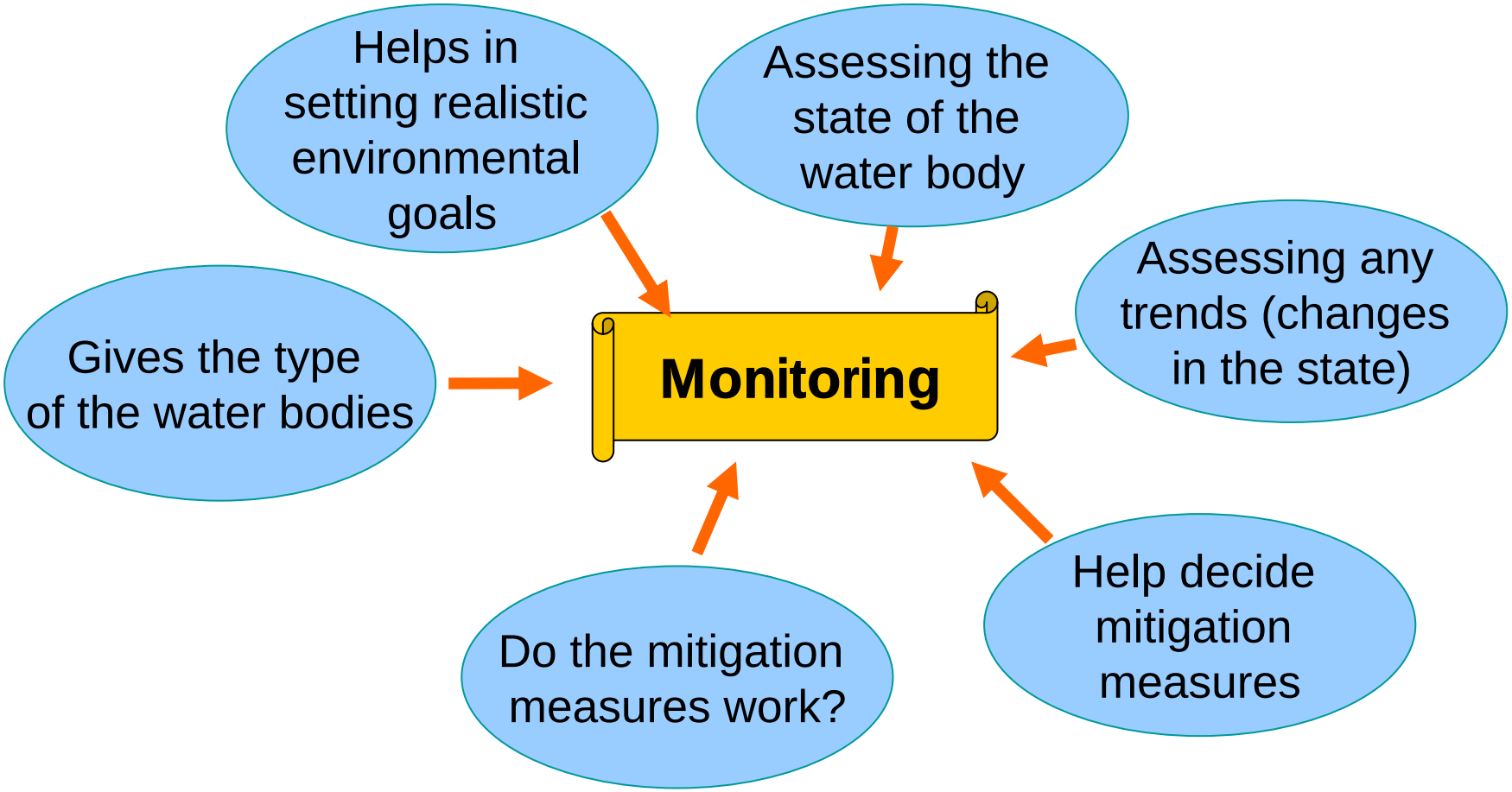
Harmonised water quality monitoring in transboundary waters – the case of Lake Macro Prespa

