

# RESERVOIRS: MIRRORS OF THE SURROUNDING LANDSCAPE?

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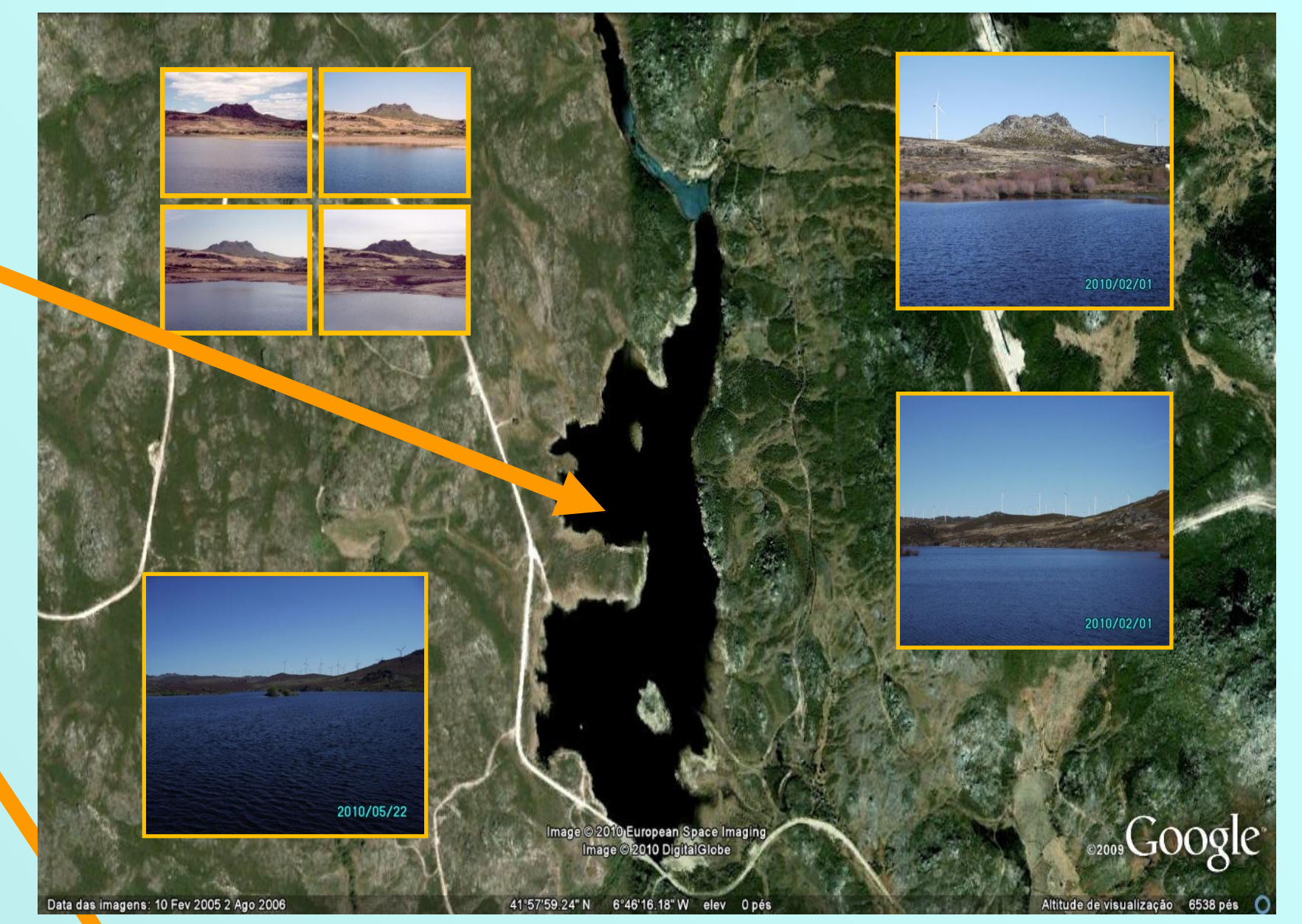
