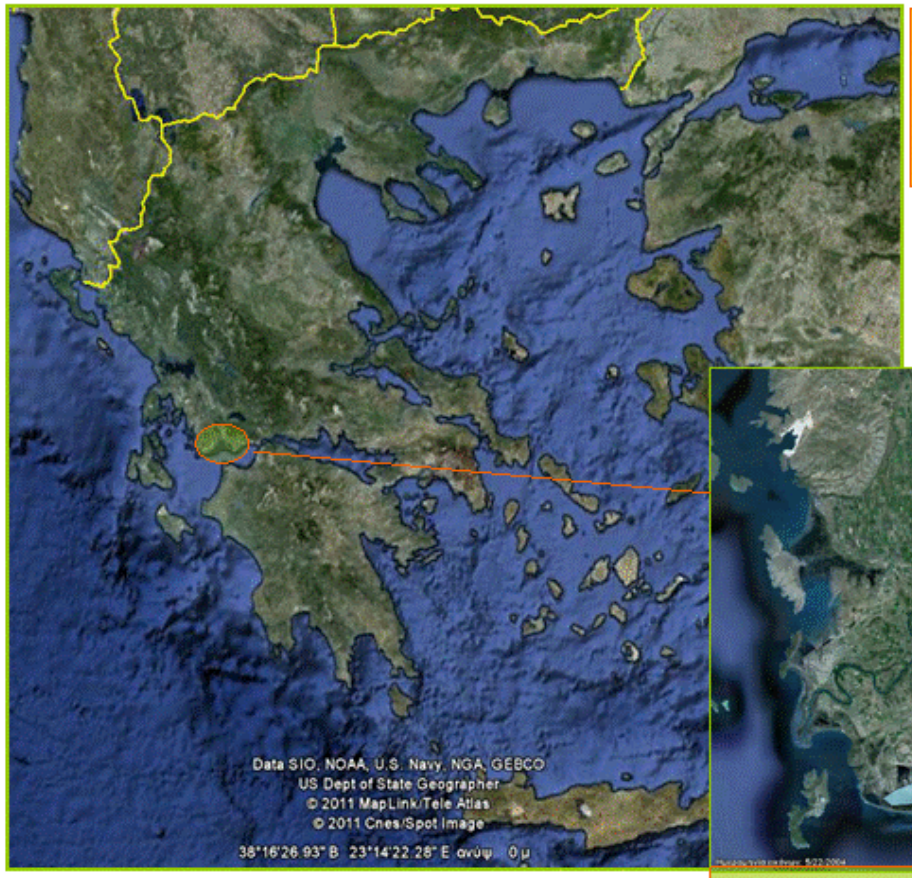
Management Agency of the National Park Messolonghi-Etoliko Lagoon

Sissia Roussi

Messolonghi-Etoliko Wetlands



Extended in **15,000ha** today
40% of surface of Greek Lagoons
Mostly shallow area (mean depth 1m)

Messolonghi-Etoliko Wetlands

Ramsar

NATURA 2000

φορέας διαχείρισης
ΛΙΜΝΟΘΑΛΑΣΣΑ
ΜΕΣΟΛΟΓΓΙΟΥ

Messolonghi-Etoliko Wetlands

About 30,000 people live in the area

900 people work around fishery
•**1,500t** production

The Management Agency of Messolonghi Lagoon

is a non profit private body, established by the Ministry of Environment, Energy and Climate Change in purpose to:

Observe the environment quality/apply the environmental legislation,

implement management plans and activities that aim to:

-Nature conservation (habitats and species)

-Environmental education /awareness of users and population

-Contribution of public services

-Promotion of the area as ecotourism destination

In order to achieve its aims, the Management Agency cooperates with research institutes, universities, NGOs.... and of course fishermen

In this frame, in last 2 years, the M.A has carried out:

- Collection of data about the infrastructures and studies relevant to environment that took place in the area during last 30 years (database that includes: subjects, budgets, evaluation of results).
- Recording of the illegal housing in the protected area (GIS map)
- Recording of the activities in the National Park that are based on environmental impact study

New fish traps in order to

Release the undersize fish
Develop the fish stock and
Rise the fishermen incomes)

Involvementation to monitoring programs

- As social partner of HCMR: “Monitoring of Mediterrenean Marine Protected Areas” - (Marie Curie)

Has already started with pilot sampling of benthos

- As partner: “Protection Action for cross border and joint Management of Marine sites of community interest (NATURA 2000) “ - (INTERREG GR-IT)

subject: habitat and management plan for the sea turtle *C.caretta*.

