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# The Conservation Status of Eastern Mauritania's ephemeral wetlands and their role in the Migration and Wintering of Black Storks (*Ciconia nigra*)

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ABSTRACT - *Research carried out on the ephemeral wetlands of eastern Mauritania since September 1999 sheds new light on the dynamic yet critical role that these wetlands play in the life history of Palearctic migrants. A wide range of data has been collected on the ecology of these temporary waterbodies to give a better understanding of their environmental and economic functions.*

*Aerial and terrestrial counts of waterbirds from 1999 to 2002 indicate the importance of these wetlands for Black Storks. Information from the field complements remote satellite tracking of Black Storks from Europe to their wintering grounds in West Africa. This helps to rationalise the motives for stop-overs by the Storks in seemingly arid, inhospitable locations.*

*Preliminary efforts have been made to inventory and classify the ephemeral wetlands of eastern Mauritania by the author in collaboration with Project GIRNEM of the German Technical Co-operation (GTZ). The ensemble of wetlands is unprotected and 3 sites have been proposed as Ramsar sites. Human population growth, sedentarisation and national food security policies are increasingly putting pressure on wetlands; islands of productivity in an otherwise arid land. The lack of a national wetlands strategy and the autonomous approach taken by development projects in developing wetland resources, increases the risk of damaging a fragile ecosystem. With so much effort being put into the conservation of Black Storks in their breeding grounds it seems controversial that there is so little information on their status in their wintering grounds.*

## Introduction

Eastern Mauritania consists of three regions, Assaba, Hodh El Gharbi and Hodh Ech Chargui, and is bordered to the South and East by Mali (Fig. 1). It is located in the arid northern Sahel, receiving on average 200mm of rainfall per year. Rain falls in a single wet season from July to October, with the majority of precipitation in August and September. In 1999 and 2000 rainfall was above average after many years of below average rainfall and drought (Fig. 2).

Rainfall is highly variable in space and in time and this is reflected in the unpredictable nature of the ephemeral wetlands. The link between increased aridity and greater wetland variability has been made by WILLIAMS (1985). The wetlands are fed by run-off from their catchments area with the vast majority of wetlands being endorheic basins or seasonal water courses. Rates of evaporation and evapotranspiration are high with water levels dropping as the dry season

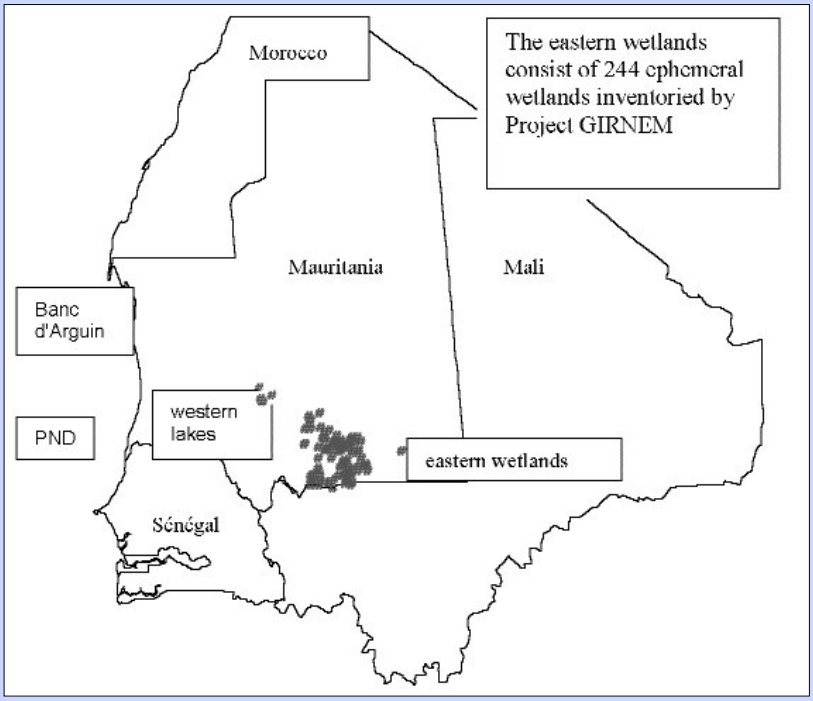



Fig. 1 - *The Principal Wetlands of Eastern Mauritania. - Principales zones humides de l'est de la Mauritanie.*

