

UMR 6042 CNRS GEOLAB
University of Limoges
Department of LIMNOLOGIE
FRANCE, Limousin,

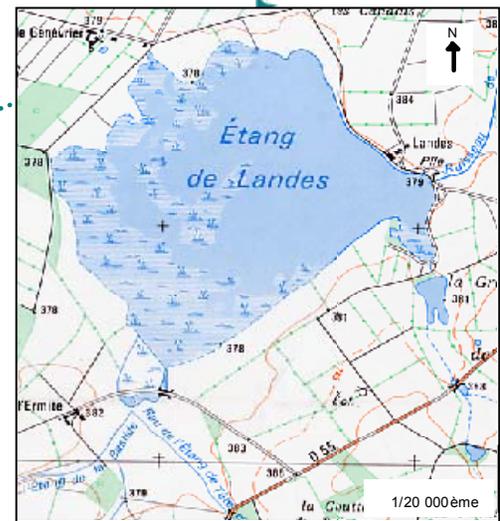
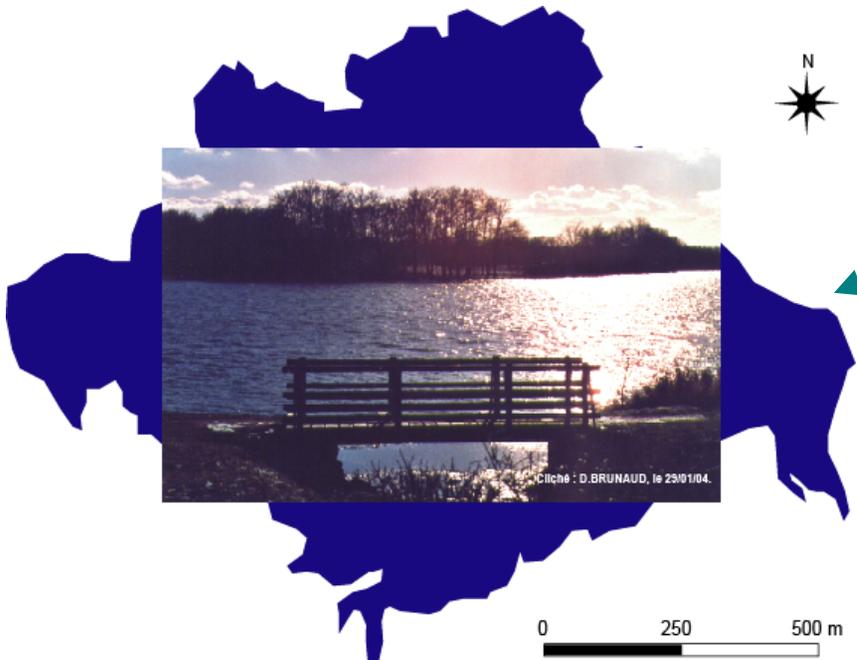
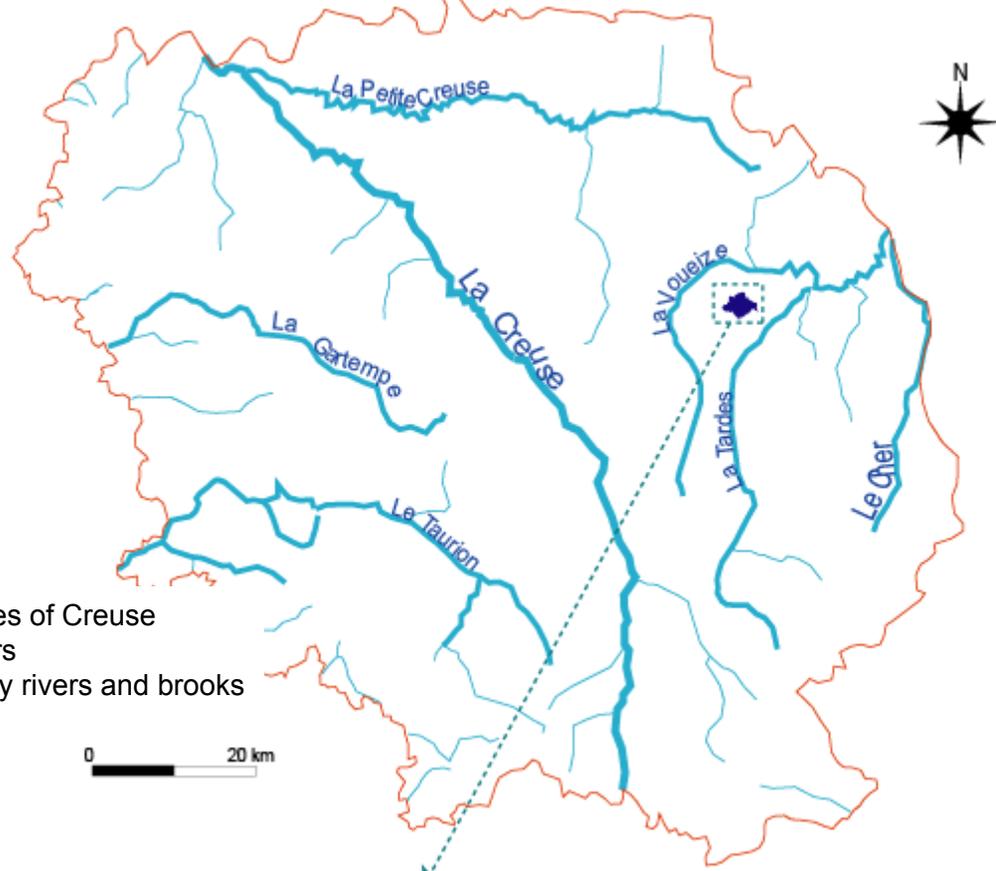
National Natural Reserve of Pond of Landes

The role of the water levels on biodiversity of a shallow pond in the Limoges region



Creuse

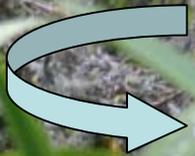
Location of the place under study



I.G.N. map

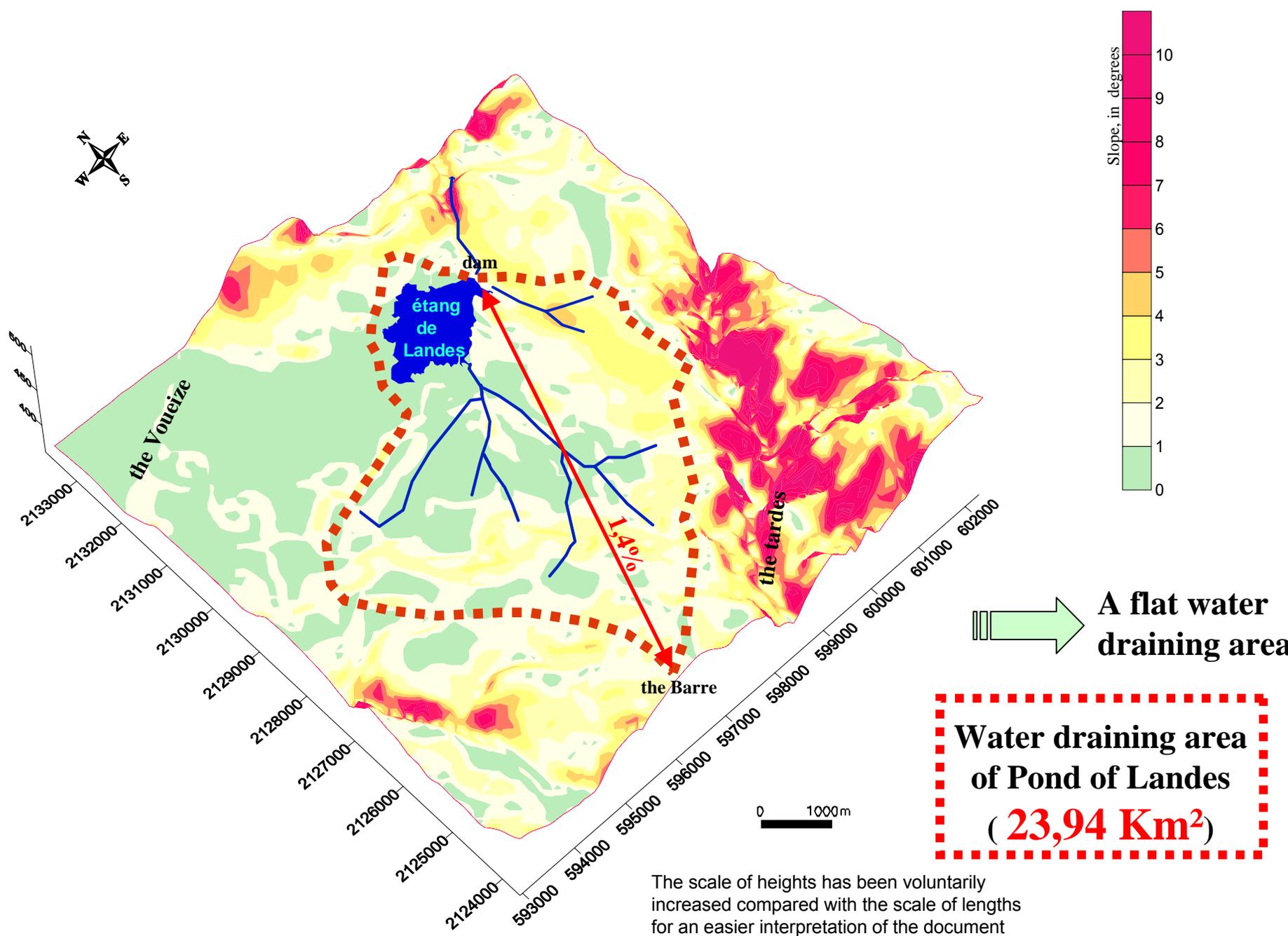
Some figures

	LIMOUSIN	Pond of Landes
Number of the water masses inspected	13 572 (source I.F.N., 2004) 22 000 (BARTOUT, comm. Or., 2005)	
Average area of all ponds larger than 0,01 km²	0,056 km²	
Average area of all ponds	0,012 km ²	
Water area		1,02 km²
Area of the wetland		1,22 km ²
Total area of the classified zone Natural Reserve		1,65 km ²



