Information Sheet on Ramsar Wetlands

1. Date this sheet was completed/updated: 28 February 2001

2. Country: Algeria

3. Name of wetland: Iherir Valley

4. Geographical coordinates:

25° 24' North latitude
8° 25' East longitude

5. Altitude: 1100–1400 metres

6. Area: 6,500 hectares

7. Overview:

The Iherir Valley is at the centre of a sandstone plateau crossed by a large network of fossil valleys. Its altitude varies between 1400 metres on the plateau to 1100 metres at the bottom of the main valleys. It should be pointed out that the history of the Saharan environment, in which is located the Iherir Valley, is characterized from the primary era by an alternation of periods of humidity and drought. The geological record for the recent past is complete and confirmed by abundant pictorial records left on the walls of rock shelters by the first human inhabitants of the Sahara.

8. Wetland type:
Marine/coastal: A, B, C, D, E, F, G, H, I, J, K, Zk(a)
Continental: L, M, N, O, P, Q, R, Sp, Ss, Ts, Ts, U, Va, W, Xf, Xp, Y, Zg, Zk(b)

9. Ramsar criteria: 1, 2, 3, 4, 5, 6, 7, 8.

Criteria that best characterize this site: 1

10. Map of site included? Please tick yes -or- no

11. Name and address of the compiler of this form:

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12. Justification of the criteria selected under point 9, on previous page:

Criterion 1: The Iherir Valley contains sites of international importance, which provide rare or unique representative examples of a former natural wetland. Because of its central location in the Tassili n'Ajjer and the Sahara and because of its nature as an island, a function of its geographical isolation, Iherir is an especially privileged place for the study of the Saharan biocenosis with rich fauna and a diversity of habitats. The Iherir is located in a protected area, the Parc National du Tassili, designated in 1983 as an UNESCO World Heritage Site. The Iherir Valley is both a laboratory and a museum of evolutionary processes, particularly useful for questions of speciation and is a privileged area among the Saharan deserts. From the point of view of archaeology, Iherir has one of the most numerous and outstanding collections of rock paintings in the Sahara.

Criterion 2: We are witnessing since the last wet period, and even today, a concentration of forms of plants and animals in rare regions, such as those of the Iherir Valley, which subsist on little precipitation in the Algerian desert, a vestige of the former drainage network. The Saharan biocenosis has progressively become poorer in number of species represented and in terms of density of specimens. The distribution of many species of vertebrates, which could have be continuous from the Atlas Mountains to the Niger River at one point in time, has gradually been divided up. This has led to a rather exceptional phenomenon in a terrestrial environment, namely the insularity in the spatial distribution of the biocenosis. The Iherir Valley, an insular habitat because of its isolation, favours the appearance and development of small random mutations, which have resulted in the progressive differentiation of scattered populations by variation in their genetic make-up. Because of their isolation, separate evolution took place, which is manifested after a sufficient number of generations by morphological differentiation. This genetic evolution, produced by ecological factors (in one place, discontinuous food resources, for example) can be amplified by ethological factors such as an aptitude for movement of a specimen or its specialized feeding. The Iherir Valley, part of the Sahara, constitutes both a laboratory and a museum of the evolutionary processes, particularly useful for dealing with problems of speciation. The Iherir region constitutes, in this sense, a privileged area in the middle of the Saharan desert.

The very numerous rock paintings in the Iherir are first class documentary material to study the evolution of the Saharan biocenosis from the Holocene (7000 to 10,000 B.C.) to the present. Most of the species represented still exist today in the southern Sahara and most of the paintings depict large savannah-dwelling vertebrates. The ostrich (*Struthio camelus*) is the only bird depicted. Its disappearance from the region of the Tassili, as well as the northern Sahara, is very recent. On a large painting of Tadjilahi, exceptionally well preserved, it is possible to recognize a large variety of antelopes: *bubale* (*Alcephalus buselaphus*), which disappeared from the northern Algerian

Sahara around 1920 (Haltenorth and Diller 1985); sable antelope (*Hippotragus equinis*), whose current northern-most populations reach only the southern shores of Lake Chad; gazelles with an exaggeratedly long neck, similar to the present-day *génénouks* (*Lithocranius walleri*); Sahara oryx (*Oryx dammah*), which survives only on the steppes of the high plateaux of Ethiopia and Somalia; and small gazelle, similar to the Dorca gazelle, which is the only species still well represented. The Barbary sheep (*Ammotragus lervia*) are still well represented here.

