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STUDY AND MANAGEMENT OF MOUNTAIN LAKES

FRENCH ALPS AND PYRENEES

ECOLOGY AND GLOBAL CHANGE



CONTACT

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ALTITUDE LAKE?

- Above 1,800 m
- Ice-covered for 8 months of the year
- Far from large urban areas and rather difficult to reach → considered as natural land preserved



WHY STUDY MOUNTAIN LAKES?



- Subjected to severe human stresses (local and global) sometimes for ages.
- Highly sensitive to any biological or chemical disturbances in the environment.
- Many recreational and commercial uses (tourism, pastoralism, outdoor activities, fishing, hydroelectricity production): both cultural and socio-economic value.
- Heritage values .



MANAGERS' INVOLVEMENT WITH MOUNTAIN LAKES

- Managers are required to preserve lakes' "natural" state while maintaining traditional human activities
- Lakes have been recent changes in their status:
 - Increase in algal production and appearance of cyanobacteria
 - Reduced water quality
 - Hypoxic conditions at the bottom of the lake
 - Species introduction and loss

But there is still a lack of knowledge regarding the reasons for these changes.



MANAGERS DEAL WITH THREE MAIN ISSUES:

- What are the consequences of local human activities?
- What is the impact of global changes on these ecosystems' behavior and state of conservation?
- How do these environments evolve? How to diagnose and react to possible dysfunction?



CREATION OF THE FRENCH SENTINEL LAKES NETWORK

- Managers of mountain ecosystems carried out studies and monitoring programs on altitude lakes with heterogeneous protocols and without dialogue. Networking between partners became necessary.



2009

- Program Aqua “water resources in protected areas in the Alps” : many stakeholders began working together.

2010

- Annual workshops have been organized.

2012

- Managers and scientists from physical, biological and social sciences joined a network called Sentinel Lakes.

2013

- This network became a Scientific Interest Group.



AIMS OF THE NETWORK

- Bring new knowledge through interdisciplinary research programs.
- Give coherence and visibility to scientific programs.
- Promote networking of member institutions.
- Translate some of the knowledge into tools that can be used by managers and their partners.