The largest pond in Limousin

Pond of Landes, un water body in a rather flat land



Different stages of the research

- checking of water levels
- gauging of the river flow
- meteorological records



Hydrological
assesment

**Water levels
variations**

**Bathymetry of
the pond
(its shape)**

Temperature
geography

Temperature
of water

**Nature of interactions
and
spatialization**

Fauna and
flora
distribution

Variations of
temperatures
according to different
types of water weed

Prospecting
living creatures

**For the
whole of
the water body**

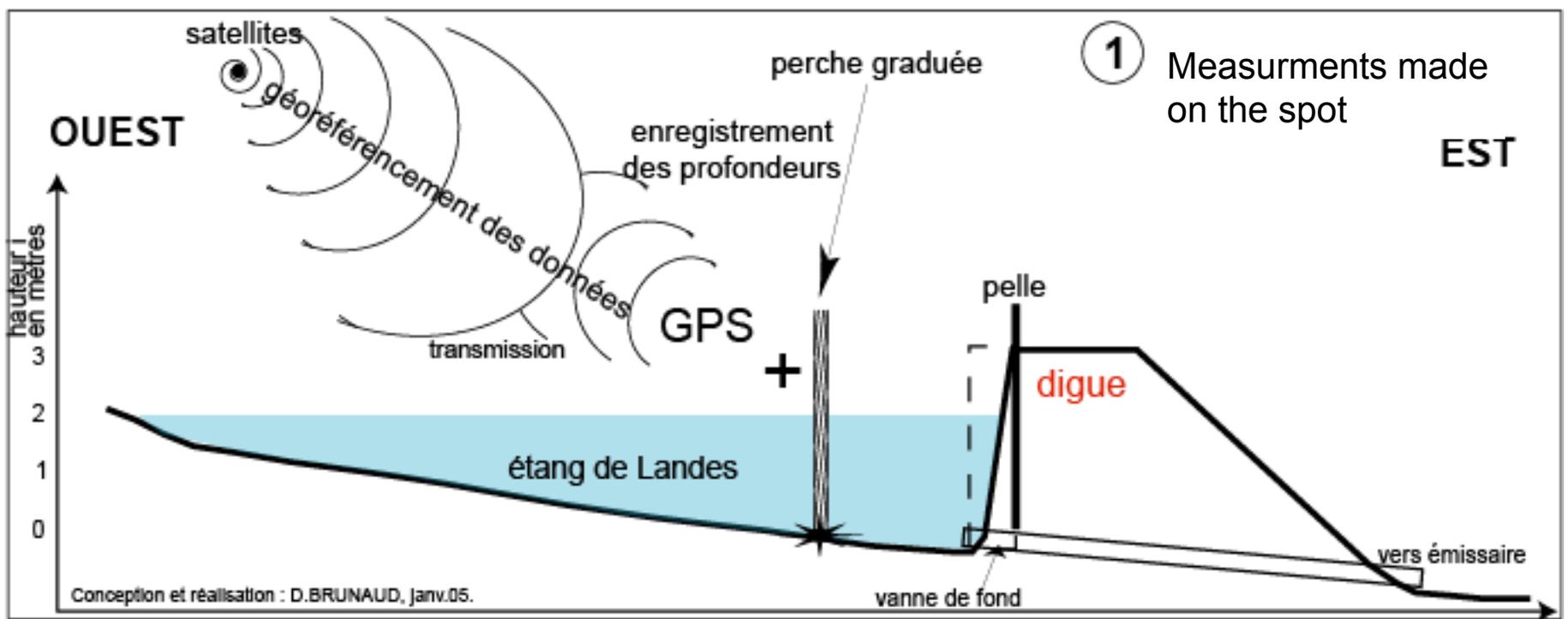
S.I.G

(GIS, *Geographical Information System*)

From the sounding the depth of the water to the bathymetric model



...the importance of ground study



Mapinfo software package

- saisie des données GPS
- géoréférencement (x, y, z) sous forme d'un tableau.
- export des coordonnées vers *Surfer*.