Eva Skarbøvik, Spase Shumka, Dusko Mukaetov

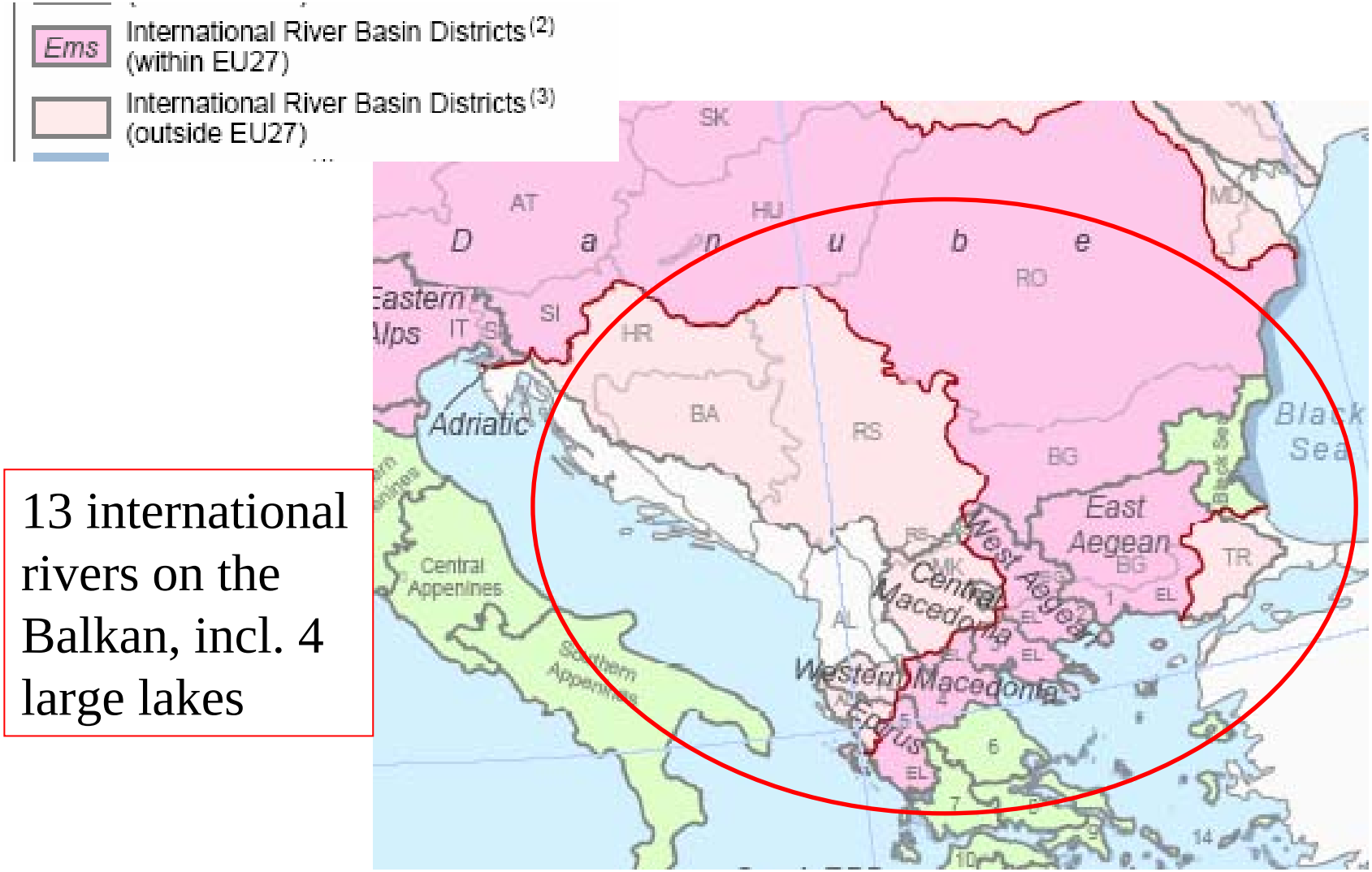
DRIMON Project – www.drimon.no

Rationale for monitoring



Transboundary catchments in Europe (pink catchments are transbounary)

This calls for cooperation on monitoring between the countries that share the water bodies.



WWW.DRIMON.NO

UN convention on Transboundary Waters (1992):

Riparian countries of international waters shall

- **establish and implement <u>common programmes for monitoring</u>**
- **agree upon which pollution <u>parameters</u> shall be regularly monitored.**
- **<u>harmonise the rules</u> for the monitoring programmes**

WWW.DRIMON.NO

EU Water Framework Directive + CIS no. 7

- Annex V of the WFD states that monitoring information from **surface waters** is required for – amongst others - Estimating pollutants loads transferred across international boundaries ;
- In the case of an international river basin district extending beyond the boundaries of the Community, Member States shall endeavour to produce a single river basin management plan…"

What is the present monitoring situation for European transboundary waters?

- **Most European monitoring programmes have different measurement protocols and sampling designs.**
- **“despite international coordination mechanisms being in place in many international river basins, only a few member states have reported using these mechanisms when establishing their monitoring programmes” (EU 2009).**
- **Why?**

Monitoring across borders – not such a simple task

- Common environmental targets and goals
- Common goal for the monitoring
- Choise of parameters
- Laboratory methods and detection levels
- Choise of sampling frequency
- Common 'international' sampling stations? And/or sampling at the same time in national stations?
- Sharing of data?
- Common databases?

