



**Foundation For the Future**  
Bellevue, Washington USA

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## The Human Impact on Planet Earth



**Imagery from Space –  
Showing changes on Planet  
Earth during the past 30 years**

Bob Citron  
Foundation For the Future  
“Humanity and the Biosphere: The Next Thousand Years”  
UNESCO – Paris, France, September 20–22, 2006

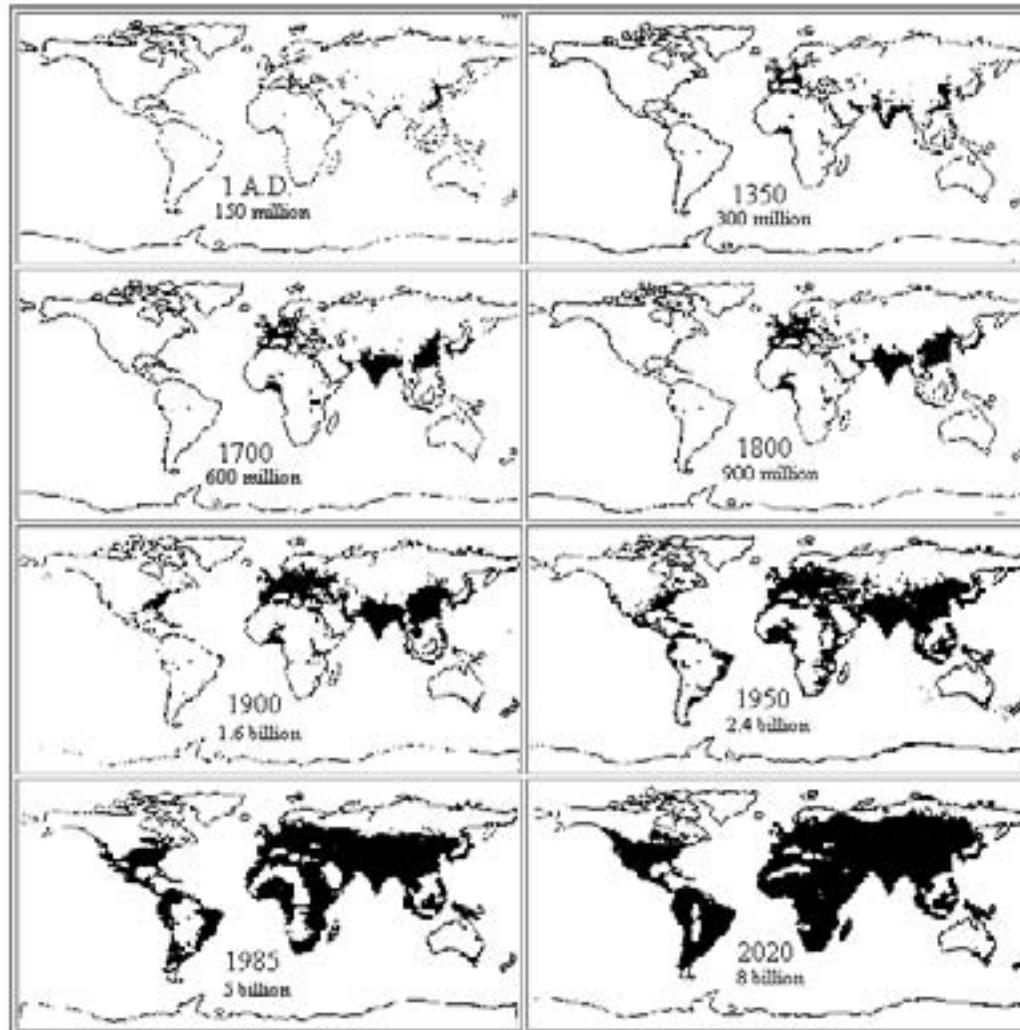


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## Global Population Change from AD 1 to 2020