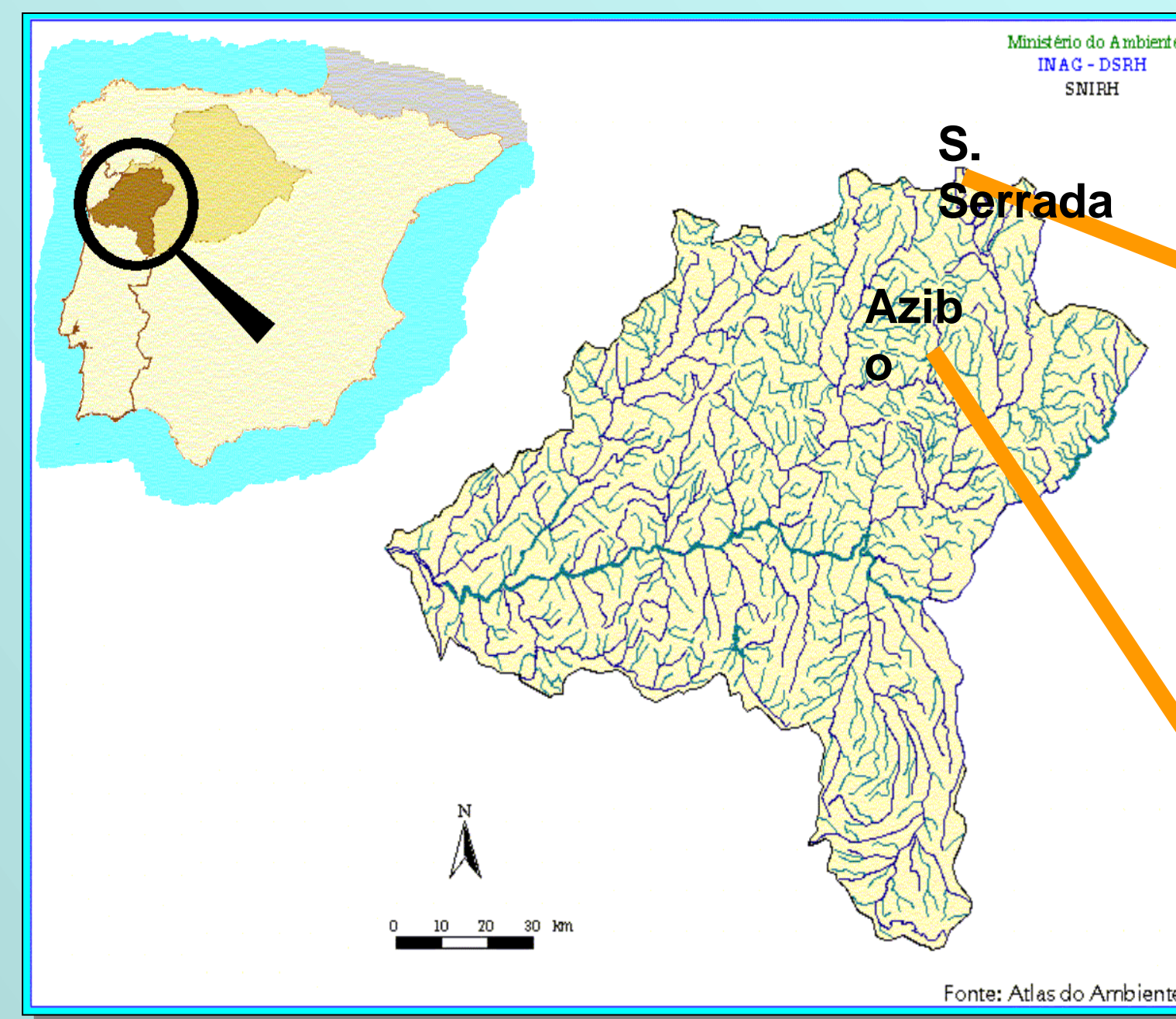
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## Introduction

