
ENVIRONMENTAL SYNOPSIS

1993

NIGER



IUCN - THE WORLD CONSERVATION UNION

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IUCN seeks above all to work with its members to achieve development that is sustainable and that provides a lasting improvement in the quality of life for people all over the world.

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NIGER AT A GLANCE

West Africa's largest state, Niger's population is still growing fast and with the severe droughts of recent years, its natural resource base is seriously threatened. Its current environmental problems include:

- Pressure on natural resources from population growth, particularly in the north
- Land degradation and "desertification"
- Pressure on woodland resources, often the only source of fuel in rural areas
- Deterioration of conditions in urban areas

Despite these problems, Niger is making several efforts to improve its environmental management:

- A code of rural laws is being drawn up that will profoundly alter social, economic and political relations if implemented
- A 1990 government-sponsored seminar set the basis for local NGOs and village associations. Now several national groups have been launched to promote environmental protection and development

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PREFACE

This environmental overview of Niger was requested by the Commission of the European Communities — specifically the Directorate-General for Development (DG VIII A/1).

It was prepared on the basis of a desk-top study of information to hand as a briefing for CEC officials. Wherever possible the most recent figures and information were employed as sources¹.

After the introductory Fact Sheet and outline of Key Issues, the report is divided into three chapters. The first deals with institutional infrastructure, especially related to environmental issues, together with national and international legislation and training opportunities. The second reviews the country's natural resources. The final chapter evaluates the nation's ecological heritage and considers its past, current and foreseeable environmental problems. Because the information changes so rapidly, no attempt has been made to provide a comprehensive survey of international organisations working in Niger. Instead, the reader is advised to contact the organisations themselves for an up-to-date summary of activities.

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¹ A note on the data sources follows the detailed reference list. Within the text, individual sources are indicated by the number of the reference inside brackets, e.g. [24]. Metric weights and measurements are used throughout. A billion refers to 1,000,000,000.

FACT SHEET

Natural Resources

Land area: 1,267,000km²

Climate: Temperature rises to a maximum from March to June (41°C) and drops to between 16°C and -2° in winter. In the northern interior there are extreme temperature fluctuations (e.g. 46°C to -2°C in Air Mountains) [28]

Rainfall: Rain decreases towards north and east, with no rain assured north of Agadez where the annual average is 125mm. Niamey gets 650mm and Gaya 800mm

Ecological zones: Sudanian undifferentiated woodland; south Sahelian zone; north Sahelian zone; Sahara Desert

Languages: French (official), Hausa, Fulfulde, Tamashek, Arabic, Zarma-Songhaï, Kanuri, Gourmantche, Tubu

Main towns: Niamey (capital) 392,165; Zinder 119,838; Maradi 104,386; Tahoua 49,948 (1988 population estimate) [31]

Currency: CFA franc = 100 centimes. Exchange rate December 1992: 267.24 francs = US\$1 and 424.25 francs = UK£1

Measures: Metric system

Land use: Area under cultivation: 35,400 km²; permanent pasture 92,670km²; forest and woodland 21,200km² (1987-1989)

Protected areas: Protected areas cover 96,950km² (7.7% of Niger) [12]. These comprise one national park and five reserves

Agriculture: The main food crops are millet, sorghum, rice, cowpeas, cassava and onions. The main cash crops are cowpeas, onions, garlic, groundnuts and sugar cane

Livestock: Cattle 2,200,000; sheep 2,970,000; goats 4,800,000; camels 360,000; horses 305,000; asses 415,000; pigs 38,000; chickens 19 million (1991 estimates)

Fisheries: 3362 tonnes (1990)

Mining: Coal 159,316 (1989); salt 3000 tonnes (1989); gypsum 3000 tonnes (1989); tin 100 tonnes (1989); uranium 2270 tonnes (1990)

Demography

Population size: 7.73 million (1990)

Population growth rate: 3.13% per annum (1985-1990)

Projected population in 2025: 19.30 million

Age distribution: Under 15 years 49%; 15-65 years 46%; over 65 years 5% (1988 census) [31]

Fertility rate: 7.1 (1985-1990)

Gender ratio: Female 50.5%; male 49.5% (1990)



Spatial distribution: Urban 17.9%; rural 82.1% (1990)

Urbanisation rate: 7.6% of population a year (1980-1990)

Health and Education

Infant mortality (deaths/1000 live births): 191 (1960); 130 (1990)

Mortality of under-5s (per 1000 live births): 321 (1960); 221 (1990)

Life expectancy: 44 years; females 46.1; males 42.9 (1985-1990)

Access to safe drinking water (% of population): 48%; urban 48%; rural 52% (1986-1987)

Access to sanitation services (% of population): 10% (1988-1990)

Access to health service (% of population): 43% (1987-1989)

Enrolment in education (1989):

Level	Number enrolled	% male	% female
Primary	344,848	64	36
Secondary	65,816	70	30
University	4,506	85	15

Industry and Pollution

Main industries: Food processing, textiles, cement, light industries for the local market

Energy: Types: fuelwood, petroleum products. *Consumption* (in urban areas, 1986): fuelwood (20,000 tonnes); gas (300 tonnes); kerosene 2500m³; hard coal (158,354 tonnes); electricity (72.5 Gigawatt/hour); fuel oil (52,801m³). Overall, fuelwood meets more than 80% of total energy needs and almost 100% of domestic needs in rural areas [31, 32]

Economic Indicators

GDP: US\$2400 million (1991)

GDP per capita: US\$380 (1991)

GDP growth rate: -1.3% (1980-1990)

Agricultural % of GDP: 36% (1988)

Exports at current market prices: US\$377 million (1991)

Imports at current market prices: US\$469 million (1991)

Total official development assistance: US\$358 million (1990)

Total external debt: US\$1653 million — of which long-term debt amounted to US\$1503 million in 1991

Sources: [1, 14, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 47, 48, 49, 50, 51, 52, 53 and 54] unless otherwise indicated

KEY ISSUES

Background

The Republic of Niger is a landlocked, predominantly arid country. The largest state in West Africa, 1,267,000 km², Niger is bordered to the south by Nigeria and Benin, to the east Chad, to the north Libya and Algeria, and to the west Mali and Burkina Faso (Fig. 1). About 75% of Niger lies north of the "Northern Line of Cultivation", an agricultural zone which receives 300mm (or less) of rainfall per annum. Almost 90% of the people depend on agriculture. Niger's natural resource base is under serious threat, undermining the livelihood of the vast majority of the population.

Political context

Under French occupation Niger became a military territory in 1900. In 1922 it was established as an colony of French West Africa. Niger gained independence in August 1960 under President Hamani Diori.

Since mid-1991 the country has experienced a transition. Following the repression of student movements in 1990 a multi-party regime was installed and a national conference organised from August to September 1991. This resulted in the appointment of a Prime Minister and the adoption of many new governmental policies during a fixed 15-month transition period. Several new institutions were established.

As well as the need to overcome the State-financed crisis and failing economy the authorities must deal with the Tuareg rebellion which contributes to the unsettled political climate and is preventing the government from tackling development issues in northern regions.

The key environmental issues are: rapid population growth and its associated pressure on natural resources; drought and desertification; urbanisation; deteriorating climatic conditions; and pressure on woodland resources for household energy needs.

Population

Niger's population is growing at an estimated 3.3% a year, and about half is under 15 years. Fertility rates are also high at 7.1 births per child bearing woman, compared with a world average of 3.3. At present rates, today's population of more than eight million will reach 19.3 million by the year 2025 (see also Fact Sheet). The high growth rate is aggravated by high population concentrations. About 85% of people live in a narrow band 100-150km wide along the border with Nigeria [2], placing excessive pressure on natural resources.

Population growth is the principal force behind erosion, land degradation, deforestation, and the increasingly serious urban environmental problems caused by mass migrations from the hinterland. Religion, cultural traditions, female illiteracy and family economics reinforce the pressure for high fertility [2].

Population growth has also reduced the farmland available per inhabitant, virtually eliminating fallow periods, the cheapest and most technologically attainable method for farmers to replenish their soil fertility [25]. The spread of agriculture to the north, fuelled by an

expanding population has also contributed to land degradation — rural Niger's most serious environmental problem [22].

Drought and desertification

From 1960 to 1968 and from 1974 to 1983 Niger's rural economy made the country self-sufficient in grain. Niger was even providing food to its less fortunate neighbours such as Mali. But from 1968 to 1973 and in 1984, climactic conditions deteriorated and severe drought resulted in six harvests out of eight being inadequate to meet national demands. The entire economy suffered [26, 28].

If drought is an inevitable fact of life in the Sahel, many of its consequences are greatly aggravated by human activities. Niger's nomadic sector is usually the hardest hit by prolonged drought. Those who have any animals left may try to migrate to more hospitable areas (as in the early 1970s). Those whose animals died converged on the cities, especially once relief camps were established. Agriculture is also badly affected by drought. In the early 1960s Niger was self-sufficient in food. After the droughts of the 1970s much food had to be imported. Cash cropping was all but abandoned as farmers concentrated on growing what food they could. Many farmers were also forced into the relief camps as crops often failed entirely. Public and animal health also suffer during drought, as disease can be much more serious in victims weakened by hunger and mass population movements resulting from drought facilitate the spread of communicable diseases [22].

"Desertification" of fertile land is not a uniform process, but is usually more severe in areas where human activity has degraded the environment. These isolated areas often expand and link up. Overgrazing taxes already insufficient water supplies. Trees are cut faster than they can regenerate, resulting in gradual but continuous depletion of the forest cover. Institutional problems such as an inadequate response to drought, false diagnosis of the problem, and poor planning have also worsened desertification [22].