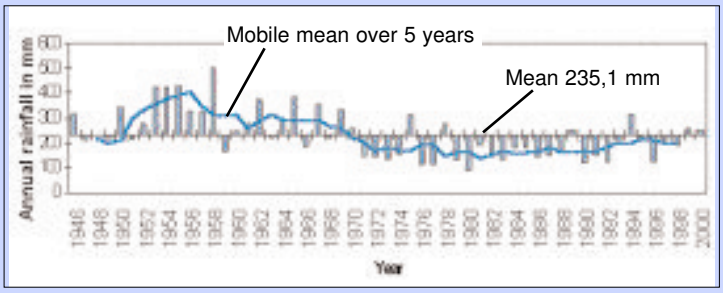



Fig. 2 - *Mean annual rainfall at Aioun, Hodh El Gharbi, from 1946 to 2000. - Pluviométrie annuelle moyenne à Aioun, Hodh El Gharbi, de 1946 à 2000.*

progresses. The duration, depth and size of the wetlands varies dramatically from year to year, with the wetlands remaining dry when seasonal rainfall within their catchments is low. Due to the unpredictable occurrence of individual wetlands the entire network of wetland resources needs to be taken into consideration when assessing the benefits they provide for avifauna.

Due to the shallow nature of the wetlands mixing precludes thermal stratification. Transparency is low with secchi depths ranging from 2.5 to 50cm. As the season progresses and water volume decreases, ionic concentration increases. While levels of sodium and chloride increase into the dry season, extreme levels of salinity were not recorded, with complete desiccation occurring before excessive salinity. These factors have an influence on primary production and the associated macro-invertebrate and fish populations, all of which are important in the diet of waterbirds.

Runoff from the surrounding uplands washes clay fines into wetland depressions. The resulting increase in clay materials and organic matter makes wetland soils more productive than the red-brown sandy soils dominating the area. The concentrations of animals attracted to the water and pasture at the wetland bring additional nutrients into the system. The luxuriant growth of aquatic vegetation (*Ipomea aquatica, Nymphea lotus, Echinochloa colona, Cyperus spp.*) also attracts waterbirds, while large Acacia nilotica trees provide roosting opportunities.

Wetland resources resulting from increased nutrient availability and moisture are the basis for a wide variety of economic activities. Livestock rearing is the principal livelihood activity practised in eastern Mauritania, responsible for 80% of the revenue there (MDRE, 1999). Animal herds rely on the surface water available in wetlands for water during the wet and cold seasons, and even into the dry season where water remains in the larger wetlands. Flood recession agriculture can be practised as the water level recedes, and the trees associated with certain wetland types are sought after for fuel and construction wood. Wild foods and medicinal plants are collected for home use, or for sale, providing a valuable source of income in drought years. Hunting and fishing are small scale activities that rise in importance when other systems of production fail in dry years.

Local livelihoods depend on open access to wetland resources, and this has been assured throughout the millennia by preserving their common property status. Customary law based on the Charia (Islamic law) is current practice throughout eastern Mauritania. Contradictions between modern Napoleonic law and customary law are creating confusion over rights of ownership and access to wetlands. This, coupled with population pressure, sedentarisation and agricultural expansion, heightens the risk of conflict between user groups and increases pressure on vital wetland resources.

This changing social context has potentially profound impacts on the ecology of eastern Mauritania's ephemeral wetlands. The risks to Black Storks due to loss of suitable habitat in the Northern Sahel are discussed with reference to conservation and management options.

## The ornithological importance of Mauritanian wetlands

The Banc d'Arguin has long been recognised as West Africa's most important waterbird site, holding the world's largest concentrations of non-breeding waders. Established as a National Park in 1976, this Ramsar site encompasses 40% of the Mauritanian coastline. There is an extensive literature available on the park and its associated bird populations (e.g. ALTENBURG *et al.*, 1982; Ens *et al.*, 1989; MENGIN & VAN SPAJNE, 1989; PRICE *et al.*, 1992; ZWARTS *et al.*, 1998). The ornithological importance of delta of the Senegal River was described in detail by DE NAUROIS (1969), before the building of the Manantali and Diama dams which radically altered the ecology (HAMERLYNCK *et al.*, 1999a, b). Restoration efforts in place since 1990 have resulted in the return of thousands of migrant and resident birds including regular sightings of Black Storks over the winter months (MESSAOUD *et al.*, 1998). The area is protected as a National Park (Parc National du Diawling-PND), and is designated as a Ramsar site.