To assess in what extent the environmental quality of aquatic systems reflect landscape features several water quality parameters were determined in two reservoirs. Concomitantly, the surrounding landscape was characterized and the existing potential sources of phosphorous and nitrogen runoff were identified and when possible estimated.

|                                   | S.SERRADA   | AZIBO   |
|-----------------------------------|---|---|
| Location                          | Latitude: 41°57'12"(N)<br>Longitude: 6° 46' 44" (W) | Latitude: 41°32'50"(N)<br>Longitude: 6° 53' 38" (W) |
| Altitude (m)                      | 1300  | 500   |
| Geology                           | granitic bedrock                                    | schistic bedrock                                    |
| Mean annual precipitation (mm)    | 1300  | 800-1000  |
| Watershed area (Km <sup>2</sup> ) | 6.7   | 89.0  |
| Reservoir area (Km <sup>2</sup> ) | 0.25  | 4.10  |
| Total capacity (m <sup>3</sup> )  | 1680 x 10 <sup>3</sup>                              | 54470 x 10 <sup>3</sup>                             |
| Max. Depth (m)                    | 18  | 30  |
| Mean depth (m)                    | 6.72  | 13.2  |
| Water level fluctuations (m)      | 8-10  | 2-3   |
| Year of filling                   | 1995  | 1982  |