Urban degradation

Although Niger's problems are not as acute as in some other West African nations, urban areas are deteriorating throughout the country. In general, Niger has no urban plans and no suitable infrastructure to cope. Water treatment plants exist only in Niamey, Maradi and Zinder, and 40% of all Nigeriens rely on untreated water from wells, ponds and streams. Supply is highly uneven and deteriorating in quality. There are severe waste-water disposal problems, and the spread of untreated wastes creates health hazards [2].

The deterioration of Niger's cities is due to the effects of a rapidly growing population, falling private and public spending, and little municipal money as a result of the inefficient taxation system. All this affects sewage maintenance, solid waste disposal, and other urban services [2].

Woodland resources

An estimated 87% of Niger's energy needs (100% in some rural areas) are met by fuelwood [2]. Unsustainable uses are destroying precious vegetation — of which Niger does not have

an abundance; the wood itself is running out. The amount consumed in the area around the capital alone is about three times what the environment can support [25].

Rural development

The rural sector, in its broad sense, is the most important part of the national economy [13], but land use is not adequately covered by law. Work to draft a '*Code Rural*' governing the use of land is now under way. The code is designed to clarify land-use and management rights in the public domain in an effort to safeguard natural resources. In the private sector it would guarantee the security of all natural resources including farmland, pasture, soil and water, trees and forage [26]. It is likely, however, that the code will also lead to conflict between different people with claims to land.

Economic development

Economic growth experienced from 1976 to 1981 — as a result of development of the uranium sector — led to a stable financial period in Niger. Since then, however, it has experienced a highly unsettled economic situation. A slight economic recovery from 1982 to 1986 was followed again by a decline. GDP for 1991 was close to that of 1980 representing an income drop of 30% per person.

INSTITUTIONAL CONTEXT

Environmental Institutions

Protected areas are administered by the Department of Wildlife, Fisheries and Fish Farming (Direction de la Faune, Pêches et Pisciculture), of the Ministry of Hydrology and Environment (Ministère de l'Hydraulique et de l'Environnement) since December 1989 [8].

Until the end of 1989, protected area administration came under the Ministry of Agriculture and Environment (Ministère de l'Agriculture et de l'Environnement) and before that with the Wildlife Management Service (Service Aménagement de la Faune), within the Department of Water, Forests, Hunting and Fishing (Direction des Eaux et Forêts-Chasse-Pêche) [8].

Protection remains inadequate, however, and few people are actually involved directly in these activities. In 1987 only 40 people were responsible for guarding and managing wildlife throughout the country [8].

Environmental Policies and Standards

Since the vast majority of the population depends on agriculture and livestock for survival, policies to improve this resource base must be made a priority. While laws exist for the protection and use of water, soils, flora, fauna, minerals, hazardous substances and public health, they are not properly implemented or enforced. In other instances, laws are inadequate [2].

The *Code Rural* may help solve some of the problems. In its present form it separates the land into croplands, rangelands and protected areas, and a zone that combines the functions of rangelands and croplands. Croplands will be governed by a system of private property rights, while rangelands will generally be owned by a pastoral group or a cooperative. The *Code Rural*, if implemented, will have profound social, economic and political implications since it defines rural property relations [2].

Legislation concerning the protection of natural resources has its origins in two decrees promulgated by the French colonial authorities when Niger was part of French West Africa. One, dating back to 1935, established the forestry regime in the French colonies. A 1947 decree controlled hunting in French overseas territories. As in many other former French West African colonies Niger has had adequate laws and regulations concerning the protected areas and wildlife from the early days of independence in 1960 [8].

A variety of laws and decrees now provide natural resource protection, including a 1962 law on hunting; a 1974 law on classified forests, protected forests and restoration areas along with its various annexes and modifications; and two 1988 decrees concerning protected areas [8]. IUCN, drawing upon the experience of its Environmental Law Centre (ELC) is currently helping authorities revise natural resource legislation, especially in relation to protected areas and biological diversity.

Republic of Niger

Minerals, especially uranium, are crucial to Niger's economy. All minerals, including petroleum, are owned by the state. The National Office for Mining Resources (ONAREM) has jurisdiction over all exploration, geological research, and mining. Mining companies are private, but the government is usually an important stockholder [22].

National and International Organisations

Most major international, multilateral (CEC, World Bank, UNSO, UNDP/FAO) and bilateral aid agencies, USAID (United States Agency for International Development), CIDA (Canadian International Development Agency), DDA (Direction de la Coopération au Développement et de l'Aide Humanitaire — Swiss Cooperation), GTZ (Gesellschaft für Technische Zusammenarbeit, Germany), and Coopération française are involved in development projects with some environmental components in Niger [2].

Since 1979, IUCN and WWF have been helping the government to develop a natural resource conservation and management programme in the Aïr and Ténéré. In 1987 they were joined by Band Aid, DDA, and DANIDA (the Department of International Development Cooperation, Denmark) [8].

Other international or foreign NGOs active in Niger include the AFVP (French Volunteers for Progress), Swissaid, Tamazalak, COSV (Coordinating Committee for Voluntary Organisations), EIRENE (International Christian Service for Peace), Lutheran World Relief, AFROCARE, CARE, and ISAID (Institute for the Study and Application of Integrated Development) [10].

National NGOs are emerging slowly. A national seminar held by the Ministry of the Interior in May 1990 laid the basis for local NGOs and village associations [8].

ONVPE (Niger Environmental Voluntary Organisation) is a new group of former agricultural technicians who have observed the degradation of their country's environment first-hand. Through radio, television, and eventually a newsletter or magazine it plans to work at the grassroots level to raise awareness about threats to the environment, focusing on forest/energy conservation, recycling of energy provided by the environment, and support for agricultural self-sufficiency [10].

The ANV (Alliance Niger Vert) was created in 1992. It plans to work as an environmental watchdog, channel aid to long-term projects, and improve NGO intervention where policies are weak, such as with the protection of fauna and the fight against pollution [10].

SOS Sahel International, launched in 1974 in the aftermath of severe drought, is active in Senegal, Mauritania, Niger, Mali, Burkina Faso and Sudan, with financing from Europe and North America [10].

Caritas Niger, part of the network of the international Catholic aid agency CARITAS, has been active in the country since 1962. It concentrates on rural development, health assistance, and emergency relief [10].

The BALD (Development Liaison Office - Bureau d'Animation et de Liaison pour le Développement), created in 1984, is a Catholic group that supports to Catholic Church initiatives in soil conservation, wood conservation, reforestation, and the fight against desertification, wind, and damage caused by animals [10].

Legislation Concerning Natural Resource Management and Environmental Protection

Internationally, Niger is party to the following conventions: the (World Heritage) Convention concerning the Protection of the World Cultural and Natural Heritage; the (Ramsar) Convention on Wetlands of International Importance Especially as Waterfowl Habitat; the African Convention on the Conservation of Nature and Natural Resources [8]; the (CITES) Convention on International Trade in Endangered Species of Fauna and Flora; the (Bonn) Convention on the Conservation of Migratory Species [12]; the Convention on African Migratory Locust; the African Bank Agreement; the Agreement on the establishment of the Economic Community of West Africa; the Convention on Game Hunting; the Convention on the Law of the Sea; the Lomé Convention; and the Convention on Plant Protection [29].

The Lake Chad Basin Commission, uniting representatives of the four countries bordering the lake, was established in 1964. A proposal is being considered to set up a single authority to manage the three contiguous "W" national parks in Burkina Faso, Benin and Niger, totalling over 10,000km², and to raise funds for its operation [8].

Though protective legislation has existed for a long time, protection has never been effectively enforced. Uncontrolled hunting throughout the country has devastated the once prolific fauna. This has led to the near disappearance from Niger of the addax (*Addax nasomaculatus*), and no sighting of the scimitar-horned oryx (*Oryx dammah*) has been made since 1983 [8]. But the major wildlife destruction has come from the expansion of cultivation to marginal areas. Rangeland degradation due to over-grazing and cutting of trees and shrubs has also been responsible for widescale habitat loss. Wild natural resources are generally not perceived as having any value because there is no ownership involved. Furthermore, wildlife is not useful to local populations and they therefore see no reason for saving wildlife habitat [20].

Legislation concerning water is primarily based on French colonial laws. When no legislation exists, customary or Islamic law is applied. Water is usually publicly owned, except in certain cases such as a well built by private means on private land. In custom and in Islamic law, the unwritten priorities in order of importance are: drinking water, animal watering, irrigation, industrial and recreational use. Though not formally law, these priorities tend to give urban areas with high populations needing drinking water preference over rural and grazing areas [22]. In general legislation does not cover the amount of water which may be used, but pumping stations in livestock areas can only be opened once surface water from the rainy season is exhausted [22].

Environmental Training Institutes and Training Capacity

There are no institutes of higher education in Niger dealing specifically with conservation. But there are environmental education programmes in schools and more generalised training establishments include conservation training in their programmes [12].

Niger has two training establishments for rural development: the University of Niamey, which produces about 20 graduates from the Agronomy Faculty (Faculté d'Agronomie), and the Institute for Practical Rural Development (IPDR) at Kollo, which trains technical personnel. The Torodi centre (Centre de Perfectionnement des Cadres du Développement Rural) deals with land-use management and courses include socio-economic issues, natural forest management and agroforestry [12].

The principal research establishment is the National Agricultural Research Institute (INRAN), whose largest department - agricultural research - studies plant improvement, crop protection and general agronomy. A genetic resources section is involved in the collection and storage of various crops. In general, these are not bred by INRAN and facilities are still rudimentary. The Department of Forestry Research (Département de la Recherche Forestière) includes wildlife and fisheries research but is in very poor shape [12].