The vertebrate wildlife is constituted by species that lived in the Neolithic period and that were able to resist and adapt to the modifications that affected the Saharan ecosystem since that period. One of the important aspects of the original population of the Iherir is the richness of its aquatic fauna. This is due to permanent presence of water in the main valleys (Edarene, Imhirou, Ifédil). The present aquatic vertebrates include fish and batrachians. The African crocodile (*Crocodylus niloticus*), which was reported at this site by Duveyrier (1867), seems to have definitively disappeared since 1924. There are now four species of fish (*Barbus ablabes, B. biscarensis, Clarias azera* and *Tilapia zilli*) in three families. The presence of four species of fish (in an area of four to five kilometres) in the centre of the Sahara is quite a unique phenomenon. The batrachians are reportedly represented by two species of Ranidae: *Rana ridibunda*, an extremely abundant Palaearctic species, and *Ptychadena mascareniensis*, a Palaearctic species. It is interesting to note that in this area these species, originating in each of two contiguous biogeographical provinces, are still sympatric. The Bufonidae are represented by two species: *Buffo mauritanicus* (Palaearctic) and *B. palotropical* (Paleotropical). The lizards are overwhelmingly represented by Saharan endemics (*Agama bibroni, A. mutabilis, Uromastyx acanthinurus*), all Agamidae. A Gekkonidae (*Ptyodactylus hasselquisti*) is very abundant. Snakes, not numerous, are represented by *Cerastes cornutus mutila* and several grass snakes of the *Psammophis* genus. These are all species adapted to the desert environment. The Iherir constitutes an important stopover for birds on their migration route across the Sahara for the migratory species. This explains the relatively large number of species (recorded in a short time): 7 waders, 6 birds of prey, including a nesting bird (*Butea rufinus*), 3 Columbidae, of which two are sedentary and many other sedentary passeriformes and migratory birds (see the annex).

Finally, mammals are represented by 11 species, including the cheetah. More interesting in biogeographical considerations is the presence of the rock hyrax (*Procavia capensis*), the representatives of this species (along with the cheetah) are the most northern in Africa.

The vertebrate population of the Iherir has several interesting characteristics. Apart from several mammals, there are few true endemic species, but there are a variety of Palaearctic and Paleotropical species. The most important contribution has been that of species that have successfully resisted, under stressful environmental conditions, desertification of the environment. The problem of isolation of animal populations following the contraction of the biocenosis is particularly noticeable here.

13. General location:

The Iherir Valley is located in the Tassili n'Ajjer, on the Fadnoun plateau, almost mid-distance between Illizi (the administrative centre of the wilaya) northwest of the city of Djanet in the south-east.

14. Physical features:

Geology and soils: Iherir is the centre of a sandstone plateau, crossed by a large network of fossil valleys. It is formed by intrusive Ordovician sandstone, with a thickness of up to two hundred metres in places. The sandstone is formed by large quartz crystals without small aggregates. There is oblique stratification, which is an indication of a river network decreasing its flow. Other geological indications seem to show that the Iherir was formerly next to a shore and that this environment was occupied by a brine lake with populations of many invertebrates, as indicated by the presence of many fossil worm colonies (*tigillites*) (Fabre, 1976). Fluvial erosion cut into the sandstone deposits during the Secondary period, creating a heavy network of valleys, now fossilized. During the Tertiary, volcanic activity took place, as is confirmed by the layers of tuff containing plants in the larger valleys and the intrusions of basaltic chimneys.

Hydrology: Historically, the presence of a forest species (*Okapia johnstoni*) confirms the existence of long streams during the Saharan Holocene. At that time, the hydrographical network was at its maximum and a relationship probably existed between the Tassili and the tributaries to Lake Chad (via the Tafassasset) and from Lake Chad up to the area of the primary equatorial forests. The hydrographical network that supplied the Ahoggar water basin, at the time it was active, consisted of three basins: one draining towards the north, the other two towards the south.