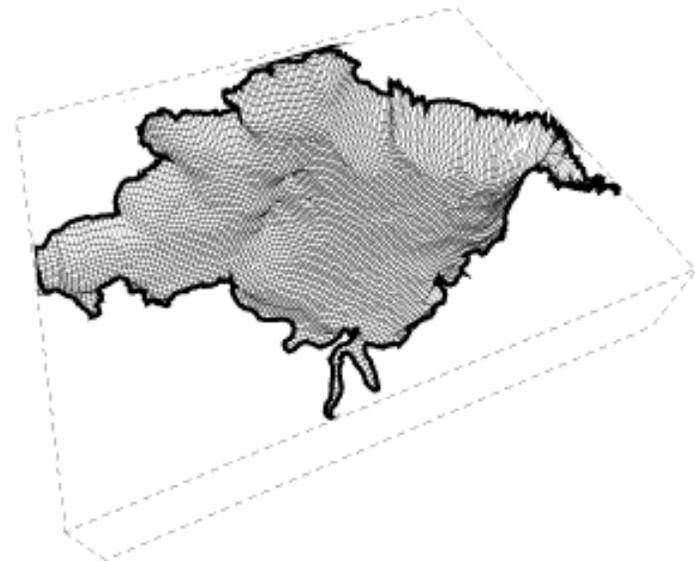
▼ conversion des données ▼

Surfer software package

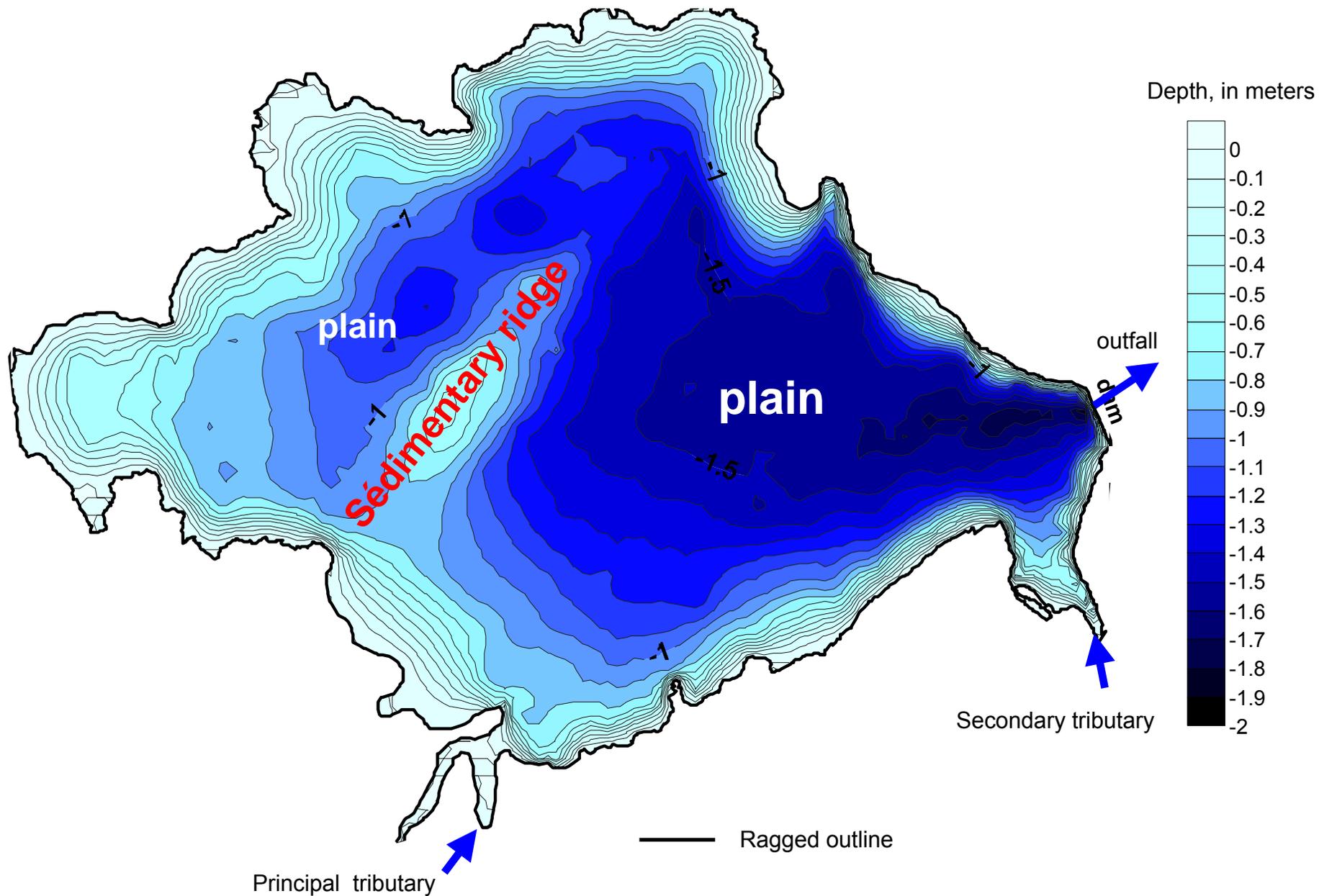
- interpolation
- grille matricielle

+++++	+ (X coord.latitudinale, Y coord.longitudinale, Z pente)
+++++	
+++++	
- modèle bathymétrique

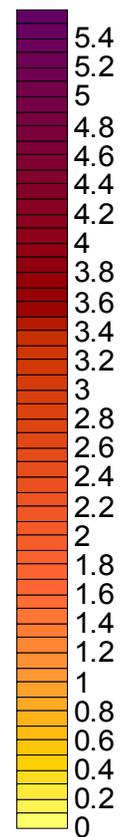
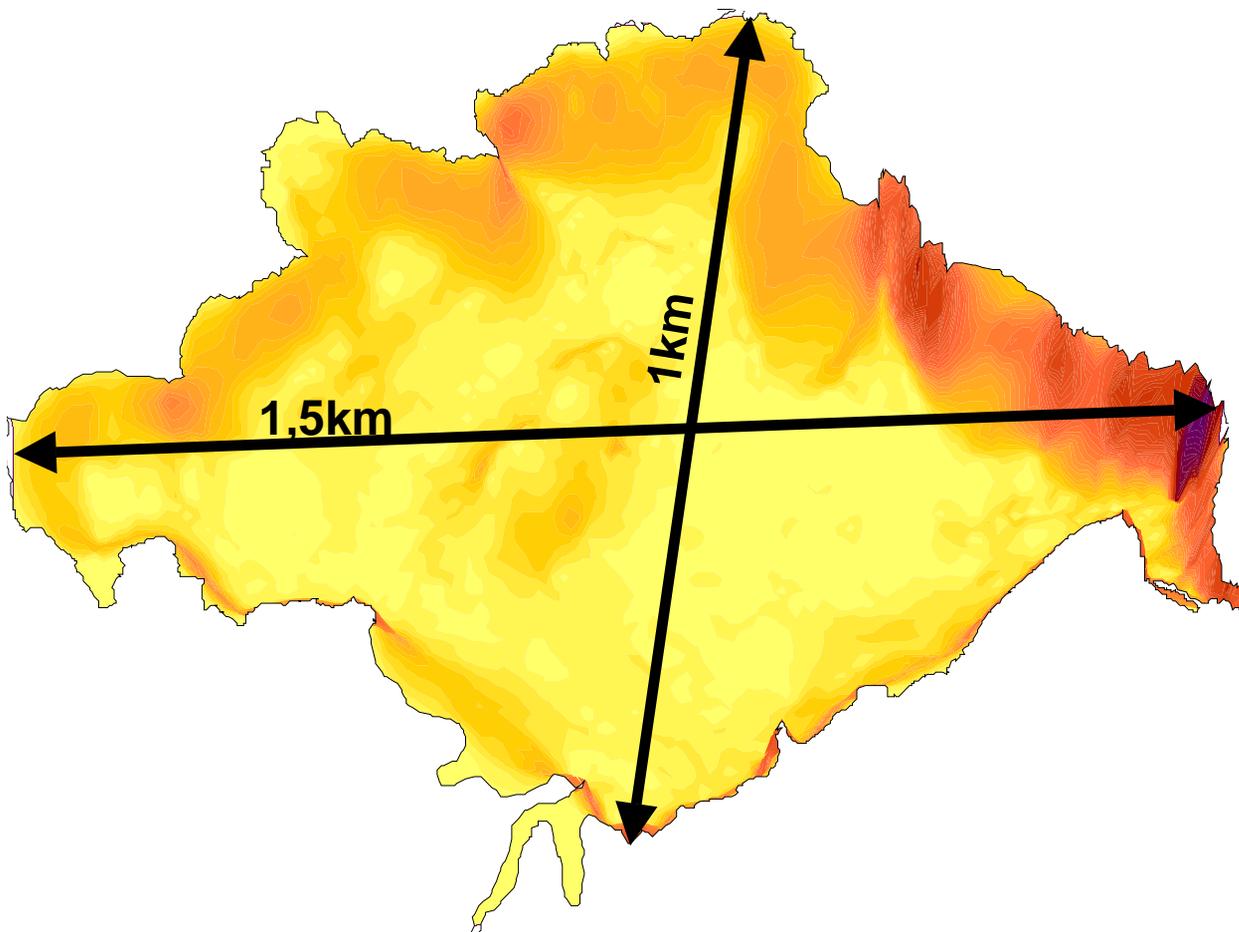
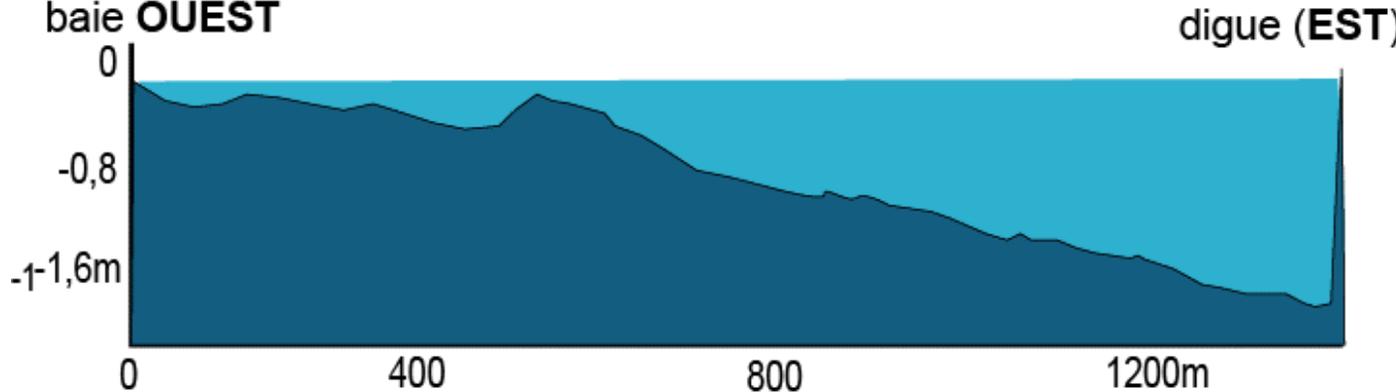
Bathymetric digital model