Bioforsk NIVA

WWW.DRIMON.NO

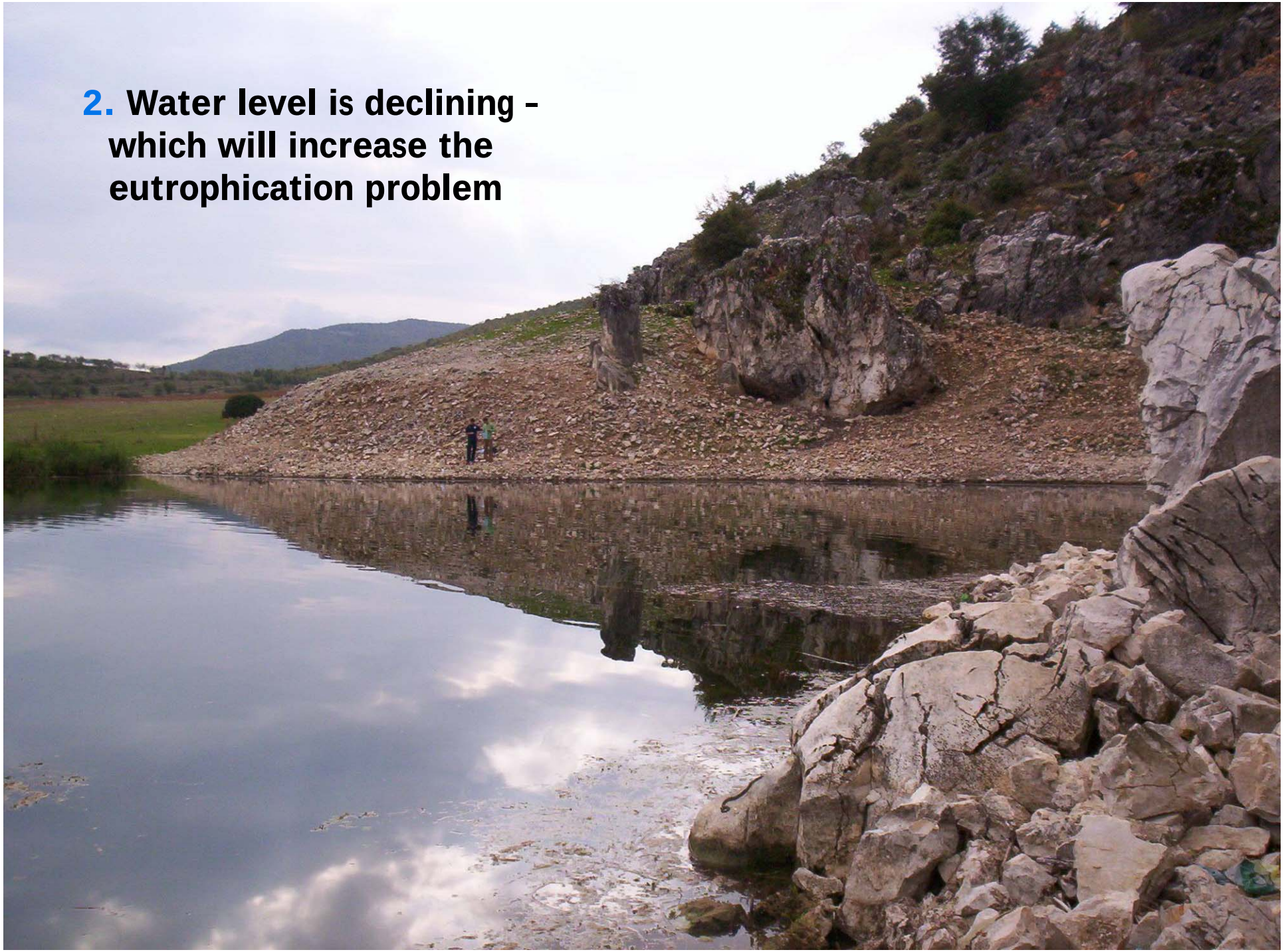
Lake Macro Prespa

- Shared between 3 countries
- 1 EU (WFD) member state and 2 non-EU
- surface area 254 km^2
- about 849 m asl.
- maximum depth 48 m
- average depth 14 m
- Total population about 25,000; 75% in Macedonia

Main threats

1. **Nutrient inputs from untreated sewage, solid waste and agricultural runoff (apple production) =>**

Eutrophication.


2. Water level is declining – which will increase the eutrophication problem

Transboundary monitoring in Lake Prespa

- **Two stations will be discussed**
- **Both are pelagic (~15 meters deep)**
- **One in Macedonia and one in Albania**

WWW.DRIMON.NO

What was easy and what was not:

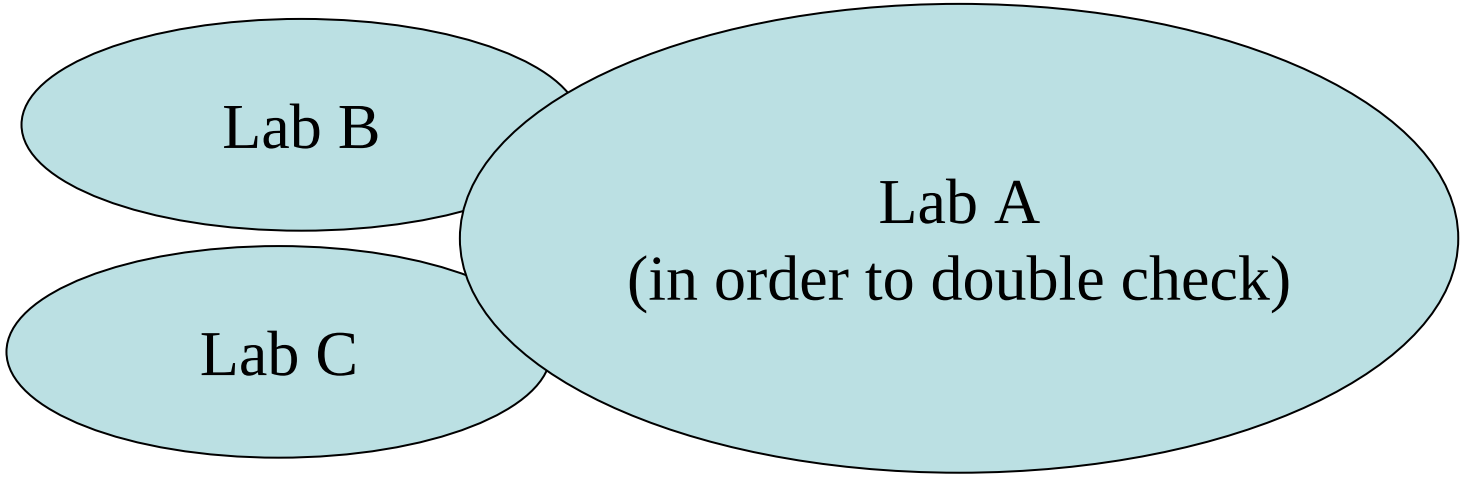
- **OK: Common goal: DRIMON Project Objectives (Eutrophication issues)**
- **OK: Common Parameters: P, N, Secchi depth, oxygen, temperature, etc.**
- **Although Chl a only in Macedonia (cost and logistics)**