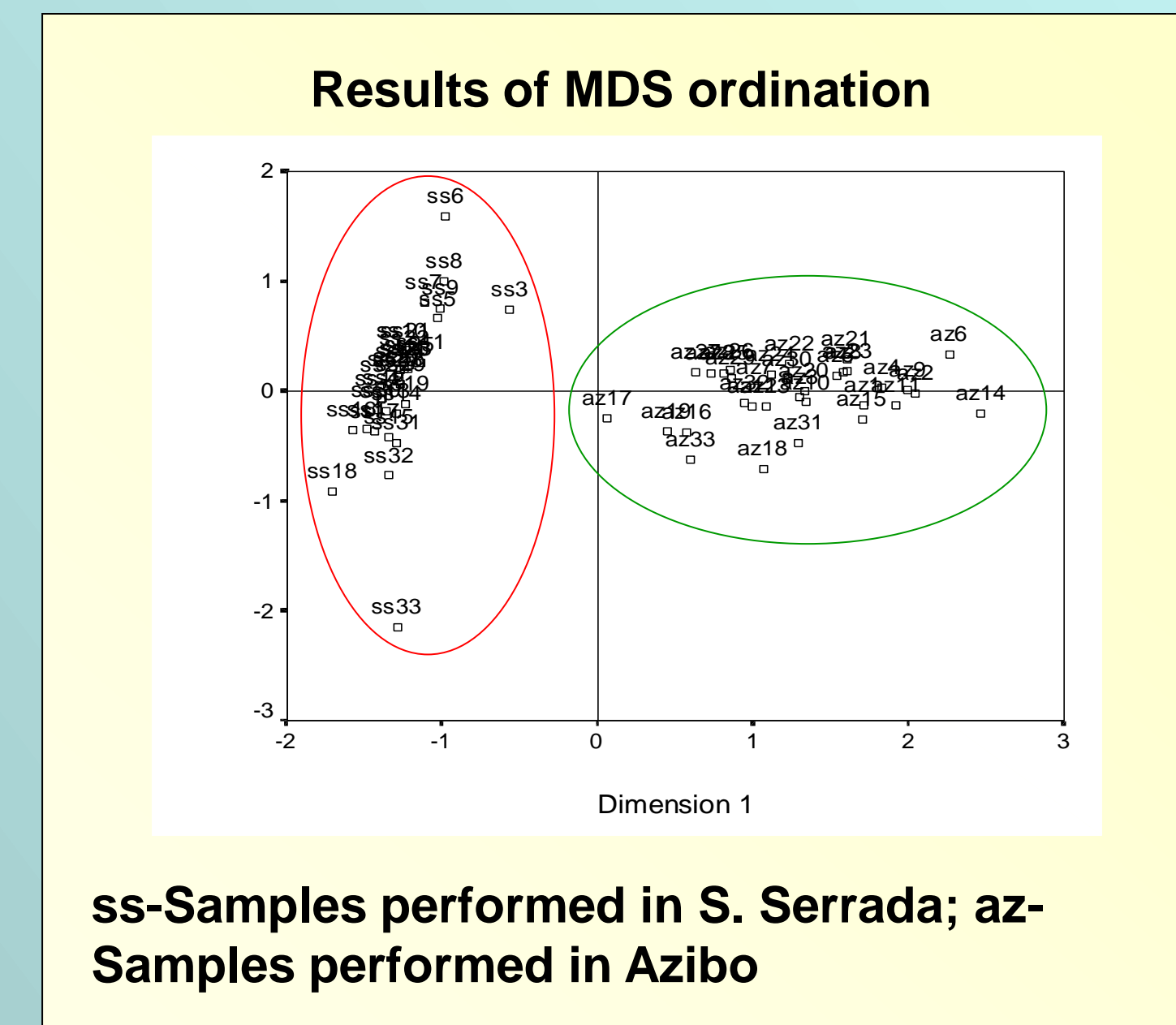
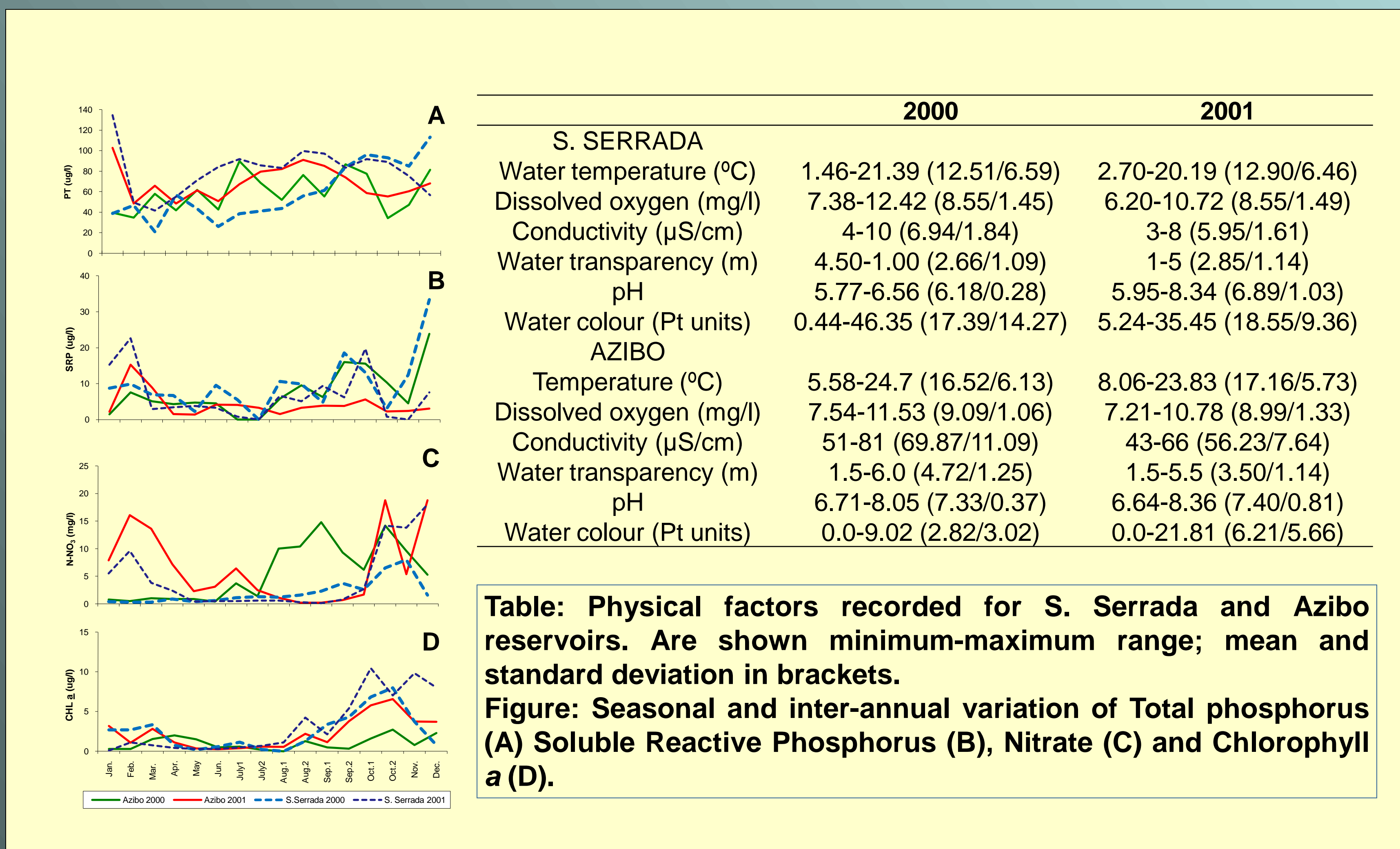