Bathymetry of Pond of Landes



Distribution of
the slopes in
the basin



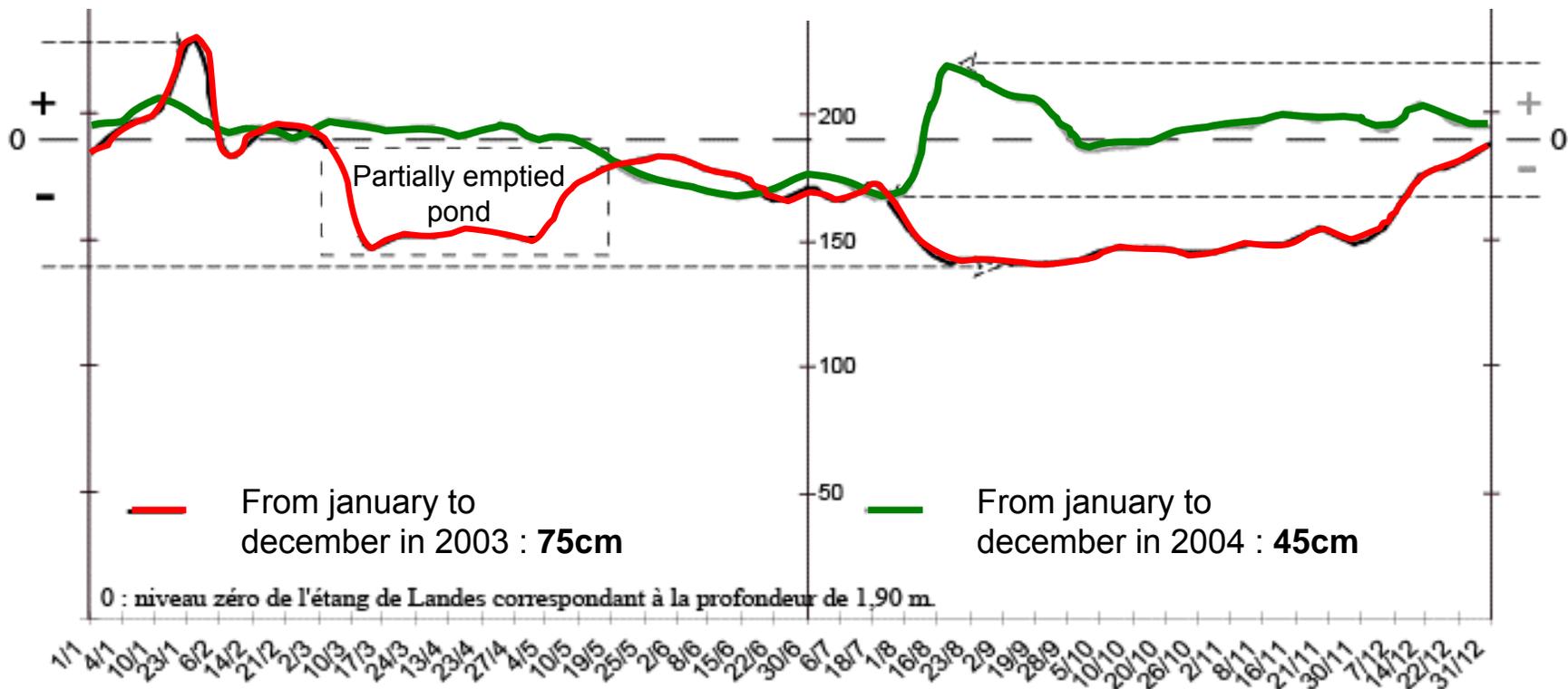
Variations of the water levels



The hight of the water,
in cm

Water level range

The hight of the water,
in cm



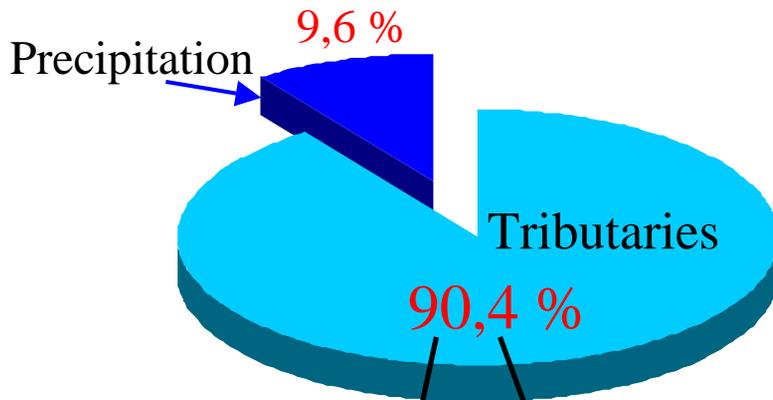
Area of Pond of Landes	102 ha
Average area in low levels period	89 ha
Average area in high levels period	161 ha
The contens of the pond	836 465 m3
The contens affected by variations	611 471 m3 (73%)

How can these water level variations be explained?

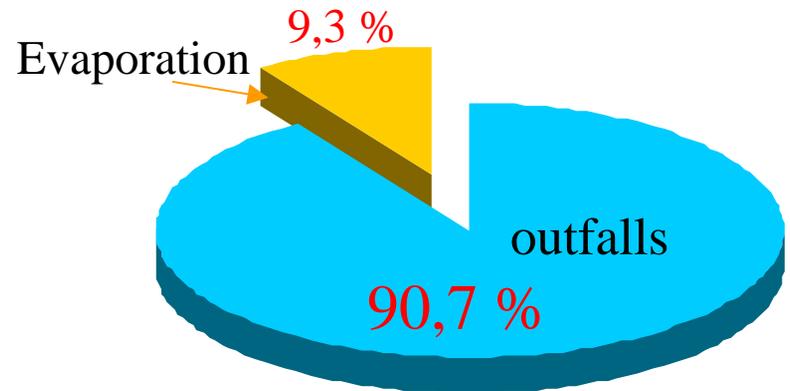


Hydrological evaluation

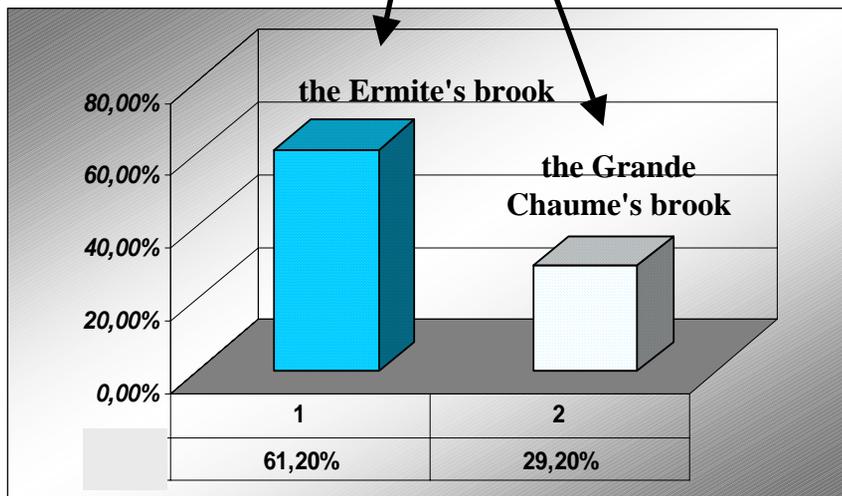
Inflow



Outflow



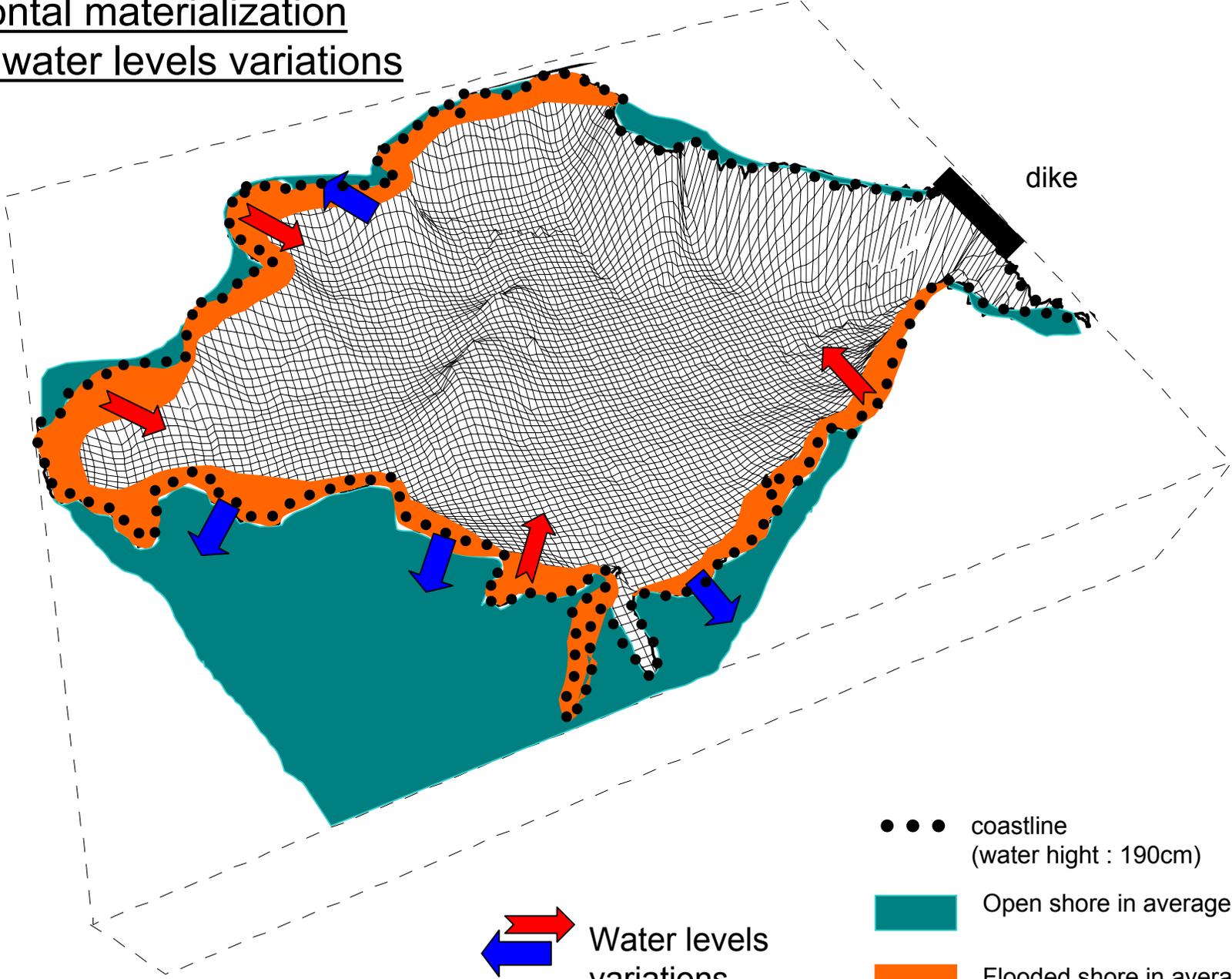
Strong tributary contribution



Any mistakes?

