

there are an estimated 12,000 Dorcas gazelle (V), 170 Dama gazelle (E), 3,500 Barbary sheep or aoudad (V), occasional addax (E) and possibly slender-horned gazelle (E). Carnivores include healthy populations of fennec fox (K), Rüppells fox (K), and a small and probably declining population of 15 - 20 cheetah (V). About 85 of the bird species recorded are Palaearctic migrants; of the remainder the estimated 800 - 2,000 ostrich represent the last viable population of the West African race, and there are substantial numbers of Nubian bustard. The reptilian fauna include the desert monitor lizard, the sand viper and various species of sand boa and gecko.

Archaeological sites from the Palaeolithic and Neolithic periods are found at many locations in the reserve, as are rock engraving sites. The 3,500 - 7,000 Twareg inhabitants for the most part maintain a lifestyle of transhumant pastoralism, raising goats and camels. The settled population practises irrigated agriculture, growing wheat, fruit, vegetables and dates.

4. STATE OF PRESERVATION / CONSERVATION

The area has been under active management since 1981, seven years before the official gazetting of the reserve. A preliminary management plan was drafted in 1984 and a revised one was prepared in 1990. The reserve authorities place equal emphasis on policing and education of local people and tourists to prevent infractions of the law. The aim is to integrate the local Twareg into reserve management, and aid them in their socio-economic development, while at the same time ensuring the sustainability of natural resources. Patrols are conducted by vehicle and camel, and an annual meeting is held between the reserve authorities and the local people.

The most noticeable problem is poaching of gazelles and ostriches within the reserve by military personnel.

5. JUSTIFICATION FOR INCLUSION ON THE WORLD HERITAGE LIST

The Réserve Naturelle Nationale de l'Air et du Ténéré Nomination, as presented by the Government of Niger provides the following justification for designation as a World Heritage property:

D) Natural property

- (i) **Outstanding examples of stages in the Earth's geological formation** The Air massif constitutes a remarkable assemblage of examples of metamorphic and eruptive activity on the ancient African baseplate. Particularly noteworthy are the spectacular intrusions of "younger granites" which confer a unique appearance to the landscape.

- (ii) **Outstanding examples of ongoing geological processes** The "live dunes" of the Ténéré are an example of erosion under way: the landscape is rapidly modified on a geological time scale by the displacement and deposition of sand.
- (ii) **Outstanding examples of biological evolution** Since the Holocene the area has experienced the effects of desertification which has modified the distribution of animal and plant species.
- (ii) **Outstanding examples of man's interaction with his natural environment** Man has been continuously present in the Air since the Palaeolithic. This presence continues thanks to the rational management of environmental resources.
- (iii) **Outstanding examples of natural phenomena and beauty** The Air constitutes a Sahelian island (climate, flora, fauna) isolated in a Saharan desert environment. It represents a remarkable assemblage of relict ecosystems, coupled with a landscape of exceptional aesthetic interest.
- (iv) **The most important and significant natural habitats where species still survive** The reserve contains important natural habitats for the survival of three Saharan desert antelope species internationally threatened with extinction: addax, dama gazelle and slender-horned gazelle. The situation of the addax, the largest wild animal of the Sahara, is particularly critical. The reserve also contains populations of animals (olive baboons, patas monkeys, rock hyraxes, caracal etc.) and plants which have been isolated in the Air for thousands of years and which therefore constitute an unique genetic entity.

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

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1. DOCUMENTATION

- i) IUCN Data Sheet
- ii) Additional Literature Consulted: J.M. Durou, 1990, Ténéré-Désert d' absolus AGEF. 215p.
- iii) Consultations: Niger Government Officials, P. Tunley, H. Jungius, J. Verschuren, J. Newby.
- iv) Field Visit: February 1991, Jim Thorsell, P. Hilaire, G. Sournia, Anada Tiega.

2. COMPARISON WITH OTHER AREAS

The Air/Ténéré Reserve extends over two biogeographical provinces: the Sahara and the Western Sahel. In the former there are 69 other protected areas, including the Tassili N' Ajjer World Heritage site and in the Western Sahel there are 22 protected areas including the two World Heritage sites Djoudj and Banc D' Arguin. Air/Ténéré is an arid desert landscape and has little in common with these latter two wetland sites but it does have certain affinities with the Tassili, 600 km to the north. Both are arid desert reserves that have shared a similar climatic history. Both contain a mix of Saharo - Mediterranean biota and both are inhabited by Twareg people. Both are important for resting palearctic migratory birds and share a number of mammals typical of the region (dorcass gazelle, barbary sheep). Both are significant sites for prehistoric remains - rock paintings and engravings and neolithic artifacts and both contain geological and botanical features of great scientific interest. Finally, each of the reserves is comparable in size and each is experiencing a similar management problem - tourism.

Despite these many similarities, Air/Ténéré is distinctive for its greater abundance of wildlife, particularly ungulates. The Ténéré portion also has a much more extensive "sand sea" and its dunes are considered the most spectacular in the Sahara. Situated astride the Saharan/Sahelian zone, it is also more influenced by Afrotropical elements.

Another area of comparable conservation interest is the Tibesti-Ennedi region and Ouadi Rimé-Ouadi Achim Reserve in neighbouring Tchad. The Tchadian areas, however, have suffered from armed conflict for over 20 years and very little wildlife is thought to remain - in sharp contrast to the Air/Ténéré which has been under active management since 1981.

3. INTEGRITY

The 1988 legislation gazetting the reserve followed active management which commenced with the assistance of an IUCN/WWF project in 1980. This project is continuing through to 1993 with support from the Swiss and Danish governments, with a 1991 budget of \$US1.4 million. The reserve authorities are well-equipped with vehicles, radios and a headquarters and there is a strong training component. Boundaries are marked at all key entry points and there is a new visitor center in Iférouane. There are some innovative activities such as the promotion of woodless building techniques, tree planting, an education magazine for children and regular meetings with local people and related government agencies.