Further inland from the coast the information available on the continental wetlands and their role for birdlife becomes scarce. The first aerial and terrestrial counts of waterbirds in Mauritania were in 1982. The results indicated the potential role of the inland wetlands for waterbirds (LAMARCHE 1984, 1985). The PND and the Banc d'Arguin have been included in the International waterbird census since 1993, as have the western lakes of Aleg, Mâl and R'Kiz (Fig. 1). Apart from studies by LAMARCHE (1983, 1984, 1998) the eastern wetlands were

largely ignored until a wetland identification mission in southern Mauritania by VAN WETTEN *et al.* (1991). Mahmoûdé, a semi-permanent wetland of over 16,000 ha in Hodh Ech Chargui is described by the authors, as is the Karakoro system in the Assaba, but the extent of small, isolated ephemeral wetlands went unnoticed.

The role played by wetlands in the northern Sahel as stop-over sites, over-wintering and breeding grounds for avifauna has been presented by several authors (JARRY *et al.,* 1987; VAN DER LINDEN, 1988; WESSIE, 1996; PERENNOU, 1991; MULLIÉ *et al.*, 1998). Research in Australia and southern Africa has increased our understanding of the importance of arid land wetlands for resident and migrant bird populations, which arrive in huge numbers after the rains to exploit their productive waters (KINGSFORD, 1995; GELDENHUYS, 1982, SIMMONS *et al.*, 1999; HERREMANS, 1999). Unpredictable occurrence from year to year, and the resulting variations in numbers of birds, are characteristics of dryland wetlands.

The importance of eastern Mauritanian wetlands to waterbirds, and Black Storks in particular, will be presented in this paper. The effects of the variable nature of the wetlands on habitat use and conservation are discussed.

## Methodology

An inventory of 244 wetlands in eastern Mauritania focusing on the central region of Hodh El Gharbi, collected preliminary information on the distribution, environmental, and socio-economic aspects of the wetlands. The pedology, limnology, topography, flora and fauna of 7 sample wetlands was studied from September 1999 to May 2000 to give a more detailed picture of the functioning of these ecosystems (SHINE, in prep.). Regular birds counts were carried out through the winter of 1999-2000, and the wetlands were included in the January international waterbird census in 2000 and 2001. Ten sites were counted in the winter of 1999-2000, and 15 in January 2001, 8 of which were dry and almost devoid of birdlife. These counts give a first glimpse of the diversity and density of species using the eastern wetlands.

## Results

### Wetland typology

Univariate analysis of the data collected during the wetland inventory tested the validity of the local wetland nomenclature and revealed three main wetland types; tamourt, gâat and oued.

Tamourts are the most common and widely distributed wetland type (59 % of all inventoried wetlands). They form when rainwater collects in a clay lined depression, to form a endorheic system. Tamourts are characterised by stands of Acacia nilotica, and 95 % of the tamourts inventoried contained this species. Tamourts have the longest mean water duration (6 months) and play a vital role in the watering of livestock.

Gâats form in depressions with gently sloping topography. They are open wetlands with a luxuriant growth of aquatic vegetation *(Nymphea lotus, Ipomea aquatica, Echinochloa colona, Cyperus spp.*). They tend to have a shorter duration (4 months) than tamourts due to their shallow relief, and are widely used for arable agriculture (73 % of gâats are cultivated). These wetlands are particularly important to *Anatidae* populations as the aquatic vegetation provides a rich food supply as well as cover.

Oueds are temporary water courses that flow during, and for a limited time after the rains (mean duration of 5 months). They have distinctive banks, unlike gâats and tamourts, vegetated with trees such as *Acacia nilotica*, *Ziziphus mauritania* and *Balanites aegyptica*. Water collects on flats or minor depressions along the oued allowing water to stagnate for several days or months. Although frequently cultivated, oueds have a rich biodiversity due to the varied nature of environmental conditions they present.

A review of international classification systems (COWARDIN *et al.*, 1979; SEMENIUK & SEMENIUK, 1995; FARINHA *et al.*, 1996; RAMSAR CONVENTION BUREAU, 1997) found that they allowed insufficient distinction between ephemeral wetlands. This makes it difficult to convey the characteristics of the individual wetland types found in eastern Mauritania on an international level. A modified version of the Medwet classification system (FARINHA *et al.*, 1996) that is based on COWARDIN *et al*. (1979), is proposed for this purpose (SHINE, in prep.).