- **Partly OK: Sampling at the same time (logistics)**

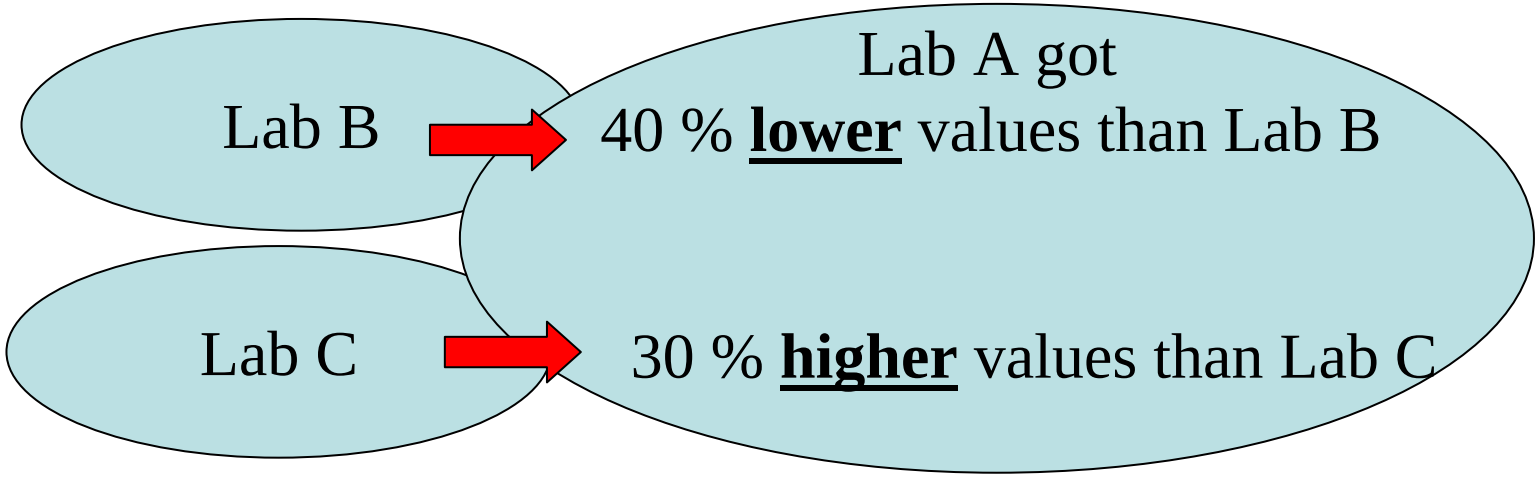
- **Main challenge: Different labs**

Chose one common laboratory in order to compare results

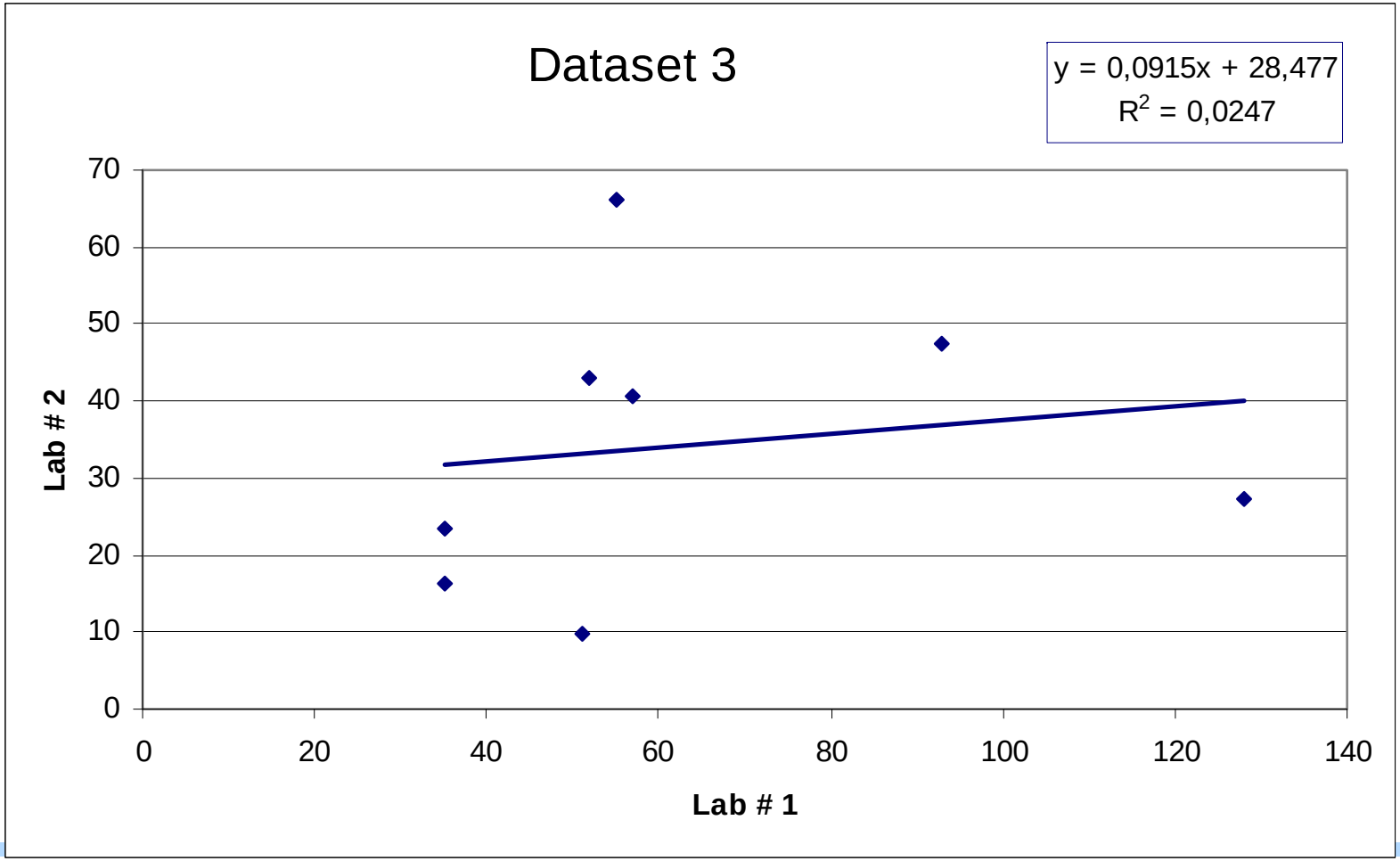
- **Compared Tot-P, tot-N and Chl a.**



For total P:

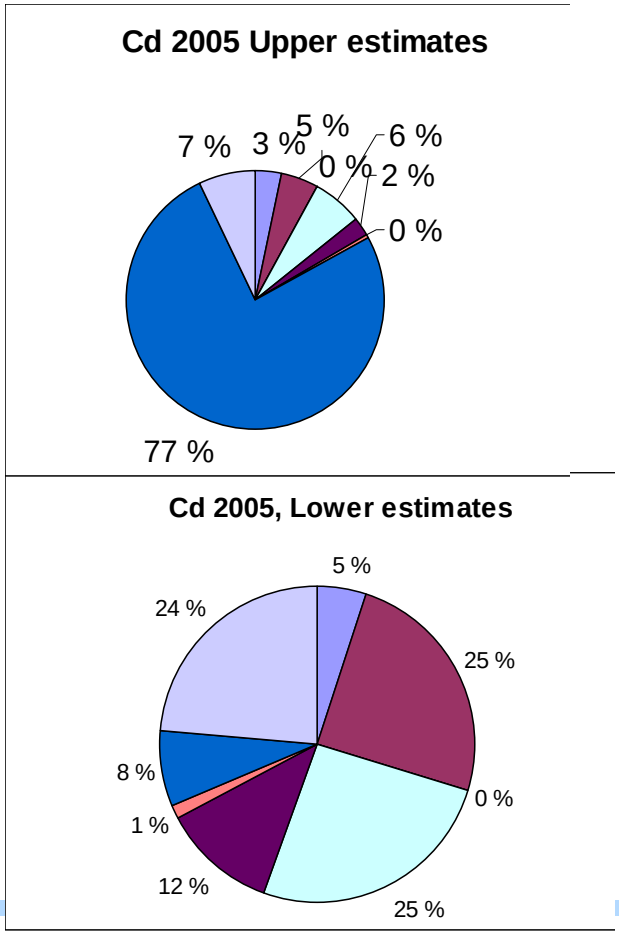

Lab B
Lab C
Lab A got
40 % lower values than Lab B
30 % higher values than Lab C

Also bad correlation between results

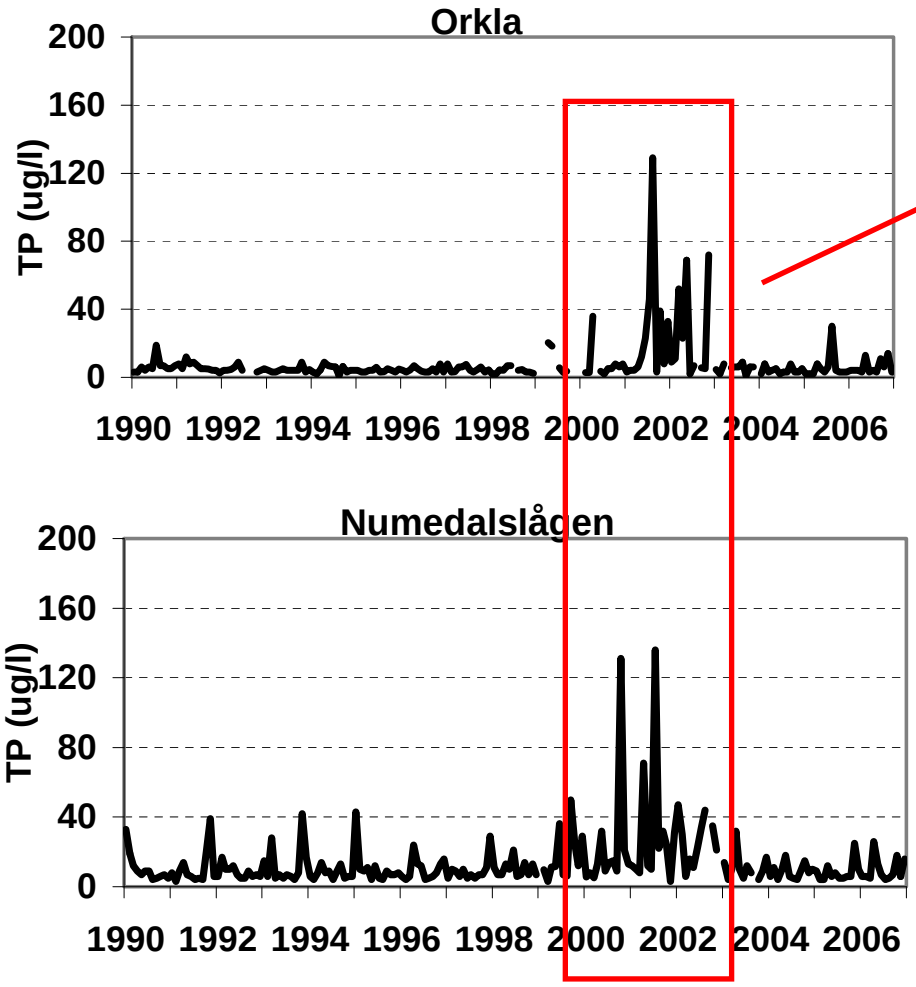


Example from the European RID Programme

- **Comparison between which state contributes most to the Atlantic, changes radically depending on whether upper or lower estimates are used:**
- **Upper estimate: Conc = LOD**
- **Lower estimate: Conc =0 (if the value is below the detection limit).**



Example from the Norwegian RID Programme



???