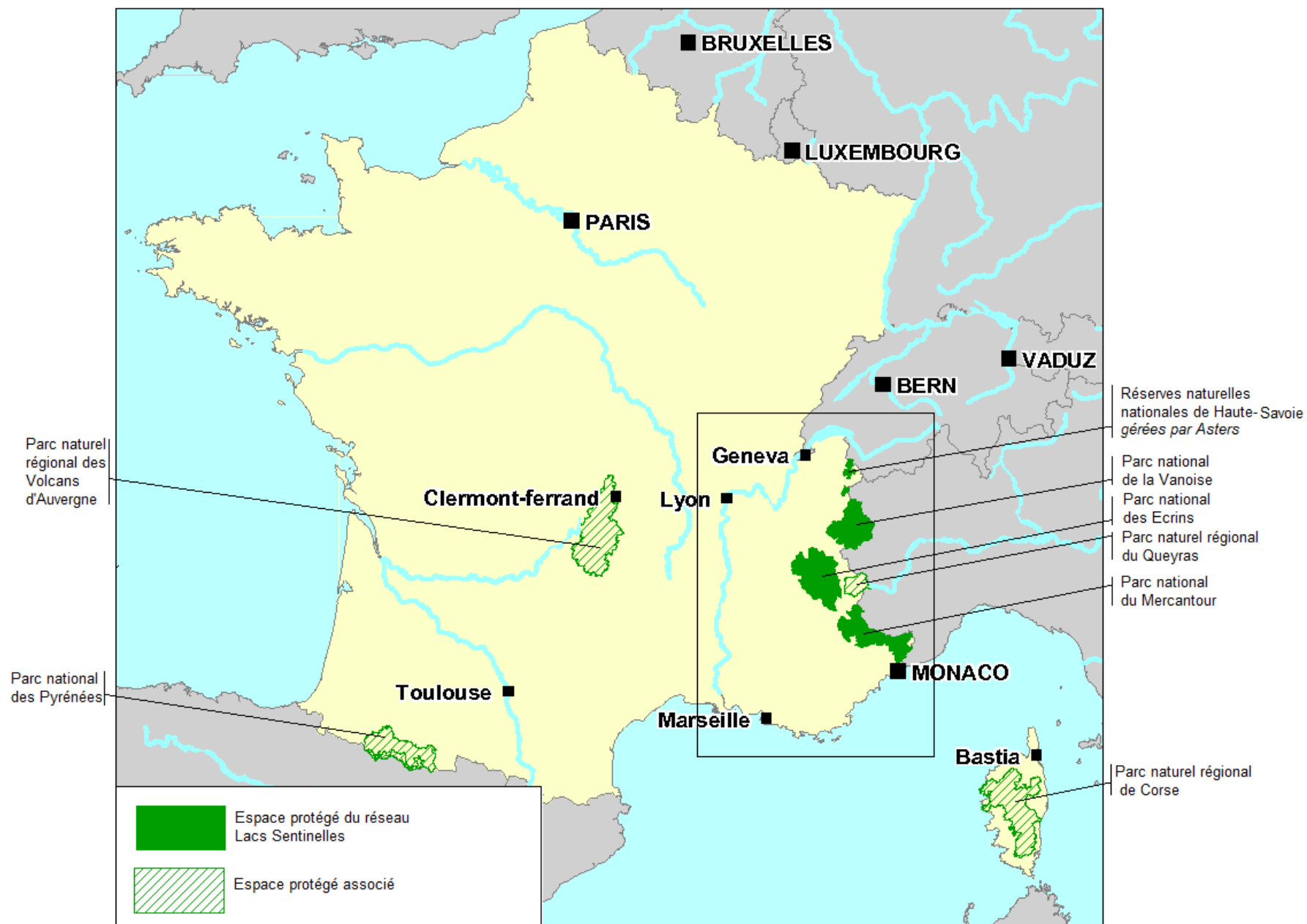
STAKEHOLDERS ' INPUTS

Site managers

- Knowledge of sites and of the management historic.
- People able to perform and conduct lakes monitoring in the long term

Multidisciplinary scientists

- Guarantor for analysis quality of data acquired
- Enable managers to understand better the functioning of these systems





ABOUT ACTIONS

Action 1: a Mountain Lake Observatory

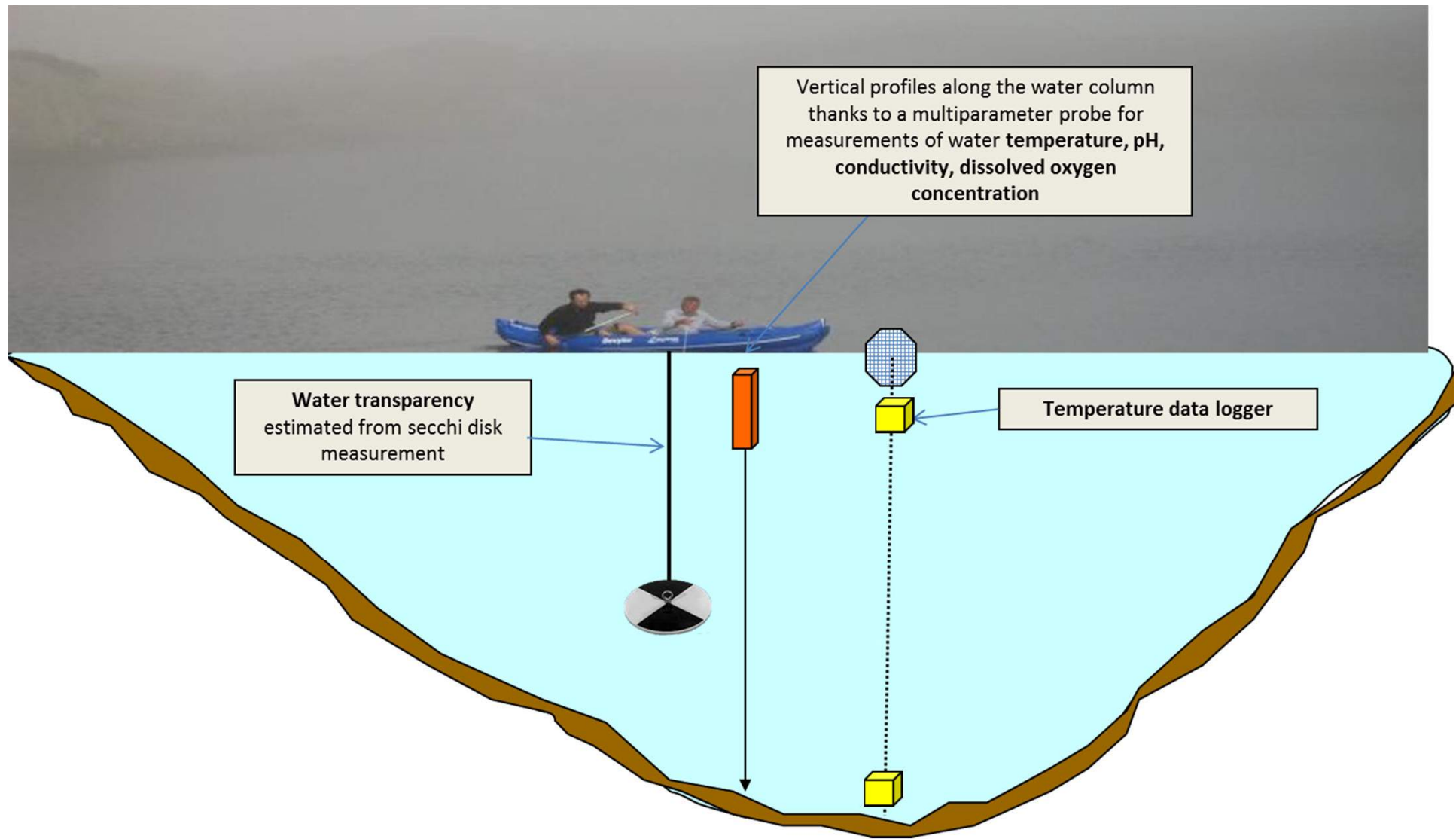
- Standardized monitoring of the lakes for comparable data set on the whole territory.
- Implementation of a common data base.