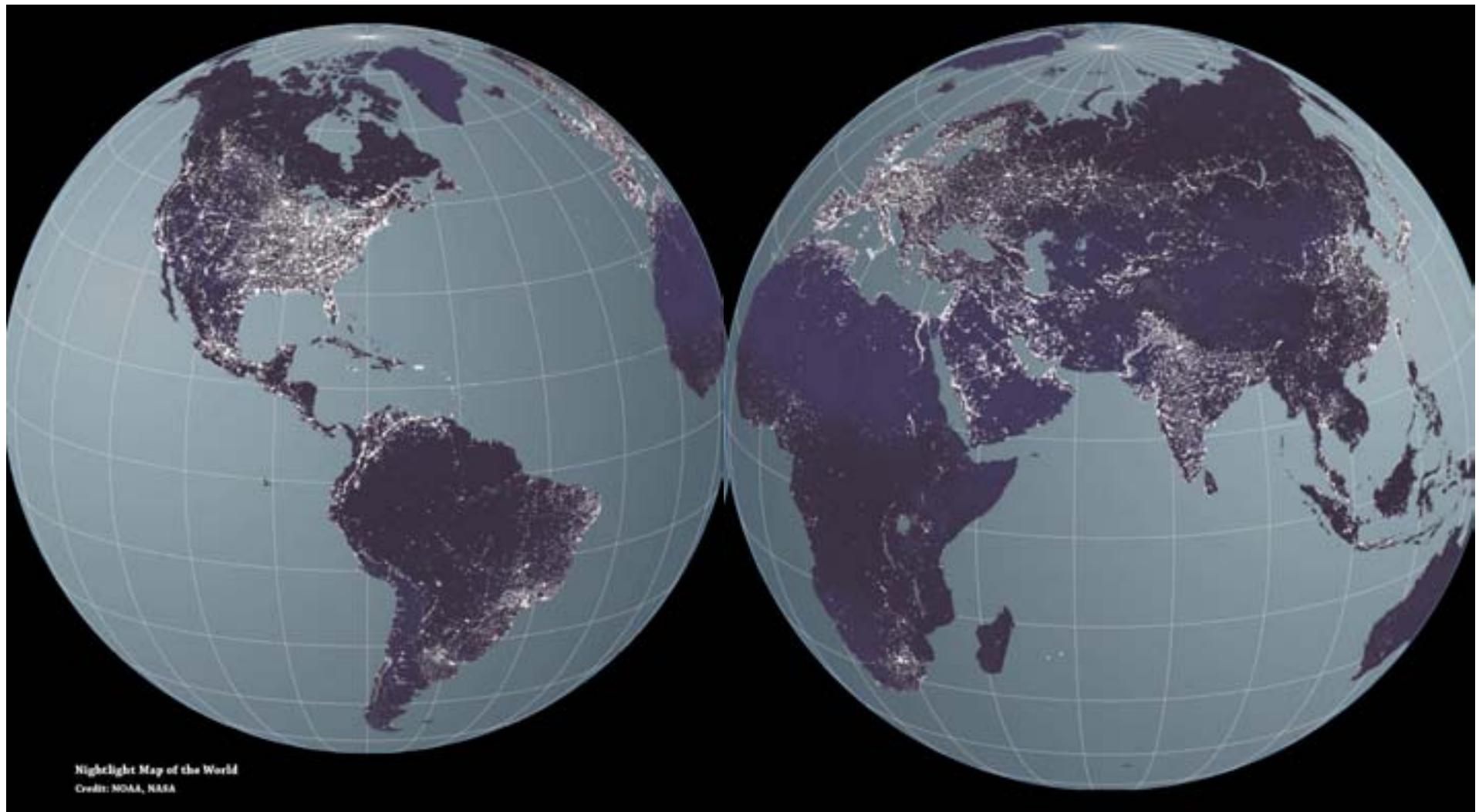
*each dot represents 1 million people*





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Nightlight Map of the World  
Credit: NOAA, NASA



# Asia

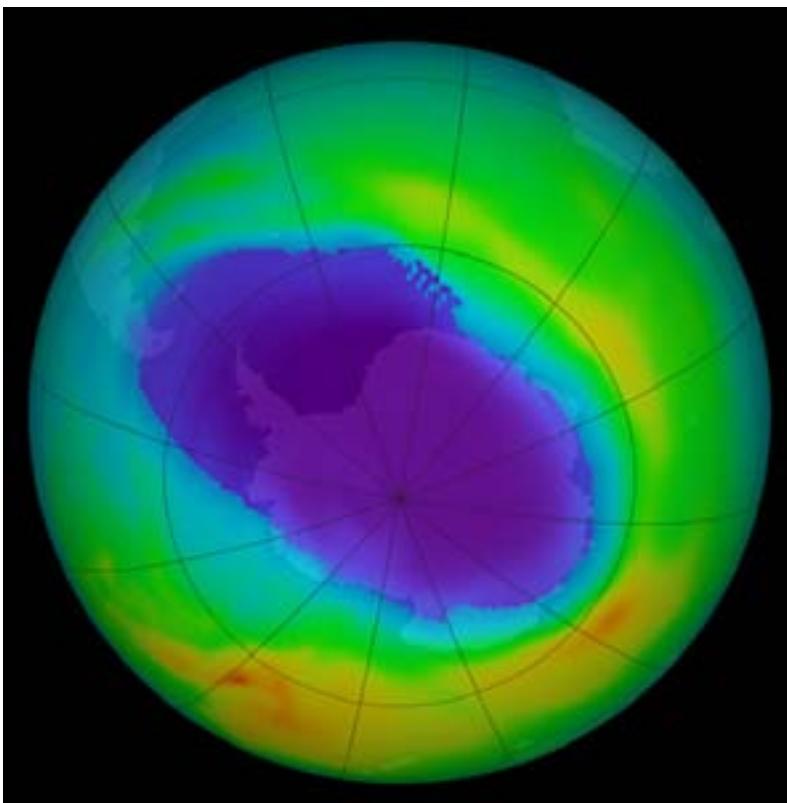
- Asia now holds 61% of the global population. Its share of the global urban population has risen from 9% in 1920 to 48% in 2000 and is expected to rise to 53% by 2030.
- By 2015 Asian countries will hold three of the world's five largest urban agglomerations: Mumbai, Dhaka, and Delhi.



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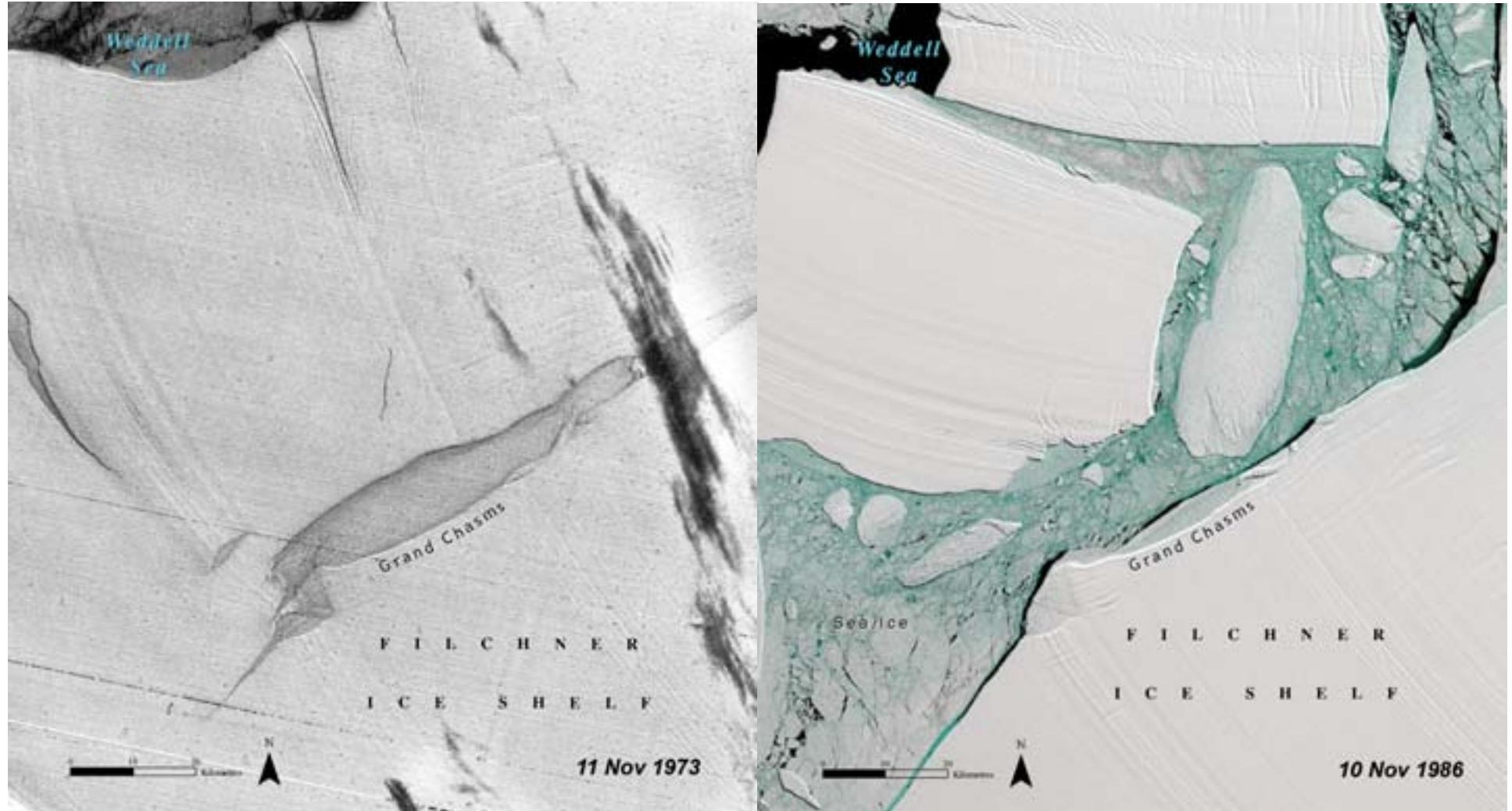