## Black Stork preferences for wetland types

Black Storks have been observed in all of habitat types described above. Sightings in the East of the country are shown in figure 3. The most northerly sighting is at Tamchekett, a oued in northern Hodh El Gharbi. The wetland is densely forested with *Acacia nilotica* and has an average water duration of five to six months. Due to the proximity of the site to the town of Tamchekett, there is considerable human disturbance from water collection, brick making, gardening and the watering of livestock. Nevertheless 8 juvenile birds were observed in September 1999, using the wetland as a stop-over point on their journey south. The trees offer shade and a place to rest while food, especially frogs (*Dicroglosus occipitalis*), is in abundant supply.

The largest concentration of Black Storks was recorded at Gâat Mahmoûdé in January 2000, by aerial survey. Although classified a gâat, Mahmoûdé has some areas of gallery forest along the oueds that feed into it from the East. It was in one of these areas (Krâ'el Akhdar), forested with *Acacia nilotica* that the storks were observed. A total count of 83 Black Storks represents more than 1 % of the biogeographical population (ROSE & SCOTT, 1997). This forested section of the wetland provides shelter and roosting opportunities for the storks, while food is abundant throughout the wetland in the form of amphibians (*Bufo regularis, Hoplobatrachus occipitalis*), fish (*Protopterus annectus*), locusts and macroinvertebrates (NICKEL, 2001). Mahmoûdé is a semi-permanent wetland and as 1999 was a year of exceptionally high rainfall, the storks had the possibility of over-wintering. The extent of their duration is unknown, but they were not present at the time of the next waterbird count in March 2000.

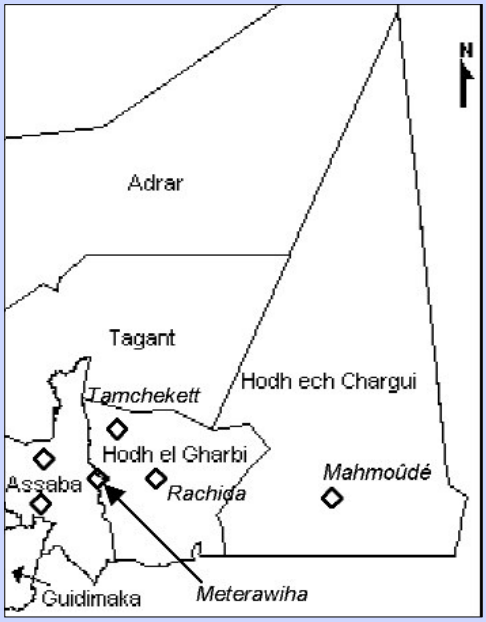



Fig. 3 - *Observations of Black Storks in eastern Mauritania. - Observations de Cigognes noires dans l'est de la Mauritanie.*

Table 1 - *Records of Black Stork sightings during the January International Waterbird Census and other sightings from 1998 to 2002. - Observations de Cigognes noires lors des recensements internationaux d'oiseaux d'eau de janvier et autres observations de 1998 à 2002.*

| **January water bird census** | | | **Other sightings** |
|---|---|---|---|
| **Year** | **Location** | **No. observed** | |
| 1998 | PND / Bell | 3 | December<br>Maghama - 62 [3]<br>Wompou - 50 [3] |
| 1999 | PND (terrestrial count) | 14 | September<br>Tamchekett - 8 juveniles [1] |
| | PND (aerial count) | 30 | December |
| | Lac R'Kiz | 1 | Maghama 75 [2] |
| 2000 | Birette (delta) | 9 | |
| | PND / Bell | 6 | |
| | PND / Diawling | 31 | |
| | PND / Tichillit | 1 | |
| | Lac de Mal | 1 | |
| | Gâat Mahmoûdé | 83 | |
| 2001 | PND (aerial count) | 27 | End January<br>Guelta Meterawjha - 1 [1]<br>September<br>Guelta Meterawjha - 7 [4] |
| | Mahmoûdé 2 | 2 | November<br>PND 3 adults [1] |
| 2002 | No January census | | No sightings during counts by GIRNEM |

[1] Observation by the author; [2] Project African Odyssey;
[3] Cigognes sans Frontières; [4] Volker Salewski

Interviews with locals at wetlands all over eastern Mauritania indicate the presence of Black Storks for short durations at tamourts, gâats and oueds. Staff of Project GIRNEM had reports of a Black Stork ringed in Madrid from a tamourt just North of Aioun (Tamourt Rachidia). Unfortunately local communities attach little scientific value to rings, most of which become trinkets and jewellery.