As beneficiary : “Protection & Conservation of Biodiversity in the National Park of Messolonghi – Etoliko Lagoon” - (Oper. Program “Environment”)

Subject: monitoring of habitats and species (in relation with NATURA 2000, .2000/60, restoration of eel stock, fishing in Mediterranean).

Problems

- Regarding the implementation of management plans: human
- Regarding the nature: anoxic crises in the lagoons of Etoliko and East Klissova

Anoxic problems

- **Etoliko** lagoon

  anoxic crises mostly during winter

- **East Klissova** lagoon

  anoxic crises during summer

Un. of Patras, N. Dimitriou, 2011

Etoliko Lagoon

Surface 1,600ha

Maximum depth **33m**

Mean depth 12m

- **L**imited sea-lagoon exchanges through the shallow Central Lagoon

- **P**ermanent anoxic water layers are developed below **10m** depth

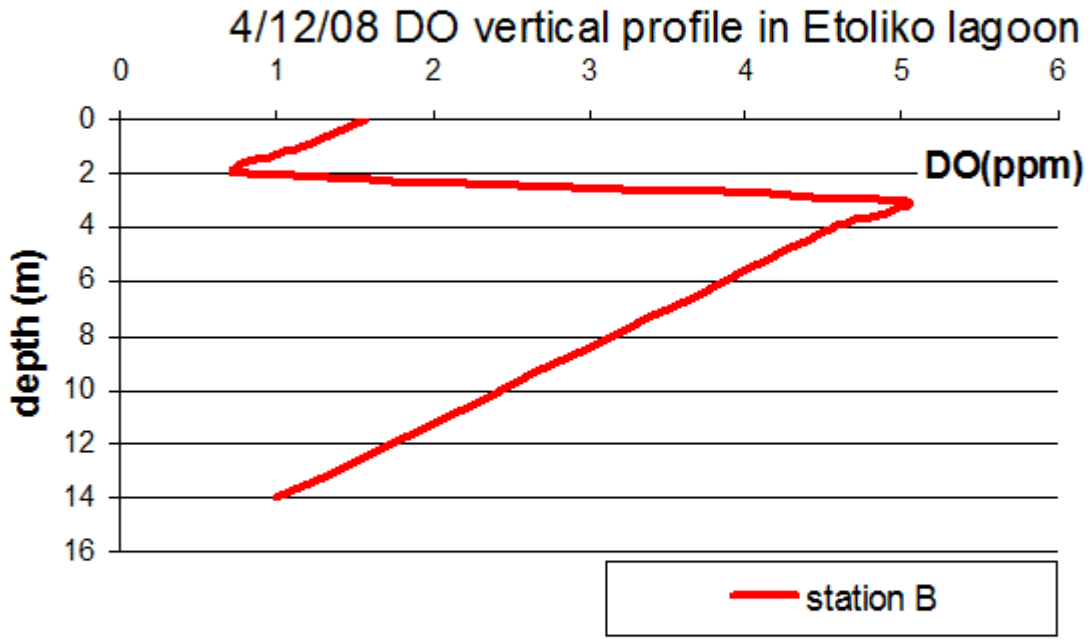
Anoxia problem is getting worse due:

- Increased incoming amounts of **wastes** (urban and agricultural)
- **Interferences** in the morphology of the area (yellow lines) limit water exchanges