Evidence from satellites of thinning of the ozone layer led to the Montreal Protocol for reducing CFCs.



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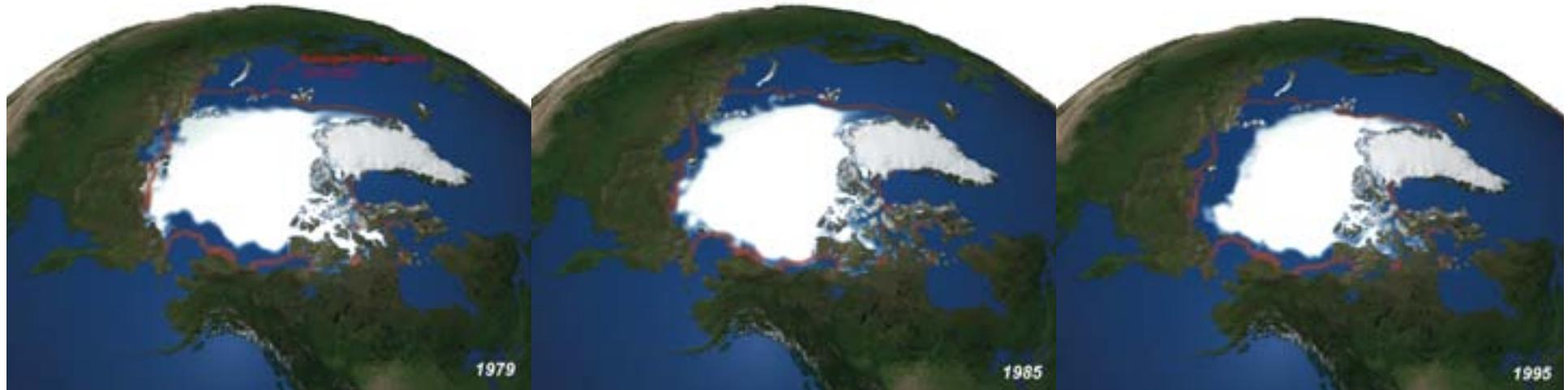


Filchner Ice Shelf, Antarctica – 1973 and 1986



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Arctic Sea Ice

1979, 1985, 1995, and 2003





Title

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## High-Impact Human Changes



Wildfires in Africa



Transforming Desert to Cities

Las Vegas, Nevada



Title

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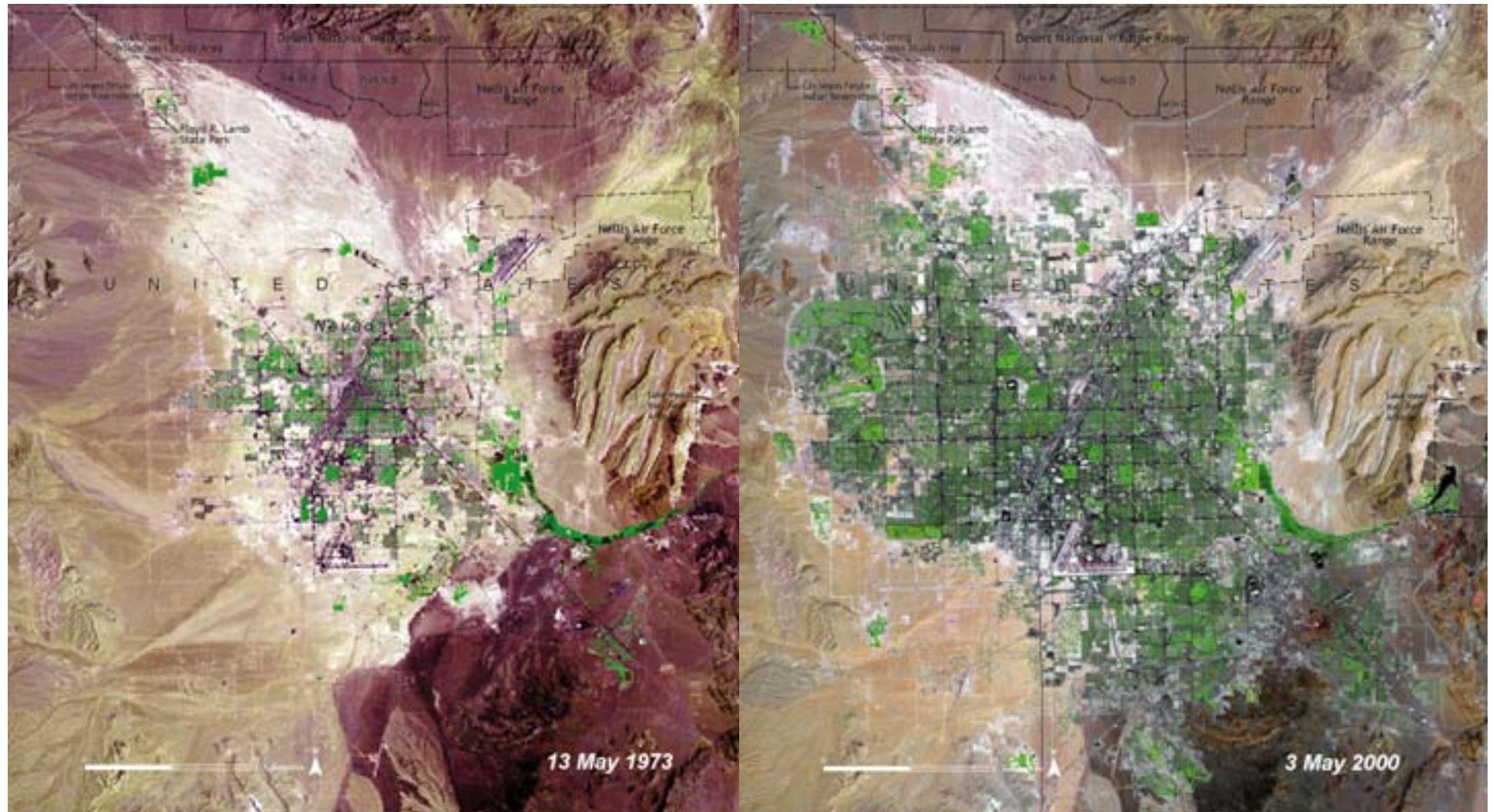
### Drought: Western United States