A wetland type common all along the southern edge of the Sahara is the guelta. These are arid zone pools which occur in mountain areas, situated either at the foot of former waterfalls or at a site where the river bed was deepened. They may be permanent, temporary or spring fed. Although small in size, gueltas support a rich biodiversity ranging from crocodiles and fish to rock hyraxes and genets. Located as they are on the border between the Sahel and the Sahara they are ideal staging posts for migrating waterbirds. A single Black Stork was observed at Guelta Meterawja in January 2000 and 7 in September 2001 (Saleweski, per. com.). Discussions with local people indicate that such sightings are not unusual.

Table 1 shows how little we know of the distribution of Black Storks in Mauritania from field sightings. Satellite tracking by projects such as Project "African Odyssey" and "Cigognes Sans Frontières" show a western route across Mauritania via the Diawling National Park (with Djoud National Park on the Senegal side) or Maghama, and an eastern route along the border between Mauritania and Mali. Forested wetlands or wetlands with forested sections tend to be selected by Black Storks as the large *Acacia nilotica* trees provide ample roosting. The diverse habitats available at Mahmoûdé ensure adequate food supplies and undisturbed woodland.

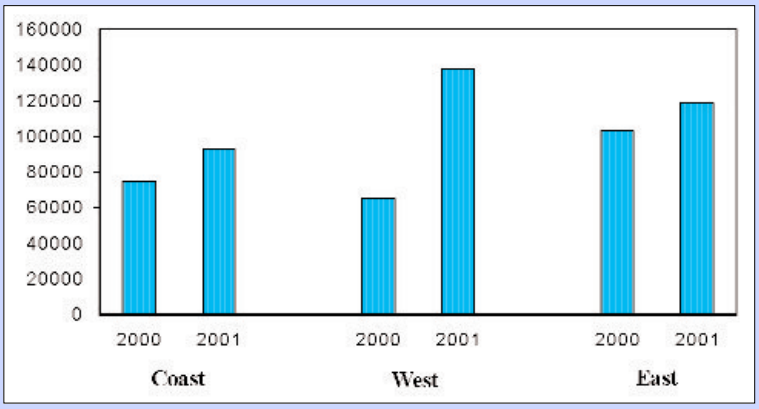
## Waterbird numbers

Bird counts conducted by project GIRNEM from 1999 to 2002 and the inclusion of the eastern wetlands in the January waterbird census have revealed previously unknown concentrations of waterbirds in the East (Fig. 4). The January 2000 and 2001 counts showed that the ephemeral wetlands of the East are as important to birdlife as the more permanent wetlands in the west of the country and along the coast (SHINE & LAMARCHE, in prep.).

Fifty-three species of waterbird have been recorded in the eastern wetlands, with high concentrations of ducks and waders. Twelve species are present in numbers representing more than 1 % of their biogeographical population (e.g. *Tachybaptus ruficolllis, Balearica pavonina, Anas querquedula, Dendrocygna viduata, Plegadis falcinellus*) in the wetlands of Sawana and Mahmoûdé, both of which have been proposed by the DEAR (Direction de l'Environnement et de l'Aménagement Rural) as Ramsar sites. Palearctic migrants are more abundant than afrotropical species and the number of waterbirds using the wetlands varies from year to year in response to rainfall.

## Wintering versus stopover

Black Storks use the wetlands of eastern Mauritania as staging posts on their migrations to or from their breeding grounds, or as overwintering grounds. The end of the wet season in West Africa corresponds with southward movement of palearctic migrants, meaning they arrive in the northern Sahel at the time when there is the highest probability of surface water. The availability of surface water varies from year to




• ***The coast*** *: Banc d'Arguin (PNBA), the coastline, Chout Boul & Aftout Es Sahéli.*
• ***The West :*** *the Senegal River Delta, R'Kiz & lakes Aleg & Mâl.*
• ***The East :*** *Mahmoûdé, Chlim, Sawana, Oum Lellé, Goungel, Boischiche, Tamchekett, Kobenni, Oum El Akriche, Essweile El Kabou, Achram, Akamour, Tamourt n'Naaj & Gabou.*