A number of development projects have an environmental education or awareness-raising component aimed at rural populations, usually in conjunction with other activities such as reforestation. The CEC has a regional programme to systematically introduce and improve environmental education in schools by training teachers and students (focusing on teacher training institutions) and providing educational material. Another programme is working with French volunteers (AFVP) and Nigerien teachers in 115 primary schools, focusing on practical and productive environmental activities at the village level. The goal is to link awareness and education efforts in the classroom to the world outside and is aimed at teachers, pupils and parents [12].

As an off-shoot of its Aïr-Ténéré project, IUCN has started an environmental magazine (*Alam*), based on the success of a similar magazine in Mali [12].

Cultural Aspects of Resource Utilisation

The Government of Niger is aware of the threats facing the country's natural resources. Several significant initiatives have been taken, but lack of resources and institutional weaknesses make them difficult to implement [2]. Culture and tradition have a major influence on how natural resources are used in Niger, often contributing to the degradation of an already fragile environment.

A fundamental factor which will determine whether Niger will to achieve sustainable development is the question of property rights. At present Nigeriens have open access to rangelands and forests. This leads to overuse of resources, with no thought to tomorrow's environment. There is a strong feeling that individuals should be given property rights which

they can market, and that a privatisation process, including cooperative ownership, should be stimulated [2].

The negative environmental consequences of traditional land-ownership patterns are most clearly seen in the rangeland and forestry sectors. With few exceptions, anyone interested in exploiting these areas has been free to do so. But each cattle owner or wood cutter who uses limited biomass resources, as grass or wood, reduces the harvesting possibilities by other inhabitants [2].

Biodiversity, too, is affected by traditional cultural and religious practices and beliefs in Niger. In past centuries the penalties for illegally cutting *Acacia albida* trees were severe. That these trees are widespread in Niger is probably partly due to earlier protection. Individual trees, too, had religious meaning as home to spirits, and some of the large trees owe their survival to this belief. These trees may be important seed sources for future regeneration. A few sacred forests are still found, principally in the Gourmantche region of the extreme south-west, though fewer since the advance of Islam. At Tchighazarene, in the Aïr Mountains, a local *marabout* strictly prohibits the exploitation of trees and animals and his authority is apparently respected [12].

Traditional medicine and traditional hunting also reflect a wider dependence upon natural resources and biodiversity. Farmers and pastoralists know the importance of plants and animals as environmental indicators. The presence or absence of certain plant species can indicate soil fertility, texture, depth or water retention capacity, thus signalling that it is time to put a field in fallow or plant a different crop [12].

Equally, religion and tradition contribute significantly to the persistence of high fertility rates, a major problem linked to excessive human pressure on limited resources [2].

Men control fertility decision-making and get benefits from children, while women bear the day-to-day burden of parenthood. As a result, men can make reproductive decisions with little extra economic cost involved in having children and a near-certainty of support in old age. Women are generally poorly educated and, until this is corrected, male domination will continue to be a recipe for high fertility [2].

STATE OF THE ENVIRONMENT

Inventory of Natural Resources

Ecological zones

Biogeographically, the country is divided into the Saharan zone in the north, the Sahel Regional Transition Zone in the centre, and Sudanian in the far south. There are a few Mediterranean and Afromontane elements in the northern mountains [1].

Water

Water shortage is a major problem. A large part of the country receives little or no rainfall each year. Surface water resources are found in only one permanent water course, the Niger River, in the extreme south-west (Fig. 2). Lake Chad in the south-east was formerly a vitally important water source but since the 1970s the portion within Niger has not been permanent. All other watercourses in the country flow intermittently and go completely dry for several months during the long dry season [2]. The most important of these is the Komadougou-Yobe River which forms a 150-km boundary with Nigeria in the south-east.

Fifteen years ago some 4213km² of Lake Chad lay within Niger's borders representing three-quarters of the surface water resources. There are still small lakes at Keita, Madaroumfa, Guidimouni, Tabalak, Dan-Doutchi, Madarounfa and Gaweye [18]. Water from all these lakes is used for domestic purposes and some crops are cultivated on the banks [6].

Important wetland areas exist along the Niger River and around the shores of Lake Chad. In general, these are not the subject of any conservation initiatives. There are numerous seasonal wetlands or *mares*, with ponded water, which are often wooded, across the Sahel zone. These are extremely important for wildlife, particularly birds, and need to be evaluated [1]. The country's major wetland, within "W" National Park, is under a variety of threats including poaching, illegal grazing, and fishing. Phosphate mining, damming of rivers, and railroad construction are also proposed in the region [7] (see Protected Areas and Wildlife).

Throughout its course the Niger River floods its banks only very locally and a narrow floodplain occurs along the loop of the Gada. In a few places rainwater collects in shallow basins to form semi-permanent lakes or ponds [6].

Although irrigation potential is still largely undeveloped one of the major uses of surface water is for irrigation. Groundwater is usually used for household needs as well as for livestock. Wells, usually of simple construction, are often hand dug with the water drawn by hand [22]. While Niger is relatively rich in groundwater most reserves are ancient storages and are believed to receive very little if any recharge [2].

Forest

As a Sahelian country Niger does not have extensive forest cover. In fact its climate is clearly unfavourable for forests as they are known in other regions of Africa. Niger has only 141,964km² of forest, just over 10% of land area [26] (Fig. 3).

Desert and semi-desert dominate the northern half of the country [1]. The region is virtually barren except for ephemeral plants which appear immediately after rains [6]. Rainfall in this area is typically very low and erratic. But when it does rain vegetation appears, characterised by *Stipagrostis* spp. and *Tribulus longipetalus*, which can survive two or three years without further rain.

Sand-filled desert wadis, which may only receive rain every 10-20 years, react to rainfall with a rapid herbaceous growth (*Panicum turgidum*, *Astragalus pseudotrigonus* and *Chrozophora brocchiana*). They also benefit from water runoff from more mountainous areas, and have relatively well-developed vegetation formations with *Acacia albida*, *A. raddiana*, *A. nilotica*, *Balanites aegyptiaca* and *Maerua crassifolia* [12].

Oases — areas where surface or near surface water is permanent — frequently support a rich vegetation. Typical species include palms (*Hyphaene thebaica*, *Phoenix dactylifera*) or tamarisk (*Tamarix* spp.) with occasional emergent waterside vegetation such as *Phragmites* and *Typha* [12].

The south of the country is Sahelian savanna with small, gnarled and thorny trees and bushes. Taller savanna woodland with *Adansonia digitata*, *Ceiba pentandra*, *Tamarix indica* and some palms is found in the south-west, while gallery forests occur along the Niger. The Central Zone contains steppe vegetation [6].

Timber for construction and for fuel is constantly harvested from the gallery forests, especially *Borassus aethiopum*, which is used for building. *Andropogon gayanus*, which grows on flooded areas, is used for thatching [6].

Agriculture

Agricultural production is erratic as it depends directly on rainfall. It has difficulty keeping up with population growth. In 25 years the surface area for agriculture has practically doubled, reaching 35,990km² in 1990. Major agricultural products are millet (59%), sorghum (14%), cassava (20%), peanuts (4%), rice (0.5%) and cotton (0.3%). Niger's main export crop is peanuts (25,000 tonnes in 1988-1990) [24]. Onions, tomatoes, sugar cane, wheat, sweet potatoes, sesame, leeks and dates are other major exports [2, 15]. Subsistence crops include millet (1.2 million tonnes in 1989), sorghum (259,000 tonnes), yams (212,00 tonnes) and rice [24]. Production of legumes — groundnuts and cowpeas — has been growing by 0.6% a year [2]. Cereal production (millet, sorghum, rice and corn) has increased by 1.6% each year for the past two decades, reaching an exceptional level (2.3 million tonnes) in 1991 as a result of abundant rainfall. Local shortfalls, however, meant that food aid was still required.

Farming in Niger is characterised by extensive use of inappropriate agricultural practices. These include poor cropping systems, land preparation practices, inefficient fertilizer application, and lack of soil conservation measures (such as conservation tillage, terracing and agroforestry) [2]. Under these conditions, degradation of farming land is inevitable. In addition rapid population growth results in migration to new, uncultivated areas and the conversion of grazing pasture to agricultural land. Ill-adapted farming practices and the

shortening of fallow periods (now frequently less than five years, if at all) and other factors which place additional pressure on arable lands.

With CEC support, CIRAD has conducted an analysis of farming productivity in several Sahelian areas using interpretation of satellite data recorded from 1985 to 1991. Results are being used in a pilot project to predict agricultural production in the Sahel. When complete, the surface areas of specific crops as well as yields will be calculated for each district [57]. ORSTOM is also involved with farming practices in Niger [58].

The World Bank provided US\$19.9 million in 1990 in support of agricultural research development and to reinforce the national planning capacity [56]. This programme is co-financed by the European Investment Bank (US\$18 million) [56].

Livestock

Livestock remains one of Niger's greatest resources and ranks second to uranium as a source of foreign exchange earnings [24]. A large part of the country, inhospitable to agriculture, is essentially grazing land. As with agriculture the livestock sector is heavily influenced by climate. In years of good rains pastoralists increase herd sizes, because animals are considered the main source of wealth. As a result, when drought comes, the reduced pasture is more intensively grazed [22]. Eventually the pasture fails because of both over-grazing and the effects of drought, and herds must be drastically reduced. Some animals may be sold for emergency cash. More often they simply die. The nomadic herders lose their livelihood and become refugees. The effect on the land is to increase erosion, reinforcing the effects of drought and compounding desertification problems [22]. This process is aggravated by the expansion of agriculture into semi-arid and arid zones [2].