In the north, there is the oued Igharghar basin, which begins on the northern slope of the Ahoggar. This river was fed by streams flowing from the western and northern slopes of the Tassili n'Ajjer (oued Tadjrajeri and oued Iherir, via oueds Mya, Mzab, Djedi, then Oued Illizi). They flowed through the wadi of Mya, Mzab, Djedi and emptied into the Mediterranean through the depression now occupied by the Melrhir *chotts* (wilaya of El-Oued in Algeria) and Djerid (in Tunisia). This large river network allowed the Palaearctic aquatic species to reach the level of the Tropic of Cancer and explains the presence of *Barbus biscarensis* at Iherir. In the south, one of the two other basins drains the water from the southern slope of the Tassili n'Ajjer towards the Tafassasset, which finishes in Lake Chad. The flood plain of the Chari, Bénoué and the Niger allowed Paleotropical aquatic fauna to populate the southern Sahara. The Tafassasset basin can be considered as the vector of *B. ablabes*, *C. lazera* and *T. zilli* from the Paleotropical domain into the Palaearctic domain. The coexistence of the four species of fish implies communication, even temporarily, between the network of Igharghar and that of Tafassasset. This extremely branched water network, a fossil network in most of its area, is formed by the beds of enclosed wadi that Le Berre (1989) classified as:

- simple cuts of several decimetres, draining local precipitation (primary runoff channels);

- steep-banked channels whose relatively narrow beds are no wider than about 20 metres;

- wider channels (100 to 400 metres) forming flood plains.

The very enclosed main valleys have a difference in elevation in relation to the plateau that can reach 300 metres. Their width varies between 10 to 100 metres. The bottom of these valleys is occupied by a series of permanent bodies of water sometimes enlarged to small lakes up to 20 metres wide by 100 to 200 metres long, with a depth of up to 5 or 6 metres. All of these bodies of water are permanently linked to each other by a rivulet with little current in August, which become more important during the winter, even if there has been no precipitation at Iherir. This fact points out the extent of the drainage area of the Tassilien sandstone. The permanent presence of water at the bottom of the largest valley allows the development of considerable vegetation, which can become continuous when there is a layer of alluvial sedimentation. It is particularly abundant where the valley widens, permitting the formation of small marsh basins. In the largest valley, small springs make possible the irrigation of crops on terraces.

Climate: In the absence of a meteorological station in the valley, data from the nearest stations (Illizi (610 metres in altitude) and Djanet (1160 metres in altitude), located approximately 150 kilometres in a direct line from Iherir, record average maximum temperatures of 42° and 39° C and average minimum temperatures of 6° and 5° C. The corresponding temperatures at Iherir do not greatly differ. The rainfall at Illizi and Djanet is about 20 millimetres with, of course, strong annual irregularity. Because of the abundance of flora in the Iherir Valley, F. Bernard (1959) estimated rainfall at 150 millimetres. This amount is probably exaggerated, and the development of vegetation here is due mostly to the conjunction of favourable elements such as the high rainfall (caused by evapotranspiration in the valley); the drainage of rainwater over long distances on barren rocky soils and its appearance at the bottom of deep valleys on clay or granite substrata; the narrowness of some of these valleys, which are real canyons and in which the vegetation, because of this, is sheltered from sunlight during a relatively large part of the day.

16. Ecological features:

From the point of view of the ecology, the combination of two factors makes the Tassili in general and especially the Iherir a privileged region in the central Sahara. The first of these factors is the relatively high altitude in relation to the average altitude of the Sahara, which is between 1000 metres and 2158 metres. The second factor is the important amount of permanent open water. The combination of these two elements produces the special ecological conditions that are very propitious for the survival of a relic fauna, which was already established here at the beginning of the Quaternary. From the point of view of human settlements, the ecological conditions have permitted the maintenance of a sedentary population since the Neolithic period, which has

not been the case for the rest of the Tuareg population of the Central Sahara. Three land uses characterize the site: environments linked to the hydrographical network from simple cuts of several decimetres, channels with steep banks and whose relatively narrow beds, no greater than about twenty metres, open wider channels (100 to 400 metres), forming alluvial plains and very narrow main valleys whose elevation in relation to the plateau can reach 300 metres. And, finally, the plateau, characterized by an abundance of bare rock at between 1300 and 1400 metres in altitude, divided into two parts: the Tassili sensu stricto, which is in the form of a *hammada* (a sub horizontal surface formed by small blocks of sandstone, cut by several channels and drainage rivulets).

The rocky complex, located at the summit of the Tassilien hills, is a mass of sandstone blocks several metres high, among which erosion has cut paths, often joined together in a crisscross pattern. The accumulated blocks form rock debris. These blocks, often forming overhangs, served as shelter for a human Neolithic population, which used the relatively smooth rock walls for rock paintings.