Fig. 4 - *Results of the International Waterbird Census, January 2000 & 2001, showing the relative importance of the coastal, western and eastern wetlands. - Résultats des Recensements internationaux des oiseaux d'eau de janvier 2000 et 2001, montrant l'importance relative des zones humides côtières, occidentales et orientales.*

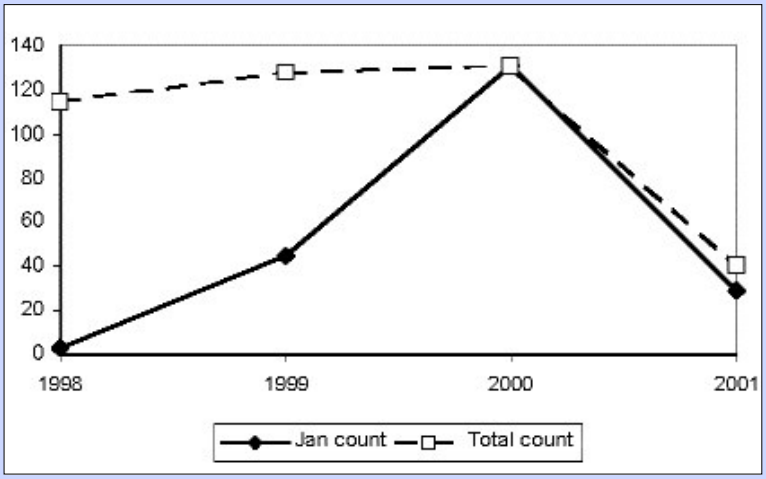



Fig. 5 - *Numbers of Black Storks, recorded in Mauritania from 1998 to 2002 (January counts and total yearly observations). - Nombres de Cigognes noires enregistrés en Mauritanie de 1998 à 2002 (comptages de janvier et totaux annuels).*

year in response to rainfall, and during drought years birds may have to continue considerably further south before finding surface water. The spatial variability of rainfall means that the distribution of wetlands with surface water differs from year to year, and waterbirds must react to this variability in order to survive.

In years of favourable rainfall Black Storks may over-winter at wetland sites in eastern Mauritania such as Gâat Mahmoûdé. More often they seem to continue south to the Inner Niger Delta or to more permanent wetlands in Mali, Niger and Burkina Faso. In this way the ephemeral wetlands provide vital staging posts on the southward migration, providing the opportunity to rest in the shade and feed before continuing South. The role of the wetlands on the northward migration is dependant on surface water being present in the larger wetlands that, varies dramatically from year to year in response to rainfall.

The majority of the wetlands where Black Storks have been observed are undisturbed apart from occasional herdsmen and their animals. The exception is the site of Tamchekett, where despite the human activity associated with the small town, the juvenile Black Storks rested and fed before continuing South.

## Black Stork observations over time

Lamarche observed an increase in the numbers of Black Storks in the Senegal Delta between 1960 to 1980 (LAMARCHE, 1988). Individuals and small groups have been recorded throughout this period at Nouakchott, Nouadibou, Aleg, Akjout, Kankossa and Mahmoûdé (*Ibid.*, 1988). Individual Black Storks start to arrive in Mauritania in September, with small groups observed from November onwards. Maximum numbers are observed in the Senegal delta in December and January with groups of up to 50 individuals commonly observed. The latest sighting in the season was on the 19th April 1995 in the delta where 2 storks were observed on their northward migration (MESSAOUD *et al.*, 1998). No ringed birds have been observed in the Senegal delta to date (*Ibid.*, 1998).

Figure 5 shows the numbers of Black Storks counted during the January waterbird census from 1998 to 2001 (unfortunately there was no International Waterbird count in January 2002 due to a dispute at ministry level). Numbers rose significantly in 1999 and 2000, especially when sightings by Project "African Odyssey" and "Cigognes sans Frontières" are taken into account. This is due to a number of factors including, an increase in interest in the

migration of the Black Stork, the inclusion of the eastern wetlands in the January count, and concurrent above average rainfall.

Numbers fell off in January 2001 despite favourable rainfall conditions. The significance of this decline is difficult to determine given the extensive distribution of wetlands across the northern Sahel when rainfall was abundant. In years of favourable rainfall there is a wider choice of habitats and greater dispersal is possible. The length of stay at the wetlands is determined by conditions at the wetland and the general availability of surface water further South. In years of below average rainfall, waterbird numbers are concentrated in the few suitable habitats available, and the stop over period in the northern wetlands is most likely reduced, due to limited food supplies.