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Las Vegas, Nevada – 1973 and 2000



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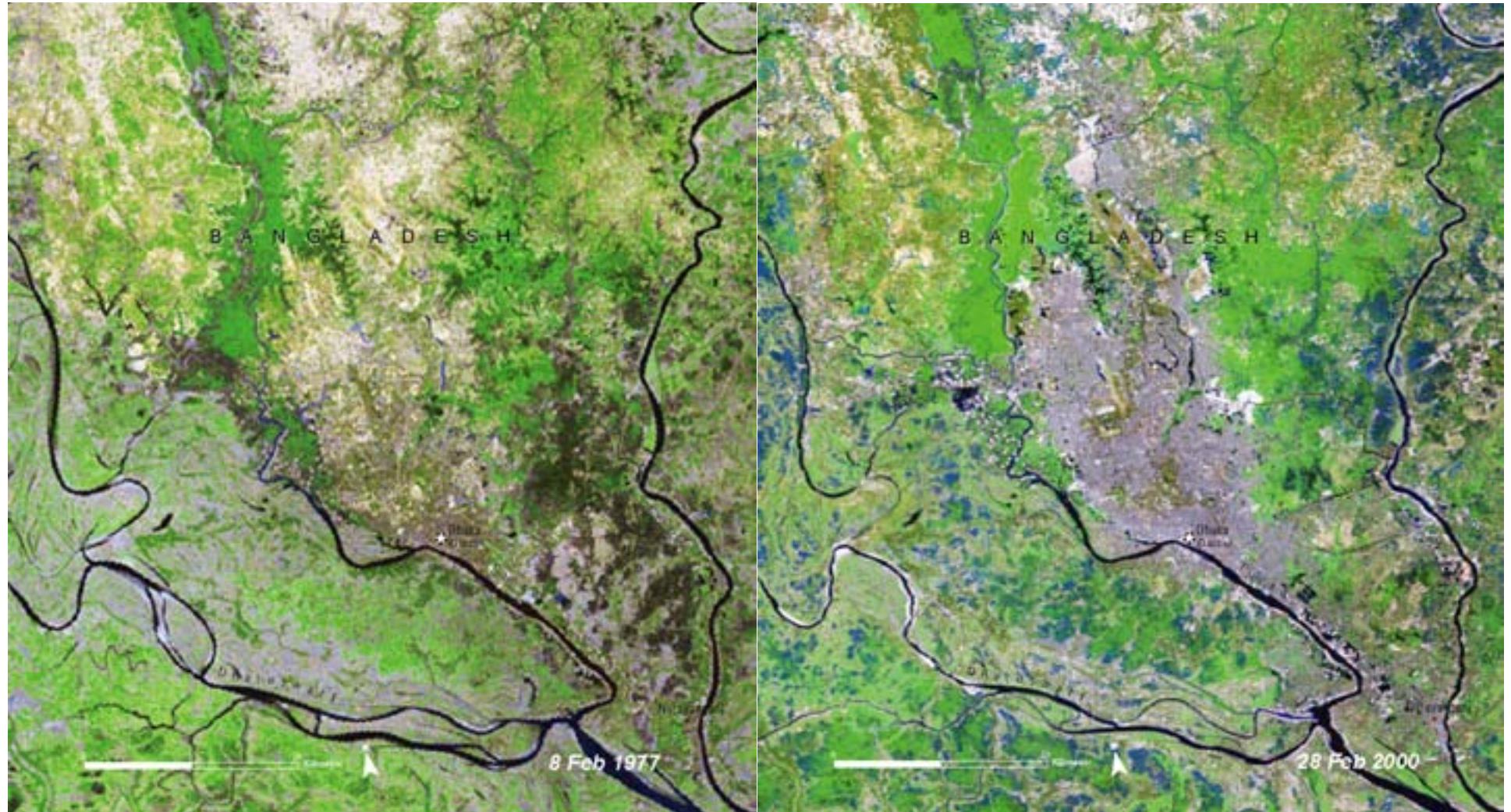


Mexico City, Mexico – 1973 and 2000



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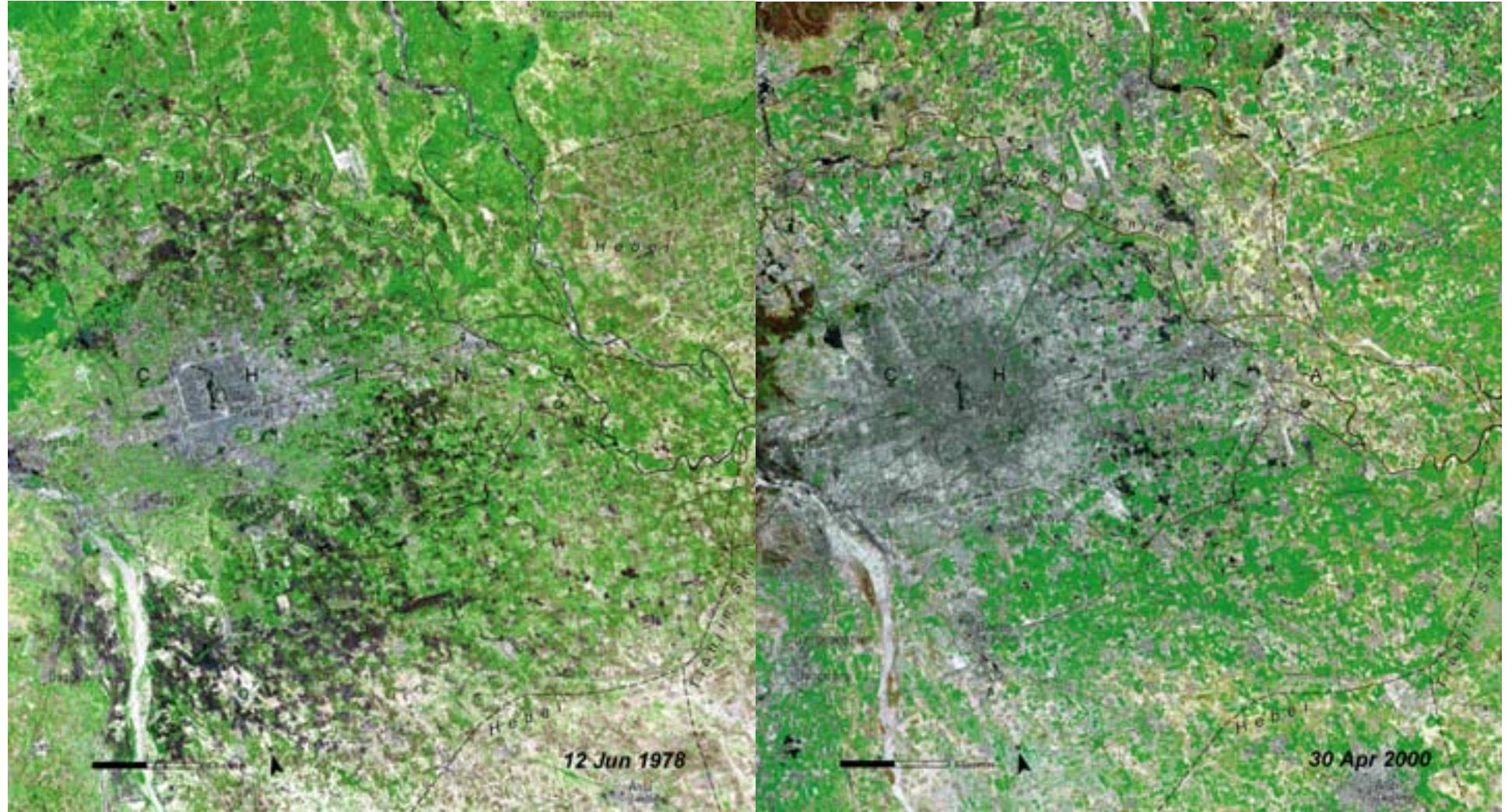


Dhaka, Bangladesh – 1977 and 2000



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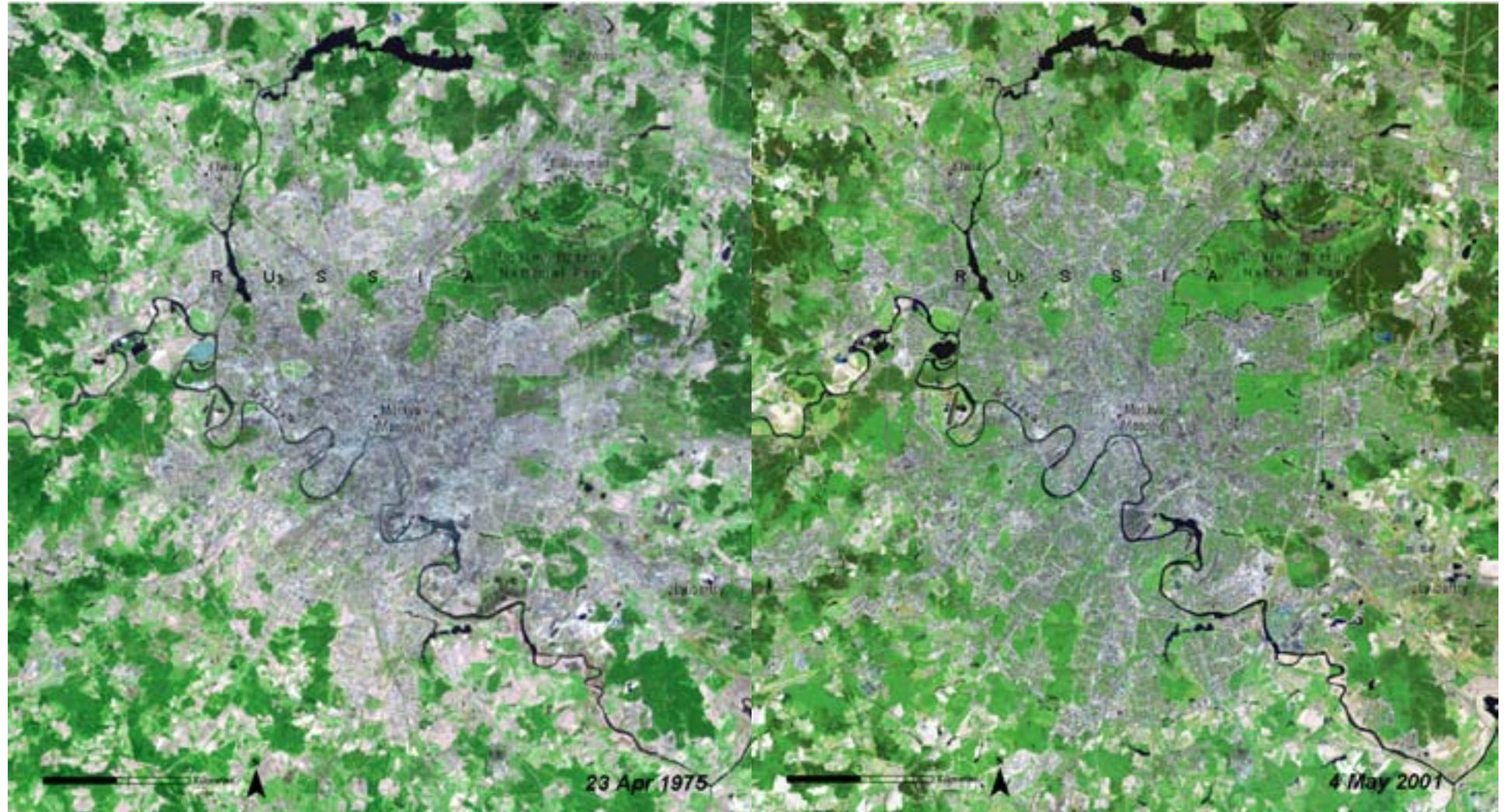