- _ outflow through the ground,
- _ inflow through ground streaming,
- _ variation of the water volume of the pond.

Horizontal materialization of the water levels variations



dike

- ● ● coastline (water high : 190cm)
- Teal square Open shore in average water
- Orange square Flooded shore in average water

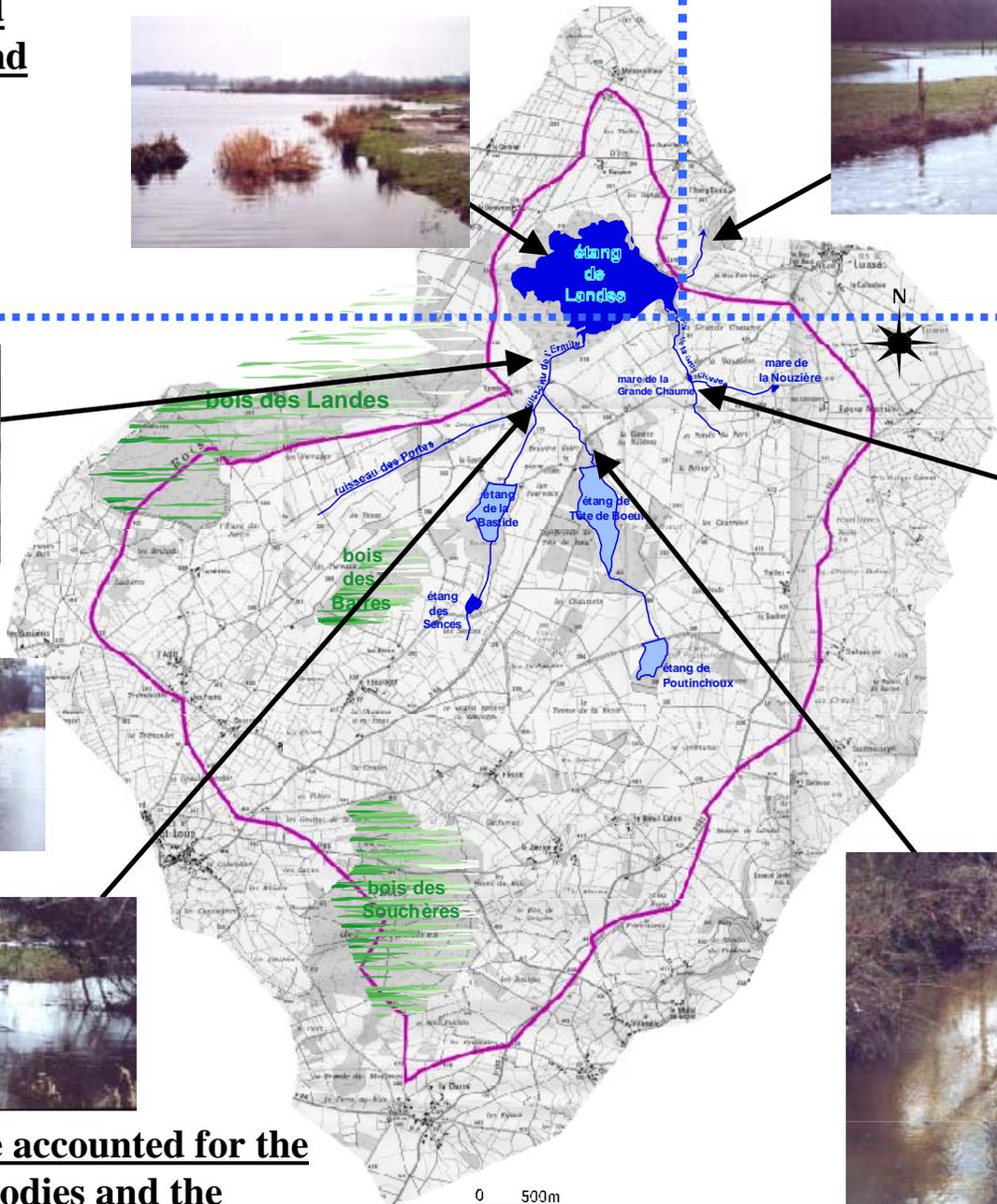
  Water levels variations

POND

A view of the flooded landscape of the pond and around in high water period...



downstream



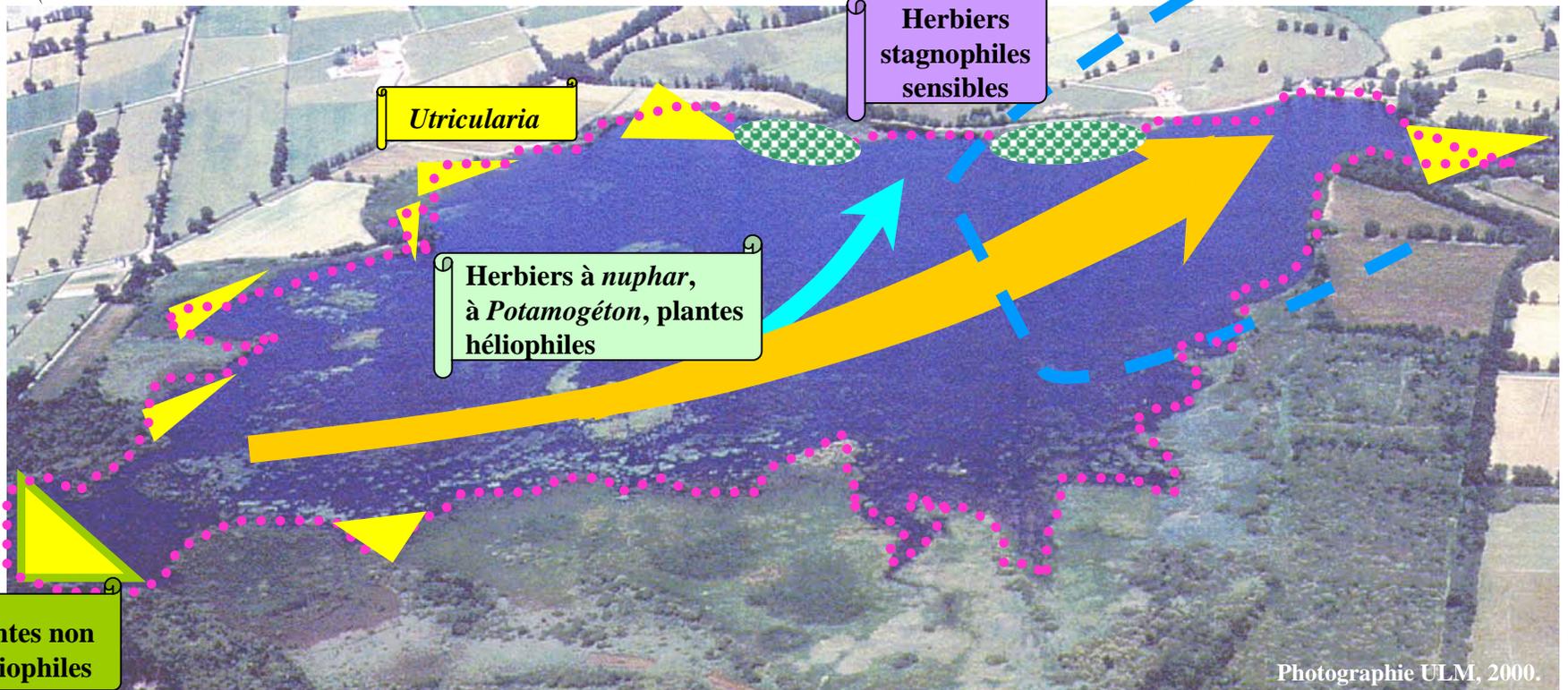
... which can be accounted for the shallow water bodies and the neighbouring places (underground water table).

upstream

Plants geography according to water levels



How do the Pond of Landes geography and some climatic elements acted in this biospatialization?



Plantes non héliophiles

Photographie ULM, 2000.

Utriculaires

A large pond :

-  depth > 1m.
-  A large water area with a ragged outline.
-  Shallow, quiet, hardly whipped bays :
-  sunny bays.
-  Shady bays.

The influence of the wind :

-  Predominating wind.
-  Wrinkles and wavelets.

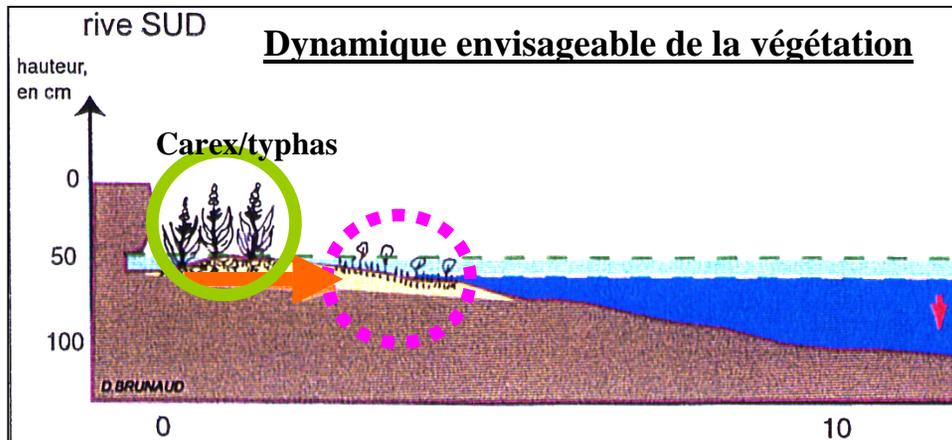
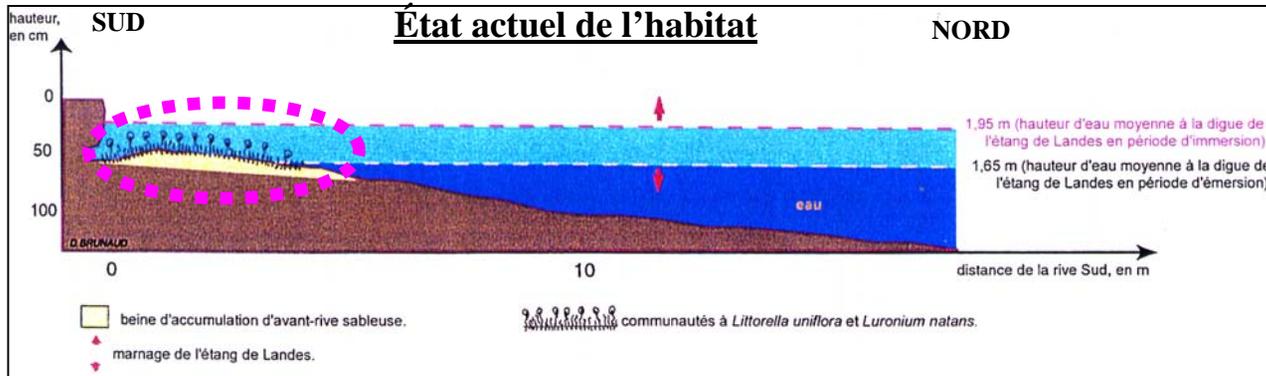
The role of the small trees in the lake :

-  Rafts of floating plants creating an obstacle to the wind



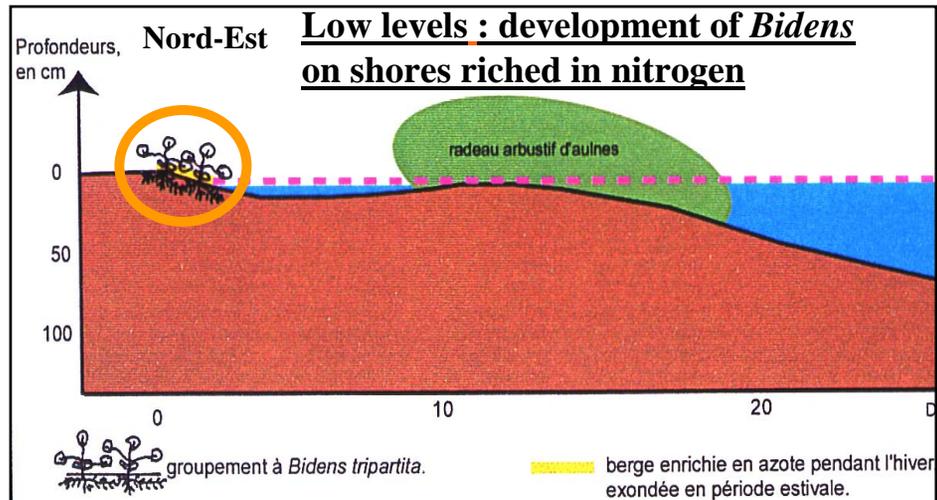
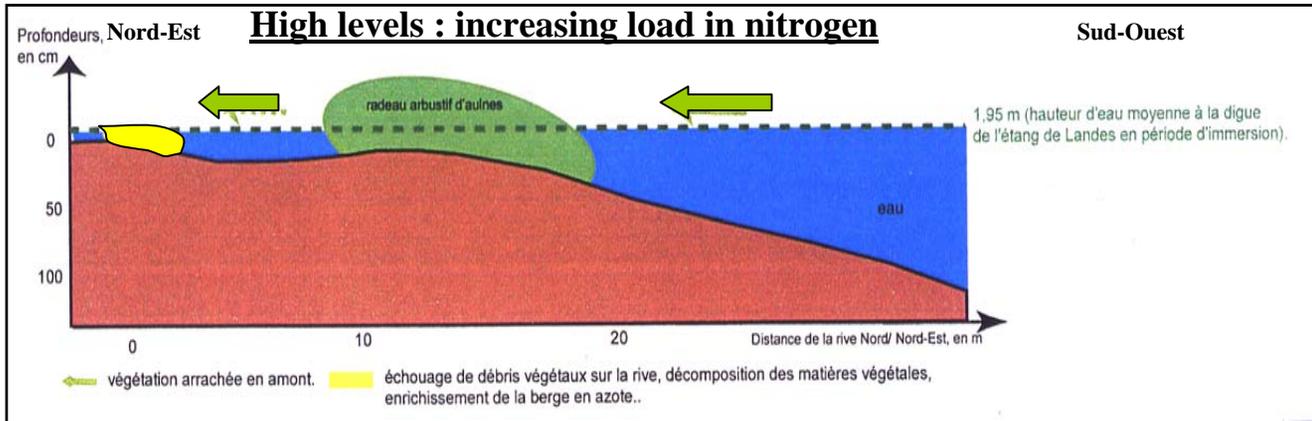
What are the relationships between the variation of the water levels and the growth of plants ?

1. *Littorella* and *Luronium natans* :



Plants affected by human intervention on water level

2. *Bidens tripartita* :



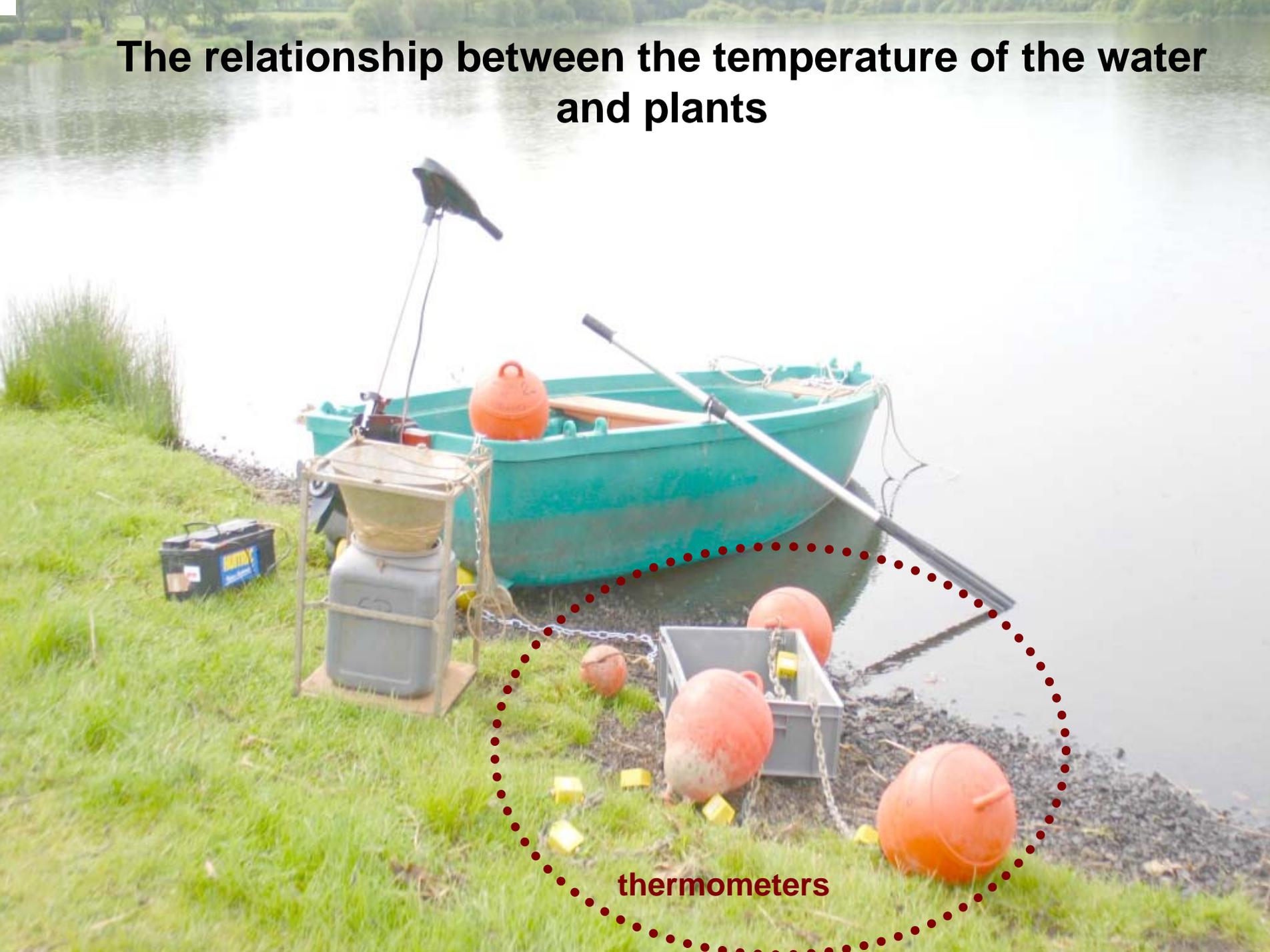
Plants which need different water levels for their growth.