Change of lab

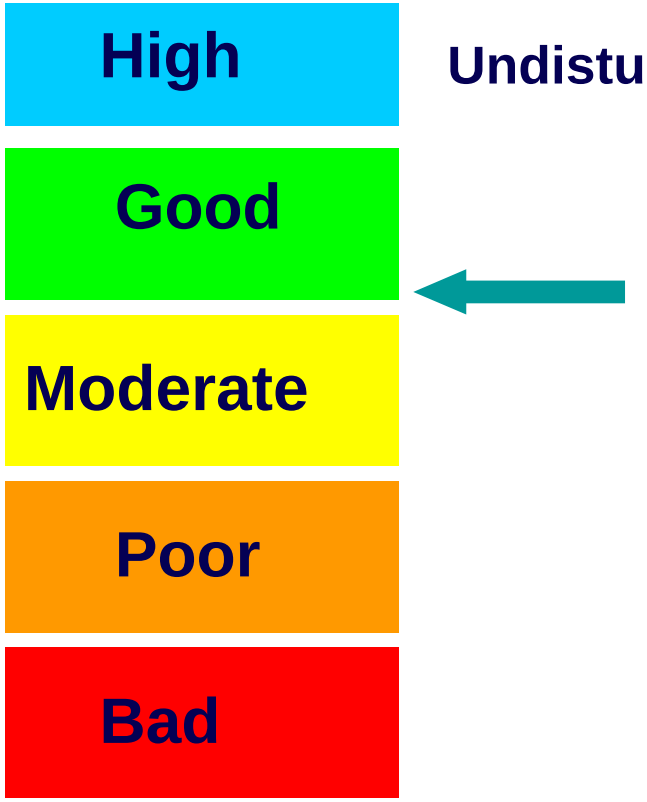
CIS Guidance no. 7 - on laboratories

- **”To evaluate the comparability of monitoring data throughout the Member States, participation in external quality audits … like international laboratory proficiency testing … is highly recommended”**


Comparing the state with the
environmental goals

Deciding the environmental goal

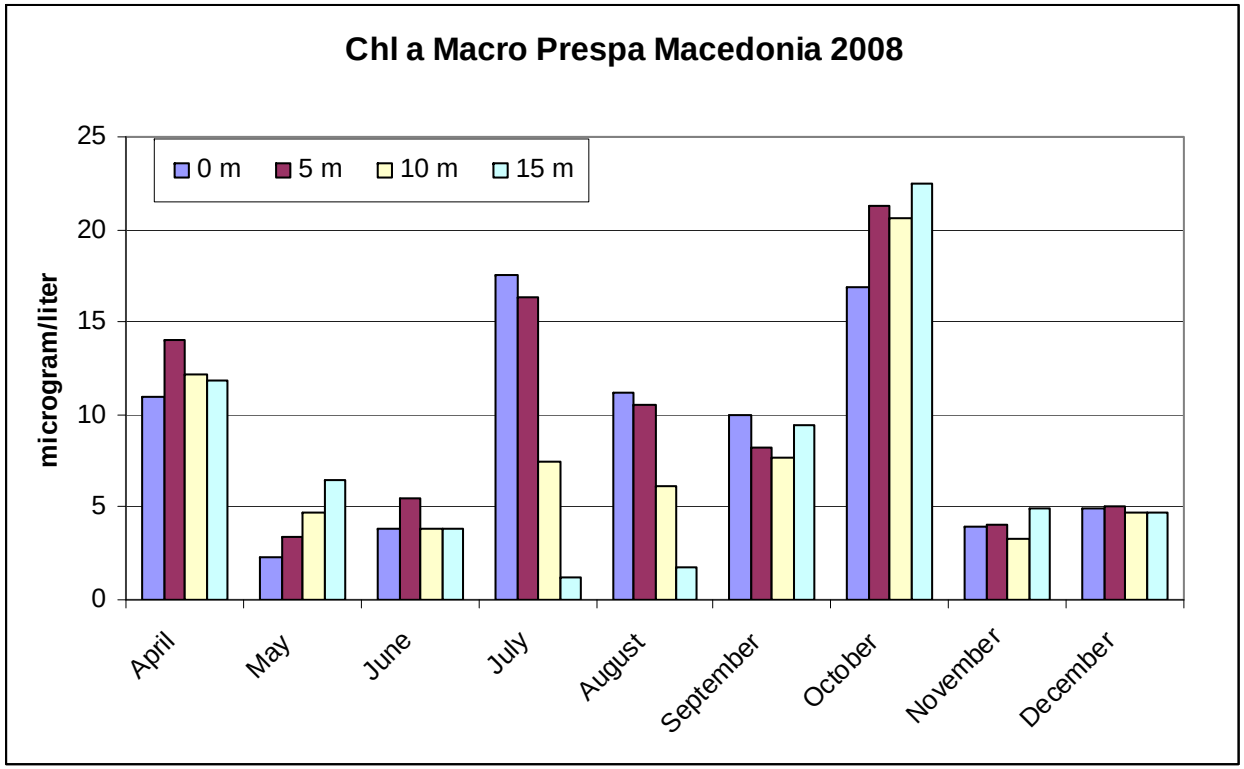
Status:



Need to be above Moderate!
But the <u>type of water body</u>
needs to be known.

Lake Types	Explanation	Chl a Good-Moderate boundary (µg/l)
Central/ Baltic L-CB1	**Lowland (<200 masl),** mean depth 3-15 meter, calcareous, hydrological residence time 1-10 yrs	8.0-12.0
Mediter-ranean L-M8	**Reservoirs**, 0-800 masl, **mean depth above 15 meters**, calcareous, large (lake surface >0.5 km^2 and catchment area above 20.000 km^2)	4.2-6.0
Alpine L-AL4	Mid-altitude (**200-800 m** asl), **mean depth 3-15 meters**, moderate to high alkalinity and lake size **large** (above 0.5 km^2).	6.6-8.0