## SERRA SERRADA

- No villages
- No agriculture
- No recreational activities
- Moderate grazing (sheep and goat)
- Wildfires

## AZIBO

- Several villages (1500 inhabitants)
- Agriculture (extensive and intensive)
- Recreational activities: 10,000 tourists and 1000 anglers per year
- Grazing (sheep, goat and cattle)



## Final Remarks

Despite of different landscape occupation, water use patterns and exposure to different factors of disturbance, differences between reservoirs were only found for conductivity ( $D_m = 1$ ;  $P < 0.05$ ), water temperature ( $D_m = 0.364$ ;  $P < 0.05$ ), pH ( $D_m = 0.758$ ;  $P < 0.05$ ), transparency ( $D_m = 0.455$ ;  $P < 0.05$ ) and water colour ( $D_m = 0.643$ ;  $P < 0.05$ ). The observed differences in water temperature, conductivity and pH might be the result of the synergistic effect of reservoir altitude, and geological zone.

## S. Serrada

Similarly, to other reservoirs located in similar geological and climatic regions (Negro et al. 2001) it was expected to find lower nutrient concentrations, water colour values and higher water transparency. These unexpected values are explained by the:

- internal disturbance caused by water level fluctuations leading to the resuspension of bottom sediments and to the periodical exposure of littoral sediments to cycles of drying and wetting;
- external disturbance originated by the combined effects of fire and grazing. grazing is not only a source of nutrients but also the main cause of fires in this region, since those are induced by shepherds to obtain better graze. Actually, this catchment is one of the areas with more fires per year (Rainha and Cabral, 2001);
- high slope and the dominant soil type in this area bear a high potential risk of erosion, with high surface runoff;
- small area of both catchment and reservoir