17. Noteworthy flora:

In all of the region of the Fednoun, vegetation is abundant above 1100 metres in altitude and because of its phytosociological aspect belongs to the Sahara-Mediterranean stage as defined by Ozenda (1977). It is characterized by the presence of species such as *Myrtus nivelli* and *Olea laperrini.* In comparison, it is interesting to note that in the Ahoggar, the same vegetative stage begins at only 2100 metres. According to Lebert (1989), the natural environments can be divided into two large categories: those linked to the hydrographical network and those linked to the plateau sensu stricto. The first category includes shrub vegetation (*Acacia* spp., *Nerium oleander, Phoenix dactylifera, Rhus oxyacantha, Ricinus communis* and *Tamarix articulata*), which are now rather sparse, and many herbaceous species, such as *Orobanche cernua*, *Silene villosa* and *Teucrium polium*. The seasonal or permanent bodies of water are bordered by *Juncus maritimus, Phragmites communis, Typha angustifolia* and *T. elephantina*. The bodies of water contain filamentous algae, Characea, *Potamogeton perfliatus* and *Myriophyllum spicatum*. In the accreted areas, rich in clay-earth sediments, there is a pattern to the populations. The *typha* are surrounded by a belt of *Juncus maritimus*, which recall the marshes of northern Algeria. The second environmental group, that of the plateau, is characterized by the *hammada* (abundance of bare rock or Tassili sensu stricto) where the sparse vegetation is limited to several clumps of *Aristida pungens*, *Andropogon laniger* and the blooming of *Pancratium trianthum* after the rains. In the rock debris, the vegetation is rare: a few *Colocpnythus vulgaris* on the clay-sand areas and a few shrubs that successfully gain a hold with their roots in the cracks in the rocks: *Errua crassifolia, Myrtus nivellei* and *Olea laperrini*.

The flora is much better represented in environments linked to the hydrographical network than those of the plateau where it is much rarer. The vegetation is represented by shrubs (*Acacia* sp., *Nerium oleander, Phoenix*

dactylifera, Rhus oxyacantha, Ricinus communis and *Tamarix articulata*) and herbaceous plants (*Orobache cernua, Silene villosa* and *Teucrium polium, Aristida* sp., *Andropogan* sp., *Typha elephantina, Zilla spinosa*). The permanent presence of water at the bottom of the larger valley makes possible the development of considerable vegetation. It is especially abundant in places where the valley widens allowing the creation of small marsh basins. There are *Juncus maritimus, Phragmites communis, Typha angustifolia* and *T. elephantina*. Collected water contains filamentous algae, Characeae, *Potamogeton perfoliatus* and *Myriophyllum spicatum*. In the widened areas, rich in clay and earth sediments, the populations are structured. The *Typha* are surrounded by a belt of *Juncus maritimus*, which recalls some of the marshes in northern Algeria.

18. Noteworthy fauna:

Concerning the paleofauna, the very many rock paintings at Iherir are first-class documentary evidence of the evolution of the Saharan biocenosis since the Holocene (7000 to 10,000 years ago) up until now. Most of the species that are represented still exist today south of the Sahara. Most of these paintings represent large plain vertebrates, including the ostrich (*Struthio camelus*), *bubale* (*Alcelaphus buselaphus*), sable antelope (*Hippotragus equinus*), long-necked gazelle (similar to the *Lithocranius walleri*), oryx (*Oryx dammah*) similar to the Dorca gazelle, Barbary sheep (*Ammotragus lervia*), giraffe (*Giraffa camelpardalis*), okapi (*Okapia johntoni*), hippopotamus (*Hippopotamus amphibius*), rhinoceros (*Diceros bicornis*) and several carnivores, such as the lion and jackal. The simultaneous presence of these species can be explained only by the presence of an abundant plant environment and permanent bodies of water, both essential for the animals and the reproduction of several species, such as the hippopotamus and the crocodile. The current vertebrate fauna is represented by a relics of species that lived in the Neolithic period and that were able both to resist and adapt to the modifications that have affected the Saharan ecosystem since that period. One important aspect of the animal populations of the Iherir is the richness of the aquatic fauna. The current aquatic vertebrates include fish and batrachians. The crocodile (*Cocodylus niloticus*), which had been recorded here by Duvryrier (1867), seems to have completely disappeared since 1924–1925, the year when the last specimen was shot (anonymous 1925).