Action 2: Identification of “workshop sites”
to allow the collaboration between researchers and managers.

Action 3: Communication and popularization

- A scientific and technical meeting each year
- A website and a newsletter

STANDARDIZED LONG TERM MONITORING



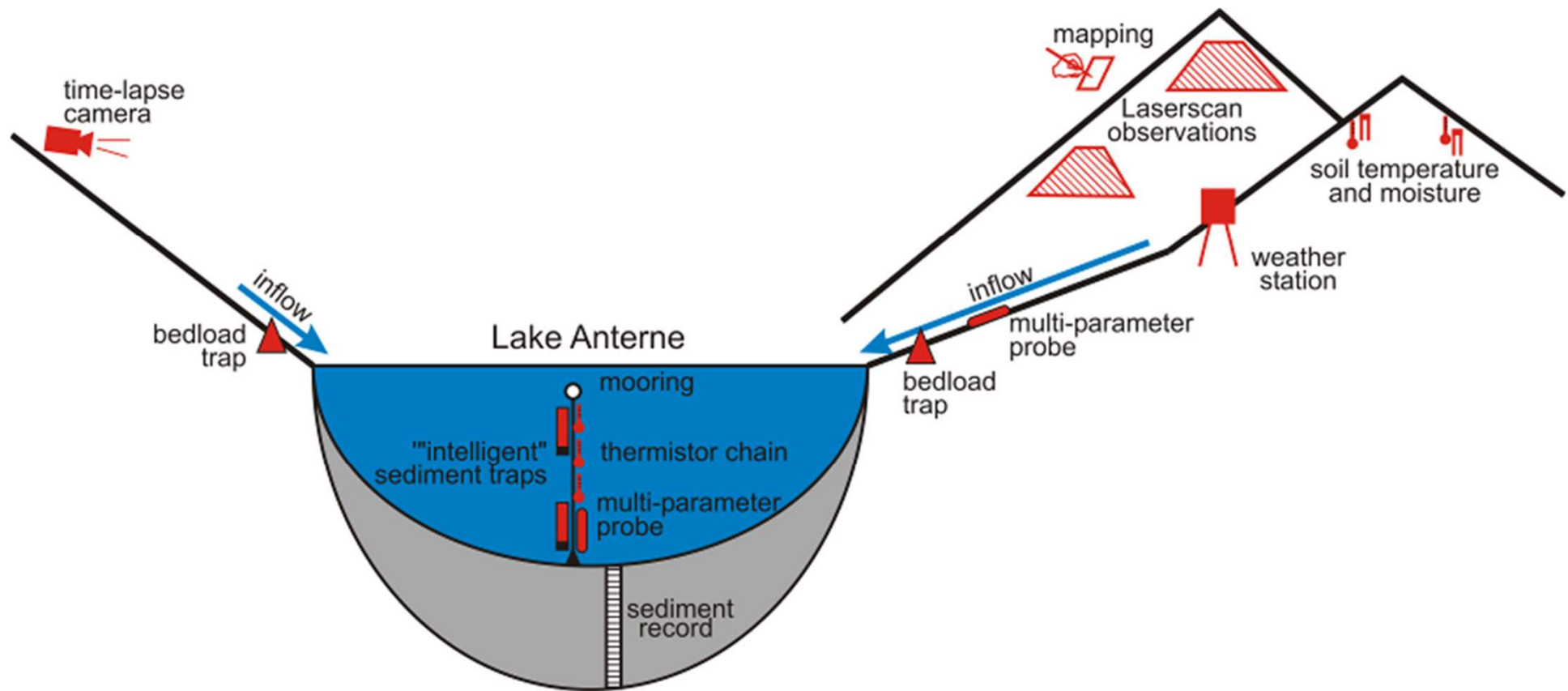


AN EXAMPLE OF A WORKSHOP SITE : LAKE ANTERNE (HAUTE-SAVOIE)

A small alpine lake part of Sixt Natural Reserve and managed by ASTERS (Conservatory of Natural Sites in Haute-Savoie, France).

Study led by Laboratory EDYTEM (Environment and Dynamics of Mountain Territories), Chambéry, France.

WORKSHOP SITE : LAKE ANTERNE





CONCLUSION

- In spite of their remote position, high altitude Alpine lakes have undergone modifications triggered by human pressure.
- Multidisciplinary research can help to understand how ecosystems respond to these multistressors conditions.
- Monitoring of a large number of mountain lakes and sharing the results within the network will also enable better protection and management of these habitats.
- Future priorities include a better characterization of the causes of changes observed in these lakes through further investigation and coordination of specific research project.

Thank you for your attention !



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