Chl a – Macedonian station



Mean surface concentration (0-5 m) is 10.7 µg/l

– *this is 2.7* µg/l *more than the environmental goal*

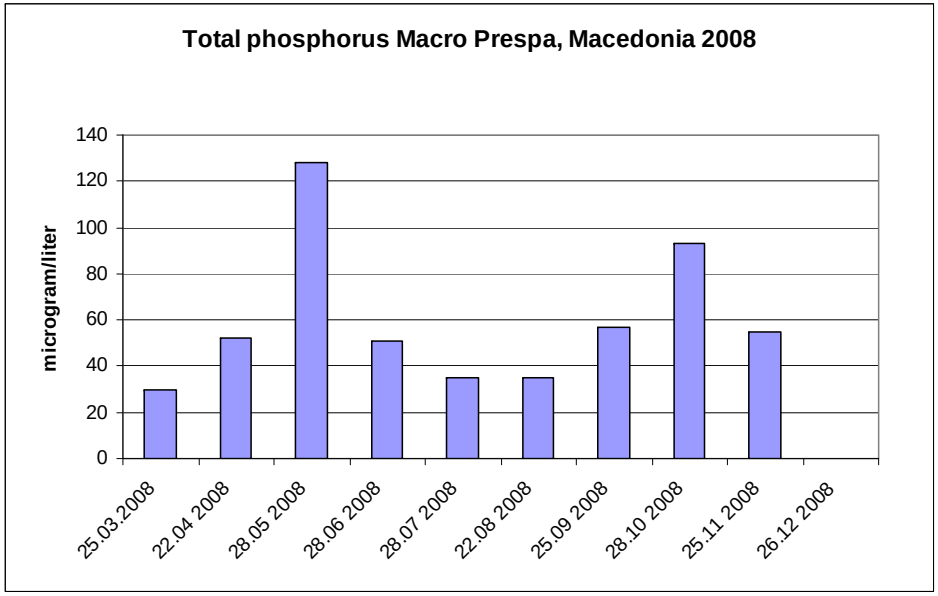
Total P – environmental goal vs state in 2008:

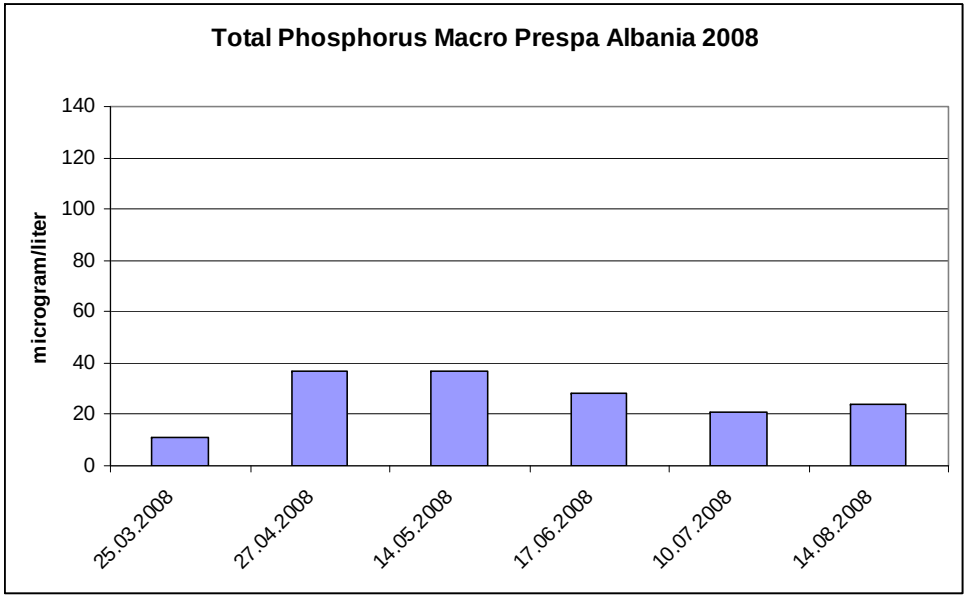
- **For the lake type: 8.2 µg/l**
- **From sediment cores Lake Prespa (Matzinger et al 2006): Reference conditions are ~20 µg/l**
- **If above 35 µg/l then eutrophic (OECD 1982).**