The fish are now limited to four species in three families: the Cyprinidae, including the *barbeau de biskra* (*Barbus biscarensis*, Boulenger 1911) and the *barbeau du désert* (*Barbus ablabes*, Bleeker 1863; syn. *B. deserti*, Pellegrin 1909). The Claridae, represented by the *silure de l'Imhirou* (*Claria azera*, Cuvier and Valenciennes 1840 and the Cichlidae, represented by the *tilapia de Zill* (*Tilapia zilli*, Gervais 1848). The simultaneous presence of four fish species over a distance of 4 to 5 kilometres in the middle of the Sahara is a very unique phenomenon. Three of these species are part of the Paleotropical group (*Barbus ablabes, Claria lazera* and *Tilapia zilli*). Part of the Palaearctic group is the species *Barbus biscarensis*, a species related to the *B. callensis* as was demonstrated by Almaca in his revision of the genus in 1971. This species is found in a large part of North Africa outside the Sahara.

The simultaneous presence of representatives of these two biogeographical populations gives credence to the interconnection of the hydrographical networks now fossils of the Sahara. The batrachians are represented by two species: *Rana ridibunda*, a Palaearctic species, and *Ptychadena mascareniensis*, a Paleotropical species. It should be noted that here these two species, originating in two contiguous biogeographical empires, are sympatric. The Bufonidae are represented by *B. mauritanicus* and *B. regularis,* and the reptiles by the endemic lizards of the Sahara (*Agama bibroni, A. mutabilis, Uromastyx acanthinurus* for the Agamidae) and one Gekkonidae (*Ptyodactylus hasselquiti*). The snakes, not many, are represented by the *Cerastes cornutus mutila* and several grass snakes of the genus *Psammophis*, both adapted to the desert environment. The mammals of the Iherir are characterized by the presence of the rock hyrax (*Procavia capensis*), a species more interesting than the others from the biogeographical point of view and the most northern representatives in Africa. In addition, there is the cheetah, a species that is becoming extinct in Algeria, represented here by several tens of specimens and the jackal (*Canis aureus*), fennec (*Fennecus zerda*), Dorca gazelle and the Barbary sheep (*Ammotragus lervia*). There is also a more localized fauna with a more limited range, such as the *goundi* (*Massoutiera mzabi*), *Gerbilus nanus, G. pyramidum, Meriones libycus* and other gerbils, plus the *souris épineuse* (*Acomys cahirinus*) and the rock hyrax (*Procavia capensis*).

19. Social and cultural values:

In the large Iherir Valley there is farmland that allows human settlements. Farming is not carried out on the valley floor, but on terraces where small springs make irrigation possible. The date palm is the dominant plant, along with the fig tree (*Ficus carica*) and a climbing vine (*Vitis vinifera*). Vegetables are grown in the shade of trees (carrots, onions and tomatoes). Barley is grown in the open for harvest in April. The farming of these crops, complemented by the raising of goats and cattle, has allowed the Tuareg to live in autarchy in the Iherir until quite recently. This is unique in comparison with the other Saharan populations where the exchange of salt and cereals or dates and cereals with neighbouring populations to the north or south of the Sahara was quite common. The very many rock paintings of the Iherir are cultural material of universal importance.

20. Land tenure/ownership of:

The aquatic parts of this wetland are in the public domain.

21. Current land use:

At the site: No activity other than tourism exists in these uninhabited areas.

In the surrounding area: Only food crops are grown on terraces, under irrigation near the site.

22. Conservation measures taken:

The Iherir Valley has been included since 1978 in the Parc national du Tassili and was designated in 1983 as a UNESCO World Heritage Site.

23. Conservation measures proposed but not yet implemented: None

24. Current scientific research and facilities:

This area, like the Parc National du Tassili, has been the object since the beginning of 2000 of studies of the natural heritage in order to establish a management plan and its implementation.

26. Current conservation education:

The Parc National du Tassili is the object of an educational programme and promotion of awareness among the general public.

27. Recreation and tourism:

Located within one of the richest open-air laboratories for rock paintings and engravings, the Parc National du Tassili, the Iherir Valley is the object of a relatively large amount of tourism. Nonetheless, since 1992 tourism has rapidly dropped until 2000 when there seems to have been a slight increase.

28. Jurisdiction:

Territorial jurisdiction is the responsibility of the wilaya of Skikda, Daïra and Dajanet. Functional jurisdiction is the responsibility of the Ministère de la Culture, de l'agriculture, de l'hydraulique, des Travaux publics de l'urbanisme, de l'environnement et de l'aménagement du territoire, le Ministère du tourisme.

29. Management authority:

The Parc National du Tassili is the management authority under the guidance of the Ministère de la Communication for all cultural aspects. However, fauna and flora are the responsibility of the Ministère de l'Agriculture, the single management authority for the fauna and flora in accordance with Environment Law 83-03 of 1983. Office du Parc National du Tassili, Djanet, Wilaya of Illizi.

30. References: