

# Africa

## At A Glance

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Population: 812 million

Percent of World's Population: 13.2%

Land area: 30,065,000 sq km

Percent of Earth's Land: 20.2%

Key Environmental Issues:

*Land degradation*

*Desertification*

*Deforestation*

*Habitat loss*

*Loss of biological resources*

*Water stress and scarcity*

*Deteriorating water quality*

*Wetland loss*

## Sites for Africa

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*Banjul Region, Gambia*

*Challawa Dam, Nigeria*

*Itampolo, Madagascar*

*Lake Chad, Chad*

*Lake Nakuru, Kenya*

*Lake Victoria, Uganda*

*Lesotho Highlands Dam, Lesotho*

*Midrand, South Africa*

*Mount Kilimanjaro, Tanzania*

*New Valley Project, Egypt*



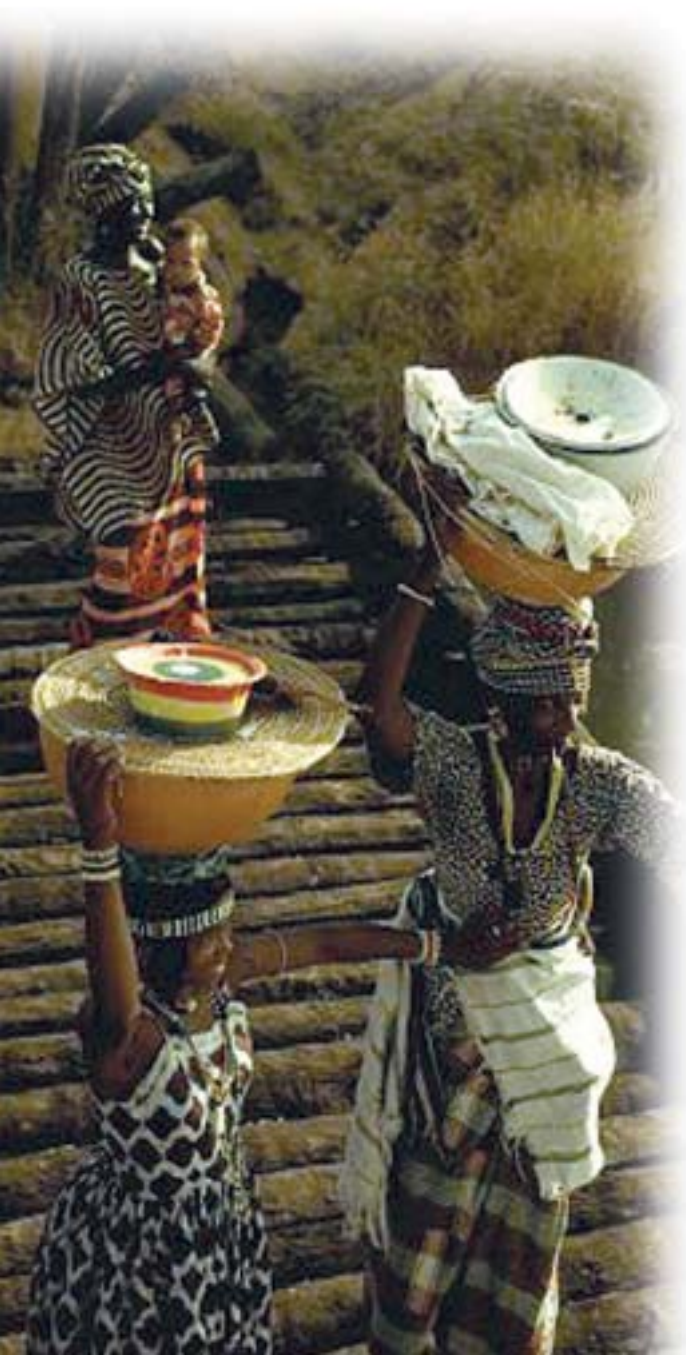
# Banjul Region, Gambia

## *Urban Growth*

**B**anjul, the capital city of Gambia, is located at the end of a peninsula. The Gambian population is increasing by about 4.2% annually. The satellite images of 1973 and 2001 indicate urban sprawl in the Banjul region during the past 27 years. Urbanization in Banjul has extended into surrounding areas, which now include several outlying districts such as Serekunde and Kanifing. The population of the greater Banjul area has more than tripled in the past 25 to 30 years.

The mangrove swamps that lie on the northeast border of Banjul have largely escaped destruction, as urban development has mostly progressed westward. Increasing population and human encroachment could be a threat to the swamps.

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### 1973 (left)

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The satellite image shows the extent of Banjul covering only a small area just at the bulge of West Africa.

### 2001 (right)

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The satellite image shows the extent of Banjul extending far into the hinterlands (Serekunde and Karafining).







# Challawa Gorge Dam, Nigeria

## *Land Degradation*

**D**am construction started in Kano, Nigeria, around 1969. There are currently 23 dams in the zone comprising the Hadejia-Jama'are River Basin. The Challawa Gorge Dam is the second largest of these dams. The Challawa Gorge Dam on the Challawa River has created a lake with a surface area of 101.17 sq. km, a storage capacity of 969 million cubic m, and a catchment area of 3,859 sq. km. The Challawa dam was completed in 1993. The Hadejia-Jama'are River Basin is part of the Komadougou Yobe River Basin and empties into Lake Chad.

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**1990 (left)**

The image shows that the area affected by land degradation was approximately 3958.7 sq. km. This is an increase from approximately 842.18 sq. km. in 1975. Construction has just begun on the Ghallawa Gorge Dam in 1990. Many smaller dams are visible in the image.

**2000 (right)**

The image shows the Challawa Gorge Dam with degraded land trailing it in both the upstream and downstream reaches. The total area affected by land degradation increased to 6707.62 sq. km. The water in the Challawa Gorge Reservoir and in many of the other smaller reservoirs can be seen to be heavily sediment laden.







# Itampolo, Madagascar

## *Deforestation*

**M**adagascar, located in the South Indian Ocean off the southeast coast of Africa, is the world's fourth largest island, with an area of about 587,000 sq. km. The island has been described as an "alternative world" or "world apart" because of the uniqueness and rarity of many of its plants and animal species. Species diversity of both plants and animals exist primarily in the rain forests of eastern Madagascar. Madagascar was once covered almost completely by forests, but the practice of burning and cutting the forest to clear the land for dry rice cultivation, grazing, fuel, wood gathering, logging, cattle ranching, and mining has denuded most of the landscape, especially in the central highlands. Coffee production has changed forest diversity in some areas.

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### 1973 (left)

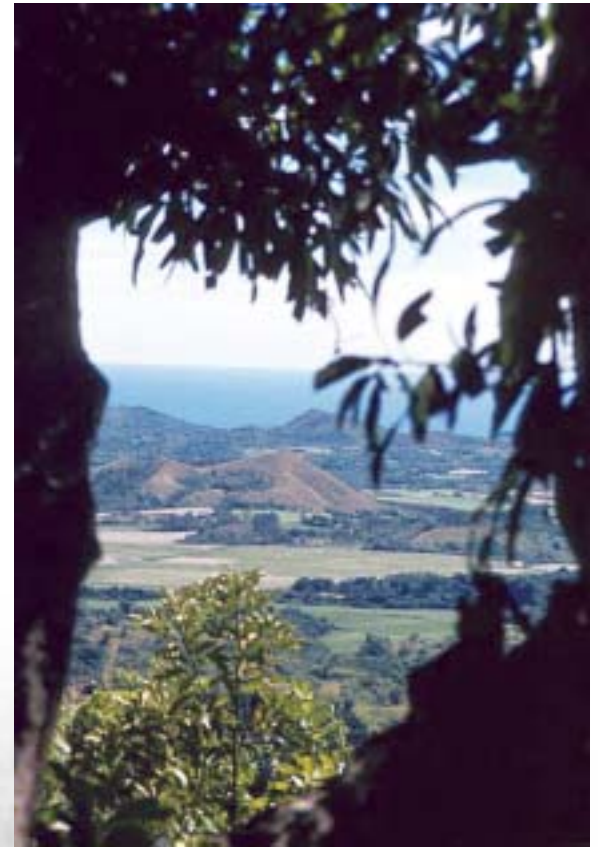
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The lake in the upper-left is Tsimanampetsota. The river flowing from the center to lower-center is the Fiherenana. The darker green areas are forested.

### 2000 (right)

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Large portions of the center of the image were deforested between 1973 and 2000.







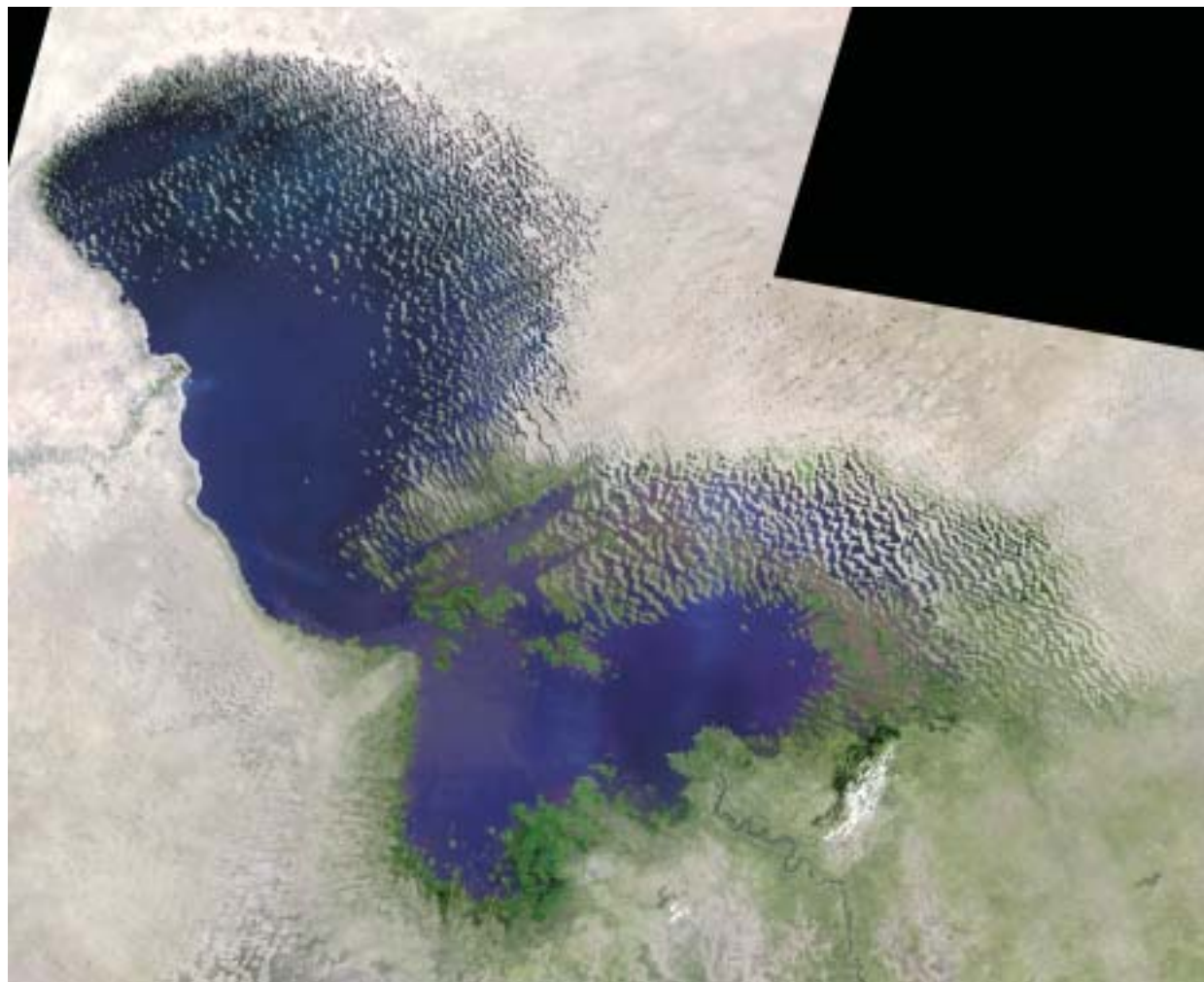
# Lake Chad, Chad

## *Desertification/Landcover Change*

**L**ake Chad is located at the junction of Nigeria, Niger, Chad, and Cameroon. Lake Chad was once the sixth-largest lake in the world, but persistent drought since the 1960s shrank it to about a tenth of its former size. Lake Chad has a large drainage basin (1.5 million sq. km.), but almost no water flows in from the dry north. The Komadougou-Yobe River, in the northwest quadrant of the Landsat images, now flows only in the rainy season. Ninety percent of Lake Chad's water flows in from the Chari River, at the southeast of the lake.

The lakebed is flat and shallow, so small changes in depth mean huge changes in area. Even in normal times, Lake Chad was no more than 5-8 meters deep. It may be more accurate to think of it as a deep wetland. Considered this way, Lake Chad was once the second largest wetland in Africa, highly productive, and supporting a diversity of wildlife.

Low-rainfall regions are usually also variable-rainfall regions. On the dry, northeast side of Lake Chad, at the town Bol, rainfall from 1954 to 1972 ranged from 125 to 565 mm (about 5-22 in), averaging 315 mm (about 12.5 in). The lake is very responsive to changes in rainfall. When rains fail, as in 1972, the lake drops rapidly because annual inflow is 20-85% of the lake's volume. In the 1950s the lake rose enough to flood out irrigation systems, peaking this century in 1962. Human diversion from the lake and from the Chari River may be significant at times of low flow, but rainfall is still the determining factor in lake level – the lake still affects irrigation more than vice-versa. Major irrigation systems have failed due to the lake level falling too low to supply water.





**1963 (upper left)**

The Lake Chad surface covered approximately 22,902 sq. km. The area shown in gray and white in the central portion of the image indicates the lake at different depths.

**1973 (lower left)**

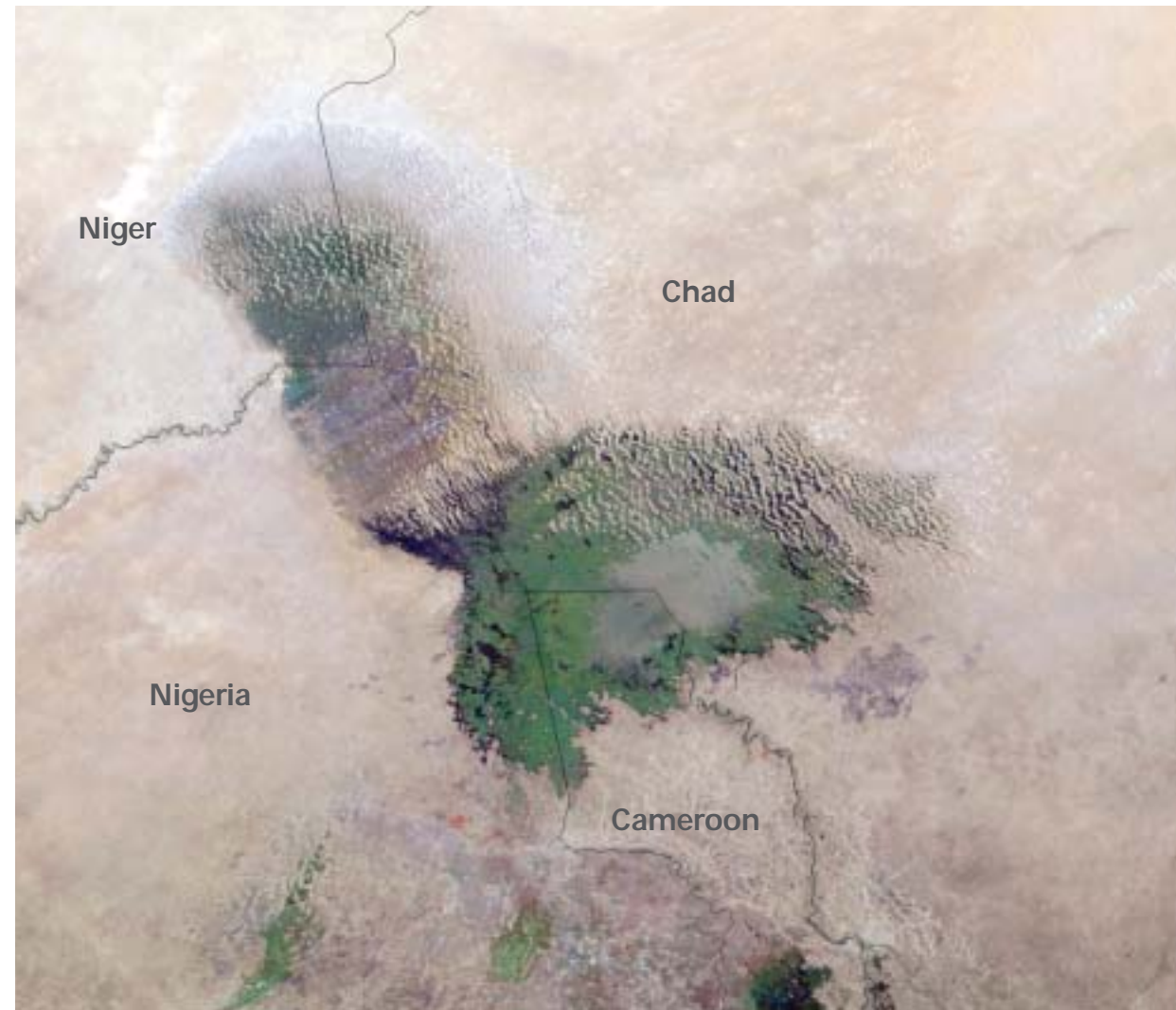
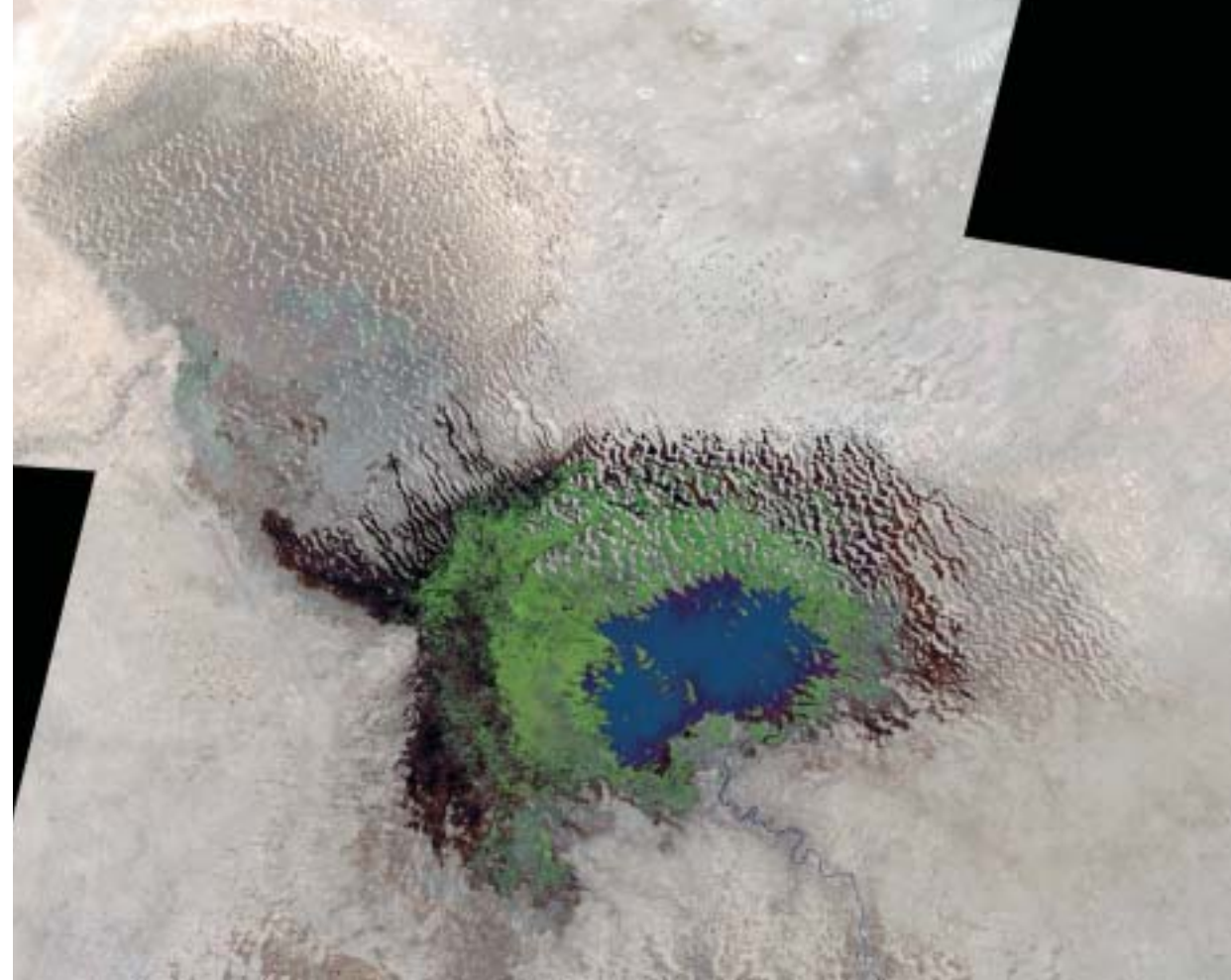
The Lake Chad water surface was reduced to about 16,884 sq. km. The area shown in red indicates the lake water while green indicates vegetation.

**1999 (upper right)**

The Lake Chad water surface was reduced to about 1,746 sq. km.

**2001 (lower right)**

The Lake Chad water surface was reduced to about 304 sq. km. The national boundaries can be seen in black.







# Lake Nakuru, Kenya

## *Land Cover Change*

**L**ake Nakuru is located southwest of the city of Nakuru, in the Eastern Rift Valley, southeast Kenya. Lake Nakuru National Park is the second most visited protected area in Kenya. It hosts the world's largest concentration of flamingos, as well many of the animal species that make Kenya a highly valued tourism destination, including lions, leopards, rhinoceros, and water buffalo. In its total area of 188 sq. km., there are over 450 bird species and 56 mammal species. Recognized as a wetland of international importance, Lake Nakuru was declared a Ramsar Site in 1990.

One of the most pressing threats to Lake Nakuru is the degradation of vegetation cover in its catchment, which is most likely to increase fluctuation in water flow and decrease water quality. The satellite images show the degradation of the vegetation cover in the catchment of Lake Nakuru between 1973 and 2001.





### 1973 (left)

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The satellite image shows the status of Lake Nakuru and its catchment area containing about 754.67 sq. km. of vegetation cover.

### 2001 (right)

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On 16 February 2001, the Government of Kenya announced its intention to excise 353.01 sq. km. of forest in the Eastern Mau Forest Reserve. As a result, most of the forest cover in the upper catchment of the main rivers that feed Lake Nakuru will disappear. About 50 per cent of the dense vegetation in the catchment has disappeared since 1973.



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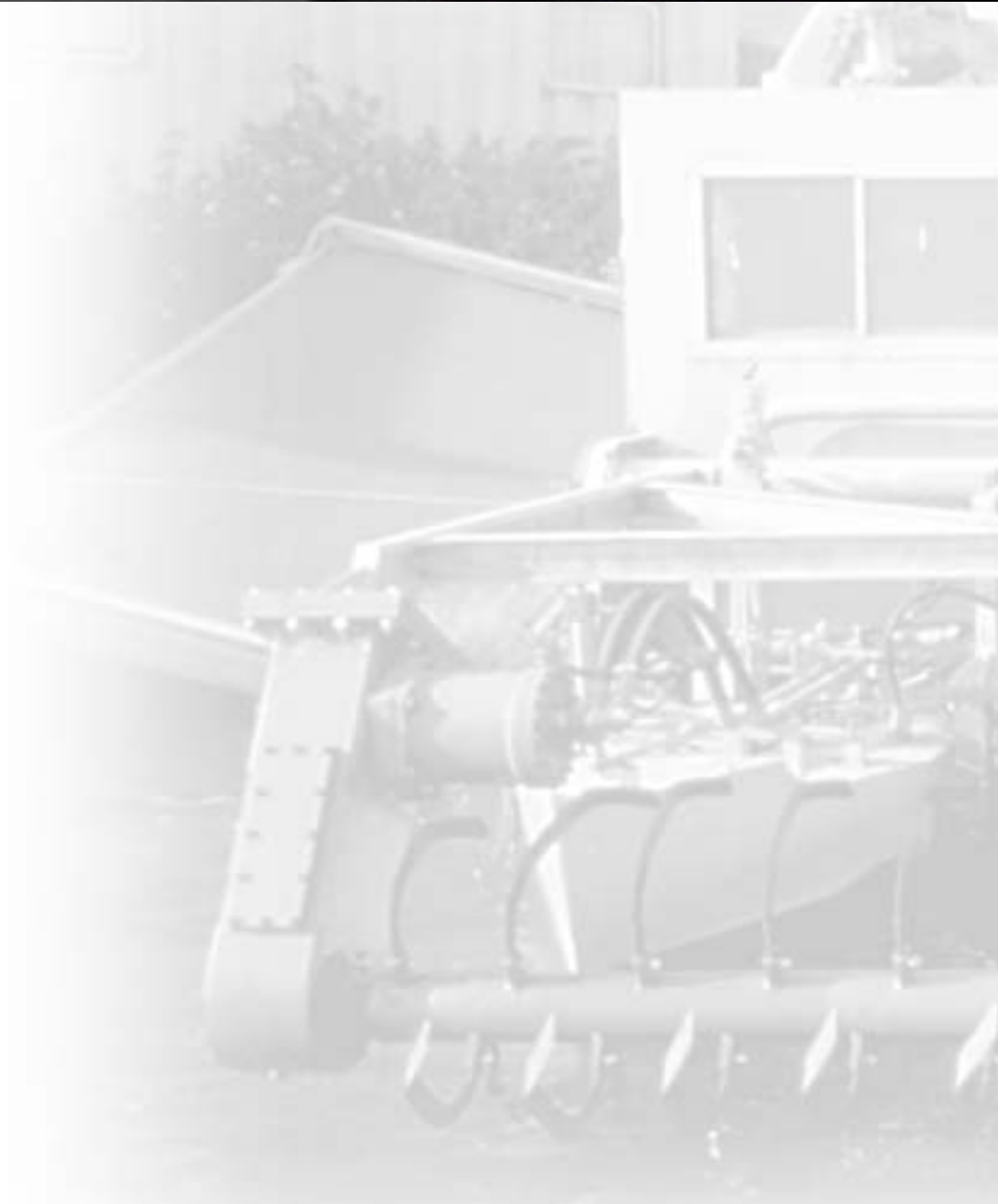
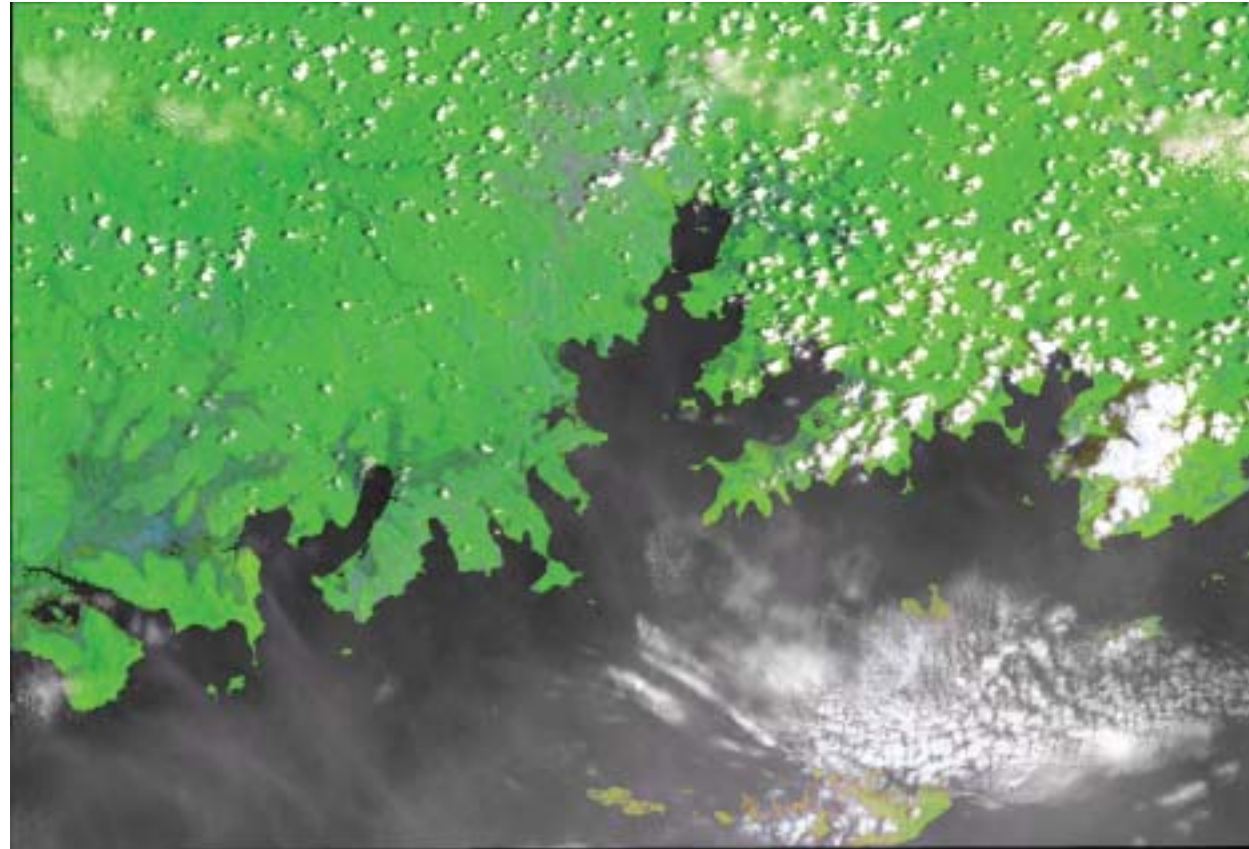


# Lake Victoria, Uganda

## *Water Hyacinth Infestation*

**L**ake Victoria is the second largest freshwater lake in the world in terms of surface area. It covers an area roughly the same size as the Central American country of Costa Rica. Bordered by Kenya, Tanzania, and Uganda, the lake serves as a valuable resource to the region providing food, potable water, hydroelectric power, and transportation. Although no one is sure exactly when or how the water hyacinth first entered the lake, reports suggest that it has been present on the lake since 1995. By 1998 it covered approximately 20,000 ha. Huge mats have paralyzed activities at the ports, villages, and bays, at times preventing even large boats from leaving their harbors. Fortunately, the amount of water hyacinth present on the lake in 2001 is considerably below its 1998 peak.

This menacing weed has particularly hit the Kenyan coastline and Port of Kisumu.





**1995 (left)**

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This portion of a 1995 satellite image taken of Lake Victoria shows very few water hyacinth near the Kibanga Port of Kampala.

**1999 (right)**

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This portion of a 1999 satellite image taken of Lake Victoria shows locations of the water hyacinth near Kibanga Port of Kampala. Water hyacinth are visible as bright green patches in protected embayments along the coast.







# Lesotho Highlands Dam, Lesotho

## *Lesotho Highlands Water Project*

**L**esotho is a small land-locked country entirely surrounded by the Republic of South Africa. Most of the large rivers in the latter arise in the mountains of Lesotho. The Lesotho Highlands Water Project (LHWP) is designed to supply water to Gauteng Province in South Africa, and hydropower to Lesotho, otherwise dependent on its neighbour for energy, using some 40 per cent of the water in the Senqu (Orange) River system in Lesotho. With five large dams to be constructed, water will be diverted through 200 km of tunnels in the Maloti Mountains, to the Ash River in South Africa and ultimately the Vaal Dam south of Johannesburg. The LHWP is Africa's largest current infrastructure project and one of the largest in the world. With a contract between Lesotho and the apartheid government signed in 1986, the first dam (Katse) was closed in late 1995, and the second (Mohale) is nearing completion.

Lesotho depends almost entirely on South Africa for economic income, and many men are employed in South Africa's mines. With low returns from mining forecast in the late 1990s, the LHWP was a very welcome potential source of income, and further employment opportunities are anticipated if the project continues. Schools and clinics have been built, and other benefits introduced to the Lesotho highlands. Conversely, more than 20,000 people in the once remote highland communities have been affected by the first phase, losing either homes, communal grazing lands or farmland, and with only 9 percent of Lesotho's land regarded as arable, any loss is nationally significant. Communities have been separated by the Katse reservoir. At the same time, reportedly around 20,000 project workers and others have moved into the region, and AIDS is now a problem. Few grievances have been fully addressed.

Some water experts in South Africa believe that further dams could be postponed if demand-management measures are implemented in order to reduce wastage. There is fear that moving forward with the second dam will stall such measures and needlessly increase the cost of water at a time when the Government is trying to improve water services to millions of South Africans in the townships.





**1986 (left)**

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The images show the Senqu River in northern Lesotho in its original condition.

**2001 (right)**

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With the valley flooded over more than 30 sq. km. after closure of the Katse Dam, this water resource development will bring important benefits to many people. There are some adverse effects on displaced communities.







# Midrand, South Africa

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## *State of Environment*

**M**idrand is strategically located approximately halfway between the major urban centres of Johannesburg and Pretoria. Midrand is 240 sq. km. in size and the current population estimate is 240,000, with about 84% living in Midrand east. Approximately 80% of the population lives in Ivory Park, which has the highest population density in Midrand. Sixty five percent of Midrand has been transformed for human settlements, crops, mining and industry. There are 232 hectares of wetlands and river areas. The dominant ecosystem is a transition of grassland that contains species that exist in both grasslands and in bushveld ecosystems.

In the future, the rapid growth of Midrand's economy is expected to continue with associated impacts on the environment. Current development trends and population indicate that if effective environmental management strategies are not adopted soon, within the next five years people could expect a significant deterioration in the quality of the environment.

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**1985 (left)**

Midrand is divided into east and west by the N1 highway, which is the primary highway connecting Johannesburg and Pretoria. In the upper left (NE) are agricultural and rural residential lands with some suburbs, and in the lower left (SE) are low residential areas with some commercial. In the upper right is a mixture of vacant lands and commercial/industrial areas. In the centre right is a high-density residential area. Along and adjacent to the N1 is the central commercial district and medium density residential neighbourhood.

**2001 (right)**

The satellite image illustrates urban development throughout the image. Along the N1 is an extension of the commercial core. The high-density residential area has expanded into the neighbouring vacant lands. Evidence of development is visible in nearly all residential areas and is expanding into adjacent agricultural and vacant lands.







# Mount Kilimanjaro, Tanzania

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## *Diminishing Forests in Mountain Areas*

**M**t. Kilimanjaro, Africa's highest mountain, is located 300 km south of the equator in Tanzania. A forest belt ranging between 1,600 meters and 3,100 meters in altitude surrounds it. The forest has a rich diversity of vegetation types that result mainly from the large range in altitude and climate, with rainfall of about 700 to 3,000 mm/yr. It hosts a very large diversity of species, with about 140 mammal species and over 900 plant species. People have moved into the forest, creating dense settlements within the Forest Reserve. Some settlements have expanded and now are the size of towns. The satellite images of 1976 and 2000 show changes in forest areas in Kilimanjaro region.

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### 1976 (left)

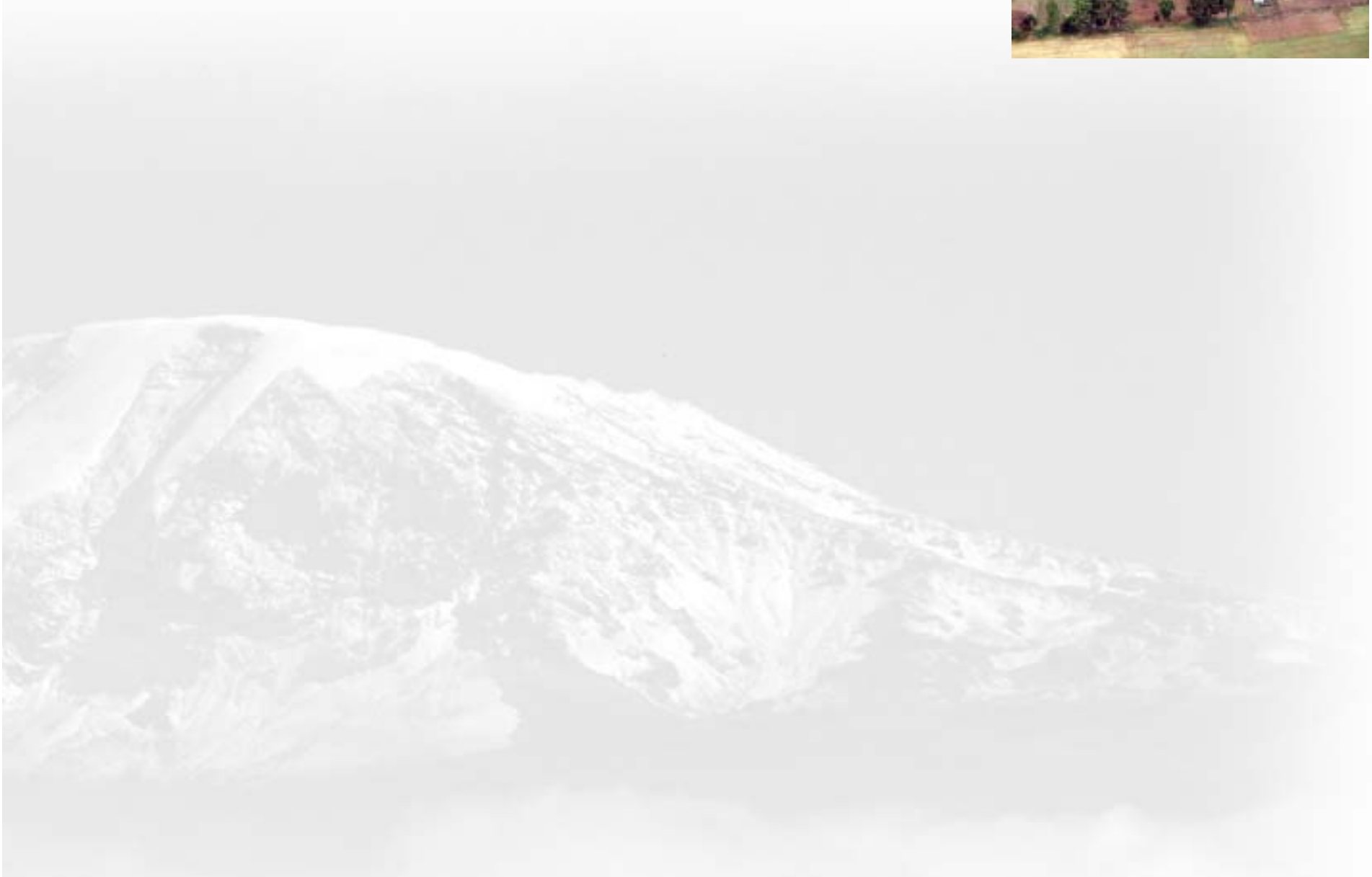
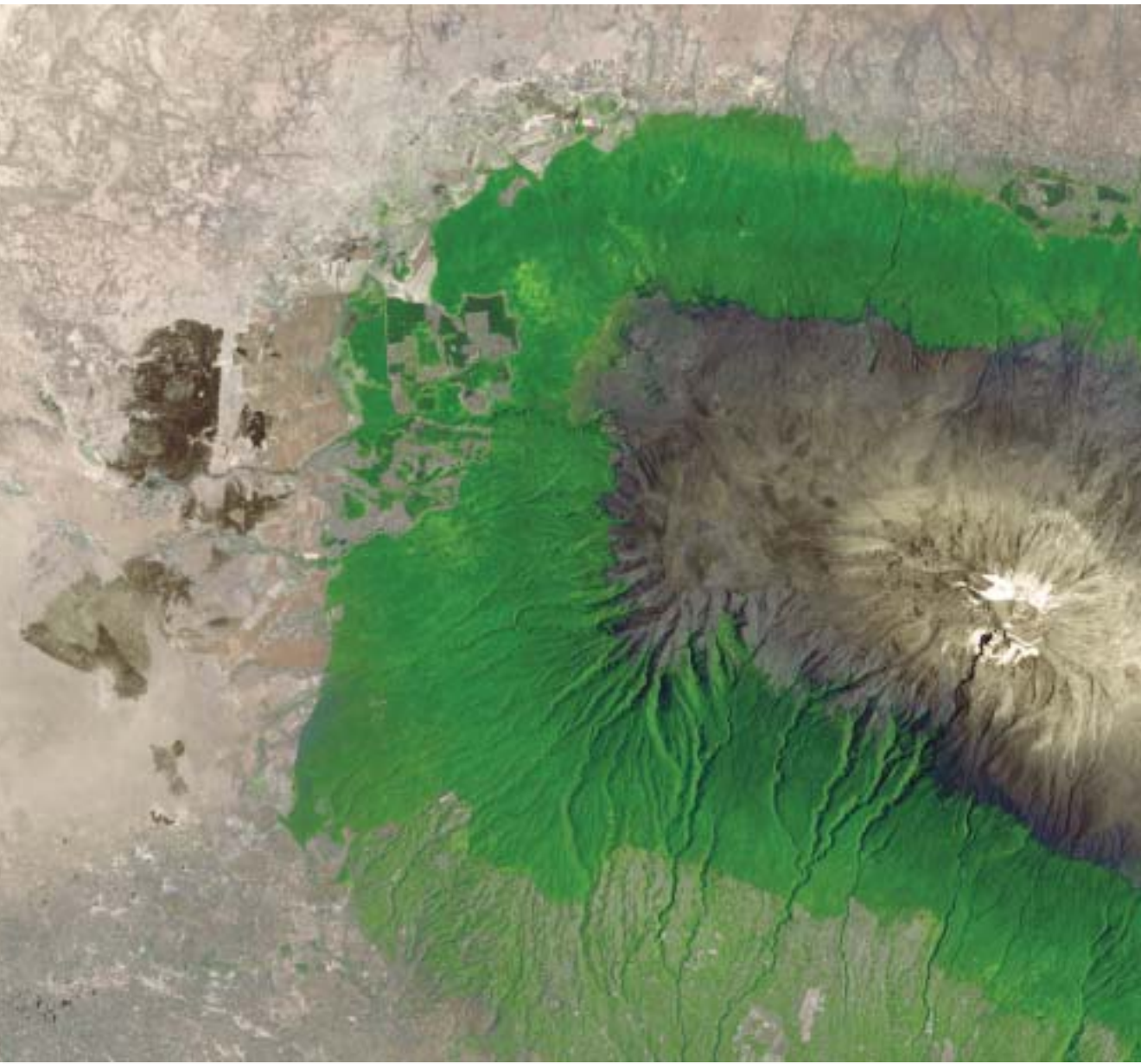
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A forest belt spans altitudes between 1,600 and 3,100 meters surrounding Mt. Kilimanjaro. In the image, green shows natural vegetation, and brown shows desert areas.

### 2000 (right)

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This image shows large tracts of indigenous forest that have been converted into other land uses, representing about 12 percent of the Kilimanjaro Forest Reserve.







# New Valley Project, Egypt

## *Agricultural Development in the Sahara*

**T**he scorched landscape of Egypt's southern desert suddenly merges into lush, neatly tended vegetable plots drip-fed with water and fertilizer. Seeking to relieve population congestion in the Nile Valley, the Egyptian government has embarked on large-scale horizontal expansion projects since the early 1980s. A comprehensive scheme for developing desert areas was put into motion to increase habitable land from the current 5 percent to 25 percent of land area.

The Toshka Project was officially launched on Jan. 9, 1997, 37 years after the inauguration of the Aswan High Dam. The Toshka Depression was connected to Lake Nasser by a new 310-km long canal, designed to take water from the Nile to new communities in the desert. The aim is to "go out from the Nile Valley," and to set up new agro-industrial population centers in the central Western Desert. The goal is to reclaim about 540 sq. km of land for farming, irrigated equally by groundwater and by canal-borne water from the Nile. The satellite images show dramatic change in the Toshka Depression between 1999 and 2001.





**1999 (left)**

The image of 1999 shows a portion of the first Tashka Lake not long after it was filled with water from Lake Nasser, but before the development of agriculture along its shore.

**2001 (right)**

The image of 2001 documents new flooding in the Toshka region, west of Lake Nasser, and the development of agriculture along the first Toshka Lake. The formation of Toshka Lakes in southern Egypt is part of Egypt's New Valley Project. The flooding of the region has been monitored since 1998, and continues to show rapid changes. Since September 2000, flooding has occurred over a large area at the western end of the Toshka Lakes stretching over 848 sq. km. The region will be used for large Egyptian agricultural developments to support millions of people.