Although there has been a gradual decline in environmental quality and some species losses this has largely been arrested over the past 10 years. Wildlife populations have stabilised or increased except for both the Scimitar-horned Oryx which has not been sighted in Niger since 1983 and the Addax which is also nearing extinction in the country. Vegetation monitoring is also undertaken but it is too early to determine trends.

Management issues include control of poaching by the military and certain government officials from Agadez but recent arrests have signalled a reduction in this activity. Tourist harassment of wildlife, which is particularly damaging due to heat stress, is less a problem due to education of tourist operators and the tourists themselves. The Paris/Dakar road race no longer is allowed to pass through the Reserve.

The local Twareg population in the reserve numbers between 2000-2500 in two confined settlements at Iféroune and Tin Telloust. There is also a nomadic population of 1500-2000 pastoralists. The settled population practise irrigated agriculture and keep fluctuating numbers of livestock. Heavy domestic stock grazing pressure (camels, goats, donkeys) occurs throughout the reserve except in the 12% of the central region which has been legislatively defined as a sanctuary. Human access to the sanctuary is banned except by permit. This has not greatly affected the Twareg who rarely entered the area as very little pasture is found there and it does not lie across any of the ancient caravan routes.

Despite regulations to the contrary, many tree species have been heavily exploited especially during past periods of drought. As a part of the Sahel region, the Air can sustain only dispersed human use, even in good rainfall years.

The size of the total area (7.7 million ha) makes it the largest protected area in Africa although the area under strict sanctuary status is relatively moderate (1.3 million ha). As desert species are found in very low densities, this large size is essential to their survival. The boundaries encompass the major features of both the Air mountains and the Ténéré desert. There is some consideration of an extension in the south-west to include a site for wildlife under certain rainfall conditions and to take into account a recently observed migration of Addax south-east to the Mt Termit region.

The challenge remaining is to devise a management system which will withstand the phasing out of substantial aid subsidies. It is hoped that the management plan now being prepared (draft due in November 1991) will lay the foundation for this in terms of the equilibrium between human needs and conservation and that revenues generated by tourism and independent research will provide the authorities with the resources to maintain the reserve.

4. ADDITIONAL COMMENTS

The Air-Ténéré has been a testing ground for the "new generation" of protected areas in Africa. Operating in the very harsh and degraded Sahelian environment, the project has achieved considerable recognition for its innovative approach. Activities began with a concern for protecting biodiversity and expanded to include promotion of sustainable resource use and rehabilitation of habitats. Camel-mounted extension agents, a programme of watershed management (involving the construction of drystone barrages), tree planting, training of masons in woodless construction and a network of 47 Twareg headmen and clan chiefs responsible for surveillance are all part of this new approach.

After an initial period of uncertainty, both the local people and the local tourist agencies have now come to cooperate more fully with reserve authorities. The reserve has still not received full recognition within the various government departments of Niger which leads to occasional conflicts of authority with more influential ministries. This problem should diminish as the reserve gains a higher public profile and if it receives World Heritage status.

5. EVALUATION

The Air-Ténéré possesses an exceptional natural assemblage of landscapes, vegetation and wildlife, unsurpassed in the region and is the last stronghold of Saharo-Sahelian wildlife in Niger. The interaction of human activity and ecological processes has created a unique and spectacular environment. The area has been settled for over 30,000 years, and the many archaeological sites present are of great historic and cultural value. Owing to the remoteness of the Air and the low intensity of settlement over the past 2,000 years, much of the wildlife that has been eliminated elsewhere in the Sahara and Sahel survives. The effects of overgrazing and over-exploitation of resources widely observed in the Sahel have been mitigated by severe droughts (e.g. in the 1970s and 1980s) which caused huge stock losses and emigration, preventing overstocking. The mountain massifs have been likened to biological islands in a sea of sand, a Sahelian enclave in the Sahara. The reserve harbours internationally important populations of five species of threatened fauna (Dorcas gazelle, Dama gazelle, addax, mouflon, ostrich) and three species of flora.

On this basis the Reserve meets the following three criteria for natural properties:

- ii) **Outstanding example of geological processes, biological evolution and man's interaction with his natural environment.** The "live dunes" of the Ténéré are rapidly modifying the landscape by the displacement and deposition of sand. Since the Holocene the area has experienced drastic effects of climatic change and major shifts in species distribution. Man has been continuously present since the Paleolithic and has developed a unique cultural history.
- iii) **Outstanding examples of natural phenomena and beauty.** The Aïr constitutes a Sahelian island (climate, flora, fauna) isolated in a Saharan desert environment. It represents a remarkable assemblage of relict ecosystems, coupled with a landscape of exceptional aesthetic appeal.
- iv) **The most important and significant natural habitats where species still survive.** The reserve contains important natural habitats for the survival of three Saharan desert antelope species internationally threatened with extinction: addax, dama gazelle and slender-horned gazelle. The situation of the addax, the largest wild animal of the Sahara, is particularly critical. The reserve also contains populations of animals (olive baboons, patas monkeys, rock hyraxes, mouflon, caracal etc.) and plants which have been isolated in the Aïr for thousands of years and which constitute a unique genetic entity. The area is also an important stopover point for palearctic migrant birds.

6. RECOMMENDATION

The Aïr/Ténéré should be inscribed on the World Heritage list. The Government of Niger, particularly the Direction de la Faune, Pêche et Pisciculture should be commended and encouraged in their efforts to continue to protect and restore the area.