State: Total Phosphorus

Macedonia: 60 µg/l

Albania 26 µg/l

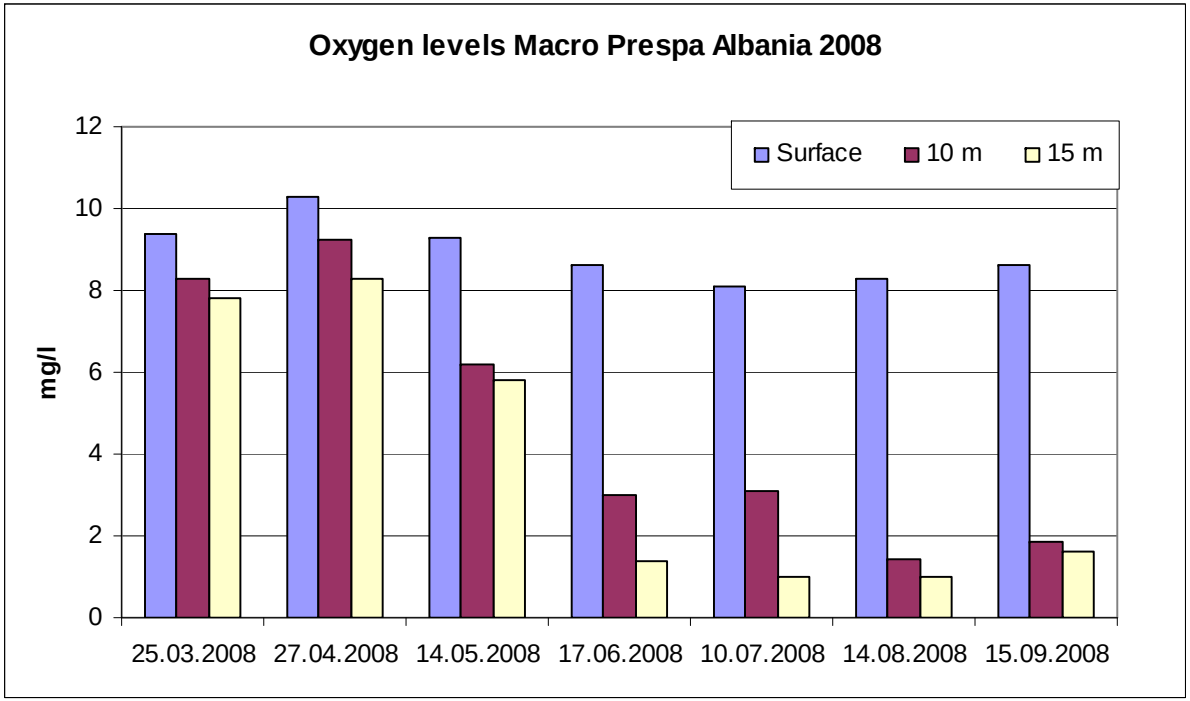


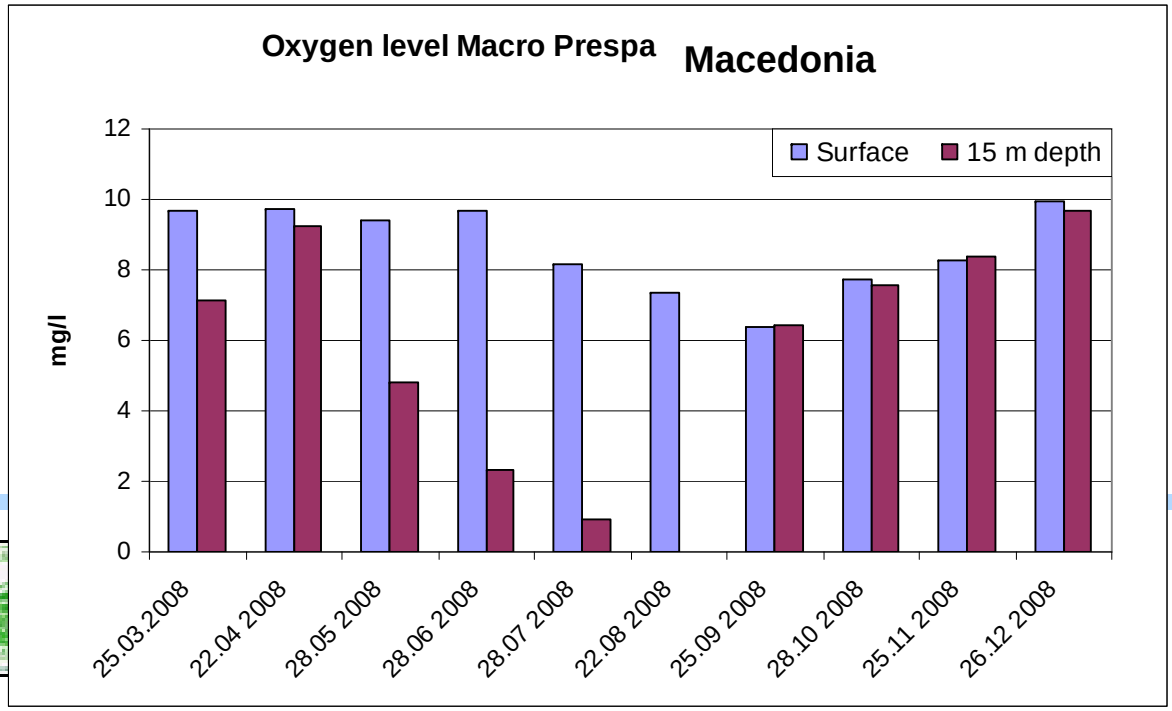


Oxygen levels

Anoxic at the bottom during the summer in both sites

=> in itself a clear indication that mitigation measures are needed





Conclusions and recommendations

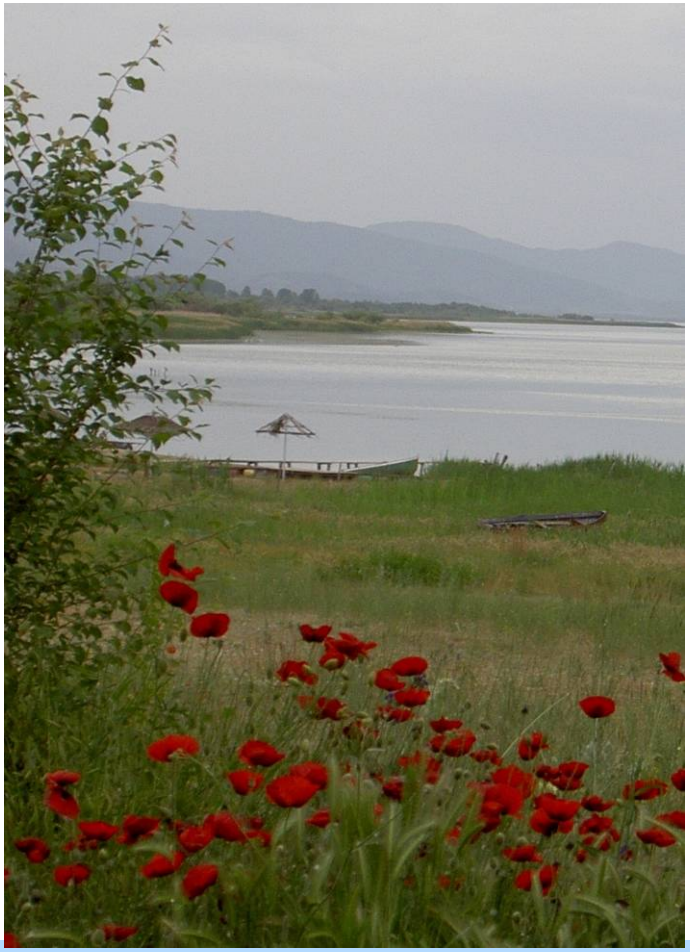
- **Lake Prespa is eutrophic and P and Chl a levels are below the required status (environmental goal)**
- **The lake level decrease intensifies this situation**

- **=> Mitigation measures need to be initiated**

- **The station on the Macedonian side has higher levels of nutrients than in Albanian side**
- **Low Chl a as compared to TP – may be due to sediments or zooplancton/Carp fish consuming the phytoplancton**

Conclusions and recommendations cont.

- **Co-operation between riparian states on transboundary monitoring is highly recommended;**
- **This will give a common basis for improved management of the lake**
- **Laboratory intercomparison exercises should be done on a regular basis**




Thank you for your attention