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**CONVENTION CONCERNING THE PROTECTION OF THE WORLD  
CULTURAL AND NATURAL HERITAGE**

**BUREAU OF THE WORLD HERITAGE COMMITTEE  
Twenty-third session**

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**REPORT ON**

**WORLD HERITAGE EXPERT MISSION TO  
ICHKEUL NATIONAL PARK  
(TUNISIA, FEBRUARY 20-26, 1999)**

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***BACKGROUND***

The World Heritage Committee inscribed Ichkeul National Park on the List of World Heritage in Danger in 1996, and requested the Tunisian authorities to provide a programme of corrective measures to reverse the degradation of the site. The Committee was informed that the Bureau, at its twenty-second ordinary session (June 1998), received a report from IUCN. This report provided technical data indicating that the salinity of the water in Ichkeul Lake may have reached excessively high proportions, and that the chances of recovery of the World Heritage values of the site may be fast receding. IUCN expressed its concern at the slow pace and effectiveness of the implementation of the rehabilitation programme by the State Party.

The IUCN had informed the Bureau at its twenty-first session (June 1997) about the recommendations put forward by the Ramsar mission to the site in January 1997:

- *Clear indication of the measures to be taken by the Tunisian authorities, based on a number of already achieved studies.*
- *Making a registered agreement (between concerned Tunisian authorities) on discharging water through the sluice gates.*
- *Formation of a "central service" which deals with the management issues of the site, including long-term management of the sluice gates of the Tindja Canal.*
- *Repairing the sluice gates.*
- *Completion of the Joumine canal for restoring the marshes of Joumine.*
- *Scientific continuous monitoring of the ecological features of the Park.*

The Committee noted that the Observer of Tunisia had informed the Bureau of several measures undertaken by his Government to retain freshwater in the lake on a year-round basis and thereby reduce salinity of the Lake. Besides, he mentioned the following other measures: (i) Irrigation and water supply needs of the population. (ii) Economic incentives to reduce the dependence on the resources of the nearby mountain which constitutes part of an area from where the waters drain into the Lake. (iii) Monitoring the number of migratory birds in Ichkeul during the European winter. The Observer of Tunisia has disagreed with some of the data presented by IUCN to the Bureau.

The Committee noted that the Bureau, while being concerned regarding the feasibility of effectively rehabilitating this site and urging the State Party to take all necessary measures to ensure rapid and effective implementation of the programme for rehabilitating Ichkeul, had also recommended an expert mission to the site. The intention of the Bureau in recommending such an expert mission was to give due consideration to the possibility for developing an improved rehabilitation programme for Ichkeul and retain its status as a World Heritage site. The Committee agreed with the Bureau's suggestion that the State Party needs to be allowed sufficient time for the implementation of the rehabilitation programme. The Committee noted that the State Party invited an expert mission to visit the site in February 1999.

The Committee decided to retain Ichkeul National Park in the "List of World Heritage in Danger", and requested the Centre and IUCN to co-operate with the State Party to field the expert mission. The Committee recommended that the Centre and IUCN ensure that the expert mission is charged with the following tasks: (i) Establish baseline data and information necessary for evaluating the effectiveness of rehabilitation measures which are being currently implemented. (ii) Prepare a report on the adequacy of conservation and rehabilitation measures. (iii) If necessary, propose additional measures that may be needed for the conservation of the site. The Committee requested the Centre to submit a report on the expert mission for review by the twenty-third session of the Bureau. It also requested the Centre to invite the State Party to provide a comprehensive report on the results of the implementation of the rehabilitation measures to the twenty-third session of the Committee in 1999.

### ***OBJECTIVES OF THE WORLD HERITAGE EXPERT MISSION***

The World Heritage Centre in collaboration with the Tunisian authorities organized an expert mission to Ichkeul National Park in February 1999. This was decided as a follow-up for the implementation of the recommendations of the World Heritage Committee adopted at its following sessions: (a) twentieth session held in Merida, Yucatan (Mexico) from 2-7 December 1996; (b) twenty-first session held in Naples (Italy) from 1-6 December 1997; and (c) the twenty-second session held in Kyoto (Japan) from 30 November to 5 December 1998.

The main objectives of the World Heritage expert Mission were the following:

- Review the implementation of the IUCN/RAMSAR recommendations that were undertaken in January 1997.
- Establish baseline information necessary for efficient evaluation of the rehabilitation measures that are being implemented for Ichkeul.
- Propose possible supplementary measures that may be necessary for the eventual conservation of the site.
- Prepare outline for the threat mitigation status report to the twenty-third session of the World Heritage Committee, in 1999.

### ***STATE OF CONSERVATION OF LAKE ICHKEUL AT THE NOMINATION AND INSCRIPTION OF THE SITE IN THE WORLD HERITAGE, AND THE CURRENT SITUATION***

Lake Ichkeul, together with its associated wetland and Djebel Ichkeul, were inscribed in the network of Biosphere Reserves in 1980, gazetted as a national park in 1980 and inscribed in the World Heritage List in 1980. It is among the few global sites that carry the three categories of protected areas.

The nomination forms presented to the Centre by the Directeur de l'Enseignement de la Recherche et de la Vulgarisation Agricole, who is also signatory to the Ichkeul nomination as a World Heritage site indicate that fishing, hunting and grazing activities were forbidden throughout the whole of the Lake Ichkeul, and that its surroundings had been slightly modified. The same nomination report warns that the installation of dams on the three tributaries that feed the lake with fresh water "would be a big threat to the ecosystem of

Ichkeul" signifying among others that at the time of nomination of Ichkeul as a World Heritage site, plans were already underway to construct the dams. The mountains around Lake Ichkeul, the marshlands and the Lake itself had "changed little", the edges of the marshland had been "partially drained" and given over to crop growing, and there were a few open-face stone and marble quarries on the southern slope of the Ichkeul mountains. About a hundred and forty families were living in the peripheral area of the Lake inside the Park.

Figures from the 1977 Foundation for Environmental Conservation Report showed vast numbers of birds wintering in Ichkeul (e.g. coot 188,000, white-headed duck 600 etc). The wildlife of Ichkeul fitted into a complex of the food chain which is dependent on the interactions of saline and fresh-water, the seasonal variation in the Lake's level with its associated inundation of the marshes and the annual inputs of sediments from the rivers. These natural cyclical fluctuations were threatened by proposals to dam rivers and redirect their waters to tourist and irrigation schemes in the east and south of Tunisia.

A four-year study (1982-86) on « Modeling and Management of the internally important Wetland at Garret Ichkeul » by the University College of London (UCL), showed that with dams on the Djoumine and Sedjenane (that feed Ichkeul with fresh water), the frequency of high lake levels would be cut to about one third of the prevailing average value. The study also showed that under the same conditions, abstraction of water from the dams would cause salinity to rise by "50 per cent to a value approximate to that of seawater". The study concluded that the above hydrological changes would reduce the area of marshland and seriously diminish the carrying capacity of the marsh-lake ecosystem for wild fowl.

Several other developments threatened the site at its creation as a national park in 1977, for example the limestone quarries on the south-side of Djebel (mountain), wood cutting, grazing, the invasion of prickly pear, and indiscriminate shooting of wild fowl. It was felt that prevention of further deterioration of the ecosystem and the conservation of Ichkeul would be achieved by declaring the site as a National Park.