Between 1938 and 1961 the number of cattle increased by four-and-a-half times to 3.5 million, and by a further 29% by 1970. Additionally Niger had nine million sheep and goats in 1970, three times the number in 1938. Camels increased sevenfold between 1938 and 1970, and the number of donkeys doubled [2]. Livestock was estimated by the FAO in 1988 at 3.6 million cattle and 11.1 million sheep and goats [24], but these figures have since declined drastically (see Fact Sheet).

The drought of 1984 resulted in the greatest loss of livestock — 30-40% of some herds. Livestock numbers are slowly increasing once again but the existence of illegal livestock markets in northern Niger results in a loss of national income,

Fisheries

As a landlocked country with little surface water, fishing is only important on a local basis and then in only restricted areas. Most fish come from the Niger River and its tributaries; the rest from small lakes and ponds [22]. Fifteen years ago, Lake Chad was the major source of fish and fishing was an important economic activity there. Since the retreat of the lake from the Nigerien territory many of the smaller lakes are managed for the local fish market [18].

Niger River fisheries declined from an annual harvest of 45,000 tonnes in 1960 to 900 tonnes in 1985, a decrease in catch per head from approximately 14kg to 0.1kg. In the southern zone

shared by Benin and Niger, 80% of the catch is immature fish [2]. In 1987 the total catch was estimated by the FAO at 2400 tonnes [24]. According to more recent estimates, however, this could exceed 5000 tonnes.

In 1990 the French Ministry of Cooperation provided FF13 million towards development of aquaculture in Niger. This grant represented the third and final phase of development of a project initiated in 1981 by Nigerien authorities with support from the Tropical Forest Technical Centre (CTFT) and with joint funding from CCCE and FAC [1].

Protected areas and wildlife

The protected areas system is made up of a national park and five reserves, which cover about 7.7% of the country. The system encompasses all vegetation types except swamp, but contains little wooded grassland or Sudanian woodland [8, 33, 34]. Details of the protected areas are provided in Table 1 and illustrated in Fig. 4.

The best preserved area of savanna woodland (which once dominated the south of the country) is found in the southwest in "W" National Park and Tamou Nature Reserve [1]. "W" National park was originally established as a "parc de refuge" in 1937. It was classified as a Total Faunal Reserve in 1953, and in 1954 was redefined by decree as a National Park [8].

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Table 1. Protected areas of Niger

Category	Number	Area (km ²)
National Park	1	2,200
Strict Nature Reserve	1	12,805
National Nature Reserve	1	77,360
Total Faunal Reserve	2	1,520
Partial Faunal Reserve	1	3,065
Total	6	96,950

The park takes its name from the double bend of the Niger River between the points where two tributaries from the west join it. The 2200km² site forms part of a larger international protected area expanding into Burkina Faso (3300km²) and Benin (5020km²), and the Reserve de Faune de Tamou (756km²) to the north. This region supports diverse birdlife. Migratory aquatic birds are common between February and May. Guinea fowl, bustards, hornbills and francolins are found throughout the park. Raptors such as vultures, fish eagle, martial eagle and gohar goshawk are also common. The waterbirds most frequently encountered are geese and ducks, waders, ibises, storks, herons and egrets. The park's wildlife also includes elephant, buffalo, topi, roan antelope, bushbuck, red-flanked duiker, grey duiker, waterbuck, kob, hippopotamus, leopard and cheetah [17, 19]. In view of its importance, this region has been declared a Ramsar wetland site [7].

"W" faces serious threats, however, including poaching, illegal grazing and annual migration of cattle belonging to Niger's Fulani people, uncontrolled bushfires, fishing and cultivation within its boundaries. An estimated 10-15,000 cattle are believed to graze in the park. There are also proposals for phosphate mining, damming of rivers, and railroad construction, which could seriously affect parts of the park [7]. Still, it is believed the Niger portion of "W" is better managed than its counterpart in Burkina Faso and Benin [8].

Protected areas in the Sahel zone are facing degradation. Apart from the Aïr-Ténéré, the most important remaining area is the Gadabedji Total Faunal Reserve and Classified Forest, which is mainly grassland. Created in 1955 for the conservation of scimitar-horned oryx (*Oryx dammah*), which may now be extinct in the country, it is the only Nigerien reserve within the Sahel-Saharan zone [8]. But it exists only in name as its management has never been effective. It is too small to support viable populations of the antelopes which are being re-established in the area, and is also subject to heavy illegal use by nomadic pastoralists [1]. Other threats include poaching and intensive livestock rearing, though illegal [19].

Niger has important desert areas with remnant wildlife populations. The enormous Aïr and Ténéré National Nature Reserve includes both sand deserts and arid mountains [1]. The Reserve, and a core zone, the Addax Sanctuary Strict Nature Reserve, were established in 1988. Covering 77,360 km² it is the largest protected area in Africa under active management, and the most important in the Sahel zone [8]. This is a multi-use reserve accommodating the customary rights of human populations living in the area, but subject to certain restrictions regarding the exploitation of natural resources. About 12% of the reserve

is classified as an Integral Nature Reserve (Addax Sanctuary) to which access is strictly limited [12].

Threats to the Aïr and Ténéré include poaching by the military, insensitive tourist disturbance of wildlife (particularly by vehicles pursuing animals to enable tourists to obtain photographs, which can lead to animal deaths from exhaustion or heat stress) and littering, overgrazing and exploitation of firewood (near population centres), illegal commercial wood collecting, and the failure of reserve authorities to obtain complete political recognition by other governmental departments [8]. The 2500-3000 people living in the region are virtually all Berber tuaregs, whose ancestors arrived in successive waves over the past 2000 years. They are usually semi-nomadic herdsmen and their camel caravans still ply the Aïr settlements. Their customary rights of residence, passage, access to water, and pasture are maintained within the reserve [8].

Tamou Total Faunal Reserve (760km²) was established in 1962 to form a buffer zone for "W" Reserve [8]. The major threats it faces include illegal expansion of agriculture and poaching. There is also overgrazing and destruction of woody vegetation [8]. Dosso Reserve (3065km²), to the north-east of "W" Park [12], was created at the same time [8]. No provisions regarding settlement, farming and grazing were included in the classification, and the reserve is now widely settled [12].

Between 1937 and 1956, 79 classified forests (covering 2120km²) and 51 restoration and defence areas (covering 690km²) were created [8, 12].

Despite the individual and collective protective measures threats to parks continue. All hunting in Niger has been banned but it is widely practised in the absence of law enforcement. Traditional hunting, which does not involve use of modern weapons and vehicles, as well as changing land-use patterns, probably does not have a significant effect on wildlife numbers. Hunting by the armed forces is of more concern and, considering its widespread nature, is difficult to control. Other problems include desertification and periodic drought, which exacerbate the conflict between people and wildlife [8]. Poaching is a serious problem, made even worse by the large number of unauthorised weapons in some reserves. Furthermore, many poachers come to Niger from neighbouring countries [16]. Finally, because of a lack of trained personnel and funds, Niger can only provide limited support for wildlife conservation and must continue to rely on international assistance [19].

Non-renewable resources

Uranium is Niger's leading currency-earning resource with reserves estimated at 360,000 tonnes, or 100 years at an extraction rate of 3600 tonnes a year [13].

The decline in the uranium market in the 1980s, together with a lowering of the price of petrol and the end of several nuclear programmes, has led to a lowered production of uranium in Niger to less than 3000 tonnes each year. Nevertheless the uranium industry remains of considerable importance for the country's economy, contributing up to 70% of export earnings. Its future is tied to an important restructuring programme which is intended to