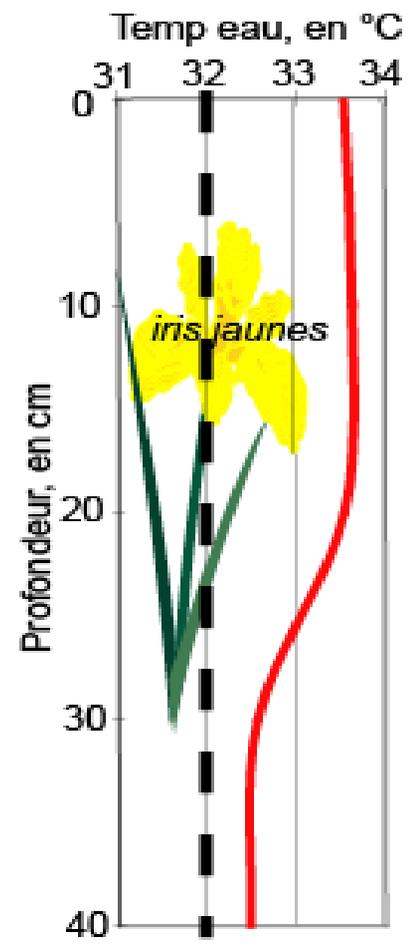
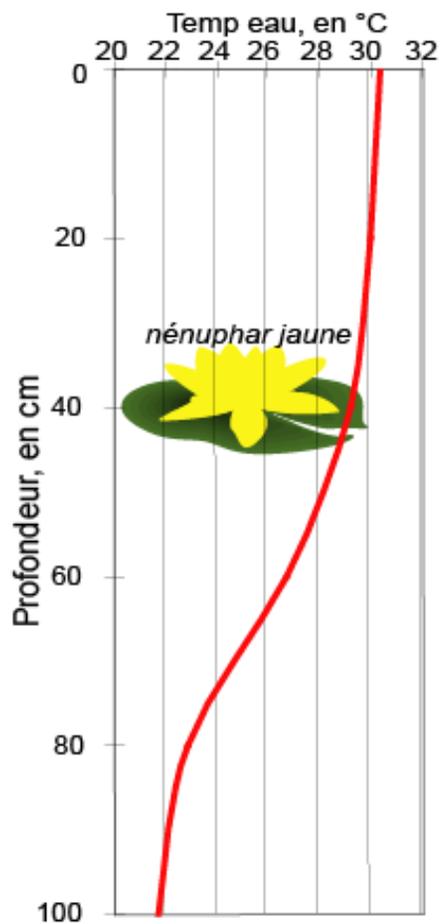
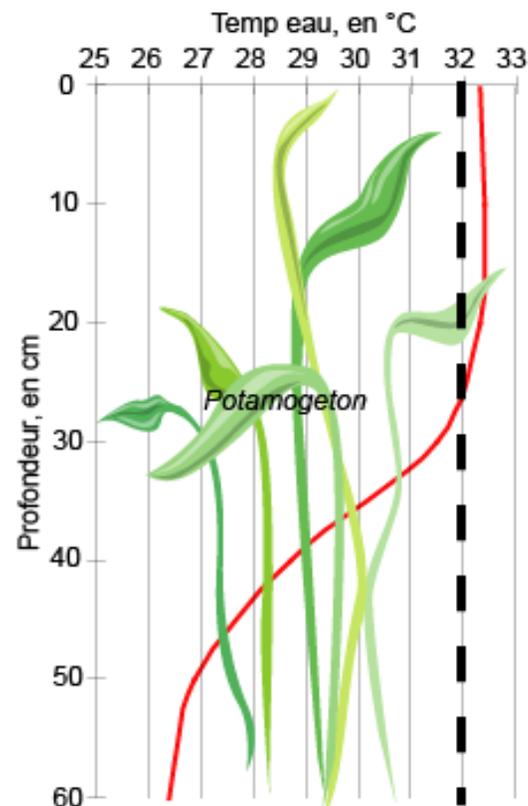
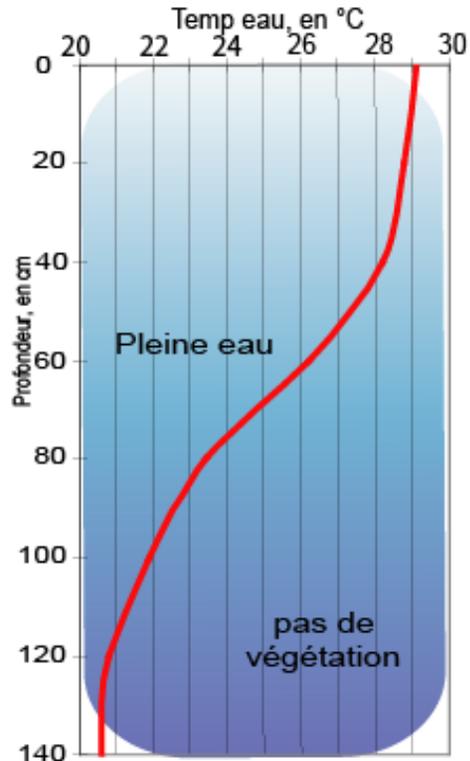
3. *Alnus* :

The harmful effect of the long time high level on their growth.

The relationship between the temperature of the water and plants

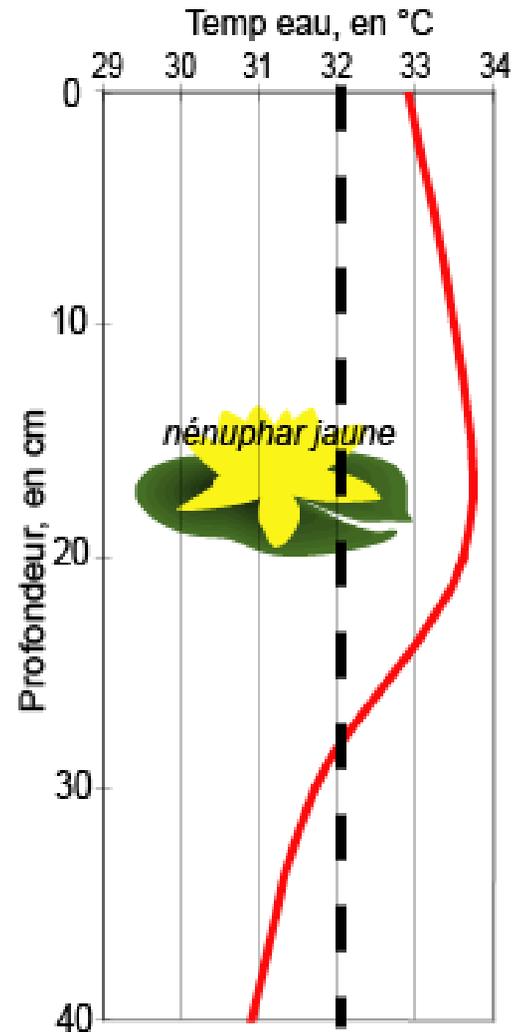
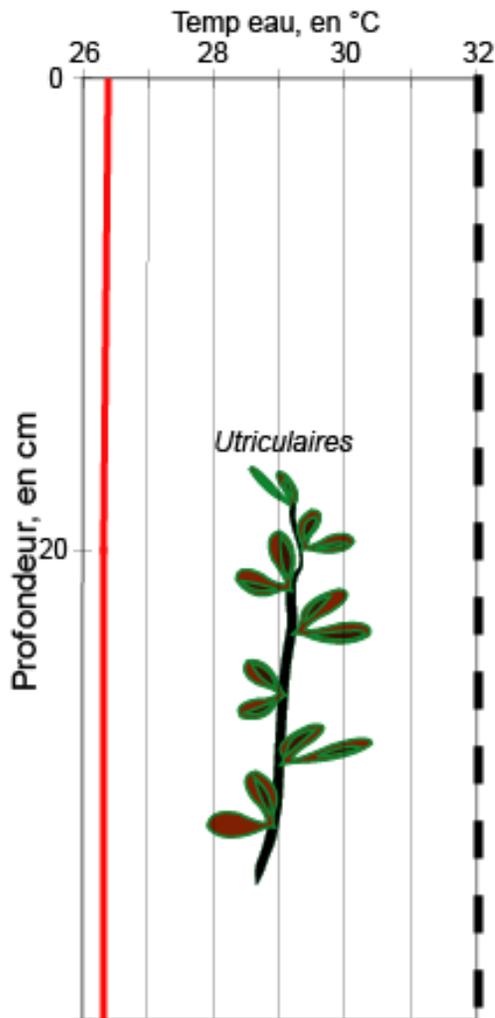


thermometers



What are the relationship between temperatures and plants?