Beijing, China –1978 and 2000



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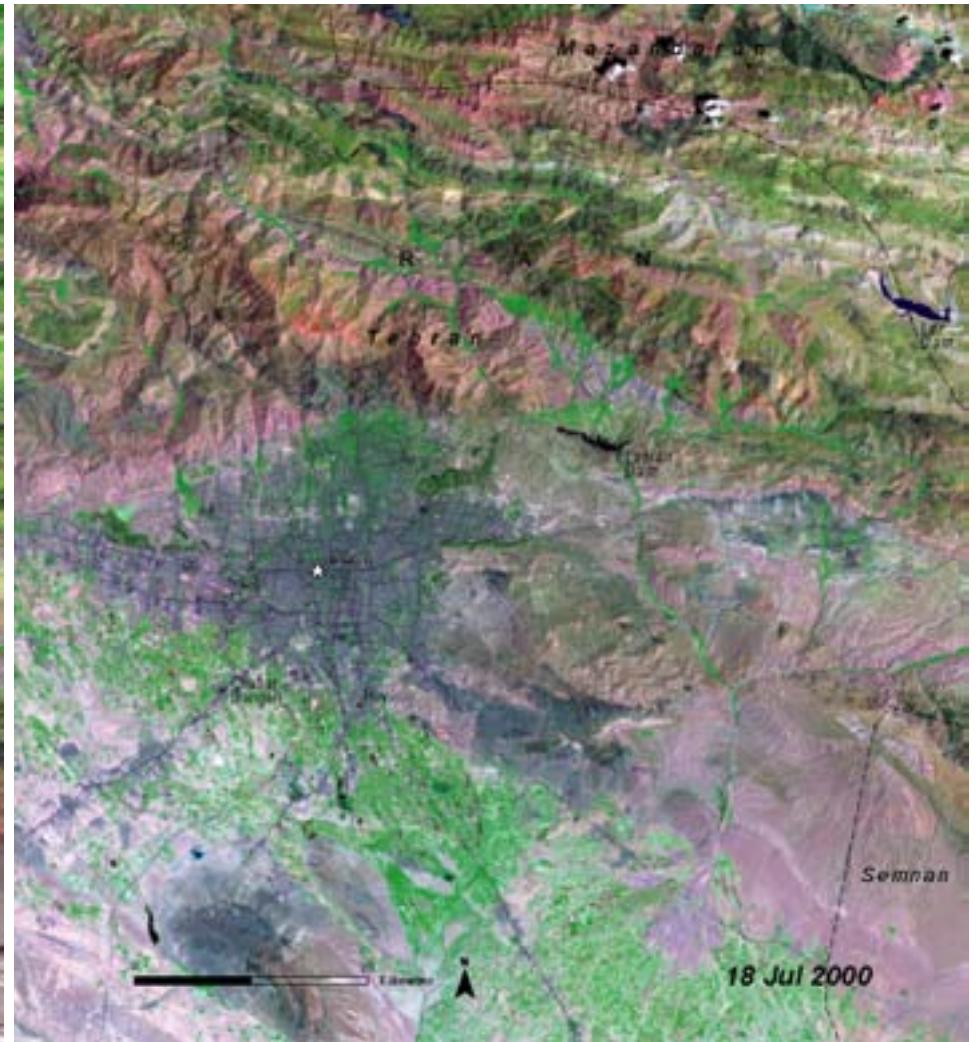
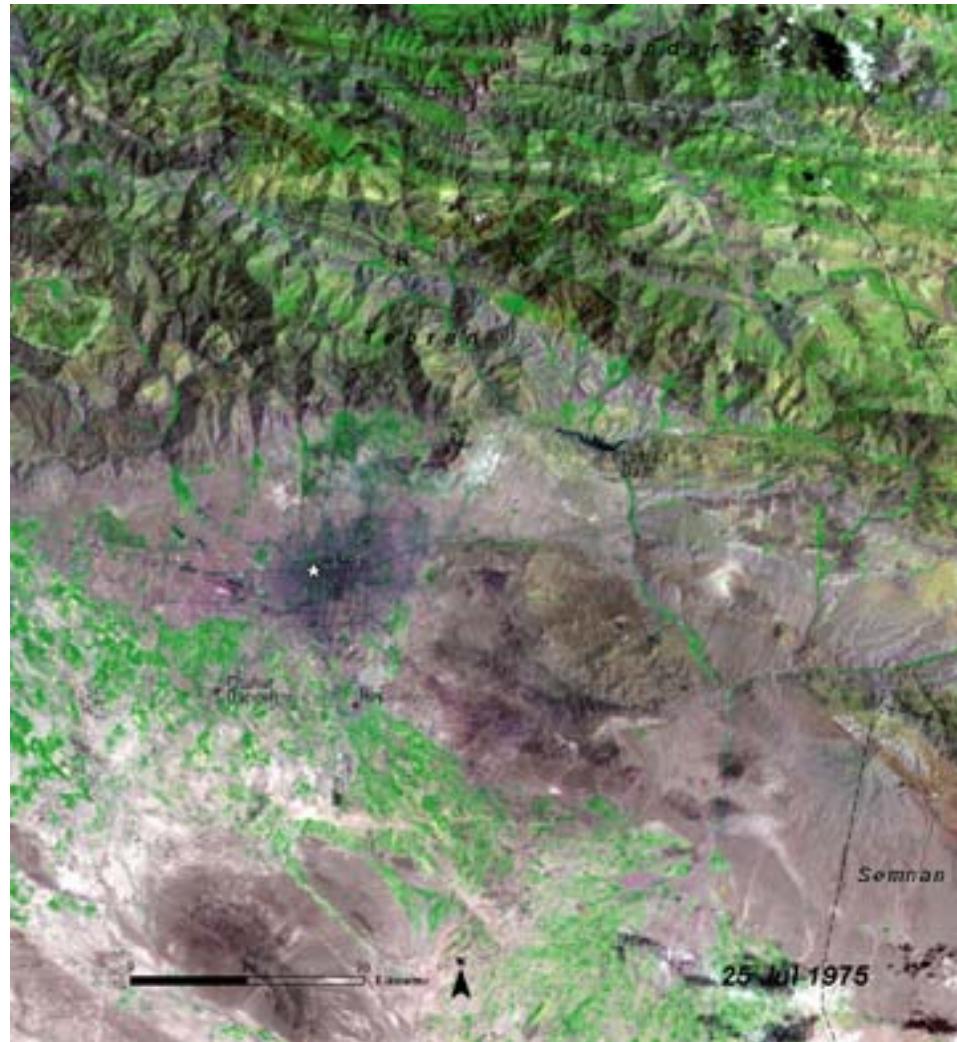