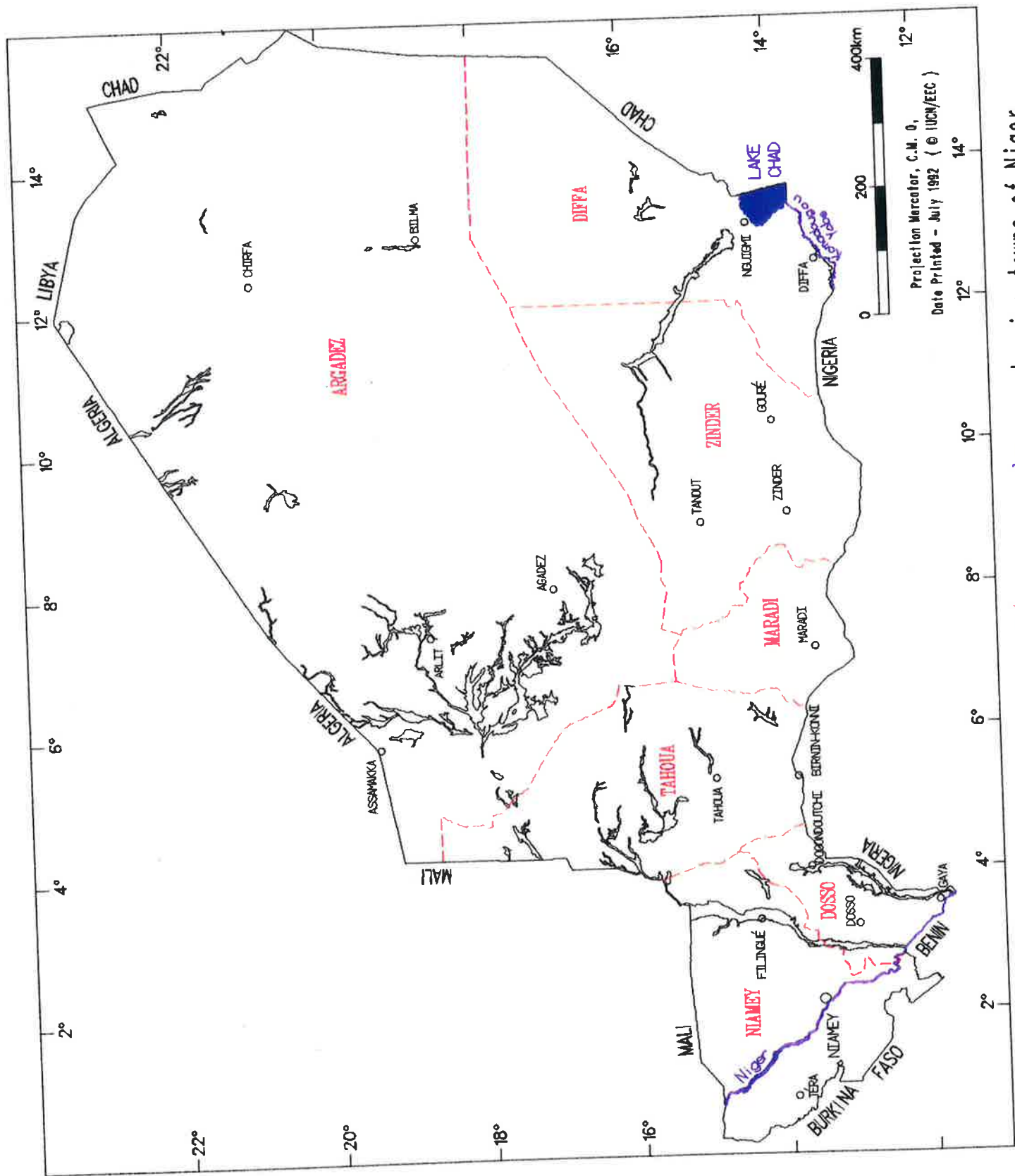


Figure 1. Administrative Boundaries, Rivers, and major towns of Niger.

reduce extraction costs (currently about CFA 17,000/kg) which would make it more competitive on the world market.

Other mineral resources include tin, iron, calcium phosphates, and gypsum. A modern salt mine is being developed, and trial gold-dredging operations have begun. Coal deposits are estimated at six million tonnes, and yearly production now averages 150,000 tonnes [24]. There are also manganese, lithium and molybdenum [22].

Oil exploration is part of Niger's effort to diversify exports from uranium [3]. Prospecting has shown positive results but exploitation will depend on world oil prices and oil may need to be simultaneously discovered in commercial quantities in neighbouring Chad for a pipeline network to be viable.

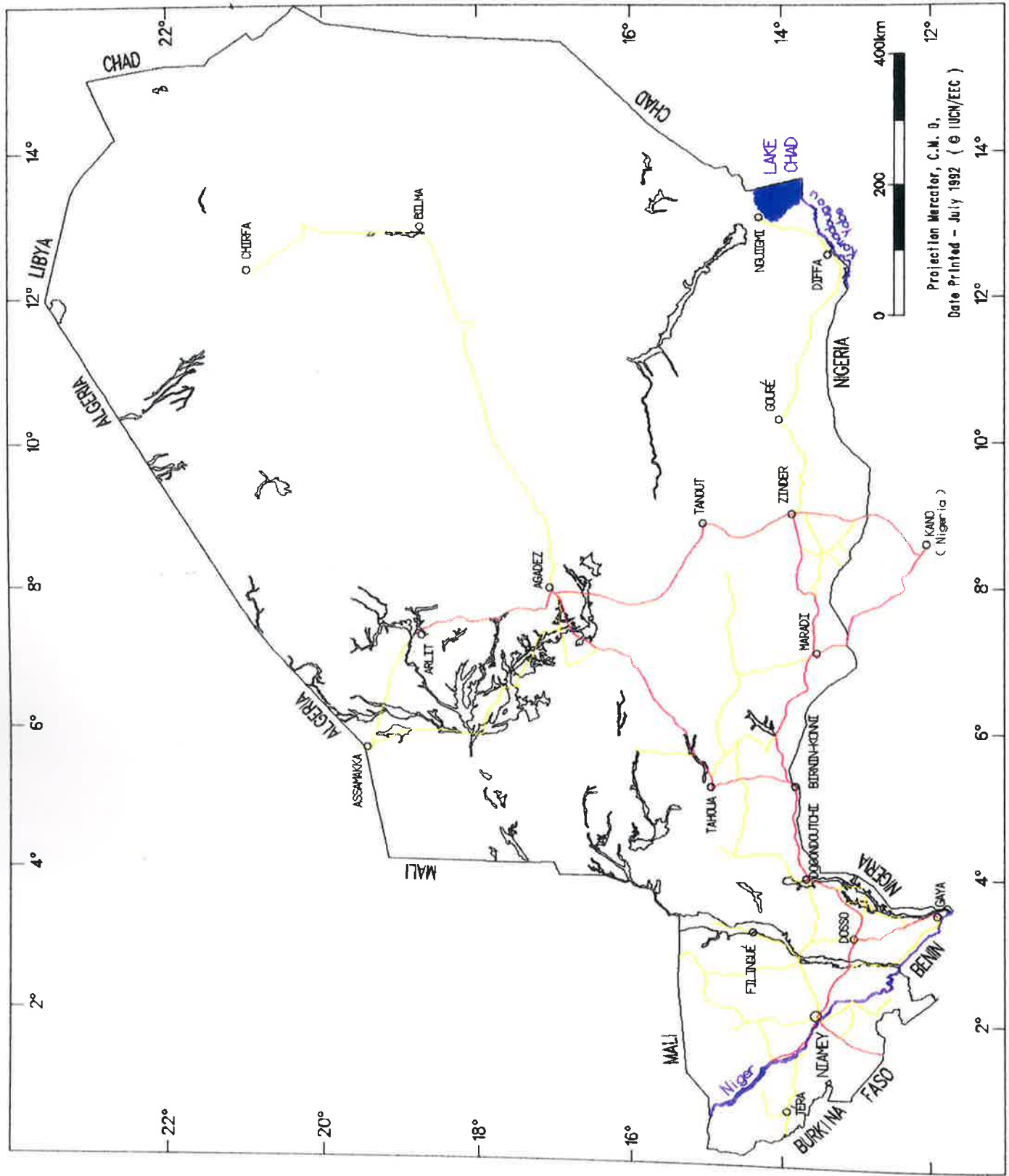


Figure 2. Major communication routes in Niger: Major Roads ✕, Secondary Roads —, Rivers —.

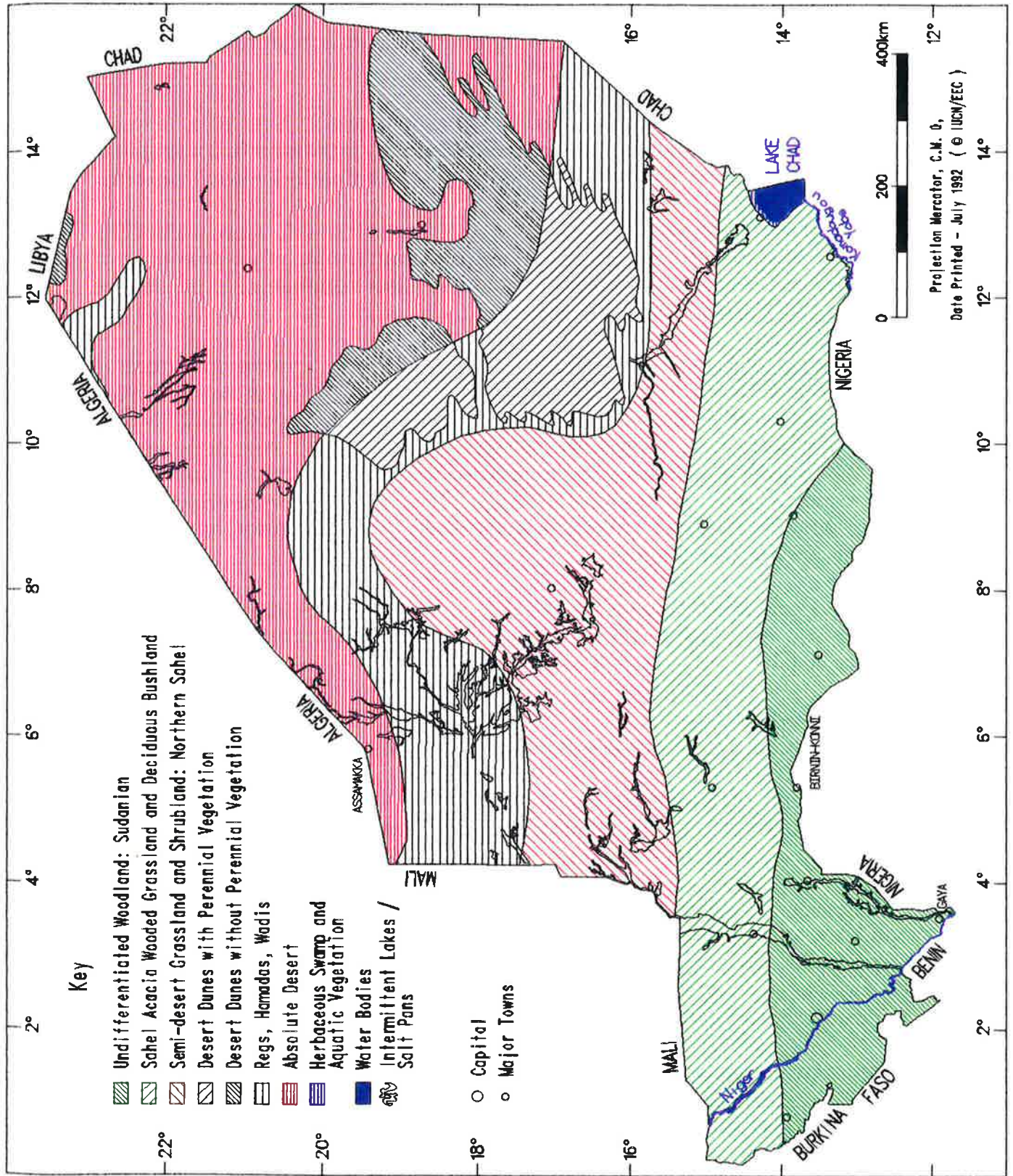


Figure 3. Vegetation pattern of Niger. See text and Annex I for further details.

