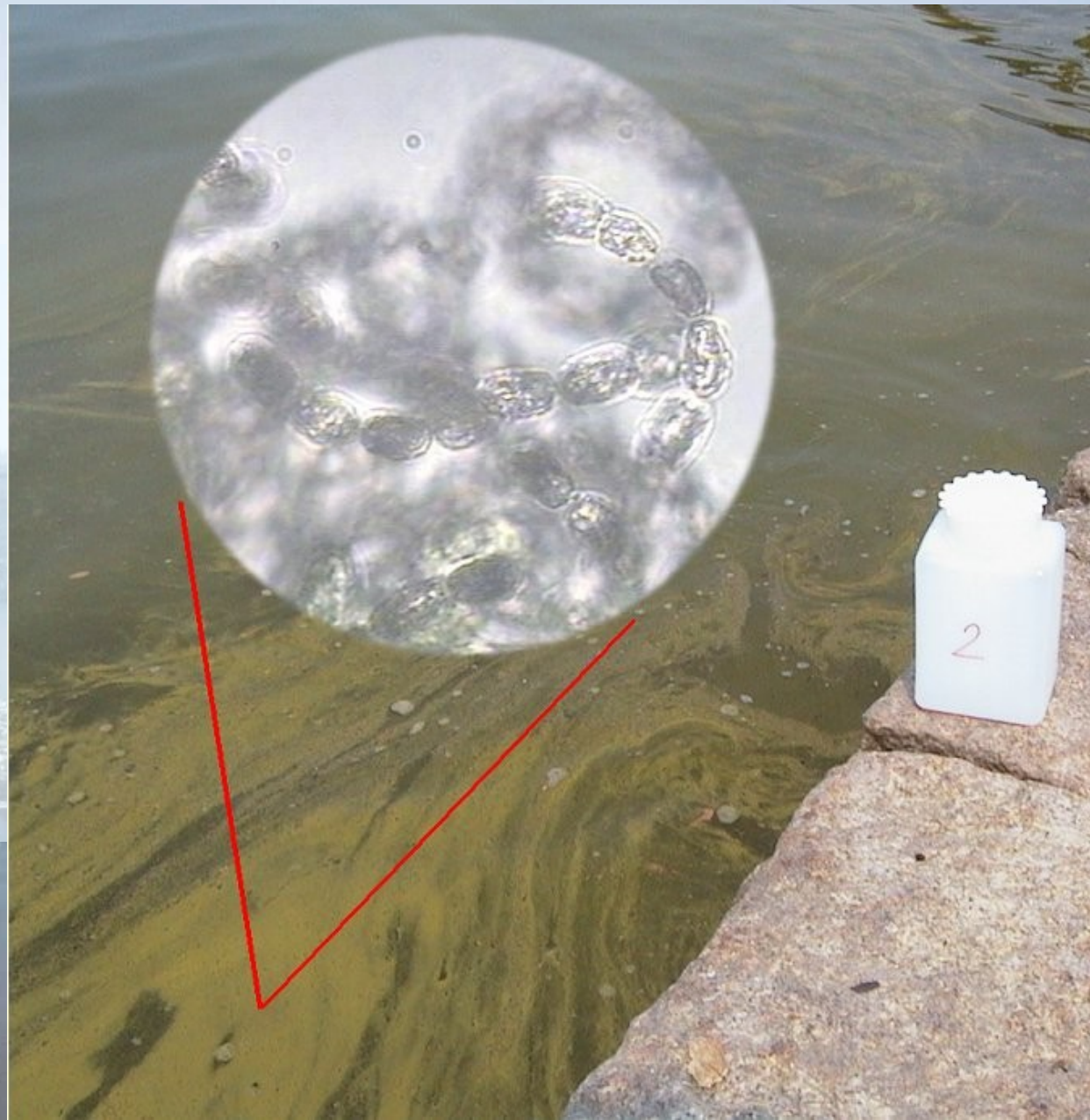


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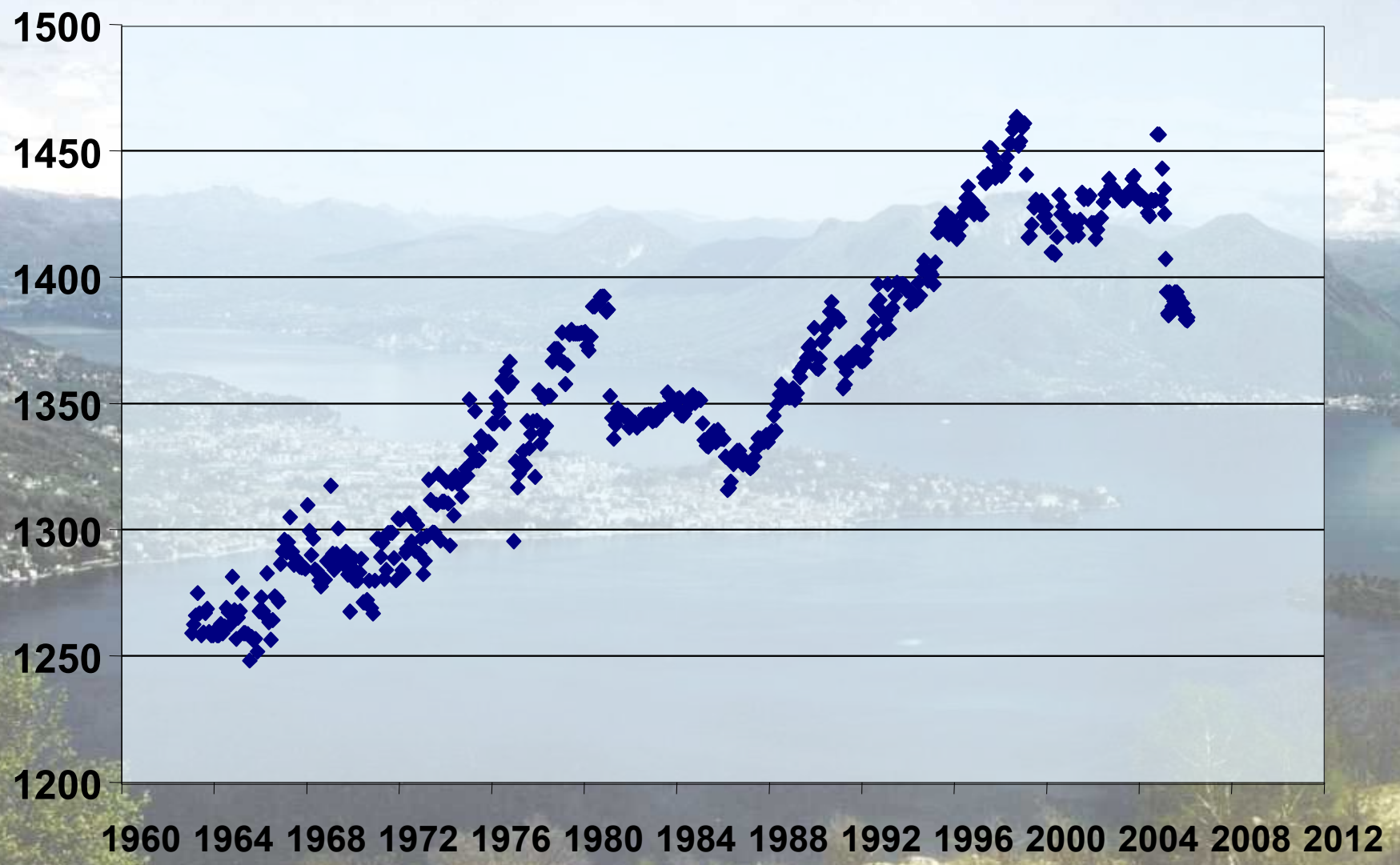


In summer 2005, 2006 and 2007 the presence of the cyanobacteria *Anabaena lemmermannii* was observed in Lake Maggiore



Lake Maggiore

Heat content in the mass of water (MJ m^{-2})





NR - IS
Ecosys



Commissione Internazionale
per la protezione delle acqua italo-svizzere

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Commissione Internazionale
per la protezione delle acqua italo-svizzere

**Monitoraggio della presenza del DDT e di altri contaminanti
nell'ecosistema Lago Maggiore**

**RAPPORTO ANNUALE
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A cura di P. Guilizzoni & A. Calderoni

Pallanza 2006



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Ricerche sull'evoluzione del Lago Maggiore

Aspetti limnologici

Programma quinquennale 2003 – 2007

a cura di Roberto Berton

Consiglio Nazionale delle Ricerche

Istituto per lo Studio degli Ecosistemi

Sede di Verbania



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