A high degree of winter site fidelity has been observed in adult Black Storks (CRAMP, 1977; JADOUL, 2000). This indicates that a site as attractive as Mahmoûdé should host Black Storks on a regular basis. However the 83 observed in January 1999 has to date not been repeated. Only 2 storks were seen in 2001 and none 2002 despite a terrestrial count by Project GIRNEM. It is possible that there were Black Storks at Mahmoûdé in 2002, but without an aerial survey is difficult to access the wooded area preferred by the storks. The isolation of this area means that it is rarely visited by local people so there are few reports of sightings. Further aerial surveys are needed to determine the inter-annual importance of Mahmoûdé for Black Storks.

## Conservation status of the eastern wetlands

In recent years the number of natural wetland habitats in the Sahel has been reduced due to development initiatives (BAIRLEIN, 1992). The political drive to assure food security and agricultural self-sufficiency has led to the northward expansion of rainfed agriculture and the cultivation of wetland depressions (GIRNEM, 1999). The building of dams, bunds and fences, and the introduction of artificial fertilisers, pesticides, ploughs and new crop varieties is intended to increase production. The impact of these developments can be detrimental to wetland resources and reduces the number of suitable habitats for Black Storks.

The Banc d'Arguin is a reserve managed by the presidency since 1976, and the Diawling National Park has been protected since 1991, under the auspices of the DEAR. None of the inland wetlands have reserve status to date (SHINE *et al*., 2001). The *Acacia nilotica* woodland at Tamchekett is designated as a classified forest but there is no holistic approach to wetland conservation. Due to the scattered, dynamic and ephemeral nature of eastern Mauritania's wetlands, contemporary conservation measures such as the creation of protected areas are inappropriate. The protection of individual wetland sites would not guarantee habitat availability for waterbirds, as sites can remain dry for several consecutive years. The entire network of eastern ephemeral wetlands needs to be taken into consideration in order to guarantee habitat availability in all years.

Local livelihoods depend on access to wetland resources for flood recession agriculture, watering of livestock, gardening, the collection of wild foods and medicinal plants, brick making, hunting and fishing. Total protection of these resources or the exclusion of the population from the wetlands would undermine these precarious livelihoods, carefully adapted to their inhospitable arid climate. While the community conservation approach has been successful in the Banc d'Arguin and the Diawling National Park, it is not an economically viable option across the wide range of ephemeral wetlands in eastern Mauritania. The alternative is empowerment of the traditional wetland managers and users through the formalisation of customary rules (BANZHAF *et al*., 2000) and increased awareness of the value of wetland biodiversity. Recognition

of the effectiveness of traditional systems in preserving wetland habitats and biodiversity is the first step in this process and one which many development agencies may find difficult to accept. The tendency among development agencies is to disregard informal management systems and to consider open access to wetland resources as an anarchic system.

## Conclusions

The enlargement of the January waterbird census to include eastern Mauritania has revealed valuable information on the distribution of the Black Stork in Mauritania. Field observations are crucial in interpreting the results of satellite tracking projects that have greatly enriched our understanding of the migratory strategies of Black Storks. The January 2000 and 2001 census included a maximum of 14 sites in the East, with several remaining dry in 2001. The wetland inventory indicates 244 wetland sites with potential for waterbirds and the list is incomplete. There is significant potential for undiscovered Black Stork habitats in this area.

In order to assure the conservation of the Black Stork more information is needed on the location and status of their wintering grounds, including the stop-over sites that assure their safe arrival further south. The International Waterbird Count, co-ordinated by Wetlands International, is vital in determining the distribution of Black Storks in West Africa. Mauritania's participation in this census is the absolute minimum contribution needed to reveal the role played by the Nation's wetlands as habitats for the Black Stork. Only when we know where the storks stop-over and over-winter can steps be taken to protect their main winter habitats. The area covered by the census should ideally be enlarged, as expansion into some parts of the East has already revealed previously unknown habitats.