Industry

Main industrial sectors

The industrial sector has entered decline following the drop in uranium production. Niger is still, however, the world's fourth largest uranium exporter.

Industrial production has experienced a reduced turnover estimated at 23% for 1991. In recent years this has contributed to a shrinking industrial base especially in the manufacturing sector. Locally produced products are frequently forced to compete with illegally imported materials.

Niger has the least developed manufacturing sector of all francophone African countries [22]. As in most other West African countries, manufacturing takes the form of the processing of agricultural commodities and import substitution and is of minor significance, accounting for less than 2% of GDP in 1987 [24].

Brewing and abattoirs, which are the mainstay of the food industry, continue to perform in a satisfactory manner. The textile industry, which benefits from a partially protected national market, exports about 40% of total production. The main company SONITEXTIL has, however, recently experienced competition from Asian producers. It is now in the process of restructuring its production line in order to improve efficiency and output. Tanneries and other industries dealing with animal products have also experienced a reduced output. Public works and construction have also suffered from the poor economic situation, with no new roads or major developments planned.

In this depressed context government incentives for development of private industry, for example, have had only limited effect. Public enterprises have undergone a structural adjustment which did not meet expected results.

Location of industry

The limited industrial activity is concentrated in and around Maradi and Niamey.

Energy sources and consumption

Most of Niger's industry is fuelled by imported petroleum. Although some petroleum deposits have been found in the south-west, they have not been considered commercially exploitable.

Electricity consumption has grown rapidly in recent years, quadrupling between 1970 and 1987 when it reached 328 million kWh. The major consumers are the uranium companies. Domestic generation, which is almost entirely thermal, covers about one-half of demand and the remainder is met by supplies from Nigeria. A massive power development programme is planned, partly because the Nigerian supply is unreliable [24].

The Arlit and Akouta thermal power station, which uses domestic coal, began operation in 1981. The initial capacity of 16MW was increased to 37.7MW in 1982. A 125MW hydro-electric plant is planned at Kandadji but financing has still to be obtained and its location is under review [24].

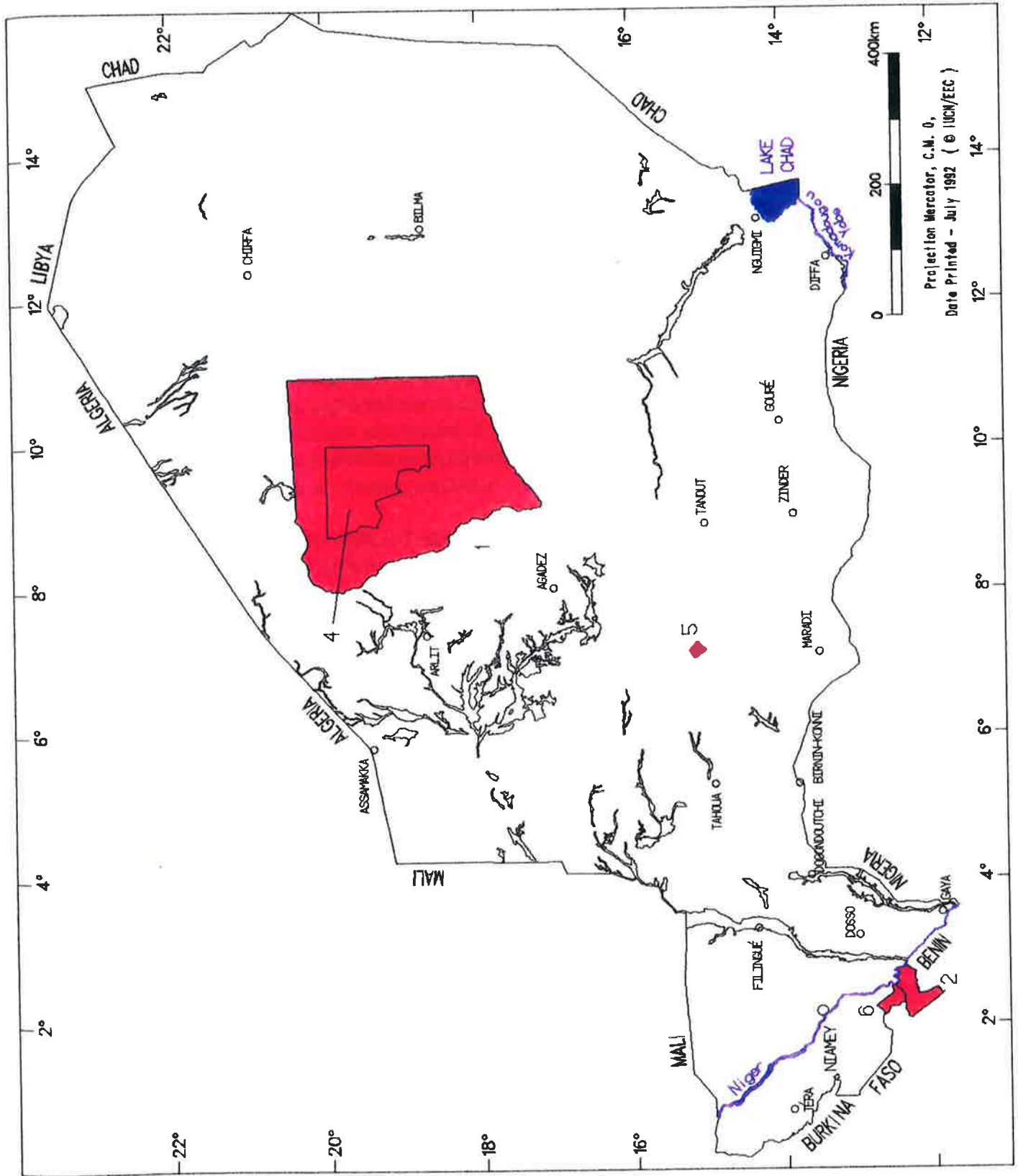


Figure 4. Protected Areas of Niger. See text and Annex II for further details.

Demography and Urbanisation

Demographic pattern

In 1991, Niger had an estimated population of 7.73 million people, of which more than 85 % lived in a narrow band 100-150 km wide, north of the Nigerian border. This concentration of population is a major concern [2] as it places extensive pressure on natural resources.

Niger's population can be roughly divided into five major ethnic groups. The largest is the Hausa - about half the population - who are overwhelmingly sedentary agriculturalists and also provide the majority of the small merchants and traders. Various groups of Hausa in Niger live along the Nigerian border, where they still maintain close contacts with their kinsmen in Nigeria where the majority of Hausa people live [22].

The Djerma-Songhai make up about a quarter of the population and generally live along the Niger River. They are sedentary agriculturalists also and account for the majority of Niger's civil servants. Next are a group of loosely-related peoples grouped under the name of Kanuri. They live in the south-east, as well as in other countries surrounding Lake Chad. They have a mixed agricultural-pastoral economy. The Fulani (sometimes called Peul) are primarily nomadic cattle herders and are scattered across habitable Niger where agricultural density is low. Like the other groups they are found in other countries, mainly in the Sahel region [22].

The Tuareg (see the Aïr and Ténéré section in Protected Areas) only make up a small proportion of the population, but they are predominant in the northern part of Niger. Their pastoral economy is based on sheep, goats and camels. They, and other nomadic groups, were very hard hit by the 1967-1973 Sahel drought which forced them to become increasingly sedentary.

Population growth

Population growth in Niger is estimated at 3.3% a year and the government has expressed deep concern at this high rate [14]. The fertility rate of 7.1 is very high compared to the world average of 3.3, and high even against the African average of 6.2. If fertility remains constant, the growth rate would reach 3.6% during the period 2000-2015 and 4% during 2015-2030 and the national population would reach 17.4 million in 2015 and 31.2 million by 2030. Approximately half the population is under 15 [2].

Population growth is a main cause of soil erosion, degradation of rangelands, deforestation, and the increasingly serious urban environmental problems [2].

Contraceptive use in sub-Saharan Africa is lower than in any other world region and surveys show that it is less likely to influence family size. Some progress was achieved with the opening in 1984 of a National Family Health Centre in Niamey (with USAID assistance) and, more recently, with the availability of contraceptives (subject of a 1988 decree). The very low level of education among women in Niger is a key obstacle to family planning. The adult female illiteracy rate in 1985 was 91 % compared to an adult male illiteracy rate of 81 % [2]. In 1989 only 2% of the women of childbearing age were using modern contraception methods [30].

Internal and external migration

As the line of rainfall moves south, so do people. Pushed from their traditional areas by drought, erosion and desertification, more and more are crowding into areas which have fewer and fewer resources to support them.

Clearly, it is not any particular attraction in cities that is pulling them. Instead, families are seeking refuge from an environment that has become sterile and inhospitable [25], and can no longer offer them hope for survival.

Neither immigration nor emigration is considered a major concern in Niger. But in 1982 the government placed legal restrictions on jobs for foreigners. Since 1985 more than 5000 migrant workers have returned home from Libya as a consequence of its campaign to reduce its foreign labour in the wake of falling oil revenues [14]. Political developments in Chad, too, have led to an influx into Niger [23].

Extent, density and distribution of urbanisation

Three-quarters of the population occupies the exploitable quarter of Niger, creating great economic imbalances and accelerating the degradation of land and the environment. Population growth and unequal regional distribution of natural resources have increased the urbanisation rate [13].

Despite the rural exodus only one-sixth of the population lives in towns [14]. Still, the urban population has been growing at an average of 7% of population per year, more than twice the overall rate [24]. It is estimated that if current trends continue, Niger's urban population will triple by the end of the century to 2.7 million, or 26% of the total population [25].

Health issues

Health care in Niger is poor. Malnutrition, lack of sanitation facilities, poor personal hygiene and severe shortages of medical personnel and facilities all contribute to low standards of public health [22]. A 1990 survey in the Tillaberi division (covering the region to the east, west and north of Niamey) revealed 17% of the people were from acute protein deficiency [30]. The death rate is much higher in the north than in the south and much higher among nomads than sedentary inhabitants.

Major causes of death include malaria, measles and cerebro-spinal meningitis. Other common diseases include trachoma and conjunctivitis, venereal disease, intestinal parasites and tuberculosis. Perhaps because of large-scale displacements caused by drought, cholera has become a problem [22]. The poor economic situation is also affecting health care as less money is available to implement the national health programme [30].

Most recent records from WHO indicate that 497 cases of AIDS had been recorded as of December 1992 [46].

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Maternal mortality rate is estimated at seven for each 1000 live births [7]. Among the causes are too-frequent pregnancies, illegal abortions, and the generally poor state of living conditions. Vaccination cover was estimated at 24% in 1988-1990.

In 1992 the French Ministry of Cooperation provided FF5 million towards maternal and child health care. Support for a programme against blindness is also provided by this donation. The Cooperation also contributed FF3 million in 1992 to improve sanitary conditions in the Zinder region [1].

Institutional support was provided by USAID to help re-organise the Ministry of Public Health and establish health standards. In 1992 the World Bank provided US\$17.6 million towards family planning programmes. Other major donors were the Belgian Government (US\$2.5 million) and UNICEF (US\$1 million) [2].

ANALYSIS OF POLLUTION AND DEGRADATION PROCESSES

Water Pollution and Water Shortage

Niger has severe water problems, resulting from a reduced rainfall, inadequate planning and resource mismanagement [2].

Rainfall has been below the previous 30-year average during an exceptionally long run of years since 1968. The Sahel region has suffered two major droughts. Lack of rainfall directly affects crop yield and natural vegetation. Low rainfall reduces the organic content of the soil, which leads to lower fertility and erosion. Eventually the area suitable for cultivation shrinks [2].

Reduced rainfall has lowered the flow of the Niger River and reduced inflow into the inland reservoirs. Heavy siltation, the result of soil erosion has, in turn, reduced the storage capacity of reservoirs and greatly reduced their ability to provide adequate water for irrigation during the dry season. Unnecessarily long pumping periods, excessive application of water, poorly cleaned canals and poorly levelled fields all add to the problems [2].

Niger's relatively rich groundwater supplies are generally of good quality, but some pollution is beginning to occur and poor quality waters have been found at scattered locations. This is especially significant in urban areas, but increasing pollution is also occurring around wells because of increased animal concentrations. Pollution endangers the recharge and storage of groundwater [2]. Much of the localised pollution could be avoided through improved education.

Niamey has problems in disposing of waste water, which is mostly being evacuated into the near-surface aquifers. The aquifers are becoming increasingly polluted with solids, nutrients, oxygen-consuming matter, pathogens and toxic substances [2].

Stormwater drainage is also a problem in Niger, despite the country's aridity. The usually high intensity of rainfall, combined with the soil's limited absorption capacity, especially in areas with little vegetation cover, leads to high runoff. Flash floods, which are common especially in the more arid regions, have caused damage in centres like Agadez and Arlit [2].

In 1992 the French Ministry of Cooperation provided FF7 million towards improving water supplies in rural centres. The main objectives are to provide clean supplies, to evaluate the overall requirements for water provision and to ensure the long-term maintenance and development of the scheme. In Tillabéry region, for example, 20 centres will be equipped under the project [1].

Soil Erosion and Degradation

Soil erosion — caused by runoff and wind — and declining soil fertility are among Niger's most serious environmental problems. Water erosion is worst in the Sahelian south where the relation between vegetation cover and the amount of rain is the worst. Wind erosion is a major problem in the Sahel, but over-exploitation has made other areas vulnerable as well [2].

The fallow period has been gradually decreasing, mostly because of increasing population pressure, and has had a severe impact on the mineral and organic content of the soil. Fallow periods in Niger now range from an average of 8.5 years in Diffa to only one year in Maradi. The process of degradation has accelerated since 1976-1977, with fallow periods declining by 10% annually and rural population growing by 3.4%, implying an expansion of cultivation to very marginal unproductive areas [2].

As with the other Sahelian countries, Niger has a National Plan to combat desertification. Degradation caused by localised overgrazing and cutting of trees and shrubs for use as livestock fodder and firewood occurs throughout Niger. The disappearance of vegetation cover and over-exploitation lead to deterioration of the rangeland. Erosion, especially wind erosion, is the next step in the process, leading to the establishment of sand dunes and, in the longer term, permanent desert [2].

Degradation of croplands is mostly caused by drought and environmental mismanagement such as reduction of fallow periods, extension of agriculture to marginal land, and the use of inappropriate agricultural practices [2]. Fuelwood collection also contributes to soil degradation but this could be controlled by better management.

Aware of this increasing degradation the French Ministry of Cooperation provided FF12 million in 1992 for development and management programmes in several valleys in Goudoumaria region.

Deforestation

Deforestation is another environmental problem in Niger. Total forest cover in 1980 was estimated by FAO at around 150,000km², including 10,000km² of protected areas and 200km² of forestry plantations [2].

The report estimates that Niger produced an average 4.2 million m³ of wood a year, but only 1.4 million m³ were available for consumption because two-thirds of forest resources are too far from consumption points to be economically viable. Between 1972 and 1986 nearly all forestry service activities were devoted to reforestation, but only 40km² on average were planted annually. This accounted for only 1/40th of the amount needed to maintain existing resources [2].

At an estimated annual consumption per head of 0.75m³, 4.1 million m³ was used in 1980, 20% in urban areas [2]. Woodfuel resources are running out, however, as consumption — especially in urban areas — far outstrips production [25]. Population growth will be the main

cause of deforestation as long as Nigerien households continue to use as much firewood as they do today. The problem will be especially serious in urban centres, which experience higher population growth rates than rural areas [2]. Woodfuel is an economically inferior product and so demand decreases as household income rises. According to the World Bank, higher family incomes would increase demand for cleaner fuels and reduce the pace of deforestation [2].

In an attempt to diversify local fuel options the World Bank has begun a subsidised bottled gas programme in all cities, but prices are still too high for most people.

Biodiversity

Niger is not a world centre of biodiversity, but it does have internationally important populations of several mammal and bird species, some already endangered [12].

Of 1178 plant species [35], four are considered endemic. The wild olive (*Olea laperrinei*) is considered a threatened species. No comprehensive inventory of the flora exists. Knowledge of the status and distribution of rare and threatened species, especially outside of protected areas, is poor. The Aïr and Ténéré National Nature Reserve is the most interesting part of the country from a botanical point of view (454 species have been recorded), but "W" National Park harbours a full array of savanna habitat plants and communities that have largely disappeared elsewhere in Niger. The gallery forests of the Niger River are also important, as are two orchid species and a sundew species found only here in Niger [1].

Just as the vegetation advances and retreats with climatic trends, the fauna is also dynamic, responding to long- and short-term fluctuations in climate and habitat availability [12]. One report [20] suggests that the large mammal numbers declined by about 90% over the past 20 years. Several species have become extinct during this period.

About 130 species of mammals have been recorded, including 28 bats and 27 small rodents [12]. Niger has 16 species of antelope, with the sitatunga (*Tragelaphus spekii*) becoming extinct recently. All but two of the others are threatened to some extent, though nine have viable populations in "W" National Park and Tamou Nature Reserve, providing that protection of this area can be maintained and improved. The korrigum (*Damaliscus lunatus*) has been reduced to a remnant population of about 50 animals in "W" and Tamou. The scimitar-horned oryx (*Oryx dammah*) used to occur widely in the Sahel zone, but is now believed to be extinct in the country. The addax (*Addax nasomaculatus*) occurs further to the north, but in extremely small numbers (200 estimated for the whole country in late 1989) around the Termit Massif and in the Aïr and Ténéré Reserve. There are plans to reintroduce several of the antelope species which no longer occur in Niger [1].

Four species of gazelle occur, but all are in decline. The slender-horned gazelle (*Gazella leptoceros*) is very rare, with probably fewer than 1000 animals in the Aïr and Ténéré, and possibly elsewhere in Niger's deserts. The dama gazelle (*Gazella dama*) is also extremely rare, with small numbers (estimated at around 350 in late 1989) in Aïr and Ténéré, and a few

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hundred around the Termit Massif. The red-fronted gazelle (*Gazella rufifrons*) occurs widely in the south of the country, but in greatly reduced numbers. The total population is about 3000-5000, including a few in the Gadabedji Faunal Reserve. The dorcas gazelle (*Gazella dorcas*) still survives, with 6000-10,000 animals in the Aïr and Ténéré [1].

About 300-400 elephants (*Loxodonta africana*) survive in the "W" National Park and Tamou Nature Reserve. Another 100 are thought to exist in the Babanrafi Forest south of Maradi. "W" is part of a priority baseline population for West Africa, which includes the reserves of northern Benin and south-eastern Burkina Faso. [1].