Anoxic crises in Etoliko Lagoon

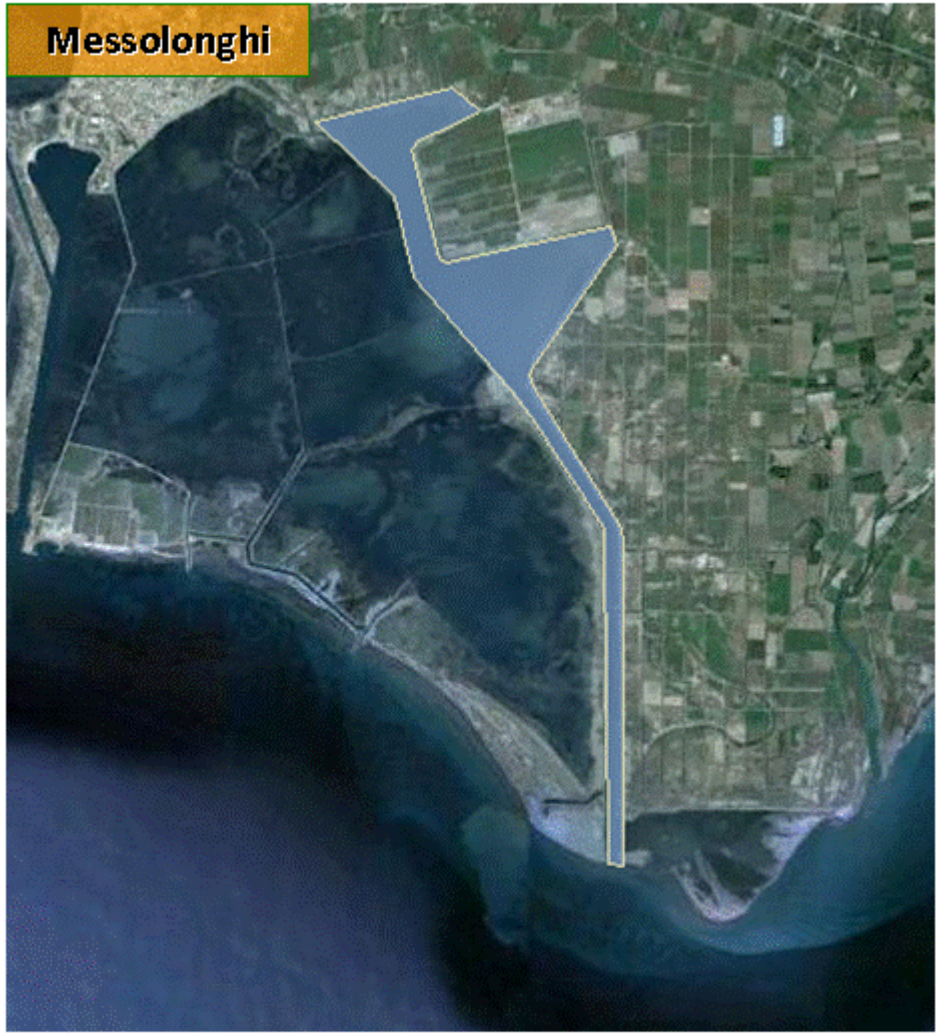
Under certain meteorological conditions (mostly in winter), anoxic zone ruptures and upwelling anoxic water masses lead to anoxic crises and release of **H_2S**.

- Such crises lead to massive fish mortalities and threat public health.



Vertical profile of DO's concentration in Etoliko lagoon during anoxic crisis at 4/12/2008

East Klissova Lagoon



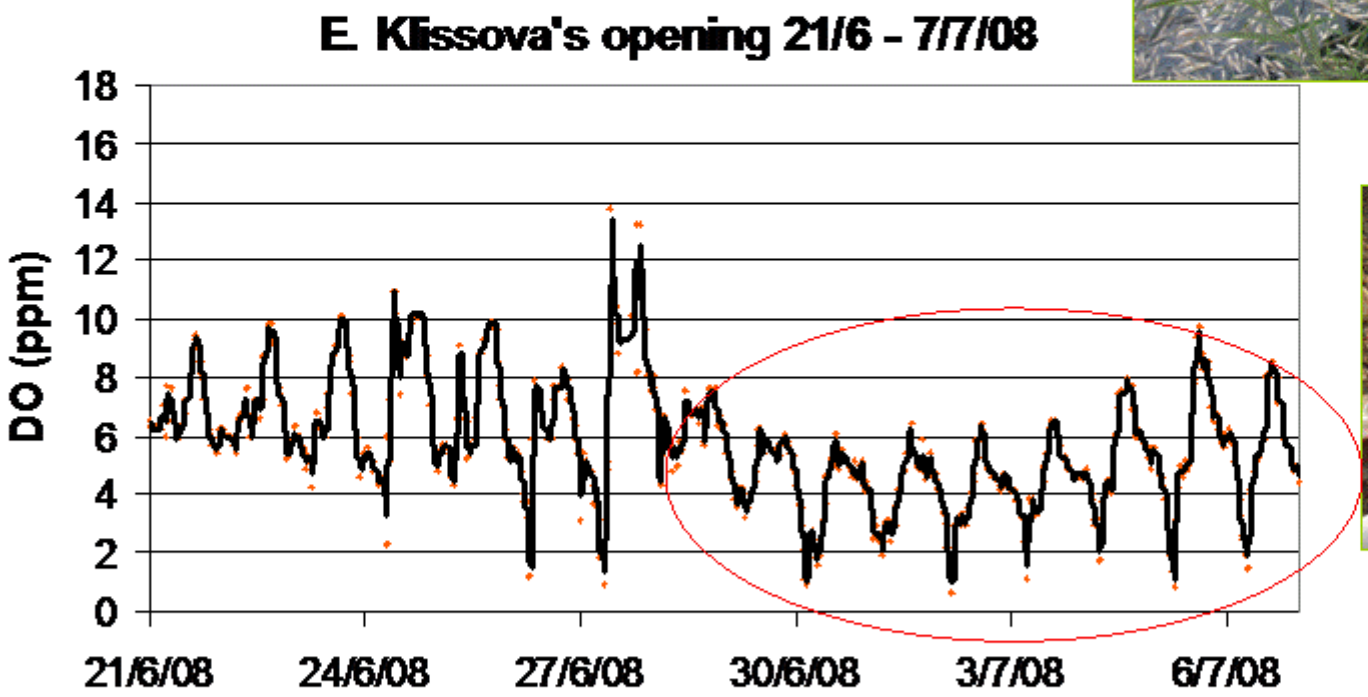
500ha Surface

- **Shallow**
  mean depth of **0.5m**
- **Long and narrow opening**
  length of **3,000m**
  and width of **50m**

Incoming **fresh water**, urban and agriculture **wastes** and occasionally illegally discharged wastes of **Olive Oil production units**

Anoxic crises in East Klissova Lagoon

During summer there are several cases of phytoplankton bloom followed by anoxic crises, causing fish mortalities.

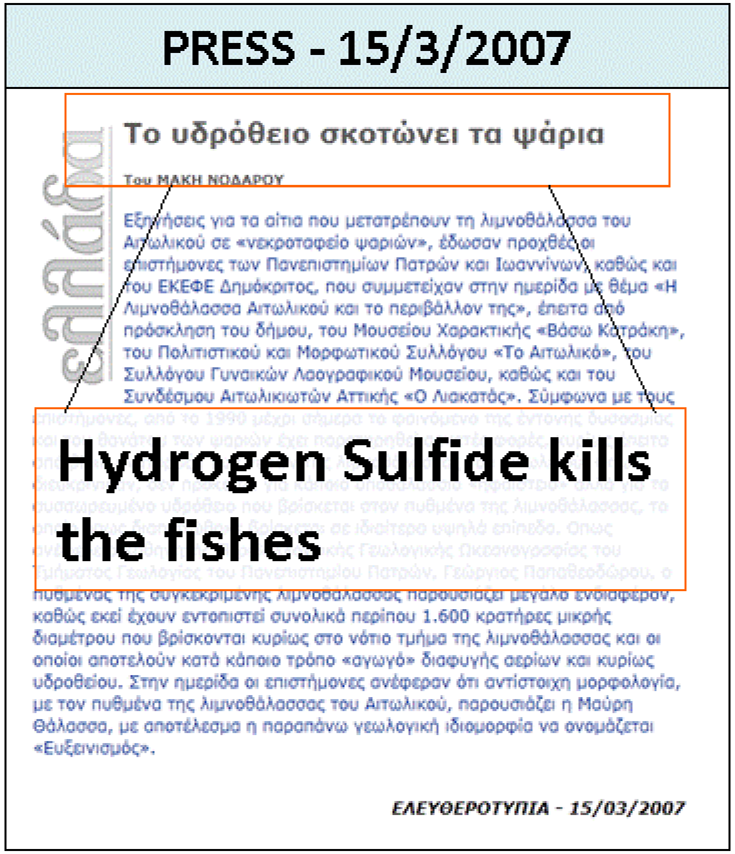


Recordings during anoxic crisis started at 30/6/08

Effects of anoxic crises

Anoxic crises effect:

- **fish population through fish mortalities, but also long-term**
- **local economy** (interruption of exploitation of lagoon's parts)
- **public health** (H_2S can be harmful if inhalate)



PRESS - 15/3/2007

Το υδρόθειο σκοτώνει τα ψάρια

Του ΜΑΚΗ ΝΟΔΑΡΟΥ

Εξηγήσεις για τα αίτια που μετατρέπουν τη λιμνοθάλασσα του Αιτωλικού σε «νεκροταφείο ψαριών», έδωσαν προχθές οι επιστήμονες των Πανεπιστημίων Πατρών και Ιωαννίνων, καθώς και του ΕΚΕΦΕ Δημόκριτος, που συμμετείχαν στην ημερίδα με θέμα «Η Λιμνοθάλασσα Αιτωλικού και το περιβάλλον της», έπειτα από πρόσκληση του δήμου, του Μουσείου Χαρακτικής «Βάσω Κατράκη», του Πολιτιστικού και Μορφωτικού Συλλόγου «Το Αιτωλικό», του Συλλόγου Γυναικών Λαογραφικού Μουσείου, καθώς και του Συνδέσμου Αιτωλικιωτών Αττικής «Ο Λιακατάς». Σύμφωνα με τους επιστήμονες, από το 1990 μέχρι σήμερα το φαινόμενο της έντονης δυσοσμίας [illegible] πυθμένας της συγκεκριμένης λιμνοθάλασσας παρουσιάζει μεγάλο ενδιαφέρον, καθώς εκεί έχουν εντοπιστεί συνολικά περίπου 1.600 κρατήρες μικρής διαμέτρου που βρίσκονται κυρίως στο νότιο τμήμα της λιμνοθάλασσας και οι οποίοι αποτελούν κατά κάποιο τρόπο «αγωγό» διαφυγής αερίων και κυρίως υδροθείου. Στην ημερίδα οι επιστήμονες ανέφεραν ότι αντίστοιχη μορφολογία, με τον πυθμένα της λιμνοθάλασσας του Αιτωλικού, παρουσιάζει η Μαύρη Θάλασσα, με αποτέλεσμα η παραπάνω γεωλογική ιδιομορφία να ονομάζεται «Ευξεινισμός».

ΕΛΕΥΘΕΡΟΤΥΠΙΑ - 15/03/2007

Monitoring the Wetland

There is **obligation** and **need** of monitoring as comes out of:

- **C**ontractual obligation (Directive 2000/60/EC)
- **N**eed of estimating the effect of several interventions
- **P**ublic health protection (H_2S in Etoliko lagoon)
- **S**mooth exploitation of the lagoons by fishermen

Monitoring methods

Two methods

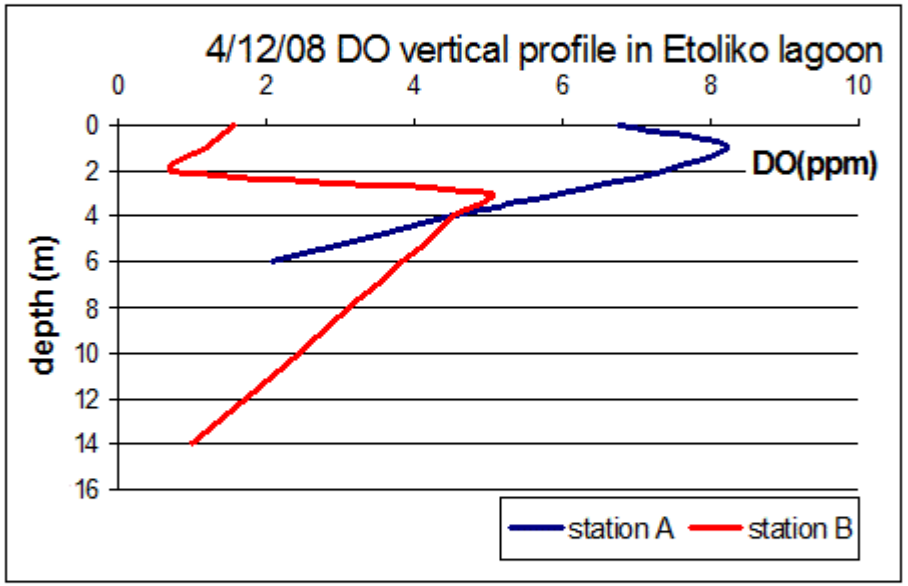
In-situ mobile recording

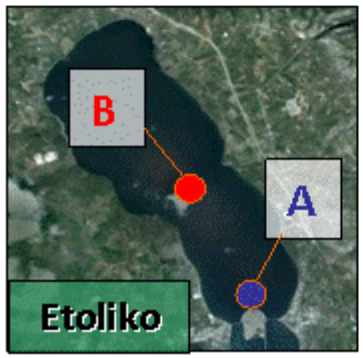
Fixed recording stations

Main advantages

In-situ mobile recording

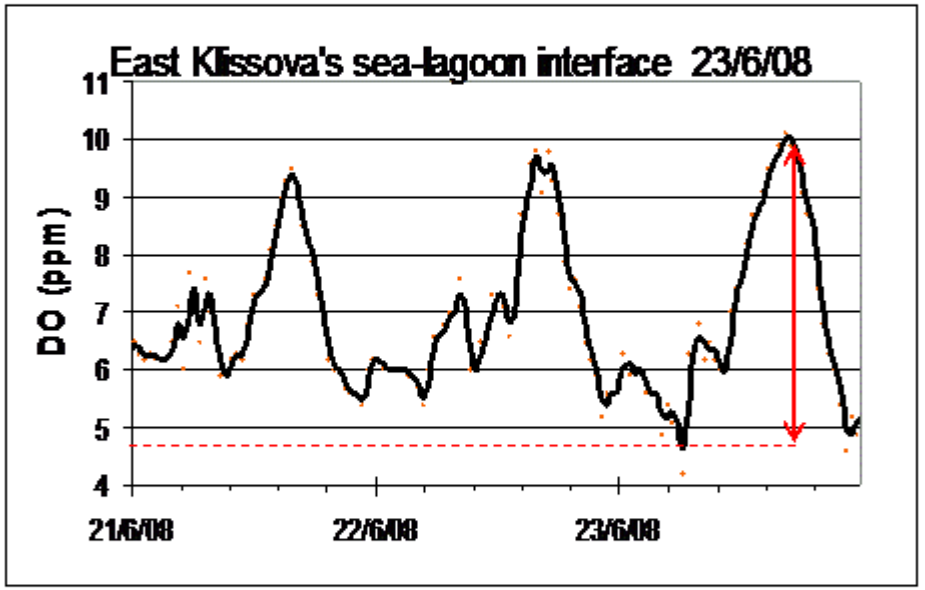
• Ability of imaging the **spatial** varying of physicochemical parameter





Fixed recording stations

• Ability of imaging the **temporal** varying of physicochemical parameter



↕ 5.2ppm daily range at 23/6/08

High frequency situations can be observed

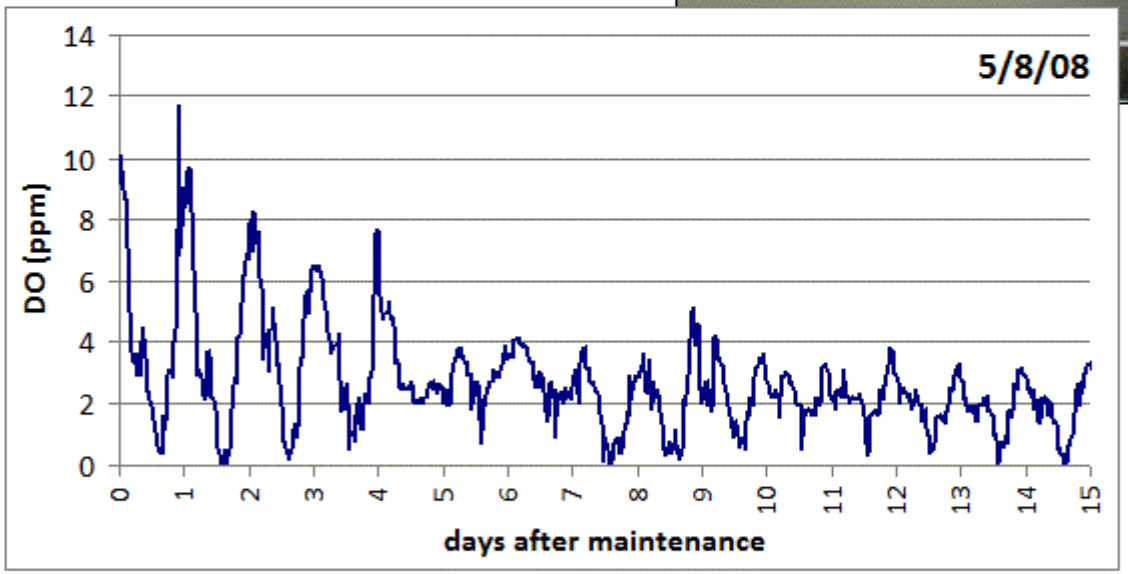
Data reliability

In-situ mobile recording

- In-situ data are pretty reliable, as the staff checks the instrument condition

Fixed recording stations

- Data coming out from instrument permanently immersed may have reliability risk due insufficient maintenance



$$DO=5.35 \cdot e^{-0.09 \cdot t}+[4.5 \cdot e^{-0.09 \cdot t}] \cdot \cos[2 \cdot pi \cdot (t-(0.1))]$$

Mathematical model reffers to records after cleaning process of 5/8/08 close to sea-lagoon interface of East Klissova lagoon

Main issues

In-situ mobile recording

- **Position**

Choosing the right place – comparing with previous data and getting a representing image

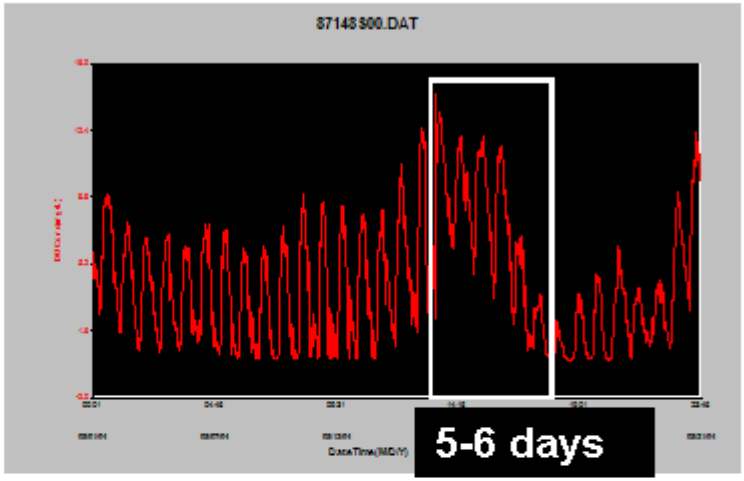
- **Proper time**

Choosing the right time and tidal phase to compare with previous data and get a representing image of the ecosystem

Fixed recording stations

- **Position**

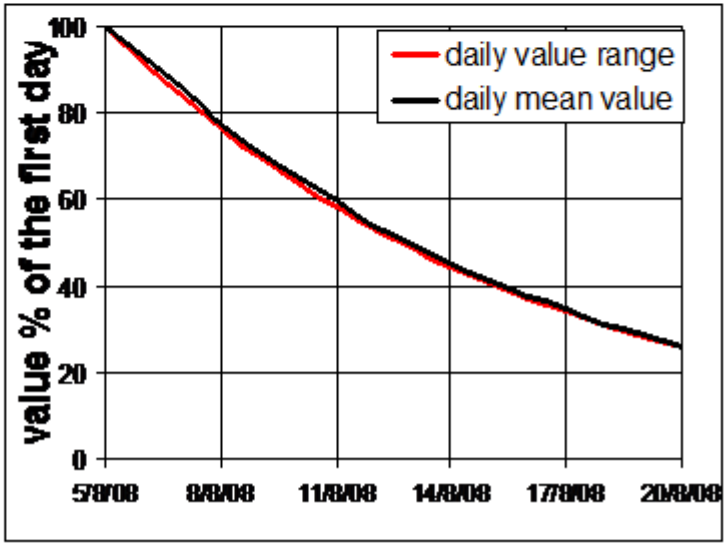
Choosing the right place - getting a representing image



DO recordings S. Prokopos 8/ 2004

- **Maintenance**

Insufficient maintenance frequency leads to recording shifts. During summer, in highly productive ecosystems, few days after the cleaning mean value and range of DO recordings decrease about 20%.



Other matters

In-situ mobile recording

• Not always possible the staff to be at place in time.

- It is common during anoxic crisis, extreme weather condition (strong wind) not to allow access to the point

Fixed recording stations

•Fixed recording stations are exposed to vandalisms

(2006. Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Station Operation, Record Computation, and Data Reporting. U.S. Department of the Interior, U.S. Geological Survey, p. 4)

Conclusion

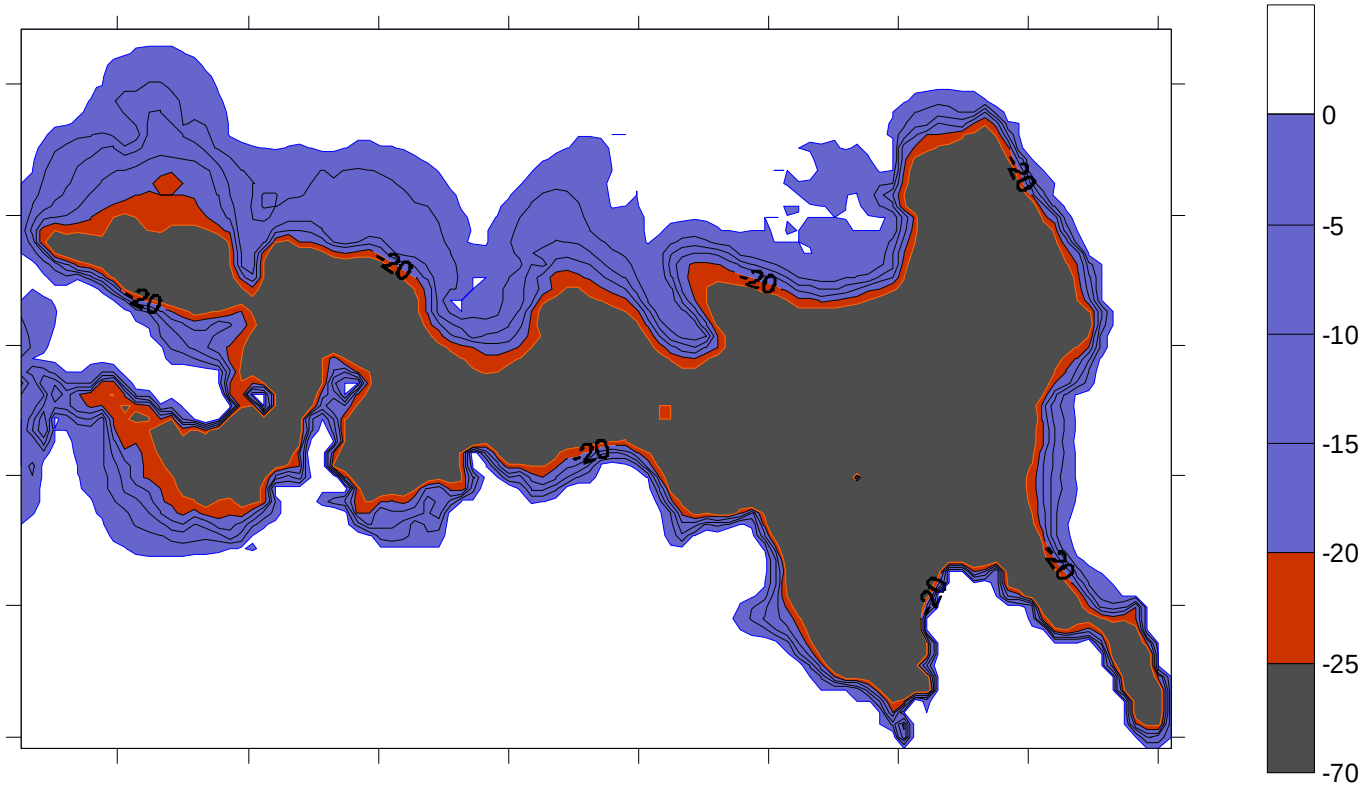
•A combination of both monitoring methods is the most suitable method for the complete image of the ecosystem

• In many cases the cost of maintenance of the permanent recording stations, especially during summer, is underestimated. That leads to unreliable data – incorrect image

Recording of the maintenance process as one more parameter as an indication of reliability

The problems of Anoxic crises in W. Greece do not stop in Messolonghi-Etoliko lagoon complex.

Amvrakikos gulf



Thank you for your attention

Sissia Roussi