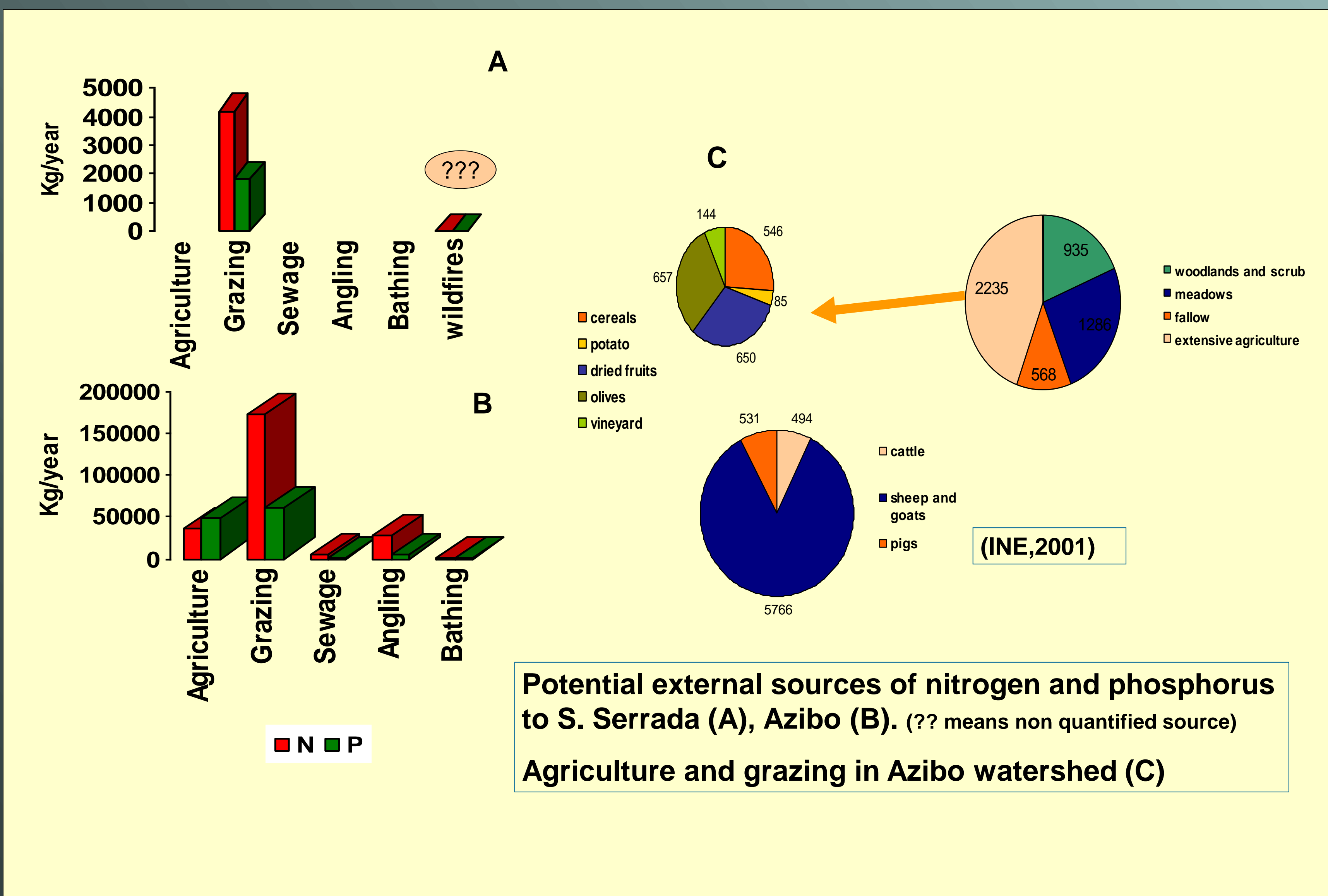
## Azibo

The most important source of nutrients seem to be:

- agriculture, mainly the intensive cultures in reservoir shore and grazing

- recreational activities inside the reservoir

The intensity of exportation of nutrients from those activities and from sewage seems to be highly seasonal. However, agricultural and grazing sources of nutrients can decrease within few years, since most of the farmers are more than 50 years old nowadays (INE,1999) and that there is a considerable tendency for human desertification because of the low rentability of agricultural practices. Besides, the landscape in this catchment is very patchy and consequently there are numerous buffer areas such as woodlands, meadows and riparian vegetation that can minimise those potential sources of nutrients. The projected golf course in Azibo Reservoir shores if implemented might be a important new source of phosphorous and nitrogen.



## Referências

- INE, 1999. Censos da Agricultura 1999. Instituto Nacional de Estatística.  
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 Negro, A. I., C. De Hoyos, C. and Vega, J. C., 2000. Phytoplankton structure and dynamics in Lake Sanabria and Valparaíso reservoir (NW Spain). *Hydrobiologia* 424: 25-37.  
 Rainha, M. and Cabral, P., 2001. Incêndios ocorridos na área do Parque Natural de Montesinho (1994-2001). Parque Natural de Montesinho (Internal Report)

From the obtained data it seems undeniable that reservoirs can be regarded as mirrors of the surrounding landscape. However, there is a lack of data concerning soil nutrient retention capacity and erosion rates. Such data are fundamental to develop export coefficient models adapted to these areas, allowing the correct estimation of nutrient and pollutant inputs, and to make possible the development of correct management measures for these reservoirs and the surrounding landscape.