Niger has around 3500 Barbary sheep (*Ammotragus lervia*), 70% in the Aïr and Ténéré Reserve where there is also a remnant population of about 20 cheetah (*Acinonyx jubatus*). The last hippopotamus (*Hippopotamus amphibius*) occur in the Niger Valley near the Mali border and the last giraffes (*Giraffa camelopardalis*) in an area east-north-east of Niamey. Both are in urgent need of protection. Wild dogs (*Lycaon pictus*) are now believed to be extinct in Niger, and striped hyaenas (*Hyaena hyaena*) are under severe threat from poisoning by nomads protecting their livestock [1].

Of about 500 bird species recorded, about a quarter are Palaearctic migrants. One species, the river prinia (*Prinia fluviatilis*), is threatened. It occurs in wetlands around Lake Chad. Lake Chad and the Niger River are important areas for wintering Palaearctic waterbirds. Lake Chad is also on an important migratory route, with 70 species moving through the area each year. Recent surveys have shown that 40% of the West African population of Egyptian geese (*Alopochen aegyptiacus*) shelter in one small area — Tabalak-Mare — of Central Niger during their migration. The last viable population of the West African race of the ostrich (*Struthio camelus*), around 1000 birds, is found in Aïr and Ténéré Reserve. The Nubian bustard (*Neotis nuba*) is widespread but not common, and is probably subject to poaching outside the Aïr and Ténéré Reserve [1].

A few Nile crocodile (*Crocodylus niloticus*) occur in the Niger River, where they are seriously at risk. Some are also present and in Mekrou and Tapoa Rivers in "W" National Park. The African spurred tortoise (*Geochelone sulcata*) probably occurs widely in the south, but its status and conservation requirements are unknown [1].

Overall, there are several threats to biodiversity. Niger's ecosystems are severely degraded through prolonged droughts, agriculture and overgrazing by livestock. Several species have disappeared or are in the process of being lost. Protected area management in the country has also been inadequate, with illegal hunting of many species. Giraffe, hippopotamus, addax, scimitar-horned oryx, slender-horned gazelle, striped hyaena and cheetah, have been reduced to such small populations that their long-term survival seems unlikely [1].

Hunting and habitat loss by land clearing, deforestation and bush fires, are also causes of biodiversity loss [2]. In a country like Niger it is crucial that the remaining biological diversity be recognised and protected. Agricultural practices are clearly not viable in this country in their present form as they are environmentally destructive, cannot provide the required foodstuffs and preclude other uses of the land. The natural wildlife of the Sahel,

which has evolved to live under harsh conditions, has a tremendous value for local people if properly managed.

Urban Environment

Conditions in Niger's urban centres have noticeably deteriorated in the last few years, though on the whole, they are far from being as severe as in some other West African countries [2].

This decline is the result of a rapidly increasing urban population, slumping private and public investments, and a persistent shortage of human skills and financial resources to ensure urban management at a reasonable level [2].

Water supply in urban centres is unreliable. Of Niger's 50 urban centres (5000 or more inhabitants), 32 have piped water. With the exceptions of Niamey and Tillabéry, where water is taken from the Niger River, all centres are supplied from groundwater. It is estimated that 48% of urban dwellers have no access to the system and must use untreated water from wells, ponds or streams [2].

Sewage systems exist, but to a limited extent only, in the six largest centres. Only Niamey, Maradi and Zinder have a water-borne waste-water evacuation system, although even in these cities the service is not especially effective. Only Niamey has a waste-water treatment plant. Countrywide, there are about ten systems of primary waste-water treatment. Other waste-water evacuation systems are dry latrines, seepage pits and septic tanks [2]. Combining this with overcrowding as the poor move in from rural areas, Niger's cities will face increasing deterioration before any improvement can be expected.

In 1991 the World Bank provided US\$20 million towards refurbishment and maintenance of waste management equipment and urban infrastructure. Co-financing of US\$10 million was provided by KfW and OPEP [2].

Energy Issues

Woodfuel supplies an estimated 87% of the total energy consumption in Niger. Firewood is used for cooking by 98% of households in urban areas [2], and 100% in rural areas [25]. It comes to urban areas by truck, van, camel and donkey from within 100km. The increasing consumption of firewood and the predatory and inefficient way it is cut and consumed has damaged the environment, particularly around urban areas. Wood for construction is also becoming increasingly scarce, leading to a substantial drop in housing quality [2].

Wood consumption is a major factor in the rapid degradation of already meagre vegetation resources, thus contributing to accelerated erosion, loss of soil fertility, and increased desertification [25].

Consumption within 150km of Niamey can be estimated at 788,000 tonnes a year, while it appears the area only has 260,000 exploitable tonnes available a year [25].

Non-wood energy comes mainly from petroleum, which must be imported [22]. This dependence on imports, combined with the increasing scarcity of the only available domestic fuel, is a precarious situation which could lead to an energy crunch.

Industry

The environmental effects of large-scale uranium mining are not well known. Radiation exposure of workers is monitored by the companies themselves according to internationally accepted standards. In a more developed country, solid waste and contaminated water from uranium mining and processing would probably be more carefully handled. Also, the desert landscape has changed character aesthetically, because of strip mining, waste deposits and the concentration of population [2].

Other industrial impact on the environment is only of waste created by the few manufacturers and poorer quality of air surrounding industry.

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NOTE ON DATA SOURCES

Every effort has been made to ensure that the information in this Environmental Synopsis is as detailed and accurate as possible. Wherever possible, original data sources have been used as a reference or, failing that, data have been checked against several other sources.

While data on the environment in Niger are not scarce, information is diffuse and concentrates specifically on a few critical sectors. Some which have received extensive attention in environmental literature include soil degradation, protected areas and population. Information exists on biological diversity in Niger, but most is culled from more general works on protected areas. Given the country's extensive migration patterns, there is abundant information on demographics. Unfortunately, much of the available information is outdated and as a result some emerging critical issues, such as deforestation, wetland conservation and desertification, are not receiving the attention they should.

While legislation exists to protect Niger's natural resources, certain sectors such as water use and land ownership, are crucial to the environment but are not covered by laws. The *Code Rural*, which is in the process of becoming law may help fill these gaps, as could the emergence of new, committed grassroots environmental organisations.

In general Niger needs a natural resource information base and inventory to address the overall objectives of land-use planning and resource management.

A number of publications are recommended for further in-depth reading on a particular topic. This includes the regular country reports of the Europa handbook [24] which provide a well-balanced review of the political (historical and present) and economic situations. A wide selection of useful statistical data are to be found in [1, 14, 30, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 47, 48, 49, 50, 51, 52, 53 and 54]. Information on biodiversity, deforestation and wildlife issues have been obtained from a number of publications [1, 6, 7, 8, 9, 12, 26, 33, 34 and 35]. Demographic, health and similar data have been taken from a wide range of sources within the United Nations (particularly WHO and UNICEF).

One of the prime objectives of this overview has been to highlight gaps in current information in the hope that government and development agencies alike will take the need for fuller information into consideration when planning and implementing future projects.

ANNEX I

Vegetation pattern of Niger (see also Fig. 3)

No vegetation map was made available to this project. The data shown here do not give an 'actual' presentation of vegetation cover in Niger but are potential vegetation patterns digitised from White, F. (1983) *The Vegetation of Africa* prepared for Unesco. Managed areas data were digitised from information drawn onto a base map by C. Magin (Personal Communication, 1992) and from a published map showing reserves of parts of five neighbouring countries *Carte Touristique — Parcs Nationaux des Pays de l'Entente* (1984), compiled by l'Institut Géographique National and Conseil de l'Entente, Abidjan.

Digitised data are held at the *WCMC Biodiversity Map Library*, WCMC, 219 Huntingdon Road, Cambridge, CB3 0DL, UK.

ANNEX II

Protected areas of Niger (see also Fig. 4)

Map Reference	Protected Area
1	Aïr and Ténéré National Nature Reserve
2	"W" National Park (of Niger)
3	Dosso Partial Faunal Reserve *
4	Addax Sanctuary Strict Nature Reserve
5	Gadabedji Total Faunal Reserve
6	Tamou Total Faunal Reserve

* not mapped

ACRONYMS

ANV	Alliance Niger Vert
BALD	Development Liaison Office (Bureau d'Animation et de Liaison pour le Développement)
CARE	Care and Relief Everywhere
CCCE	Caisse Centrale de Coopération Economique
CIDA	Canadian International Development Agency
CIRAD	Centre for International Cooperation in Agricultural Research for Development (Centre de Coopération Internationale en Recherche Agronomique pur le Développement)
COSV	Coordinating Committee for Voluntary Organisations (Comité organisatoire des services volontaires)
CTFT	Tropical Forest Technical Centre (Centre Technique Forestier Tropical)
DANIDA	Department of International Development Cooperation, Denmark
DDA	Direction de la Coopération au Développement at de l'Aide Humanitaire (Swiss Cooperation)
CCEC	Commission of the European Communities
ELC	IUCN Environmental Law Centre (Bonn)
FAC	Fonds d'Aide et de Coopération
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit, Germany
ha	hectare(s)
INRAN	Institut National de Recherche Agricole au Niger (National Agricultural Research Institute)
IPDR	Institut Pratique de Développement Rural (Institute for Practical Rural Development)
ISAID	Institute for the Study and Application of Integrated Development
IUCN	The World Conservation Union
KfW	Kreditanstalt für Wiederaufbau
km	kilometre(s)
kWh	kilowatt-hour(s)
MW	Megawatt(s)
NGO	non-governmental organisation
ONAREM	Office National des Ressources Minières (National Office for Mining Resources)
ONVPE	Organisation Nigerienne des Volontaires pour la Protection de l'Environnement (Niger Environmental Voluntary Organisation)
ORSTOM	French Technical Cooperation Agency (Institut Français de Recherche pour le Développement Scientifique en Coopération)
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNSO	United Nations Sudano-Sahelian Office
USAID	United States Agency for International Development
WWF	World Wide Fund For Nature