Eastern Mauritania has some advantages that can be capitalised upon to ensure the protection of the Black Stork. The hunting of waterbirds is practised at very low levels and is generally limited to drought years when it supplies an alternative source of income. The wetlands have been well preserved to date by multi-functional, common property systems under customary law. It is only now as the population expands and settles and the pressure to increase agricultural production grows, that these vital habitats are at risk. Wetlands have been lost in eastern Mauritania due to the building of dams and the clearing of land for agriculture (e.g. Legreye in the Affolé, N'Savenni, 25 km from Aioun), and with current government policy directed towards food security, the trend seems set to rise. A National Wetland Strategy is urgently needed to harmonise approaches to wetland development and to assure the protection of the crucial waterbird habitats.

Education on the value of Mauritania's biodiversity and in particular the role of wetlands is needed to alert the local population to the international importance of their national heritage. Black Storks are an ideal "flagship" species to attract both local and international attention to the vital role played by isolated ephemeral wetlands for global biodiversity.

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## Résumé

# Le statut de conservation des zones humides éphémères de l'est de la Mauritanie et leur rôle dans la migration et l'hivernage des Cigognes noires (*Ciconia nigra*)


A côté des zones côtières, à l'avifaune particulièrement riche, que sont le banc d'Arguin et le delta du Sénégal, les zones humides continentales de la Mauritanie sont souvent négligées. Elles jouent pourtant un rôle vital dans la vie des migrateurs paléarctiques et, en particulier, de la Cigogne noire. Depuis septembre 1999, des recherches ont été entreprises afin de déterminer la distribution et les aspects environnementaux et socio-économiques de ces étendues d'eau temporaires.

On distingue trois types de zones humides :

1 - Les plus courantes, les tamourts (59 % de toutes les zones inventoriées) se forment lorsque les eaux de pluie sont collectées dans une dépression argileuse. Ils sont caractérisés par des peuplements d'*Acacia nilotica*, ont la plus longue durée moyenne de présence de l'eau (6 mois) et jouent un rôle vital dans l'abreuvage du bétail.

2 - Les gâats se forment dans les dépressions des zones de faible pente. Ce sont des milieux humides ouverts contenant une végétation aquatique luxuriante (*Nymphea lotus, Ipomea aquatica, Echinochloa colona, Cyperus spp.*). La présence d'eau en ces lieux semble être plus brève (4 mois) que dans les tamourts, à cause du manque de profondeur. Ces zones sont largement utilisées pour l'agriculture (73 % sont cultivés). Ce type de milieu est très important pour les populations d'anatidés parce que la végétation fournit à la fois d'abondantes sources de nourriture ainsi que le couvert.

3 - Les oueds sont des cours d'eau temporaires qui coulent durant ou après les pluies (durée moyenne de 5 mois). Ils ont des rives distinctes, contrairement aux gâats et tamourts, bordées d'arbres comme *Acacia nilotica, Ziziphus mauritania et Balanites aegyptica*. Bien que fréquemment cultivés, les oueds ont, par la nature variée des conditions qu'ils présentent, une grande richesse du point de vue de la biodiversité.

Des Cigognes noires ont été trouvées dans les trois types d'habitat. Elles utilisent les zones humides de l'est mauritanien comme étapes de migration en provenance ou vers leurs zones de nidification. Les années favorables, elles peuvent y prolonger leur hivernage. Ainsi, en janvier 2000, après une année 1999 particulièrement pluvieuse, un total de 83 ex. a été dénombré à Gâat Mahmoûdé. En règle générale toutefois, elles n'utilisent cette région que comme une étape vers des zones situées plus au sud et où l'humidité est permanente (delta du Niger, Mali, Niger, Burkina-Faso). La majorité des habitats humides où des Cigognes noires ont été observées sont généralement calmes et non perturbées, hormis occasionnellement par la présence de bergers et de leurs bêtes. Le site de Tamchekett, un oued abondamment peuplé d'*Acacia nilotica* et proche d'une ville, fait exception. Malgré l'intense activité humaine, 8 Cigognes noires juvéniles s'y sont temporairement arrêtées en septembre 1999.

Ces diverses zones humides sont menacées par l'accroissement de la population humaine, sa sédentarisation et une politique poussant à développer la production agricole. Certaines ont été irrémédiablement perdues par la construction de barrages et l'essartage de terres. L'absence d'une stratégie nationale sur les zones humides et l'approche autonome des projets de développement accroissent le risque d'altérer considérablement un écosystème fragile, vital pour l'avifaune et, en particulier, la Cigogne noire.