Moscow, Russia –1975 and 2001



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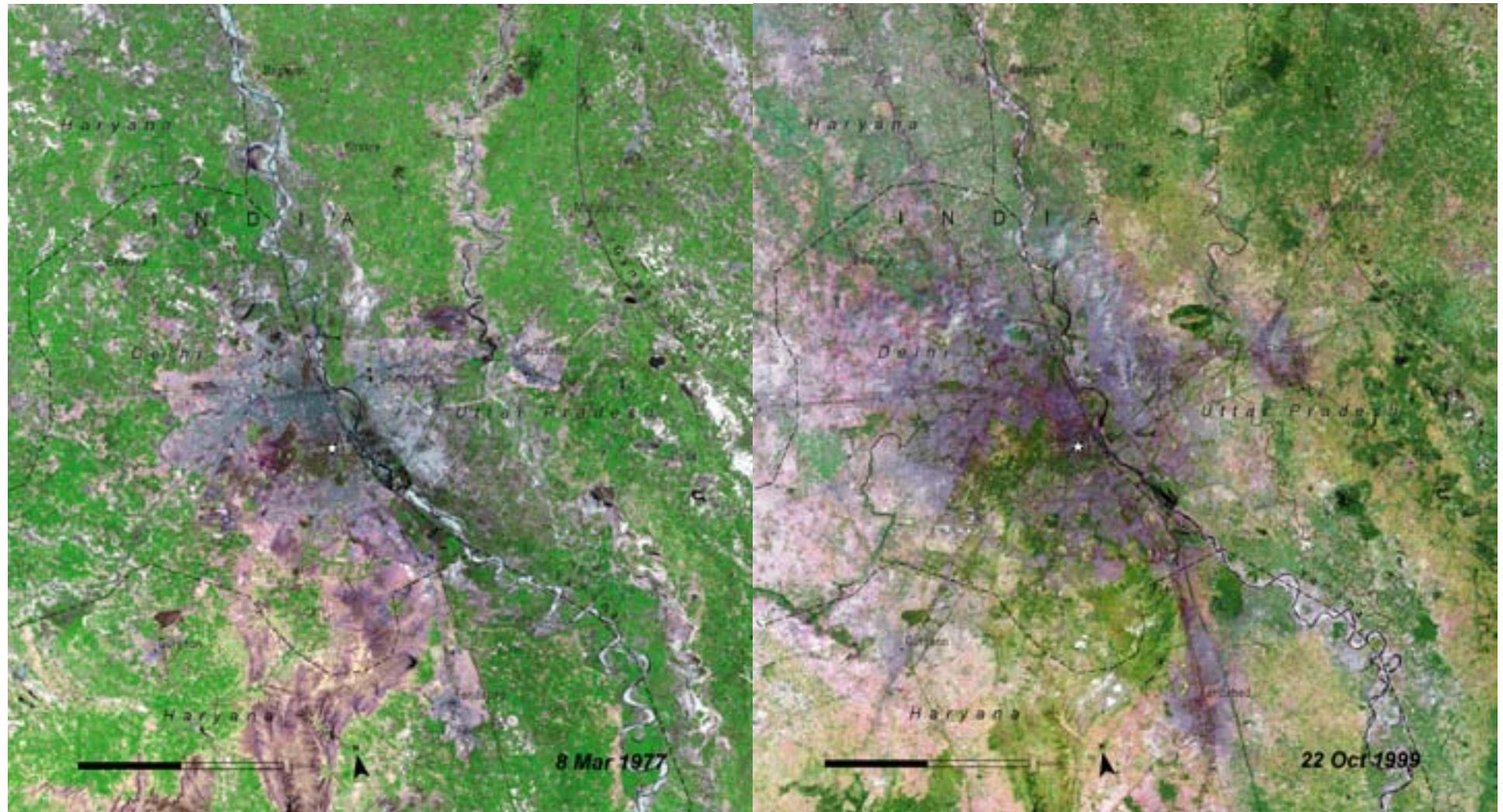


Tehran, Iran — Population grew from 2.8M (1970) to 14M (2004)