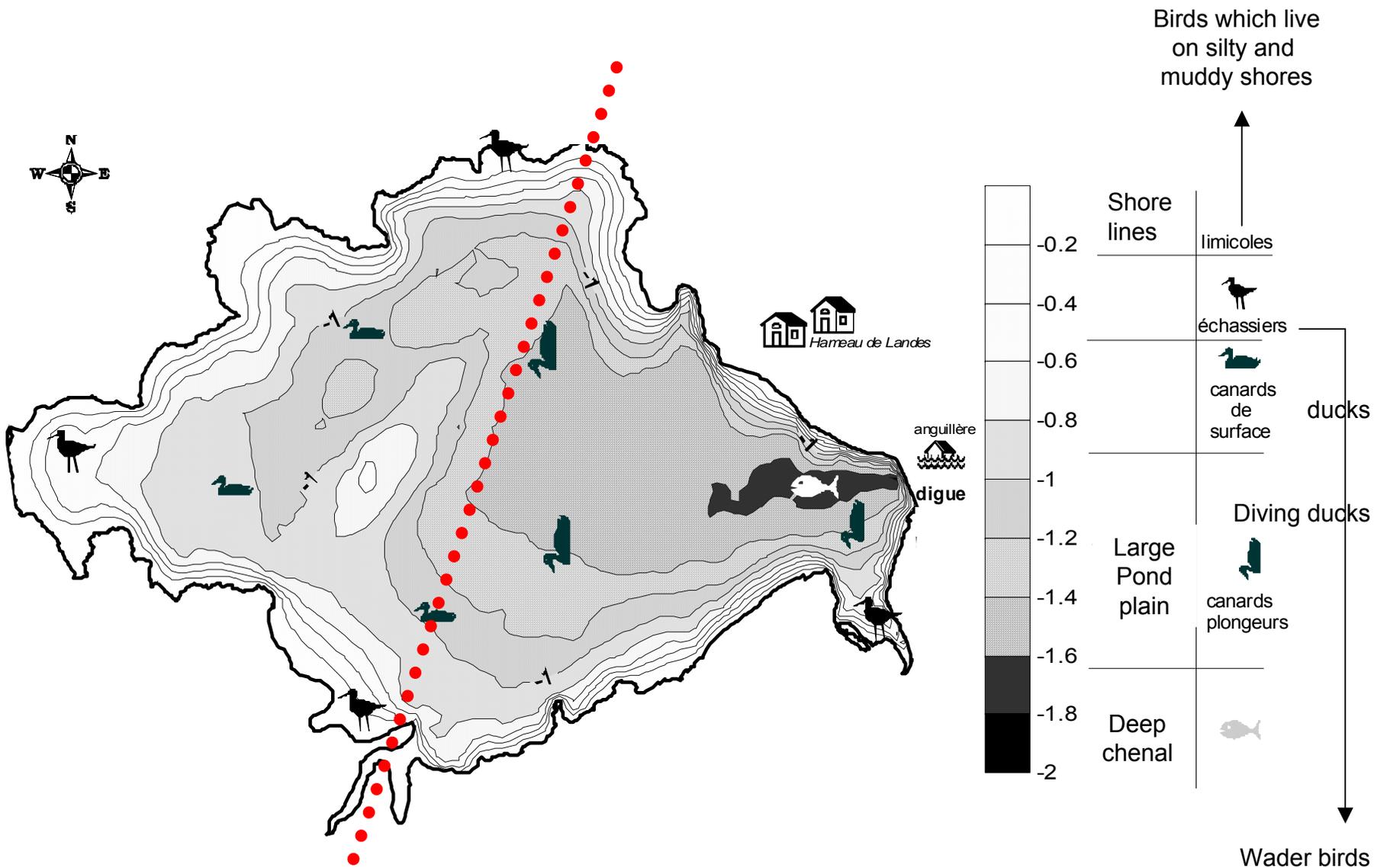
Temperature anomaly



The places where the birds live according to the depth



Living places of birds according to the water heights



The bays,
mooks
of living
creatures



A small *Nycticorax nycticorax*



Ardea purpurea and *Ardea cinerea*



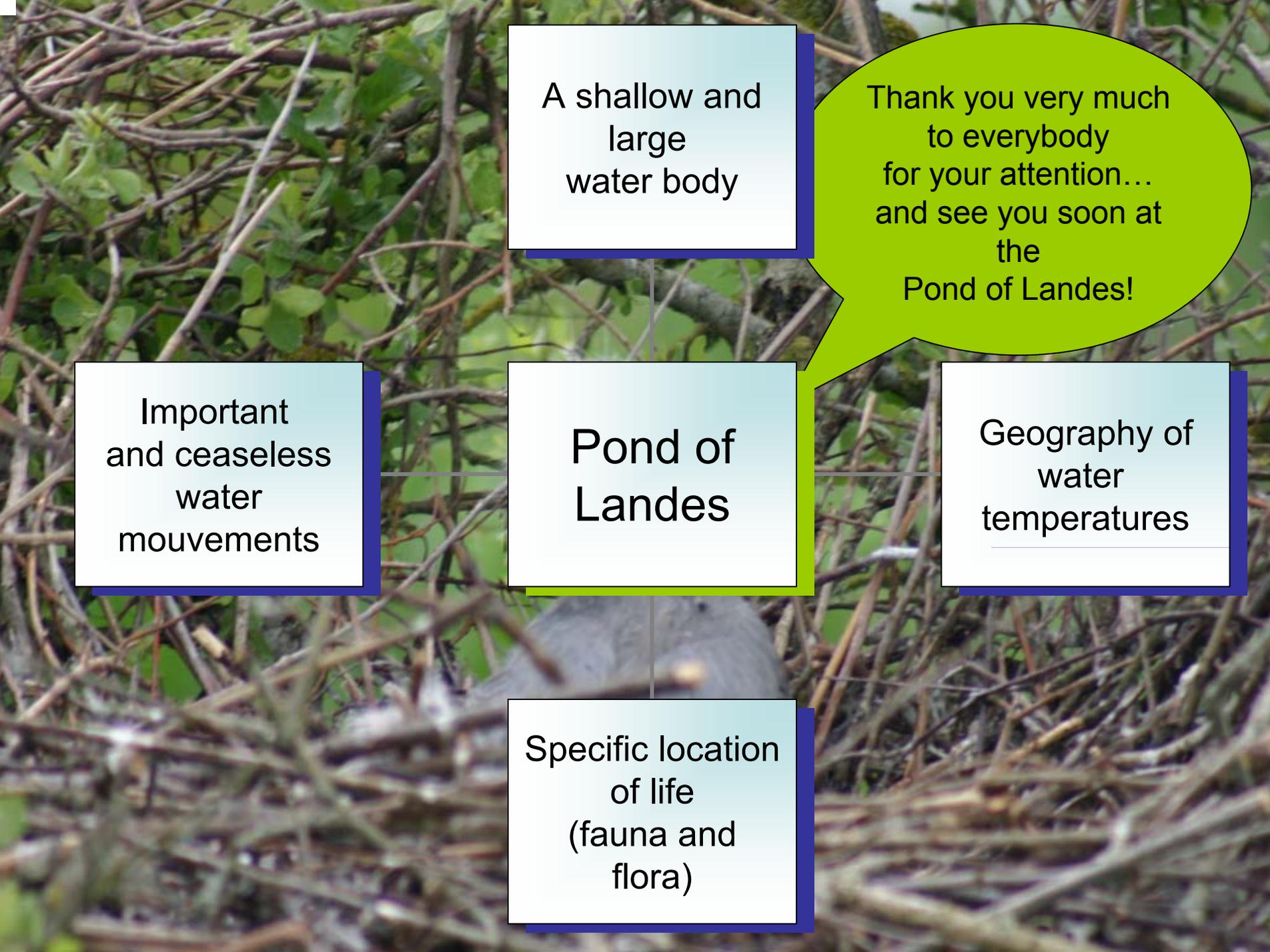
Pond of Landes



Egretta garzetta



Ardea cinerea



A shallow and
large
water body

Thank you very much
to everybody
for your attention...
and see you soon at
the
Pond of Landes!

Important
and ceaseless
water
mouvements

Pond of
Landes

Geography of
water
temperatures

Specific location
of life
(fauna and
flora)