A 1991 report of the Foundation for Environmental Conservation entitled « Use and Non-use Values in the Conservation of Ichkeul National Park, Tunisia » indicated that the gazetting of Ichkeul as a National Park in 1980 was to protect the habitat of avian fauna then estimated at 120,000 Pochard (*Aythya ferina*), 100,000 Widgeon (*Anas penelope*), about 200,000 coot (*Fulicia abra*), and up to 20.000 grey lag geese (*Anser anser*) which winter on the marshes of the Lake. These are the same wildlife values that motivated the designation of the site as a World Heritage site, Biosphere Reserve and a Ramsar site.

Lake Ichkeul is fed by the Oueds (rivers) Sedjenane and Djoumine and several smaller streams and is connected to the sea by the Oued Tindja. The mission was informed that historically the Lake level fluctuated on an annual cycle-high during the winter and the spring when fresh-water flows out through the Tindja, but low in summer when most of the inflowing rivers are dry and evaporation lowers the level of the Lake below that of the sea, salt water then flows into the Lake up the Oued Tindja. This cycle is reflected in the Lake salinity which is low in the winter and high in summer, moreover the seasonal influx of sea water in summer gives very high salinities in the north-east portion of the lake.

The University College of London study cited above estimated that the annual supply of water to Lake Ichkeul by the three main Oueds averaged 321 millions m<sup>3</sup> between 1961-1988. The report also mentioned that the rapid rise in the Lake level to a peak of over 2m NGT (average peak 1.11m NGT) (Niveau General Tunisien - above sea level at a specific site) in 1982/83 an exceptionally wet winter, resulted in a “dramatic decline” of wintering waterfowl population from 122,000 to 25,000. The rise in water levels forced the birds to seek new feeding areas. The 1983/84 figures show an increase in the total number to 146,000 but the composition was different implying that Lake Ichkeul can have a year-to-year variation in both the number of birds present and the species of composition suggesting the possibility of an external factor controlling Ichkeul. The report also suggested that fluctuations in the numbers of geese at Ichkeul within the same season were probably due to “exchanges with the main Algerian marshlands Garaet Mekhada and Lake Fetzana, respectively 140 and 200 km west of Ichkeul”.

The projected changes in temperature (increase of 1 degree C. by the year 2025) and sea level rise (of 20cm by 2025), in relation to the global climatic change will obviously affect Ichkeul and its future. A Ramsar report quoting a UNEP study of Mediterranean wetlands estimates that the effects on the Ichkeul catchment as a result of global warming would especially result in:

at least a 10% decline in riverflow due to evapotranspiration in the region; 12% rise in water salinity; rise by 12% demand for irrigation water; 26% fall in average storage of water in the reservoirs; approximate by 25% filling of reservoirs with sediments, with mean storage falling to around 60%. Other direct impacts would be on the adjacent agricultural activities, inland lagoon fisheries, bird migration and wintering areas at Ichkeul; and others. The effects of the above changes will depend upon the conservation management measures implemented. These measures have to combat both the effects of the dams and global warming.

Tables 1, 2, 3 and 4 give the chronological data on the levels of water, water salinity, rainfall around Ichkeul, bird population count from 1993 to 1999 total and per species, and fish production. The following can be noted from the data:

- Accurate chronological data on water level, rainfall, bird count and water salinity is necessary in order to establish parameters for systematic monitoring of the ecology of Ichkeul;
- Ichkeul depends at the moment on rainfall to balance the water salinity by raising the water level and ensuring increased wintering of the faunal population ;
- While the situation may appear "to be improving" for Ichkeul in some years, including for 1998/1999, the rainfall in this region is highly unpredictable – posing a possible imminent danger to Ichkeul ;
- It will take more than rainfall to reinstate the 320.97 m<sup>3</sup> of water supplied to Ichkeul annually by the three Oueds during 1981 to 1978, prior to the construction of the two dams;

- At the time of inscribing Ichkeul in the List of World Heritage in Danger in 1996, the bird count as well as the water level and the rainfall were very low, hence the high salinity of the Lake ;

## ***TUNISIAN RESPONSE TO THE IUCN/Ramsar RECOMMENDATIONS OF 1997***

1. ***Clear indication of the measures to be taken by the Tunisian authorities, taking into account the results of a number of already achieved studies:***

### **General:**

- **Environmental awareness:** The level of interest in Ichkeul - in government and public circles in Tunisia - is higher than it has ever been. There are frequent discussions in the media, and government officials made it clear that development of a management system to maintain the ecological character while allowing use of some of the water resources, is Tunisia's highest environmental priority. This much increased recognition of the importance of Ichkeul and its resources is the major development, and is greatly to be welcomed.
- **The National Agency for Environmental Protection (ANPE):** The greater level of environmental consciousness was demonstrated by the establishment in 1988 of the National Agency for Protection of the Environment (ANPE), a governmental body attached directly to the Prime Minister's Office. The Agency has been entrusted with "co-ordination of actions necessary to ensure the preservation of Ichkeul National Park, vis-a-vis development activities in the region".

### **Actions taken at the National Level:**

- A Ministry for Environment and Territorial Management was created in 1991
- According to the relevant Tunisian authorities (Ministry of Environment, and the Ministry of Agriculture), the conservation of the Ichkeul ecosystems and the utilization of its natural resources are conceived and implemented in the general framework of the "National Planning Process of Sustainable Development". In this regard, the "National Agenda 21" has been developed which reflects the commitment of the Tunisian Government to conserve and to use natural resources in a sustainable manner, in particular, those of protected areas and wetland ecosystems including Ichkeul National Park.
- At the national level, a planning process is currently underway for the conservation of the coastal zone, including Ichkeul National Park, and the sustainable use of its natural resources. An agency (Agence de Protection et d'Aménagement du Littoral: APAL) was established in 1995 for achieving this goal.
- A programme on wetland management is currently underway in Tunisia: 10 wetlands, including Ichkeul, have been identified for pilot action, as well as a study to propose the proper measures that will be applied.
- A " Master Plan for the Identification and Management of Sensitive Areas" has been developed. Legislative instruments have been adopted for the conservation of "sensitive areas" including Ichkeul National Park.
- A "Programme on Education and Public Awareness" is being implemented, including the incorporation of environmental and conservation issues in school and university curricula.

### **Actions taken at the Regional Level:**

- A Biodiversity Center has been established in Tunis for 'Observatoire Sahelo-Saharienne' (OSS), for the Mediterranean sub-region. Scientific studies using remote sensing as well as ground monitoring, such as undertaken by OSS, will link the wetland areas along the northern African coastline and Ichkeul National Park is expected to benefit from these scientific services.

### **Actions taken so far at the local level (Ichkeul) taking into account the results of various studies:**

- Sluice gates controlling the movement of water between the sea and Ichkeul have been constructed. The Ministry of Environment (ANPE) is now operating these gates. Water has been released in 1998.
- Regular monitoring of the water level and salinity at strategic points of the Lake (Map 1) is being undertaken. Results of this monitoring are attached (Figs 1 and 2).
- The sluice gates are being adapted to ensure better management of fisheries. Two hundred thousand Tunisian Dinars are available for this purpose.
- A fence has been fixed in order to protect bird habitats.
- Stations for measuring physico-chemical parameters and the extraction of sediments in the Lake (Maps 2 and 3), as well as for rainfall (see Fig 3 for results) have been established. A water purification device is planned in order to avoid pollution from agricultural activities surrounding Ichkeul National Park.
- Water will be regularly released from a new dam in order to provide fresh water to Ichkeul. This dam is currently under construction and is expected to be completed by the year 2000.
- A highway was planned close to Ichkeul, but on the basis of the Environmental Impact Assessment (EIA) study that has been carried out, the plan was cancelled.

