

Asia

At a Glance

Population: 3,721 million

Percent of World's Population: 60.66%

Land Area: 44,579,000 sq km

Percent of Earth's Land: 30%

Key Environmental Issues

Land use change

Desertification

Deforestation

Habitat loss

Forest loss and degradation

Water scarcity

Pollution of freshwater resources

Over population

*Expansion of aquaculture and
loss of mangrove areas*

Degradation of coastal and marine resource

Sites for Asia

Al Isawiyh, Saudi Arabia

Aral Sea, Kazakhstan

Atatürk Dam and the Harran Plain, Turkey

Beijing, China

Dhaka, Bangladesh

Oil Well Fires, Kuwait

Huang River Delta, China

Irian Jaya, Indonesia

Isahaya Bay Reclamation, Japan

Lake Hamun, Iran/Afganistan

Mesopotamian Wetlands, Iraq/Iran

New Delhi, India

Paektu San, Korea, DPR

Phnom Penh, Cambodia

Shenzhen, China

Sundarban, Bangladesh/India

Thailand Aquaculture, Thailand

Three Gorges Dam, China



Al Isawiyh, Saudi Arabia

Center Pivot Irrigation

Saudi Arabia, although rich with oil, is lacking a more vital natural resource: water. The kingdom has decided to diversify its economy and modernize its agricultural sector in order to become more self-supporting to meet the country's growing demand for wheat. As Saudi Arabia has severely limited water resources, the government decided to use the revenues from the oil industry to adopt the best technologies available for farming in arid and semi-arid environments.

Center pivot irrigation has been introduced in Wadi as Sirhan, a large alluvium-filled graben up to 300 meters below the surrounding plateau. Located in the extreme north along the border with Jordan, Wadi as Sirhan is a remnant of an ancient inland sea and is underlain by four aquifers, two of which contain fossil water more than 20,000 years old. The satellite images between 1986 and 2000 show the transformation of the desert to agriculture through center pivot irrigation.





1986 (left)

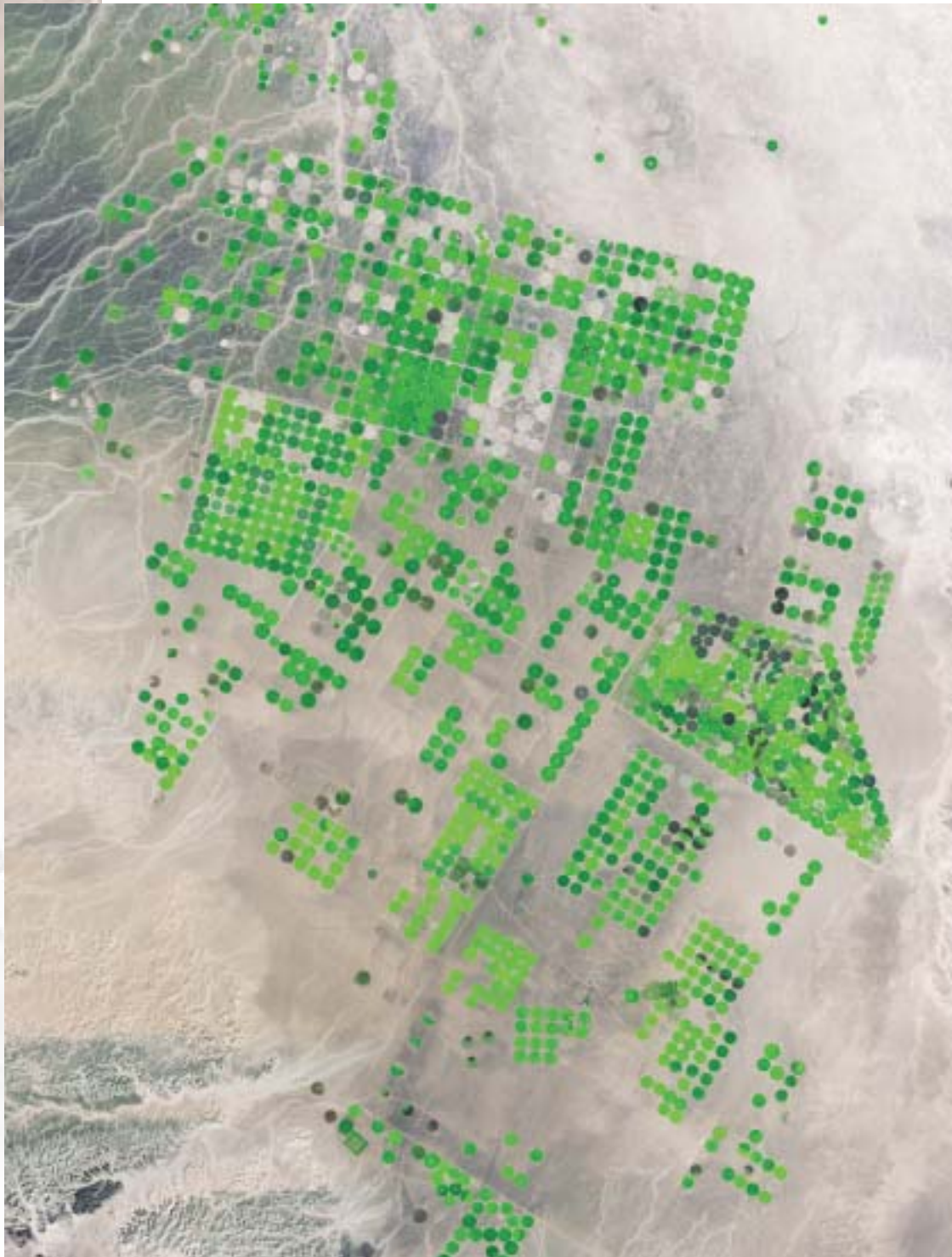
This image shows Wadi as Sirhan near the village of Al Isawiyah prior to the introduction of center pivot irrigation.

1991 (upper right)

This image shows the region shortly after the introduction of center pivot irrigation.

2000 (lower right)

Once established center pivot irrigation quickly spread throughout the region.





Aral Sea, Kazakhstan

A Sea in Peril

The Aral Sea, located in Central Asia, has undergone many changes in the recent past. The world's fourth largest lake before 1960, the Aral Sea has been progressively drying up. The Amu Darya and Syr Darya rivers, the sea's only inflow sources of water, no longer reach it. Some progress has been made since 1990. The total water withdrawal in the basin has now stabilized at about 110-120 cubic km/year.

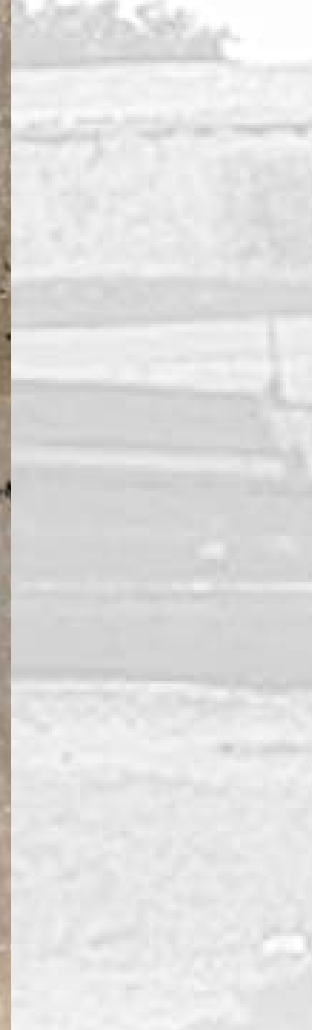
The water crisis in the region continues even today. The gradual drying up of the Aral Sea will increase environmental degradation with huge adverse socio-economic effects. There are a variety of significant environmental problems, such as climate change, loss of biodiversity, water pollution and air pollution, in the Aral Sea Basin. The current trend is unsustainable but the poverty and export dependencies of the Central Asian states have prevented real action, and the sea continues to shrink.

The series of satellite images between 1972-2001 show continual shrinkage of the Aral Sea. More than 60 percent of the Aral Sea has already disappeared. It may completely disappear in coming decades. In the image, black shows water, brown shows desert areas and green shows vegetation.



1973

1987





1999



2002

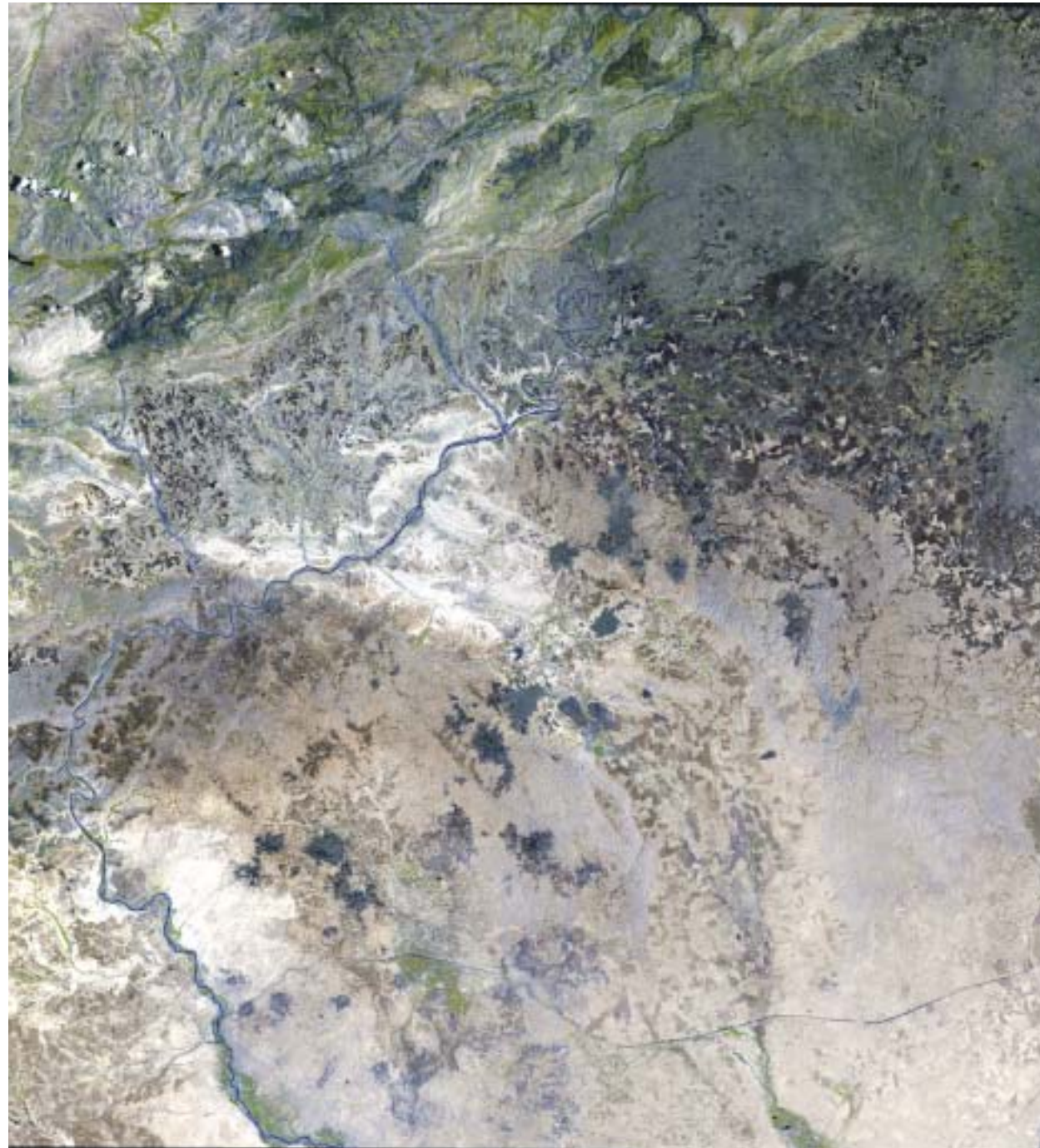




Atatürk Dam and Harran Plain, Turkey

Freshwater Resources and Dam

Atatürk Dam is the world's fourth largest dam, providing hydropower and irrigation for Sanliurfa and the Harran Plain of Turkey. The Atatürk Dam construction on the Euphrates River began in 1983 and was completed in 1990. By 1992 the reservoir had filled to capacity, and is now producing hydroelectric power and irrigation waters for Sanliurfa and the Harran Plain located southeast of the reservoir. The Euphrates River enters the image at the top through a gorge in the Taurus Mountains and exits the image at the bottom. On the Euphrates, just off the image bottom, is Lake Assad, a major Syrian reservoir. The Euphrates River is a major international river whose harnessing raises many environmental and water resources issues that need to be addressed by the countries sharing its waters. In the satellite images blue represents water, green represents natural vegetation and brown represents barren lands.





1975 (left)

Before the dam and reservoir were constructed, most of the agricultural lands produced seasonal, low water crops, such as barley and pistachio. This is a post harvest image, so the fields are either in fallow or were harvested in the spring. The primary agricultural areas are north and east of the river. They are visible mainly as dark harvested agricultural lands. The Harran Plain is in the southeast quadrant of the image.

1999 (right)

In 1999 the lands north and east of the reservoir were still dominated by seasonal agriculture. However, the Harran Plain, now provided a steady flow of water through the Sanliurfa irrigation tunnel, supports water-intensive cash crops, such as cotton, corn and soybeans. Urban and rural populations have grown in size since the introduction of the Atatürk Dam and Sanliurfa Tunnel. Official statistics shows that the population of Sanliurfa grew from 276,528 in 1990 to 410,762 in 1997, indicating a 49% increase largely supported by economic activity due to hydroelectric power provided by the dam.



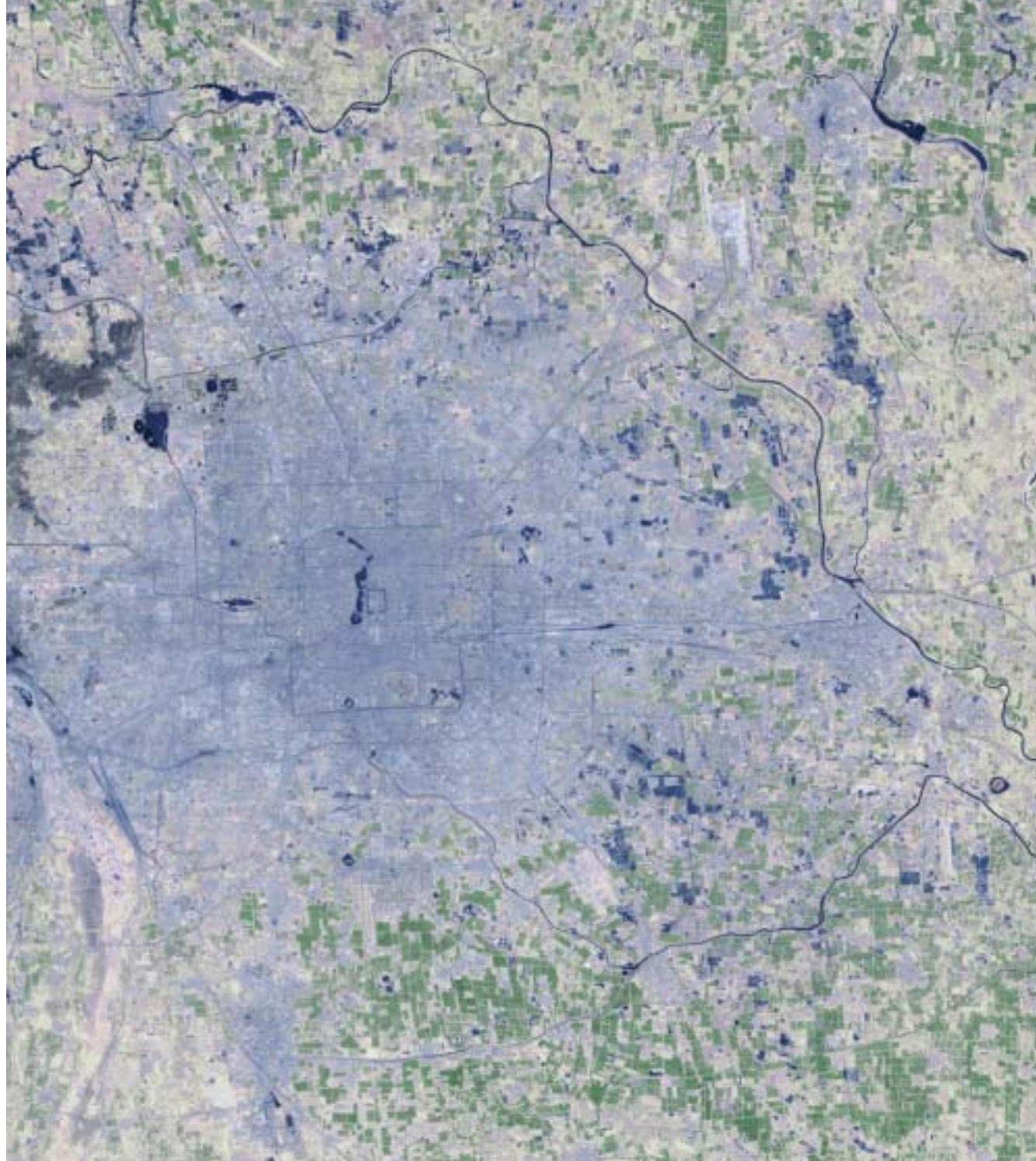


Beijing, China

Urban Population Growth

Beijing, the second largest city in China after Shanghai, is the cultural, political, and intellectual center of the country, as well as a major industrial and commercial metropolis. Beijing's extremely rapid industrial and commercial development is putting pressure on the city's historical and cultural landmarks, and causing significant loss of productive agricultural land. Like many other large cities, Beijing has also encountered serious pollution problems because of its growth. The Landsat images show the city's growth trends and remarkable changes during the "reform era" since 1979.





1978 (left)

The image shows the status of Beijing before the new economic reforms of 1979. The light blue area in the center shows Beijing, including the Forbidden City. The green hills west of the city are covered with deciduous forests. A mixture of rice, winter wheat and vegetables, represented in a range of colors depending upon the stage of their development, dominates the agricultural lands.

2000 (right)

This image shows urban growth expanded from the city center often along major transportation corridors and toward the airport. The estimated population was 11 million in 1992, with approximately 7 million living within the city boundaries. The suburbs grew rapidly as new construction of institutional, industrial, and residential buildings covered the landscape and resulted in the conversion of prime agricultural land to urban uses. The agricultural lands closest to the city center that historically been dominated by vegetable and rice production are among the most threatened by commercial and residential development. The population growth, mainly due to in-migration, increased to 13 million by the year 2000.





Dhaka, Bangladesh

Uncontrolled Urban Population Growth

Dhaka, the capital of Bangladesh, has achieved phenomenal growth since the country gained independence in 1971. In 1971, Dhaka had a population of almost two and a half million. Today it has a population more than ten million and occupies over 1500 sq. km. Dhaka is one of the poorest and most densely populated cities in the world having 6545 people per sq. km.

Dhaka is located on an alluvial floodplain between the Ganges/Brahmaputra rivers and the Meghna river. In a major flood event, about 71 of the 90 wards in the city will suffer severe damage and up to 25 percent of the country may be flooded. Seventy-five percent of the population of Bangladesh lives less than 10 meters above sea level. The monsoon rains cause repeated flooding and storm surges from cyclones devastate populations far inland from the coast. The green color in the images represent forest and agriculture, bright white spots represent planned areas for infrastructure and gray shows urban areas.



1977 (left)

Dhaka is visible in the top central portion of the image along the Turag River. Its seaport Narayangan is located 16 km to the southeast close to the confluence with the Meghna. The confluence of the Meghna and the Ganges can be seen further to the southeast. These two rivers dictate life in the region.

2000 (right)

The image reveals the conversion of low lands and agricultural areas to urban as Dhaka expands to the north. The very flat and broad nature of the floodplain can clearly be seen in the shifting channels of the major rivers.





Gulf War Oil Well Fires, Kuwait

Environmental Pollution

The Persian Gulf war brought about some of the worst environmental pollution ever recorded as result of oil spills and oil fires. During the air and ground war of January–February 1991, 700 oil wells were damaged, of which more than 600 were set on fire. Ninety-five percent of the oil was removed and exported. Five percent continues to pollute the desert with a high risk of contaminating the ground water that is so limited in the region. The satellite images show the dramatic changes in Kuwait during the Gulf War. The blue shows water, green shows natural vegetation, light yellow shows desert areas and black shows pollution from oil spills and fire.



1990 (left)

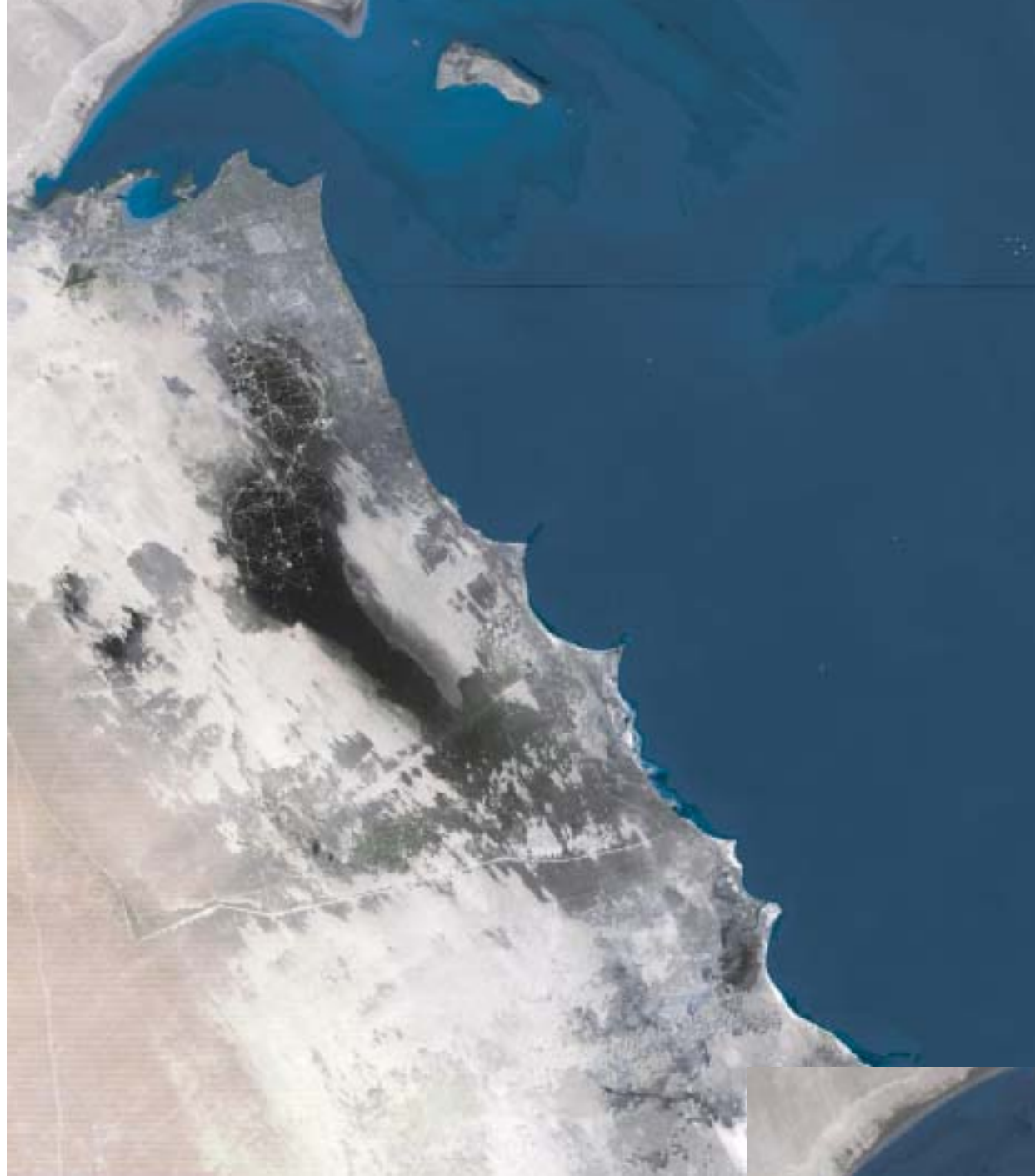
The August 1990 image (before the oil fire) shows the capital city of Kuwait in the upper part of the image.

1991 (upper right)

The November 1991 image was acquired after the fires had been extinguished. It shows the damage to the landscape and a number of newly formed oil lakes.

2000 (lower right)

The January 2000 image shows that the area is developing again but the soil quality has not yet been restored.





Huang He Delta, China

Environment Changes/Impacts of Land Use

The Huang He (Yellow River) is the muddiest river on Earth and is China's second longest river, running 5475 km (3,395 mi) from eastern Tibet to the Bohai Sea. The Huang He's yellow color is caused by a tremendous amount of mica, quartz, and feldspar in the sediment, most of which is accumulated as the river carves its way through the highly erodable loess plateau (wind-blown soil deposits) of north-central China, with substantial erosion taking place. As the river erodes the loess, it becomes a "river of mud" (Loessial soil is called *huang tu* or "yellow earth" in Chinese).

Between 1979 and 2000, satellite images show dramatic changes in the tip of the Yellow River delta. During this period, several hundred square kilometers have accreted to and been eroded from the coast.





1979 (left)

Agricultural lands were few until land reclamation efforts began in the 1950s. Only thirty years ago, this place was a vast expanse of saline-alkaline soil with limited agriculture.

2000 (right)

Between 1979 and 2000, the delta tip grew nearly 100 square km. Aquaculture has expanded along much of the coast and agriculture overall is better developed.





Irian Jaya, Indonesia

Loss of Traditional Lands

Irian Jaya is Indonesia's largest and most eastern province covering the western half of the New Guinea the world's second largest island.

Indonesia is the world's second largest producer of palm oil, after Malaysia. It currently has 3.2 million hectares of forest for oil palm plantations. Indonesia increased its production of palm oil by some 6.5 million tonnes last year. The drive to meet demand is causing many companies to jump into the market and convert forest areas into plantations.

Two major factors influencing deforestation in eastern Irian Jaya are the growth of the palm oil industry and the Indonesian government's policy of transmigration. A third concern is oil and gas exploration.

The result of the policies for Irian Jaya is a large and rapid increase in population that needs employment and infrastructure to accommodate them, while the palm oil industry finds an easy source of labor to work in newly created plantations. Numerous negative impacts are noted on the environment and on the local cultures and economies.





1990 (left)

The image shows tree canopy nearly untouched by development. Two rivers are visible, the smaller but more important of which is the Uvimmerah River to the northwest of the image. The other main river is along the border of Papua New Guinea. A transportation net is developing to connect the forest resources to a small river port.

2000 (upper right)

The image shows a large square area in the northwest quadrant where intervention in the forest shows its conversion into an oil palm plantation. The lighter green of the monoculture contrasts with the darker green of the old growth of the rest of the forest canopy. The reddish-brown areas have been cleared for planting, but have yet to be populated by palm trees. At the bend in the river near the affected forest area, a larger river port has been established to facilitate transportation of the palm oil.



2002 (lower right)

The intervention in the forest has expanded by 2002 and now reaches the Uvimmerah River in the northwest quadrant.





Isahaya Bay Reclamation, Japan

Tidal Flat Wetlands

This part of Japan has a mountainous interior filled with coastal plains, volcanoes, and hot springs. The Ariake Sea is a large bay almost equal in size to Tokyo Bay and Ise Bay. During low tide, a vast tideland appears, where over 15 species of valuable creatures live, such as mud skippers. The Isahaya Bay on the Ariake Sea is one of the largest and richest staging sites of migratory birds with an incredible amount of benthic and other organisms including mollusks and fishes. Tidal flat wetlands throughout Korea, China and Japan are among the most threatened by the need for increased food production and urbanization.

The Isahaya Bay Reclamation project separated approximately 30 sq. km. of tidal flats from the Ariake Sea in 1997. The intent of the project was to increase agricultural land and to decrease the risk of flooding. The land available per farmer for vegetable production will increase three-fold. The sea wall and its enclosed reservoir should provide a buffer to reduce the risk of flooding both from the river and from typhoon driven high tides.



1993 (left)

This image shows the Isahaya Bay some four years before the reclamation project that separated approximately 30 sq. km. of tidal flats from the Ariake Sea in 1997. Historically, the Ariake Sea has been little affected by red tide damage, thanks to the tideland's self-cleansing effects.

2000 (right)

On this image the seawall and the reservoir can be clearly seen. Future agricultural areas under development are on the white drying tidal flats. Walls to create and protect the future agricultural land can be seen as linear features on the old tidal flats. A few years ago, when the sluice gates around the bay's mud flats were closed, there were reports that the range of tide in the Ariake Sea had shrunk. The removal of one third of the bay will likely have some yet-to-be determined effects on the aquatic ecosystem, including a possible decline in seaweed aquaculture.



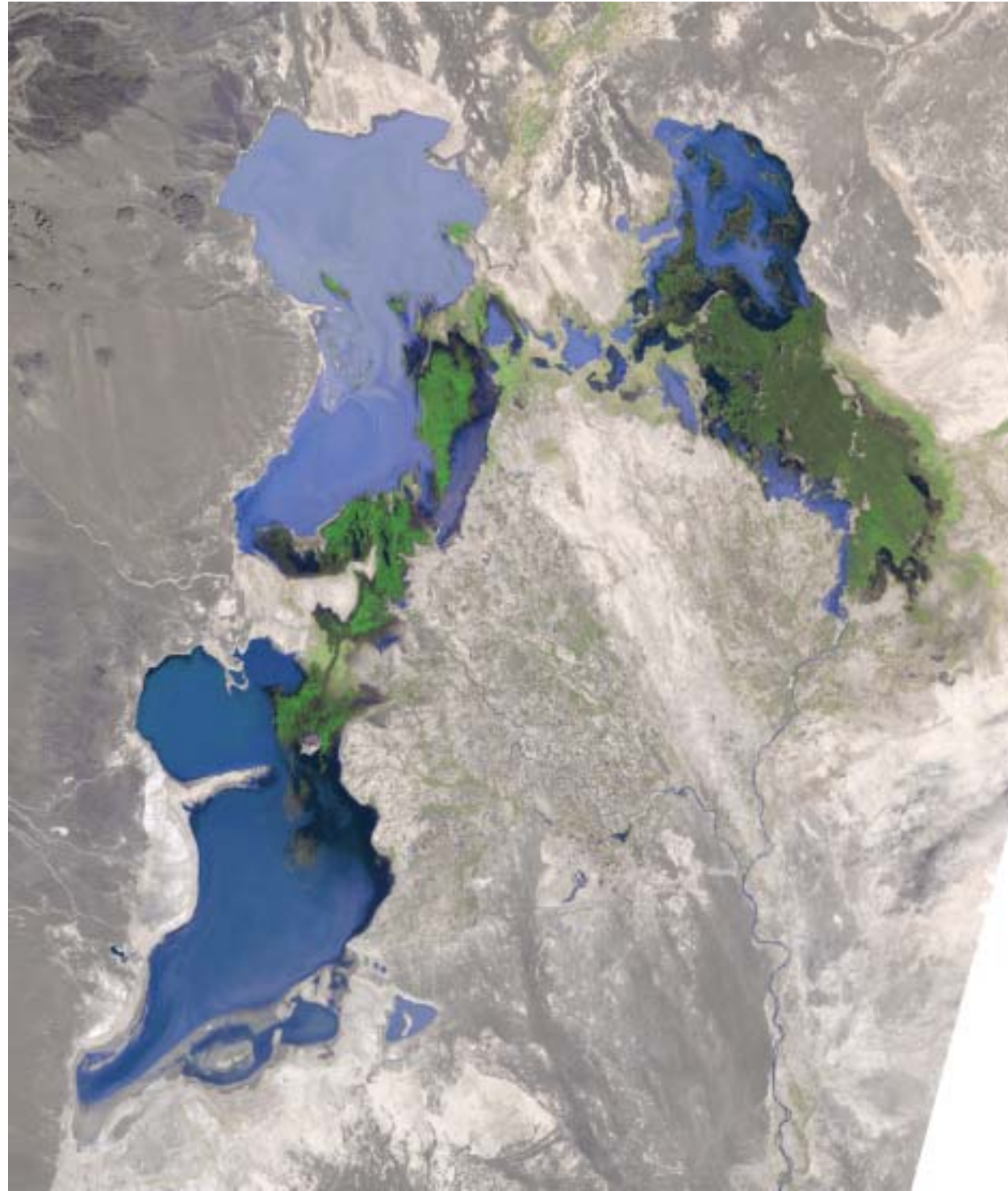


Lake Hamoun, Iran/Afghanistan

Sistan Oasis Parched By Drought

Sistan lies in a large depression located between Afghanistan and Iran. In the centre of this closed basin lies a historic riverine oasis nourished by the Helmand, one of Afghanistan's major rivers rising in the western Hindu Kush. By creating a distinct delta environment in a true desert setting, the Helmand has transformed one of the region's common salt flats into a cradle of life. Remarkably, although the river empties into an extremely arid evaporation pan, it sustains a vast and predominantly freshwater wetland complex, Lake Hamoun. Reaching their greatest extent with spring floods, these wetlands cover an area ranging from 2,000-4,000 sq. km. More than a third of the Iranian portion has been designated as an internationally protected area under the Ramsar Convention on Wetlands, but no land has been set aside for conservation in the Afghani portion.

Reflecting a dramatic decrease in precipitation and drought, satellite imagery shows the snow-covered area in the Helmand basin has decreased by almost two-thirds. By 2001, Iran and Afghanistan were experiencing for the third consecutive year an extreme drought so severe that Lake Hamoun dried out completely. However, drought is not the only reason for Lake Hamoun's disappearance. Sistan's environment has been also radically modified by human manipulation of water resources such as irrigation schemes, which siphon flows from the wetlands.

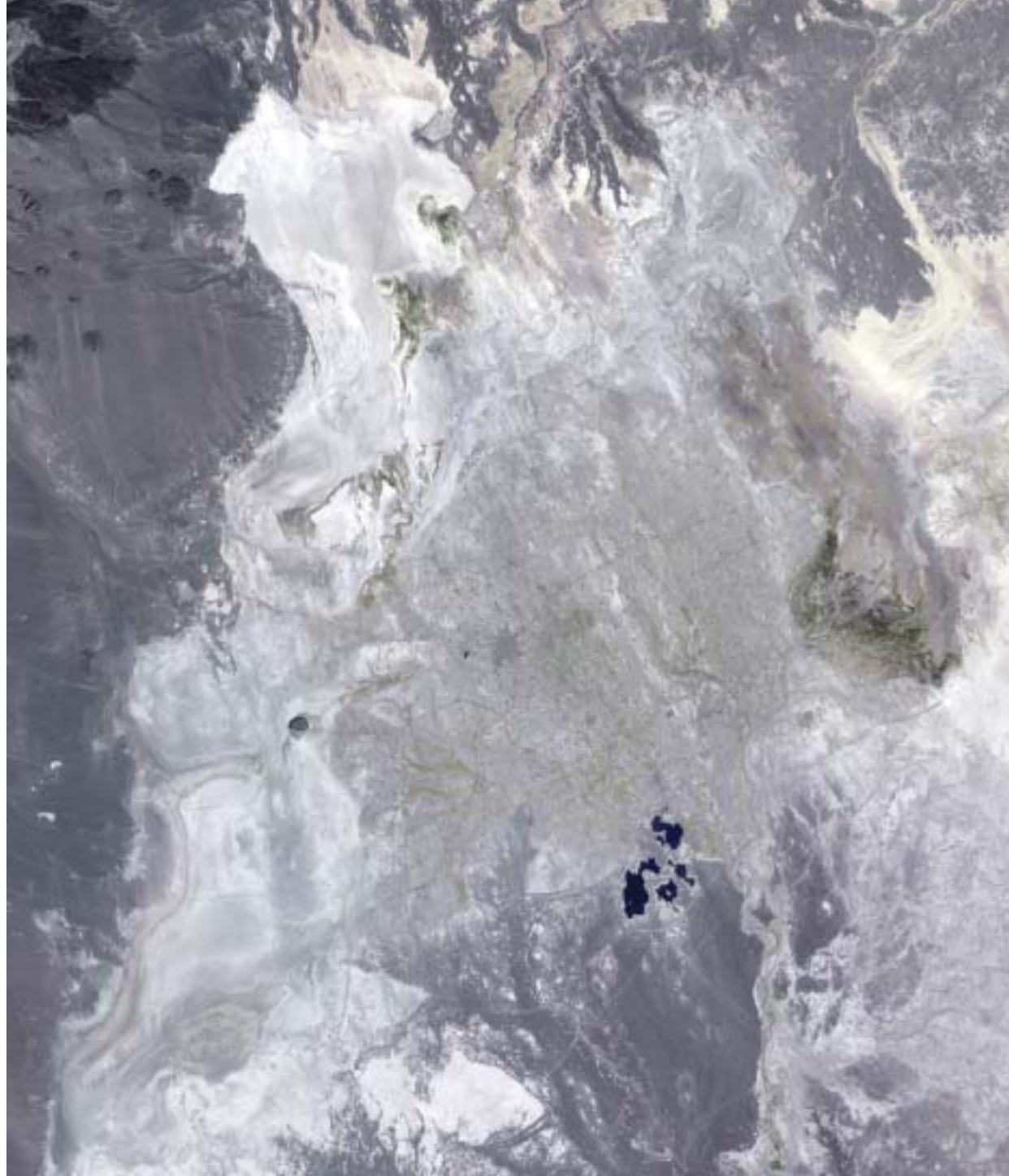


1976 (left)

Winding through the Margo desert, the Helmand forms a dendritic delta and dissipates in a series of lagoons or “hamouns.” Numerous seasonal rivers also converge in the closed basin. The image shows dense reed beds appearing as dark green, while tamarisk thickets fringing the margins of the upper lakes show up as light green. Bright green patches represent irrigated agriculture, mainly wheat and barley. The lakes flood to an average depth of half a meter denoted by lighter shades of blue, while dark blue to black indicates deeper waters not exceeding four meters.

2001 (right)

Hamoun wetlands vanished as Central and South Asia were hit between 1999 and 2001 by the largest persistent drought anywhere in the world. The only sign of water in this scorched landscape of extensive salt flats (white) is the Chah Nimeh reservoir in the center right of the image, which is now only used for drinking water.



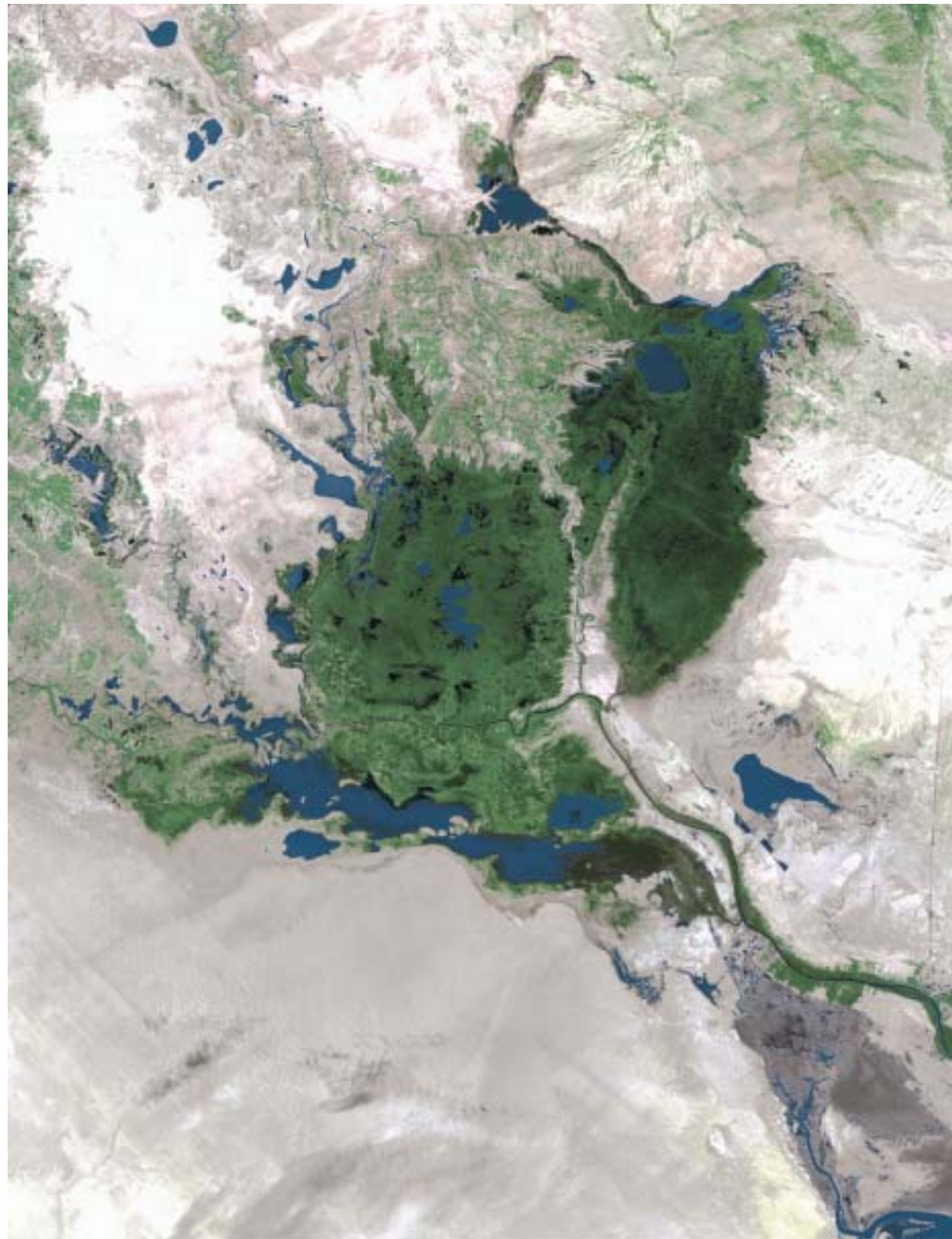


Mesopotamian Wetlands, Iraq/Iran

Disappearing Wetlands

The Mesopotamian marshlands are one of the world's great wetlands covering an estimated original area of 15,000 - 20,000 sq. km. The marshlands are an important center of biodiversity, play a vital role in the intercontinental migration of birds and have long supported unique human communities. Water reservoirs created by large dams upstream, as well as drainage activities in the marshlands themselves, have significantly reduced the quantity of water entering the marshes. Together these factors have led to the collapse of the ecosystem.

The satellite images taken in 1973, 1990 and 2000 provide a synoptic illustration of the great changes that have taken place in the Mesopotamian marshlands, located at the confluence of the Tigris and Euphrates rivers in southern Iraq and extending partially into Iran.



1973 – 1976 (left)

A mosaic of four images taken between 1973 and 1976 shows the status of Mesopotamia region. Permanent lakes appear in black and seasonal lakes are blue to very light blue. Dense marsh vegetation (mainly Phragmites) appears as dark green patches, while green elongated patches along riverbanks are date palms.

1990 (upper right)

Permanent lakes appear in black and seasonal lakes are blue to very light blue. Olive to grayish brown patches indicate low vegetation and dark green patches are dense marsh vegetation.

2000 (lower right)

The image from March 2000 shows that most of the wetlands have disappeared. Most of the marshland area appears as olive to grayish-brown patches indicating low vegetation on moist to dry ground. The very light to gray patches are bare areas with no vegetation and may actually be salt evaporates of former lakes.

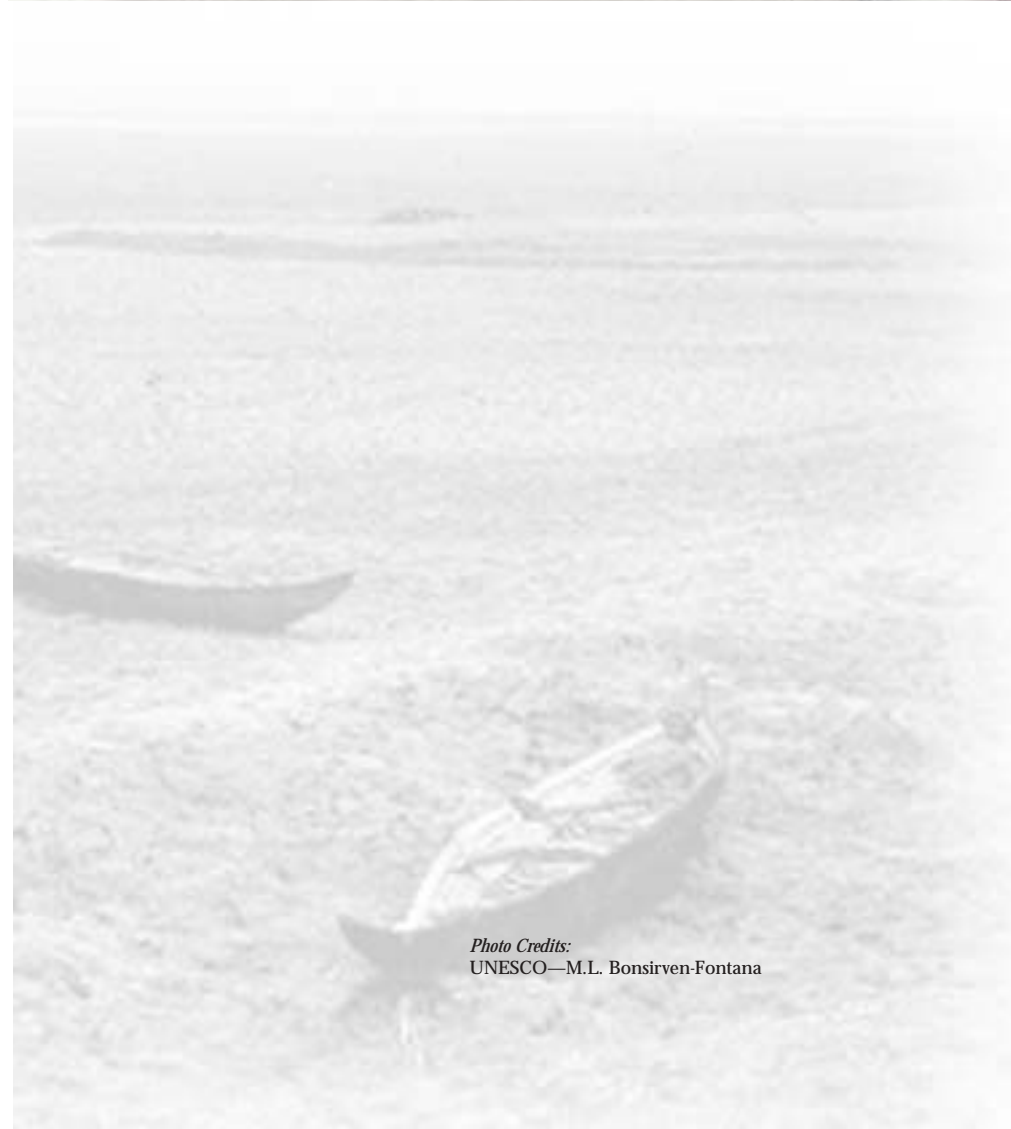
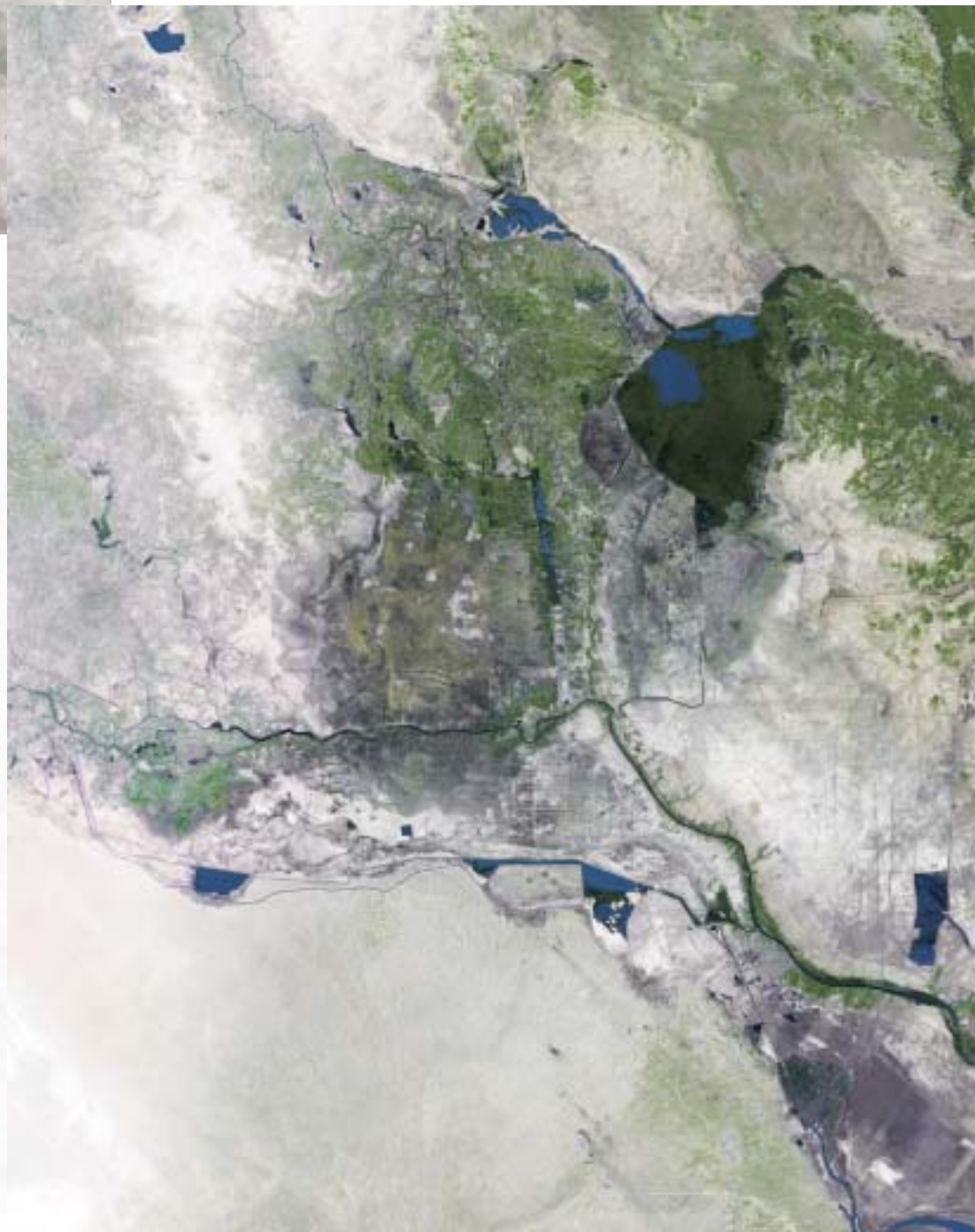
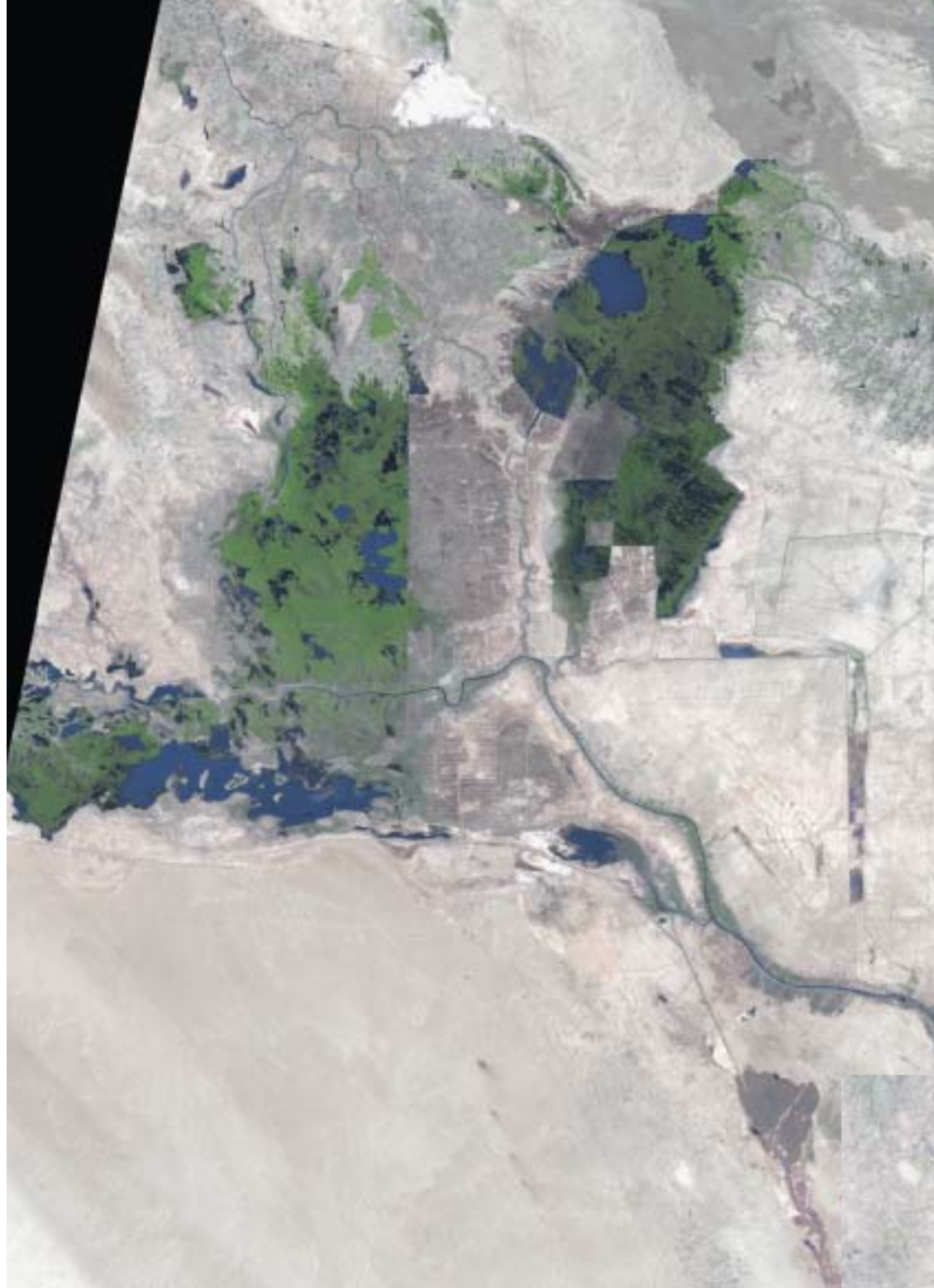


Photo Credits:
UNESCO—M.L. Bonsirven-Fontana



New Delhi, India

Urban Sprawl in a Megacity

New Delhi has experienced massive urban growth in recent decades, placing enormous pressure on the institutional and natural resources that support the city. The population of Delhi has increased from approximately 5 million in 1975 to about 12.2 million in 2000, and it is projected to continue to rise to over 22 million by 2021. Most of this growth is due to high migration rates associated with enhanced income and employment opportunities in New Delhi. The urban area has grown from 182 sq km in the 1970's to more than 750 sq km in 1999. This growth is primarily at the expense of productive farmland as well as loss of natural vegetation. At present, natural vegetation is 5.93% of the total area. The satellite images of 1977 and 1999 show the urban sprawl in New Delhi. In the image, green represents natural vegetation and dark blue represents urban areas.



1977 (left)

The 1977 image shows the status of New Delhi with a population of 5.3 million.

1999 (right)

The image shows dramatic expansion of urban areas in New Delhi with population increased to 12.2 million. As the population sharply rose by 46.31% during the 1990–1999 decade, more areas were converted to urban areas.

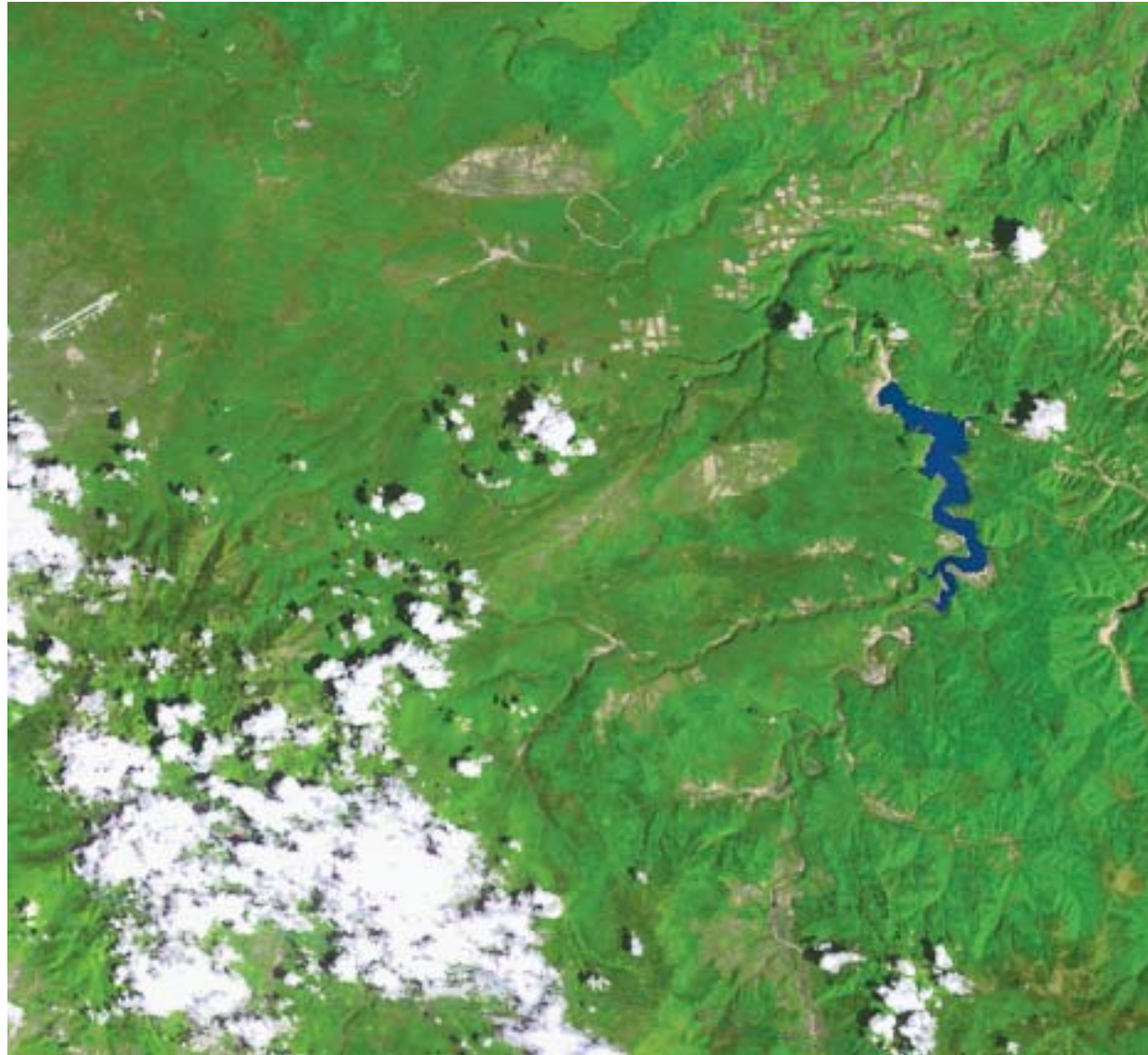




Paektu San Region, Korea DPR

Agricultural Expansion in Mountain Regions

Mt. Paektu is an ancestral mountain and the symbol of patriotism to the Korean people. It embodies the spirit of the nation. Volcanic soils and short, dry and relatively cool growing seasons make this high plateau suitable for agriculture. The satellite images document the changes in agricultural in this region. Here green shows natural vegetation, blue shows water and gray-brown shows bare agricultural soil prior to emergence of crops.



1980 (left)

Shortly prior to the collection of this image the dam was constructed on the volcanic shield of Paektu San. The newly filled reservoir can be seen in addition to some limited agriculture. Some of the existing agriculture appears to be related to recent burn scars.

1999 (right)

The area under cultivation on the plateau, west and north of the reservoir, is substantially greater in 1999 than in 1980.





Phnom Penh, Cambodia

The City and the River

Phnom Penh is the capital city of Cambodia. It is just west of the four-way river intersection, which is called the Chattomukh (“Four Faces”). From the northwest and northeast, respectively, flow the Tonle Sab and Mekong Rivers. These waters merge and split into the Basak River and the Mekong, which flow southeast to the South China Sea. The Mekong River is the 12th longest in the world, flowing from western China to the Mekong Delta in southern Vietnam. Phnom Penh is the Mekong River’s largest city. Its population fluctuated wildly during the 1970s and 1980s; from an estimated 1.2 million in 1971 it swelled with war refugees to 2 million or more by 1975. By 1978 it was reduced to about 100,000 and then rebounded to over 1 million by 2000. The satellite images show Phnom Penh, the Mekong River, some irrigation works and the changes in landuse in this region.



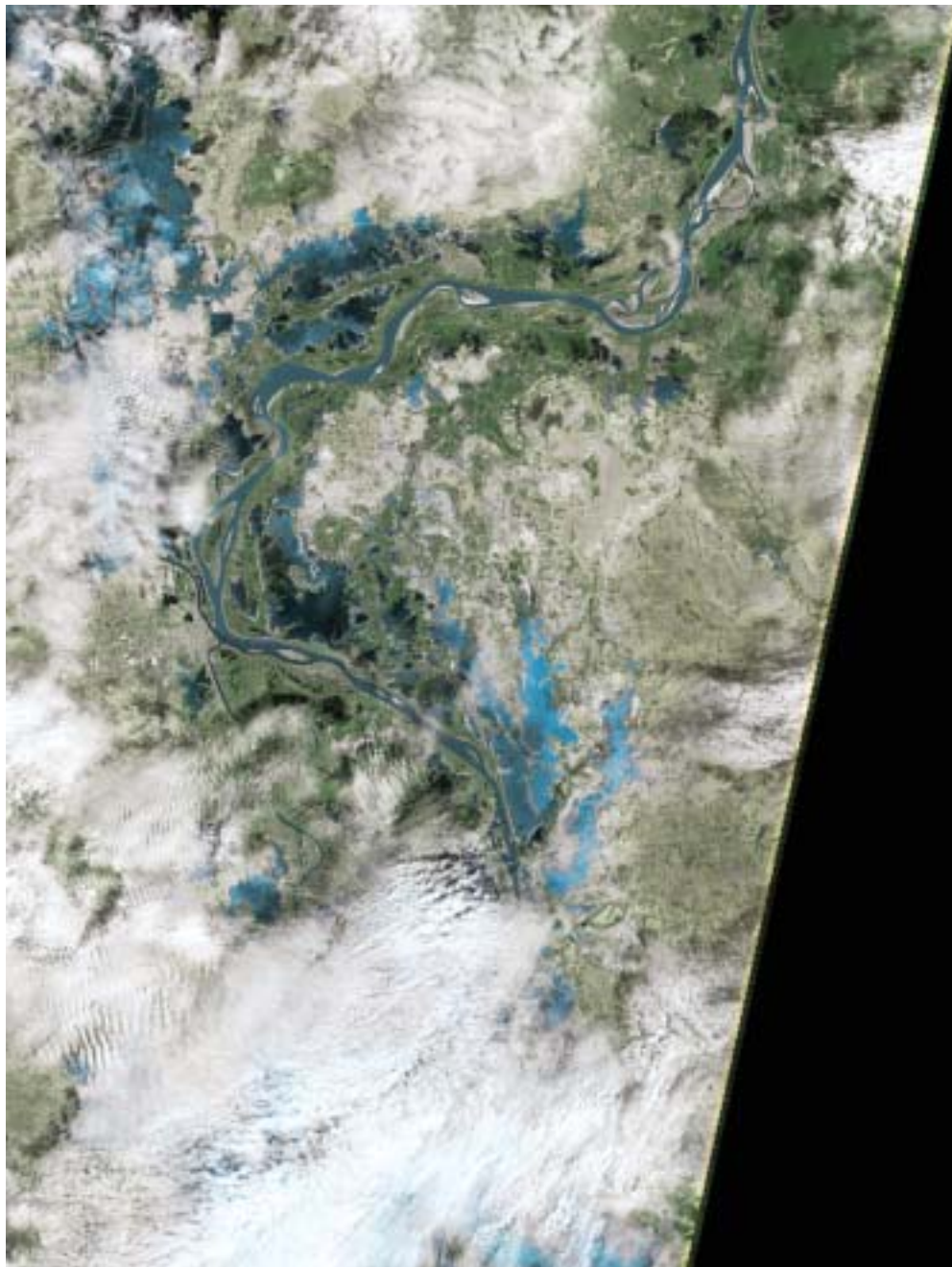


1973 (upper left)

The areas appearing as white or gray are areas that had been under cultivation. The Mekong River on the right is clearly larger than the tiny Tonle Sap River. This image is obviously not from the height of the rainy season and the 2 rivers are quite distinct from each other. Many lakes are visible in the image. These lakes are important to the local population that relies heavily on fish in their diet. Phnom Penh is barely visible as a slightly purple area just to the left of where the two rivers converge.

1985 (lower left)

This image does not show the yearly flooding either; instead the focus is on the irrigation systems set up under the Khmer Rouge. The irrigation canals are evident in a white grid pattern both in the Mekong basin and to the west of the Tonle Sap River. The light green scattered throughout the white grid show that the ground was somewhat newly under cultivation.



Sept. 2000 (upper right)

This image shows the region when the Mekong backs up and inundates the area. The Tonle Sap Lake covers about 270 sq. km in the dry season and about 1500 sq. km. during the rainy season. In the image the two rivers are virtually indistinguishable due to the flooding. Phnom Penh is just barely noticeable at the edge of the bend in the river.

Dec. 2000 (lower right)

Although cloudy, this image shows how much the waters recede in just a few months. The areas in light green are probably under early cultivation again. The remnants of the canals built under the Khmer Rouge regime are still in evidence to the northeast of Phnom Penh.



Photo Credits:
UNESCO—Daniel Riffet



Shenzhen, China

Urban Growth in an Economic Zone

The city of Shenzhen is located just across from Hong Kong and south-east of the Zhujiang (Pearl) River Delta Region in China. The city has been the focus of intense urbanization, known as Shenzhen Special Economic Zone (SSEZ). Comparison of these two satellite images shows the dramatic change in the landscape from 1986 to 2000, as thousands of high-rise buildings and factories have replaced previous agricultural and vegetated areas. The gray color in the image depicts urban areas, green represents natural vegetation and blue represents water.



1986 (left)

The 1986 image shows a concentrated area of development, which is primarily limited to the lower middle and adjoining coastal regions with less than 71,000 people.

2000 (right)

This satellite image shows that by 2000, the developed urban area has expanded to the north, northwest, and northeast and is home to more than 1 million people.

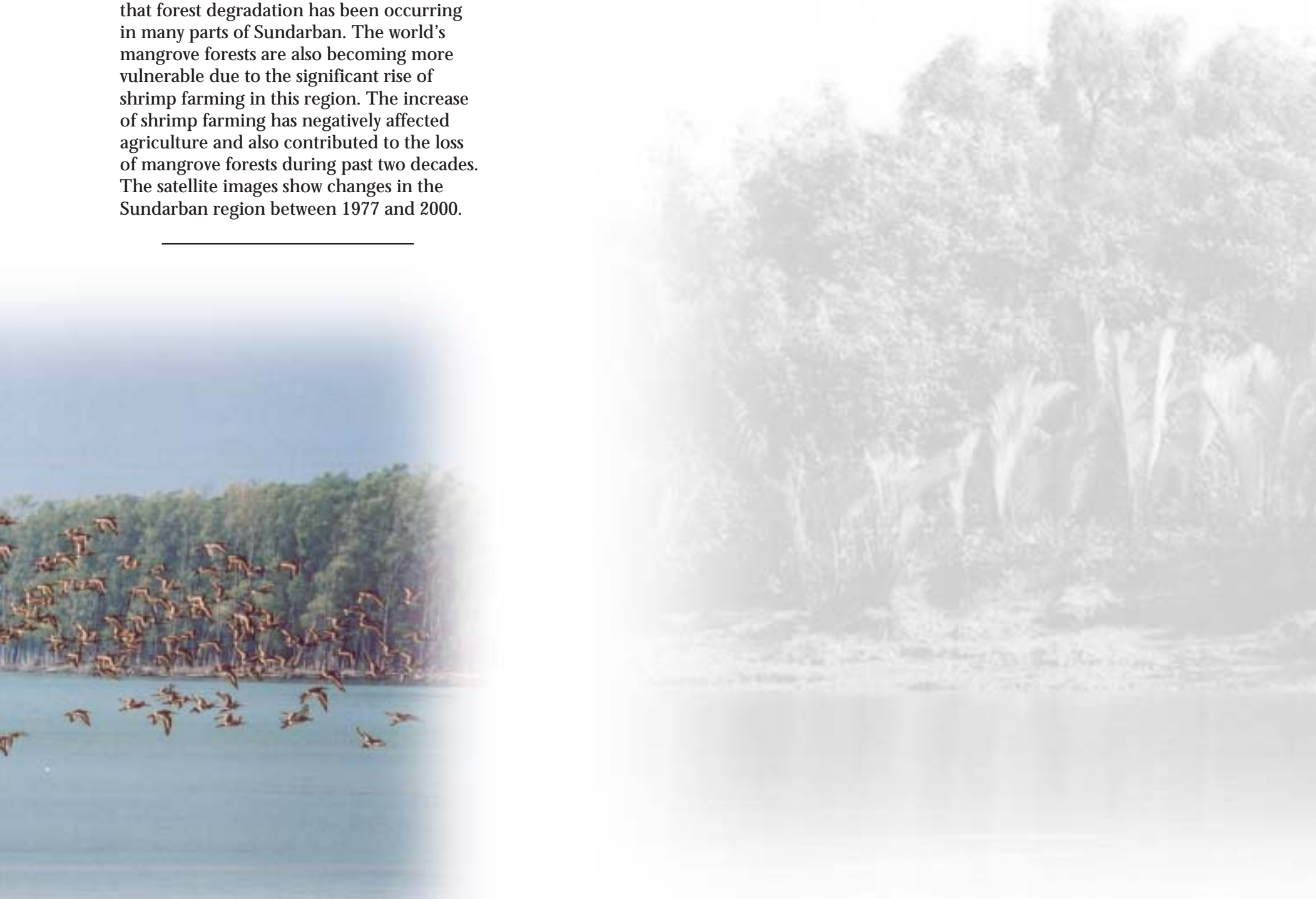




Sundarban, Bangladesh/India

World's Largest Mangrove Forest

Sundarban, the largest mangrove forest of the world, is situated in the southwestern part of Bangladesh and in the West Bengal of India, guarded by the Bay of Bengal. The total area of Sundarban is approximately 10,000 sq. km. Approximately 60% of the mangrove forests fall in Bangladesh and 40% in India. It was declared as a UNESCO's World Network of Man and Biosphere Reserve in 2001. Sunderban is an excellent example of the co-existence of human and terrestrial plant and animal life. Despite high population pressure and environmental hazards such as siltation, cyclone flooding and sea level rise, the aerial extent of the mangrove forest has not changed significantly in last the 25 years. In fact, with improved management, the tiger population has increased from a mere 350 in 1993 to 500-700 in 2000 and eco-tourism is progressing well. While sufficient data is not available, several reports suggest that forest degradation has been occurring in many parts of Sundarban. The world's mangrove forests are also becoming more vulnerable due to the significant rise of shrimp farming in this region. The increase of shrimp farming has negatively affected agriculture and also contributed to the loss of mangrove forests during past two decades. The satellite images show changes in the Sundarban region between 1977 and 2000.



1977 (left)

The closed vegetation canopy of Sundarban can clearly be seen as very dark green in the image, representing vigorously growing vegetation.

2000 (right)

This image is a mosaic of images from different times of the year. The agricultural lands in the west half of the image are pre-harvest, while the agricultural land in the east half are post-harvest. Local areas of shrimp farming show as light purple in previously dark green areas. Overall little change is visible. A closer look at the Sundarbans reveals a shifting composition of the wetland as water and soil quality changes.





Thailand Aquaculture, Thailand

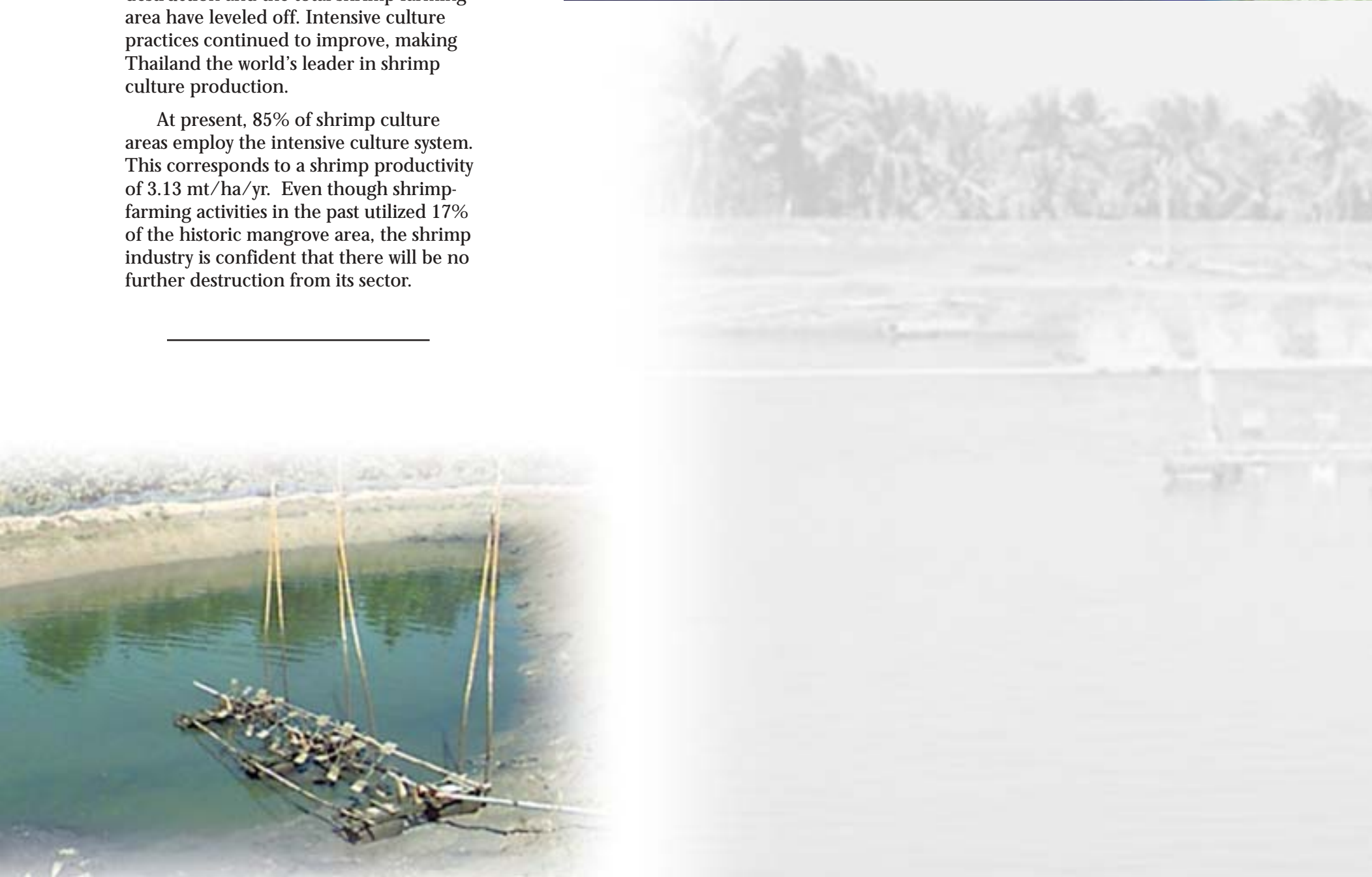
Aquaculture in Asia-Pacific

During the past three decades aquaculture has become the fastest growing food-producing sector and is an increasingly important contributor to national economic development and food security. The rapid population growth in Asia is widening the gap between supply and demand for fish, thereby threatening national food security in many countries.

In the coastal area of Thailand, about 54.7% (2037.65 sq. km) of mangrove was destroyed between 1961-1993 according to the Thai Royal Forestry Department. The highest rate of 129.81 sq. km./yr between 1979-1986 has declined since the introduction of the intensive aquaculture systems in 1987.

The most recent intensive culture system no longer requires mangroves. Since the intensive culture system was introduced in 1987, shrimp production has increased sharply, while mangrove destruction and the total shrimp farming area have leveled off. Intensive culture practices continued to improve, making Thailand the world's leader in shrimp culture production.

At present, 85% of shrimp culture areas employ the intensive culture system. This corresponds to a shrimp productivity of 3.13 mt/ha/yr. Even though shrimp-farming activities in the past utilized 17% of the historic mangrove area, the shrimp industry is confident that there will be no further destruction from its sector.



1973 (left)

The image of 1973 shows the coastal area of southern Thailand with mangrove areas.

2002 (right)

The 2002 image reveals a dramatic change in land use along the southern coast. Much of the coastal ecosystem has been converted to intensive shrimp cultivation, new infrastructure and construction of new dykes.





Three Gorges Dam, China

Man-made Landscapes

The Three Gorges Dam is located on the Yangtze River at Saduping in Hubei province in China. The Yangtze is the longest river in Asia and the third longest in the world, stretching nearly 6,500 km across China. The Three Gorges Dam will be the largest hydropower station and dam in the world, with a 600 km long and 160 metres deep reservoir. As planned, the capacity of Three Gorges dam, 17 million kilowatts, will top that of the largest dam currently operating by 40 percent. The dam may end up providing as much as one-ninth of the nation's electrical production: the energy of 15 nuclear power plants. In addition the dam will provide flood control for a river that has killed one million people in the last 100 years, and will allow shipping upstream to Chongqing for 10,000 tonne ships.

Many issues also exist. Up to 40 percent of the cost of the project will need to be spent on the vastly difficult task of relocating the over 1.2 million refugees displaced by the reservoir. The reservoir will partially or completely inundate 24,300 ha of farmland, 2 cities, 11 counties, 140 towns, 326 townships, and 1351 villages. In addition to commercial fish species, it will also affect endangered species, including the Yangtze dolphin, the Chinese Sturgeon, the Chinese Tiger, the Chinese Alligator, the Siberian Crane, and the Giant Panda. Esthetically, the Three Gorges are known throughout the world for their beauty. Many cultural remains will be submerged representing all of many cultures, including the Ba, who have lived in the valley.

The physiognomy of this region is foothills and the vegetation belongs to the evergreen and deciduous mixed forest of the sub-tropic climate zone. The two images are composed with a natural color composite where vegetation appears natural green. The images show dramatic changes between 1987 and 2000.





1987 (left)

The dam site prior to the beginning of construction. The dam site is in the middle of eastern most of the three gorges, Xiling Gorge. Portions of the Xiling Gorge can be seen in the right-center and left-center of the image.

2000 (right)

Comparing the two images from 1987 and 2000, the diversion and navigation canals and the beginning construction of the 2 km concrete dam can easily be seen. An entire mountain was leveled to provide material for the dam and to make way for the navigation canal.