### **2. *Making a registered agreement (between concerned Tunisian Ministries) for discharging water to Ichkeul:***

- Such a registered agreement in fact is considered not necessary. There is a programme concerning this issue agreed upon by the whole Tunisian Government. This programme ensures that twenty million cubic meters of water will be released every year to Ichkeul National Park through the new dam whose construction is expected to be finalised in the year 2000.

### **3. *Establishment of a "central service" which deals with the management issues of the site, including the long-term management of sluice gates of Tinja Canal:***

- According to the Tunisian authorities, this is not relevant. A mechanism for coordination already exists between the concerned Tunisian Institutes. This mechanism could be restructured so as to include all stakeholders in the Committee that supervises this mechanism.

**4.           *Restoration of the sluice gates:***

- Such restoration is underway. An additional device will be provided so as to maintain the biological life cycle of two major fish species. Between 1999 and the year 2000, the management of sluice gates will depend on the availability of water and climatic conditions. The plan will be to close the sluices when the water salinity is low. After the year 2000, the Tunisian authorities see a period of stabilizing the management of the ecosystems of the Lake. The Oued Sidi El Barrah would be transferring 90 Million m<sup>3</sup> to the Sejnane dam part of which 20 Million m<sup>3</sup> will be diverted to Ichkeul to maintain on a long term basis an acceptable amount of 280 Million m<sup>3</sup>/Year rendering Ichkeul less dependent on the rainfall.

**5.           *Completion of the Joumine Canal for restoring the marshes of Joumine:***

- According to the Tunisian experts, the Joumine Canal does not pose any problem for the Ichkeul ecosystems. This canal has been built in order to ensure the drainage of the agricultural areas. It has to be maintained in order to serve the agricultural activities outside the Ichkeul National Park.

**6.           *Scientific monitoring of the ecological attributes of the Park:***

- Such monitoring is underway:-
  - (a) Climatic attributes: Rainfall daily measurements, as well as graphic recordings at two stations, Tindja and Zabbous.
  - (b) Hydrology: Water turbidity is measured and recorded graphically at Tinja (upstream), Sidi Hassoun (down stream), the mountain, Ain Raghda, and Nkhilet. Conductivity and salinity are estimated in samples taken three times daily at the dam and at Ain Raghda.
  - (c) Measurements of physico-chemical attributes of water and sediments: The Environmental Protection Agency (ANPE) carries out these measurements for samples taken from the Lake and the wadis at identified stations (see attached Figures). There are eleven permanent stations on the Lake for *in-situ* measurements, and for sampling water and sediments; there is also one permanent station located at the fishery of wadi Tinja. Besides, there are stations at Tinja, Sejnane and Melah, and three stations at wadi Joumine.

All these measurements are accompanied by records on the flora and fauna of the Park made by scientific experts. The preliminary results indicated certain changes in the environment, notably the development of herbaceous growth of *Ruppia* west of the Lake, and the clear spreading of *Potamogeton* seeds and bulbs that can possibly germinate in the sediments. This latter observation in particular is encouraging, since it indicates the potentiality of the growth of *Potamogeton*, the main source of food for most of the birds, once adequate environmental conditions prevail.



## ***A SUMMARY OF THE PROGRESS REPORT ON THE APPLICATION OF THE MANAGEMENT PLAN OF ICHKEUL NATIONAL PARK***

The Management Plan of Ichkeul includes three main management programmes. These are (a) Management Programme of the Tinja Dam (PROGETIN); (b) Ecological Management Programme (PGE); (c) Programme of Relevant Socio-economic Studies (PROMASE). Each of these Management Programmes includes one or more projects.

### **Project of Rehabilitation and Functioning of the Dam (PROGETIN):**

- Evaluation of the rehabilitation efforts, and of the dam functioning.
- Rehabilitation work.
- Maintenance of the dam and its surroundings.
- Study of the impact of the pumping station.

#### ***Realized and Proceeding Projects:***

- Large scale evaluation of the fisheries (05/1998).
- Evaluation of dam rehabilitation (03/1999).
- Maintenance of dam (1998).
- Dredging

#### ***Remarks:***

- The maintenance of the dam, and the dredging are carried out every year.
- The management of the pumping station is to be realized in the second plan.
- The management rules concerning the dam are determined by the application of a predictive model that has been applied since 1996.

### **(1) Measures for Protecting the Ecosystems (PGE)**

#### **The Salt Marsh:**

- Exclusive protection of lowlands (1997-1999).
- Controlled protection of the transitional areas (2000-2001).

#### ***Realized and proceeding projects:***

#### **The Marsh:**

- Protection of the salt marsh (1996-1999).

#### **The Lake:**

- Exclusive protection of the *Potamogeton* areas in the west: 2500 ha (after 2001).
- Controlled protection of the surface of Joumine marshes: 150 ha (after 2001).
- Restoration activities (after 2001).
- Different studies, and technical assistance for restoration activities (after 2001).

#### **The Mountain:**

- Exclusive protection of the north slope of the mountain (2000-2001).
- Restoration measures for the vegetation on the west and south slopes (2000-2001).
- Application of the methods of combating and preventing fire (2000-2001).
- Combating of illegal woodcutting (2000-2001).
- Studies and technical assistance as needed (2000-2001).

Remarks:

- Protection of the Joumine salt marshes of Melah, Ghezala, Sejnane, and Douimis: accomplishment of 15 km of enclosure, and 17 km are expected to be accomplished in 1999.
- Concerning the actions for protecting the Lake, these will be realized once the acceptable physico-chemical conditions are achieved.
- The actions related to the problems of the mountain will be realized in the second phase which will start when relatively good conservation is achieved of the flora and fauna of the north slope.
- The marble quarrying activities that have been damaging the mountain and disfiguring the landscape have been stopped since January 1994. Similarly, the use of the Park's hot springs for religious cleansing purposes was stopped since the activity posed a pollution threat to the Park and was a health hazard.
- It is envisaged, within the socio-economic development plan, that eventually, there will be complementary actions for the restoration of the vegetation.
- The number of families residing in the Park has gradually reduced from one hundred and forty at the time of inscription of Lake Ichkeul in the World Heritage List to sixty at present..
- A planned highway between Lake Ichkeul and Laguna de Bezerte has been diverted following recommendations of an Environmental Impact Assessment Study. The highway will now be constructed further around the Laguna (at higher cost) in order to avoid potential pollution to Lake Ichkeul.

**(2) Programme of Ecological Monitoring**

- Monitoring, at the minimum level of physico-chemical attributes, and biological observations (since 1995).
- Expanded monitoring, more regularly and more frequently (starting 2001 for 3 years).

Realized and On-going Projects:

- Monitoring at the minimum level (installation of an observation network, and a laboratory for analysis: equipment (since 1997), action (since 1995), and expertise (on-going)).

Remarks:

- The ANPE (Environmental Protection Agency) provides the results of the continuous observations on climatic, hydrological, physico-chemical and biological attributes recorded since 1993.
- Elaborate measurements will be carried out in the second phase once the acceptable physico-chemical conditions are achieved (the dam rehabilitated, and the water is made available from Sidi El-Barrak); the ultimate objective is to validate the management system which will also be utilized and eventually improved.

**(3) Research Programme**

- Complementary research on: (a) environmental conditions, (b) eutrophication and aquatic flora, (c) fish biology, (d) general ecology of the species populations of the Park, and (e) modeling.

### **(1) Project of Fishery Development (PROMASE)**

- Establishment of an observatory of ichthyology (2000).
- Development of new techniques for fry stocking, and studies (1999-after 2001).
- Development of new techniques for fishing in the Lake (after 2001).

#### *Realized and On-going Projects:*

- Monitoring the passage of the fry, mullet and eel (programme of ecological monitoring).

#### *Remarks:*

- Development of new fishery techniques will be studied after the rehabilitation of the dam, and after obtaining results of monitoring the fry (after 2001).

### **(2) Project of Grazing Development**

- Diversifying the composition of pasture in an experimental plot.
- Development of the herb layer in an experimental plot in the elevated areas of the salt marsh.
- Coordination with the economic and the institutional actors.

### **(3) Project for Reception , Information and Training**

- Management and equipping the visitor centre.
- Management of the points of interest in the marsh and on the mountain.
- Project for training and information (audio-visual equipment; production of documents).

#### *Realized and On-going Projects:*

- Preparation of parking lots at specially selected sites far from bird areas. (1999)
- Preparations of the exterior of the visitors' centre (1999).
- Establishment of watch towers with equipment (1998-1999).
- Preparation of a natural-pond for bird viewing, and a centre for watching the birds of prey (1999).
- Erecting Park interpretation and direction signs, and promotion of awareness-raising (1999).
- Production of documents (1997-1998).
- Equipping the visitors' centre, including audiovisual apparatus and the library (1999).

#### *Remarks:*

- The management of Ichkeul Park was the objective of a joint project between the CEE and the Tunisian Government, in cooperation with UNESCO. This project made possible the construction of the visitor centre, and the provision of some necessary equipment, as well as achieving some activities, such as fixing interpretation and visitor-direction signs and preparation of picnic areas, carrying out activities related to the awareness-raising, and acquisition of some equipment for rangers.

#### **(4) Project of economic development for the local population**

##### *Realized and On-going Projects:*

- Improving the living conditions in the rural areas surrounding the Park (1998-2000).

##### *Remarks:*

- The problems caused by the presence of a resident population in Ichkeul Park have not been taken into consideration as a priority in the projects submitted for financial support for the following two reasons: (a) The number of the resident families has diminished to one half after closing the quarries. At present there are no more than 60 families living in the Park. (b) A UNDP project has been launched concerning the integrated rural development of the population around the Park. Besides, Ichkeul has been selected as one of the sites for launching pilot activities that are in the process of elaboration.

### ***CONCLUSIONS***

- For some years, the future of Ichkeul and its wetland values has appeared severely compromised by the plan to divert most of its water supply by the construction of six dams; this, despite the fact that it is one of the world's most widely-recognized wetlands at an international level, being inscribed in the World Heritage List and on the Ramsar List and designated as a UNESCO Biosphere Reserve. With the new approach to environmental values in Tunisia, there is an opportunity to preserve Lake Ichkeul in the context of an integrated management plan for the wetland, and surroundings.
- Inclusion of Ichkeul National Park in the List of World Heritage in Danger should be perceived, not as a penalty, but as a concern. It is also a means of raising awareness at both the national and international levels about the importance of maintaining the universal World Heritage values of the Park. It calls for close cooperation between the Tunisian authorities, World Heritage Statutory organs (Bureau, Committee), and the World Heritage Centre, as well as all other concerned parties in order to achieve this goal.
- It should be realized that it is not possible in the foreseeable future (in the next five to ten years for example) that the Ichkeul site can be rehabilitated and restored close to the state it was when listed as a World Heritage site.
- The World Heritage expert mission found that the actions undertaken by the concerned Tunisian authorities, as well as the studies and monitoring activities are progressing in the right direction. Encouraging results have been achieved so far. Therefore, the efforts made so far should be supported and given adequate time. International Assistance should be made available upon request. However, periodic revisions and evaluations must be made of the progress of the rehabilitation programme, and the management plan, in order to fulfil their objectives and that the Park maintains the values for which it had been inscribed on the World Heritage List.

## RECOMMENDATIONS

- Since the control of water flowing through the Oued Tindja is crucial to maintaining the ecological character of the World Heritage site, the highest priority should be given to completing the sluice during 1999, and to establishing agreed specific operation rules including automation as a short-term solution. Figures cited in this report as well as past studies of the Sahelian region and Ichkeul in particular indicate wide fluctuations in annual rainfall. There is a need for intervention to bring water to the Lake from the proposed canal from Sejnane river dam whose construction will be completed in the year 2000. It would be difficult to judge success or failure of current rehabilitation measures before that dam is constructed and the canal is completed and is functional.
- It was not clear to the mission as to the expected parameters of various measurements that are being taken
- The educational opportunities offered by the newly constructed Ecomuseum and its exhibition should be fully exploited, through specialized training for the newly appointed technicians for operating the Ecomuseum. Similar specialized training is required for the technicians who will be operating the sluices.
- The expert mission raised concern that the birds wintering at Ichkeul, particularly *Ansa* species are almost exclusively from the Central European countries (Austria, Czech Republic, Slovenia, Hungary, Poland, and former East Germany). It is important to understand the state of conservation of summer habitats in these European as well as the other relevant Sahelian wetlands, to predict accurate assessment of the expected bird situation at Ichkeul.
- The expert mission recommended that the State Party be assisted in organizing a workshop in order to discuss the Management Plan of the Park and the proper strategy for implementation of it. Consideration would be given to the roles of the different parties, and the integration of the plan into the framework of the regional and national development plan.
- Concerning the programme of rehabilitation of the ecosystems of Ichkeul National Park, the expert mission suggested that the relevant Tunisian authorities take into consideration two important issues which have not been mentioned in the progress reports or the management plan of the Park. The first of these two issues is the participation of Ichkeul local inhabitants inside and outside the Park in the decisions and the activities related to the implementation of the plan. This should be viewed in the context of empowering people to mobilize their own capacities, be social actors rather than passive subjects, manage the resources, make decisions, and control the activities that affect their lives. The second important issue is capacity building which aims at promoting human skills of all parties, including local inhabitants, concerned with the rehabilitation programme and the implementation of the management plan.
- An additional rehabilitation measure necessary for Ichkeul is the control of grazing. Currently, the livestock graze uncontrollably, and there is clear indication of overgrazing which may eventually create conflict by herdsmen grazing their sheep on the immediate shores of the Lake. A study should be undertaken on the carrying capacity of this very limited area and a proper sheep harvesting scheme established.
- There is no doubt that the monitoring activities that are currently executed in Ichkeul National Park have been quite useful, and have provided some indication of the positive effects of the rehabilitation programme concerning, in particular, the regeneration of *Potamogeton*. These activities could be more useful if they are directed towards the realization of the main criteria for Ichkeul to be maintained as a World Heritage site.

One of these criteria deals with "ascertained danger of the serious decline in the populations of endangered species, or the other species of outstanding universal value which the property (site) was legally established to protect". Therefore, The World Heritage expert mission suggested that monitoring activities in Ichkeul should emphasize the status of endemic and endangered species of universal and national values. There is no indication of monitoring such species in particular, in the progress reports.

- In a study of "Use and Non-use Values in the Conservation of Ichkeul National Park, Tunisia" Thomas *et al*, (1991)\* mention non-use existence economic values. However, they refer to the important values and functions of the Lake and marshes of Ichkeul. The most important of these values and functions are the livestock grazing on the marshes, lake's fisheries, the existing potential value of the Park as a tourist resource, the role of the water table recharge, and the function of the marshes in the treatment of sewage and purification of water. They argue that the economic gains from measures to rehabilitate the ecosystems would outweigh the economic benefits from the use of water in agricultural irrigation, and effectively maintain much of the international significance of Ichkeul National Park and its surroundings. The World Heritage expert mission notes that one of the most underdeveloped values and functions in the Park are those of "ecotourism", which represents an economic resource of considerable potential. The mission was informed that UNDP is in the process of assisting Tunisia to elaborate a project entitled "micro-projet de promotion des activites generatrices de revenus pour un developpement durable dans la zone de Ichkeul Gouvernorat de Bizerte". It could however, be rewarding that an in-depth economic analysis be launched of the values and functions of the Ichkeul ecosystems in general, with emphasis on developing the resource of ecotourism in particular. Such an analysis, by raising awareness, may provide a good demonstration to decision-makers that it would be economically more beneficial to secure the water needed for the rehabilitation of Ichkeul National Park.

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\* Thomas, D. H. L.; Ayache, F.; Hollis, G. E. 1991. *Use and non-use values in the conservation of Ichkeul National Park, Tunisia. Environmental Conservation*, 18 (2): 119-130.

#### **ACKNOWLEDGEMENT**

The members of the World Heritage Expert Mission would like to express their sincere gratitude to the staff members of the Tunisian ANPE (Environment Protection Agency) who spared no effort in making the Mission's visit to the concerned Tunisian Institutes and to Ichkeul National Park successful and fruitful. The discussions carried out with the ANPE staff members and the information they made available contributed significantly to the fulfilment of the objectives of the Mission.

The World Heritage Expert Mission is also grateful for the enlightening discussions with the staff members of the Ministry of Environment, the Department of Hydrology of the Ministry of Agriculture, and the Forestry Department of the Governorate of Bizerte.

Annex I

**LEVELS OF WATER, SALINITY, RAINFALL**  
**AND BIRD POPULATION FROM 1993 TO 1999**  
**OF LAKE ICHKUL**

Table I

YEAR	LEVEL OF H <sub>2</sub> O IN CM NGT	RAINFALL IN mm	NORMAL (mm)	BIRD COUNT	WATER SALINITY	COMMENTS
1993-1994	-	356	494	131,333	>70 g/l	Unexplained likely error in reporting
1994-1995	-	559	572	97,074	38 to 40 g/L	High salinity
1995-1996	130	861	765	39,361	19 g/l	Spring, Low salinity season, High rainfall
1996-1997	10	355	-	187,732	45 to 60 g/l	Very High salinity, low H <sub>2</sub> O level and low rainfall
1997-1998	-	790	-	90,500	30 g/l	April-Sept - 98 was considered sufficient
1998-1999	23	460 in 3 months and increasing	-	-	27-28 g/l	Slightly Lower

(This data has been obtained from several sources)

**Annex II Water bird population at Ichkeul**

1993/1994 1994/1995 1995/1996 1996/1997 1997/1998 (English)

Canard siffleur	46 080	30 000		33 000	17 200	(Wigeon)
Fuligule milouin	28 540	27 500	18 500	32 500	16 000	(Tufted duck)
Foulque macroule	44 280	20 000		65 000	24 200	(Coot)
Oie cendrée	3 087	10	7 500	6 500	1 300	(Goose)
Canard colvert	1 775	2 750		22 000	11 000	(Mallard duck)
Sarcelles	1 750	2 250	6 250	7 000	2 800	(Teals)
Autres anatidés	2 381	2 564	7 111	7 322	8 000	(
Autres	3 440	12 000		14 410	10 000	(others)
<b>TOTAL</b>	<b>131 333</b>	<b>97 074</b>	<b>39 361</b>	<b>187 732</b>	<b>90 500</b>	

**Annex III Population of Fish in Lake Ichkeul (in tons)**

Year	Types of Fish			Eels	Total All
	Bordigue	Filet	Total		
1990	91	2	93	165	258
1991	94	2	96	52	148
1992	71		72	86	158
1993	76		76	75	151
1994	106	29	135	91	226
1995	55	60	115	25	140
1996	35	53	88	24	112
1997	37	34	71	39	110

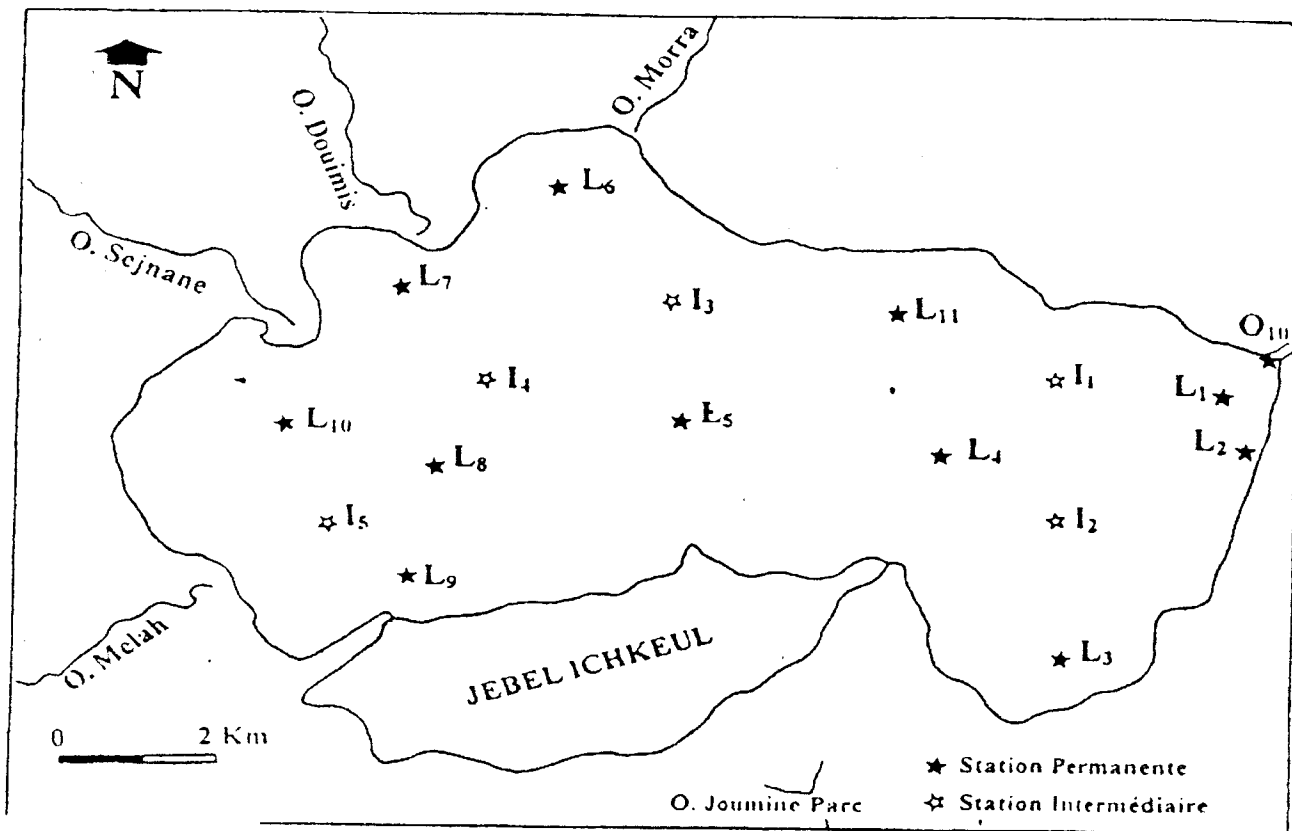
(Source: Report of the Environmental Protection Agency, Ministry of Environment, Tunisia)



**Annex IV Production de la pêche dans le lac Ichkeul**  
*(exprimé en tonnes)*

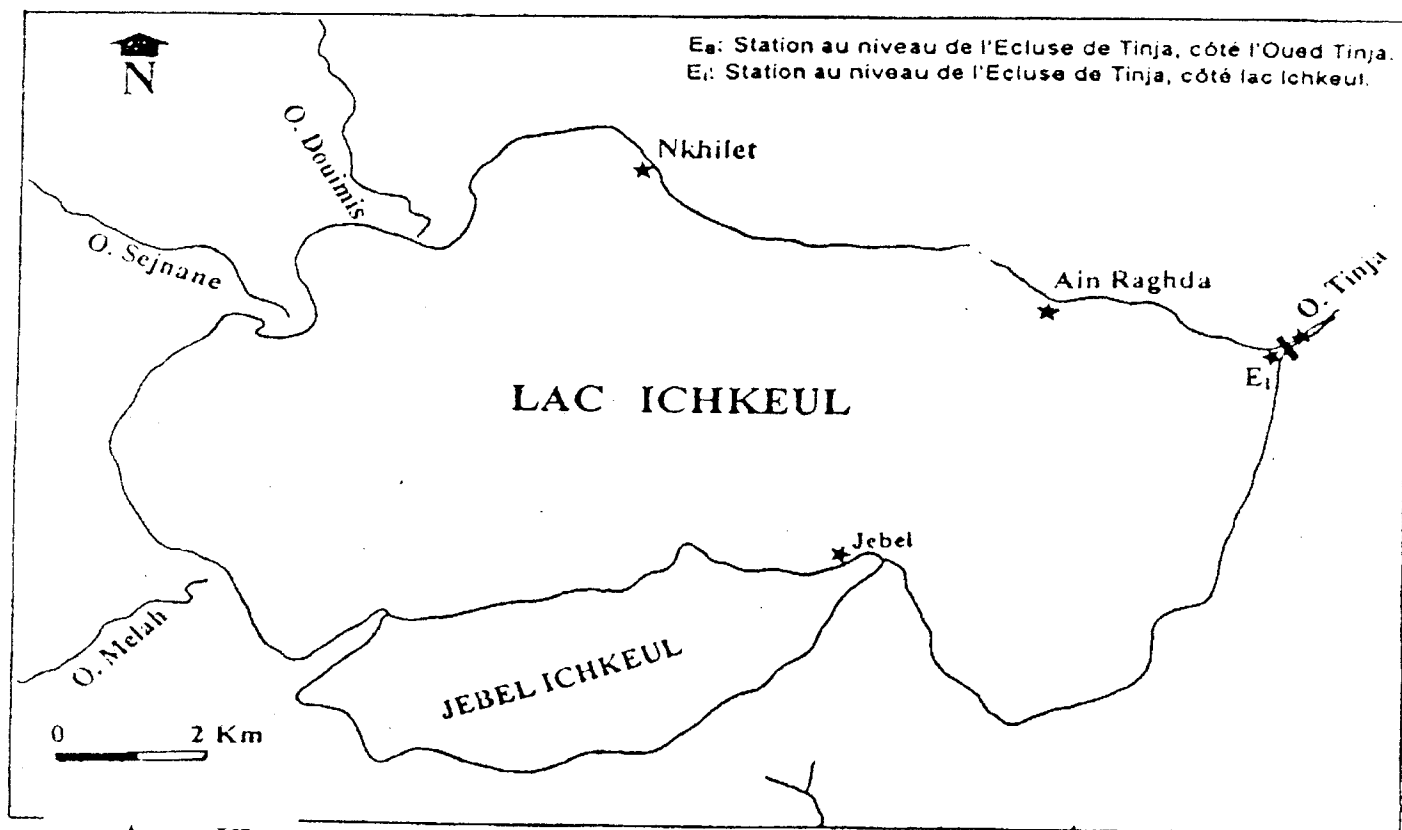
<b>Années</b>	<b>Divers poissons</b>			<b>Anguilles</b>	<b>Total</b>
	<b>Bordigue</b>	<b>Filet</b>	<b>Total</b>		
<b>1990</b>	91	2	93	165	258
<b>1991</b>	94	2	96	52	148
<b>1992</b>	71	1	72	86	158
<b>1993</b>	76	-	76	75	151
<b>1994</b>	106	29	135	91	226
<b>1995</b>	55	60	115	25	140
<b>1996</b>	35	53	88	24	112
<b>1997</b>	37	34	71	39	110
<b>1998*</b>	36	43	79		

\* La production de la pêche jusqu'à la fin du mois de novembre 1998.



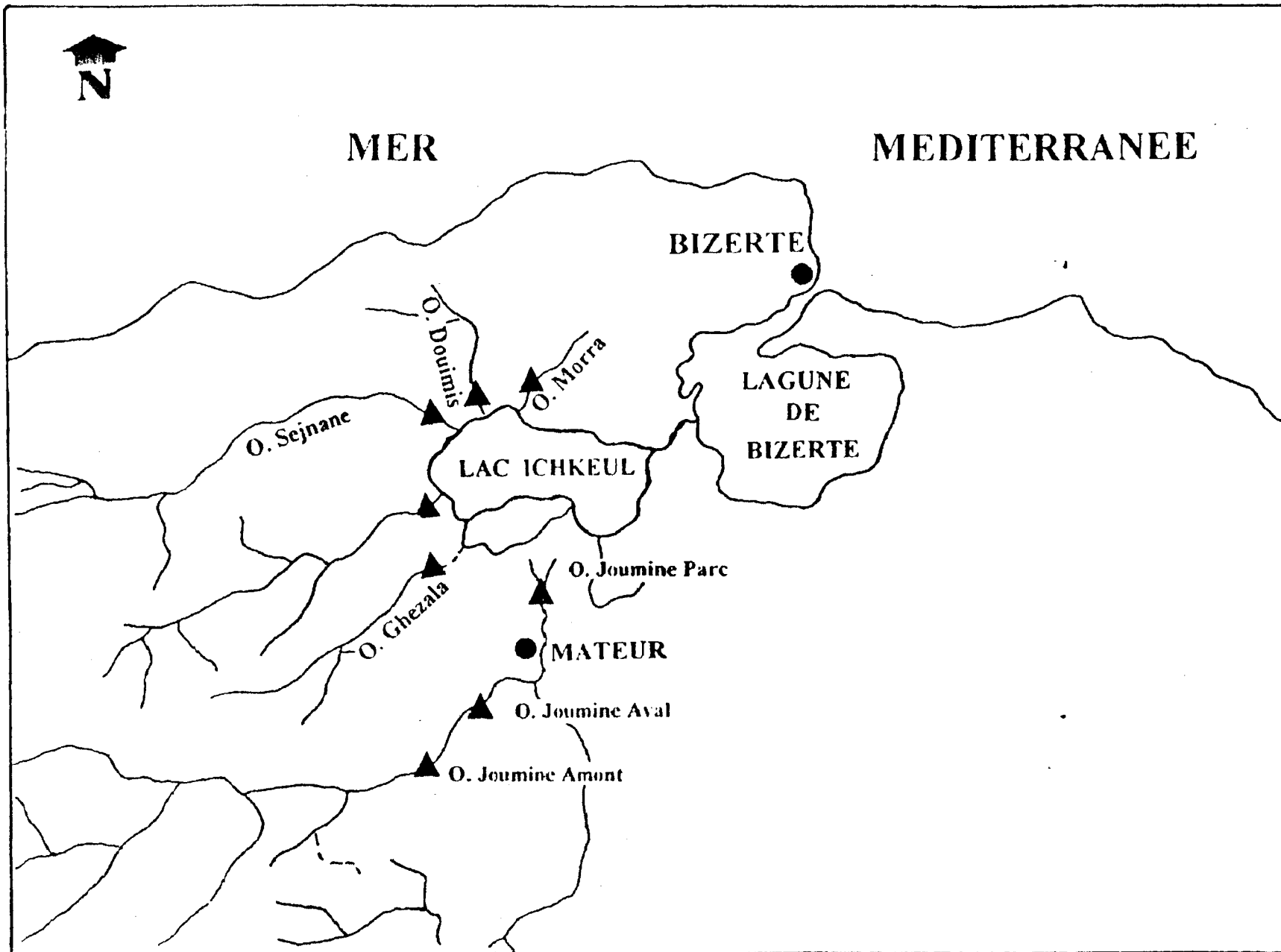
Annex V

Carte de répartition des stations de mesures journalières de Salinité Conductivité et Hauteur de l'eau autour du lac Ichkeul.



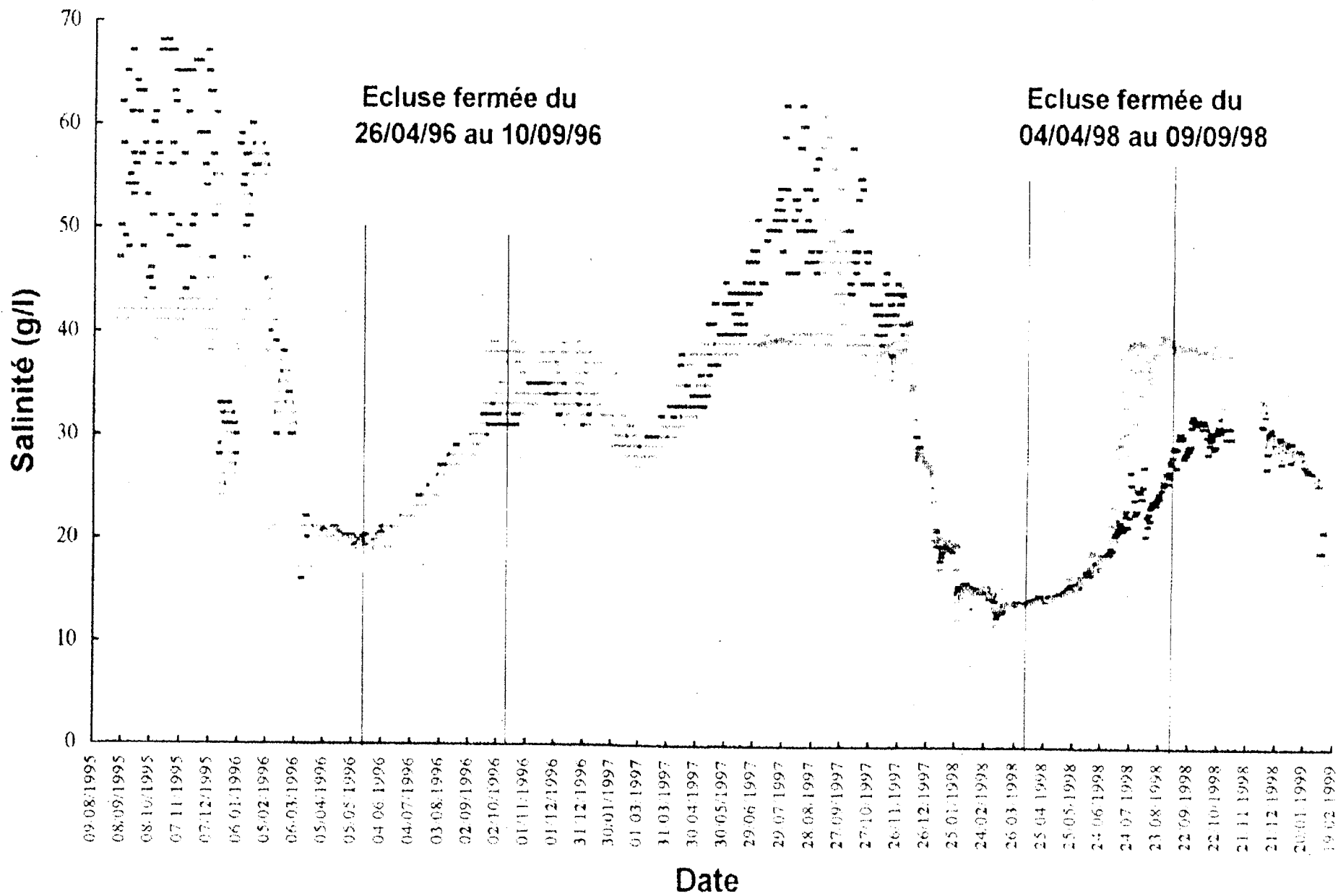
Annex VI

Carte de répartition des stations de mesures des paramètres Physico-chimiques et des prélèvements d'eau et des sédiments au niveau dans lac Ichkeul.



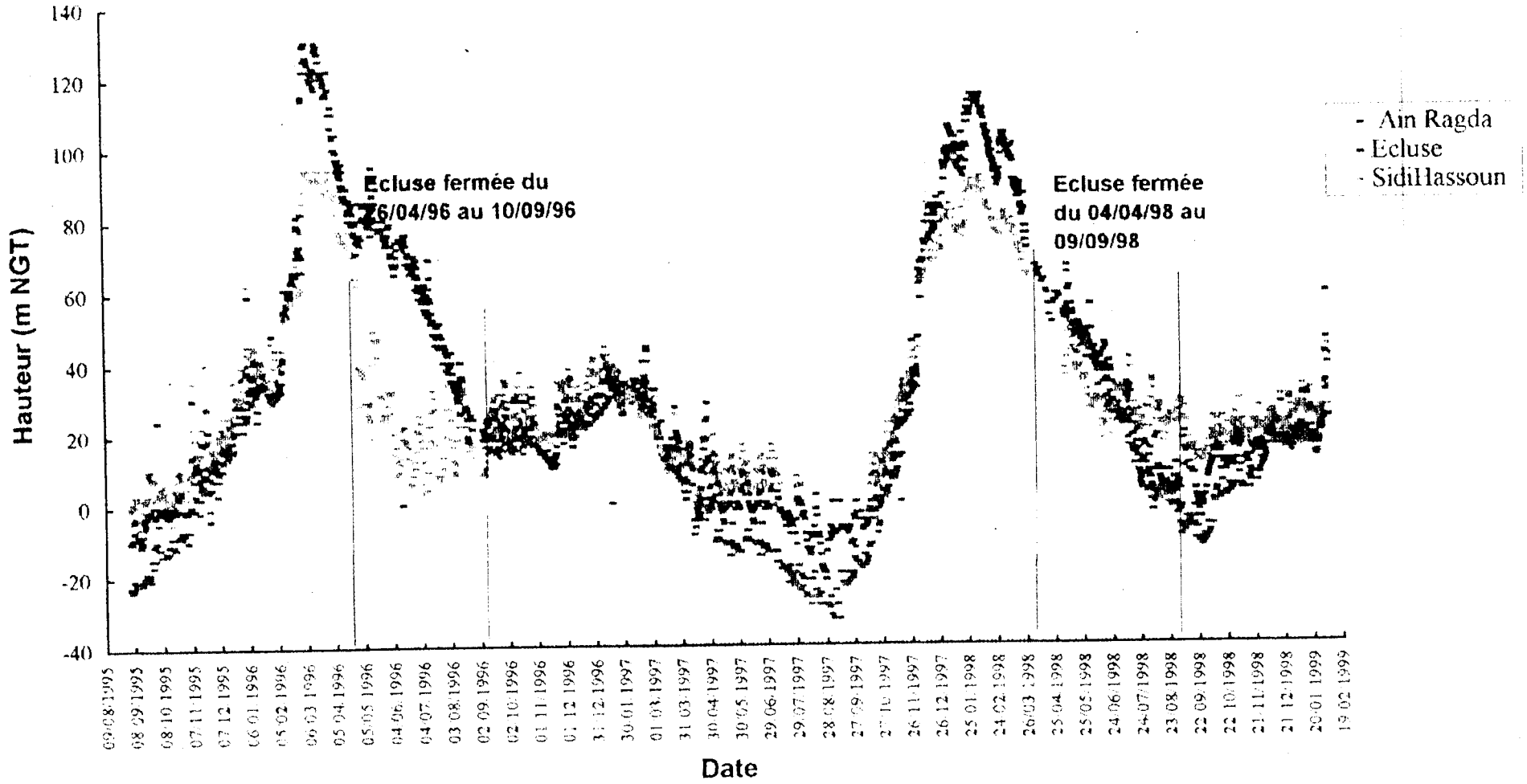
Annex VII Carte de répartition des stations de mesures des paramètres Physico-chimiques et des prélèvements d'eau et des sédiments au niveau des oueds.

# Annex VIII Evolution de la salinité



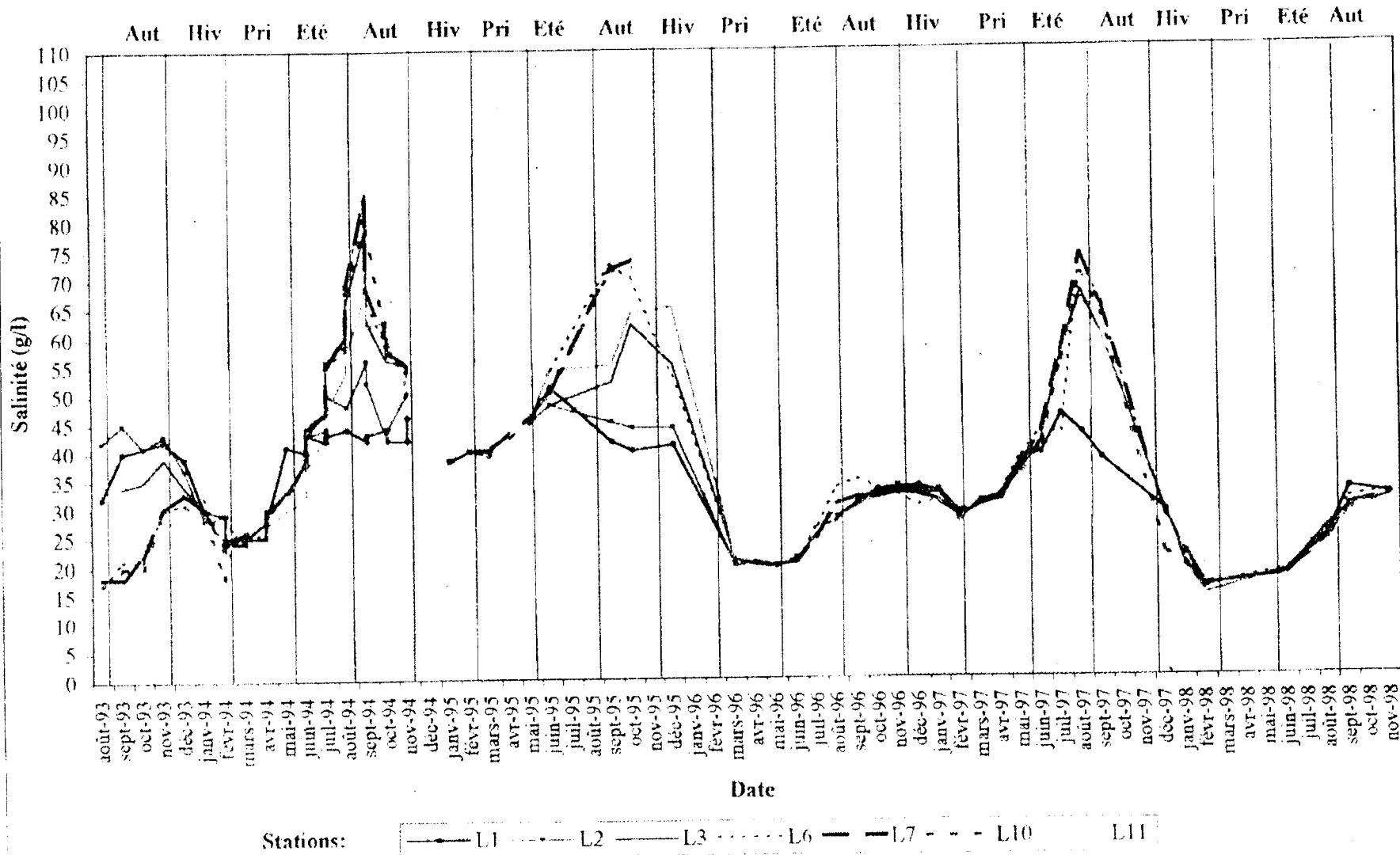
Annex IX

# Variation de la hauteur d'eau



Annex X

Variation de la salinité dans le lac Ichkeul pendant la période 08/93-11/98



### Annex XI

Variation mensuelle moyenne de la précipitation et de la conductivité dans le lac Ichkeul pour la période (Août 93 - Novembre 98)