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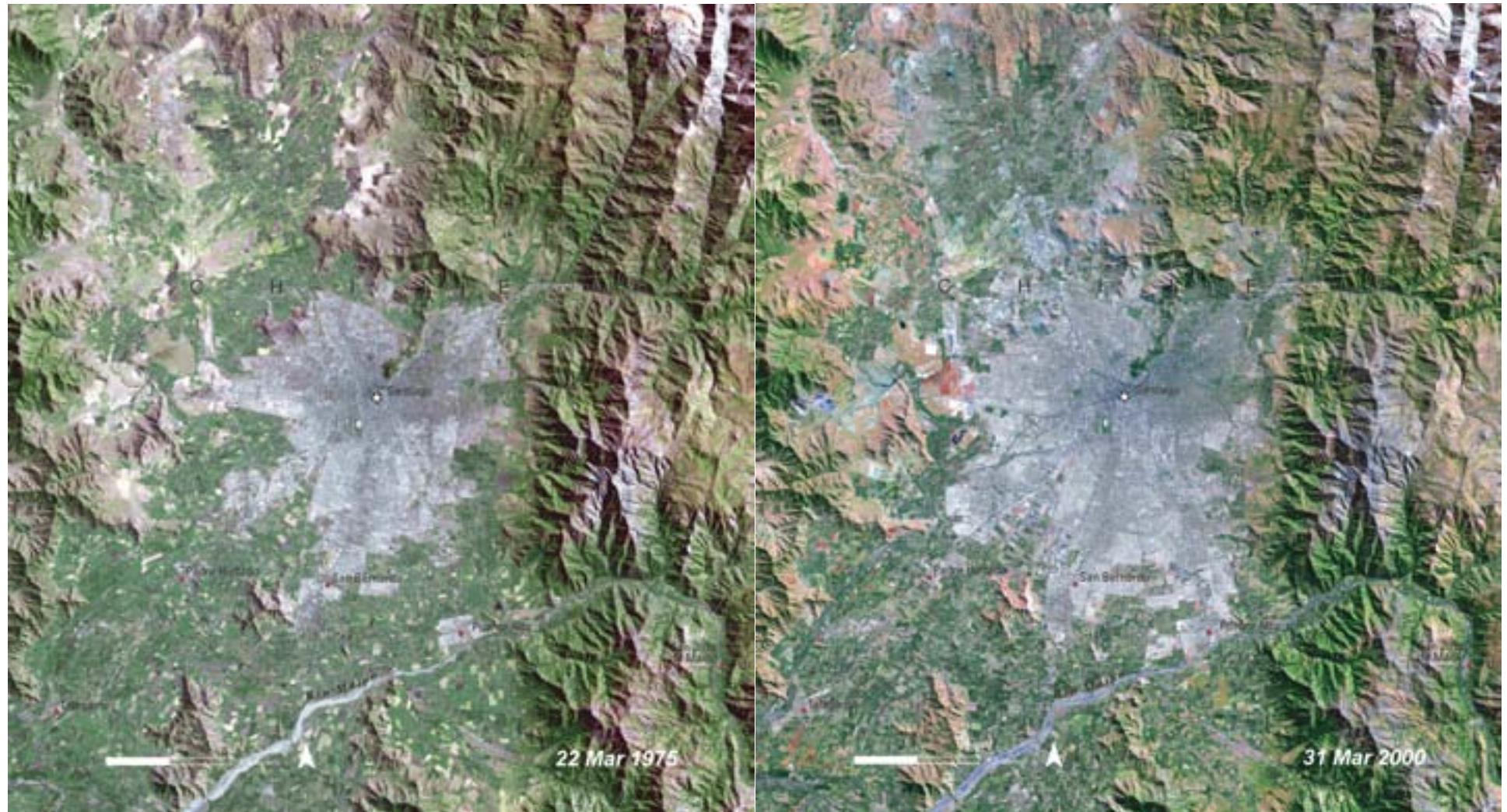


Delhi, India – 1977 and 1999



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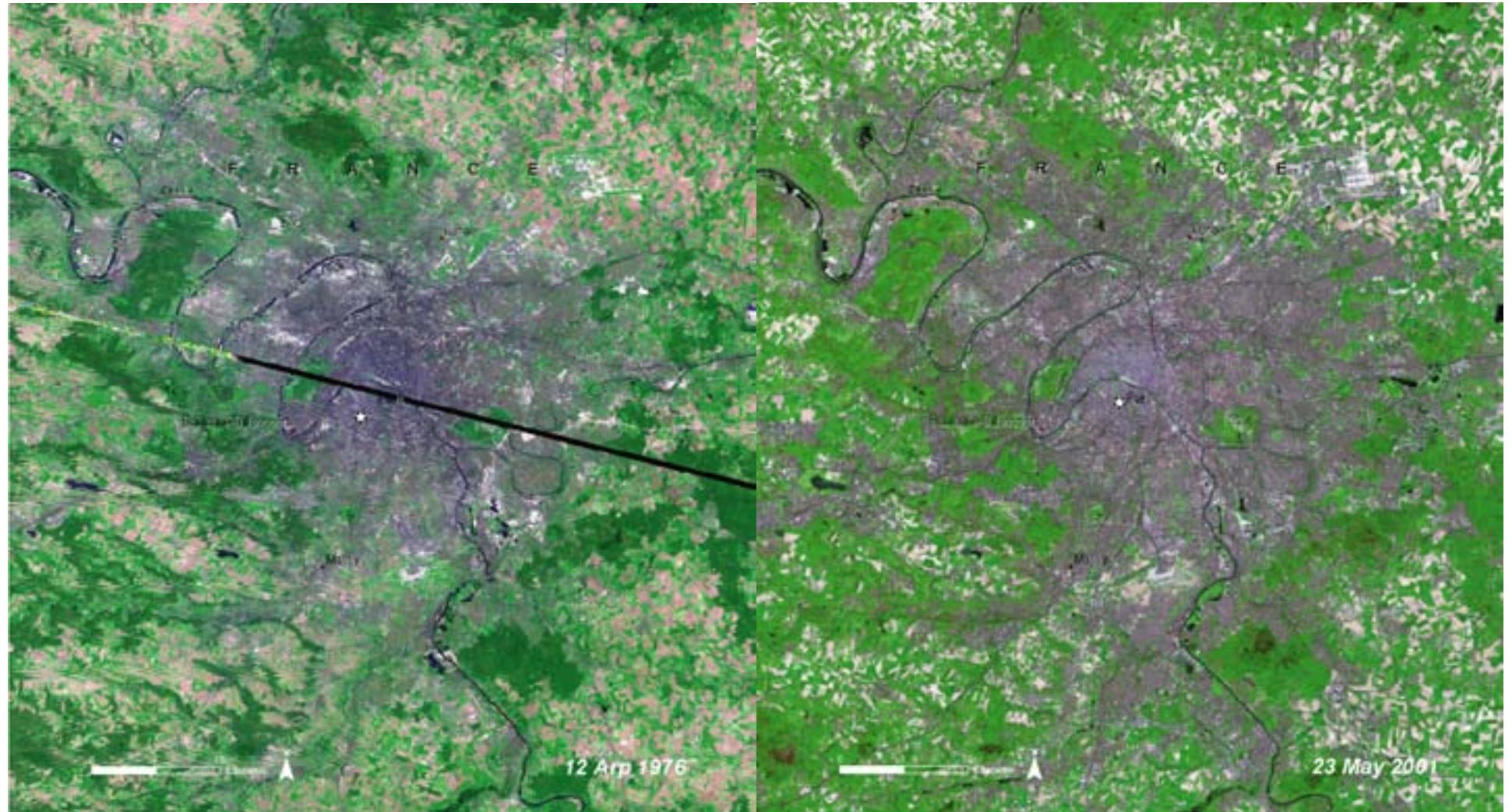


Santiago, Chile – 1975 and 2000



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Paris, France – 1976 and 2001



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### Iguazú National Park Region, Argentina



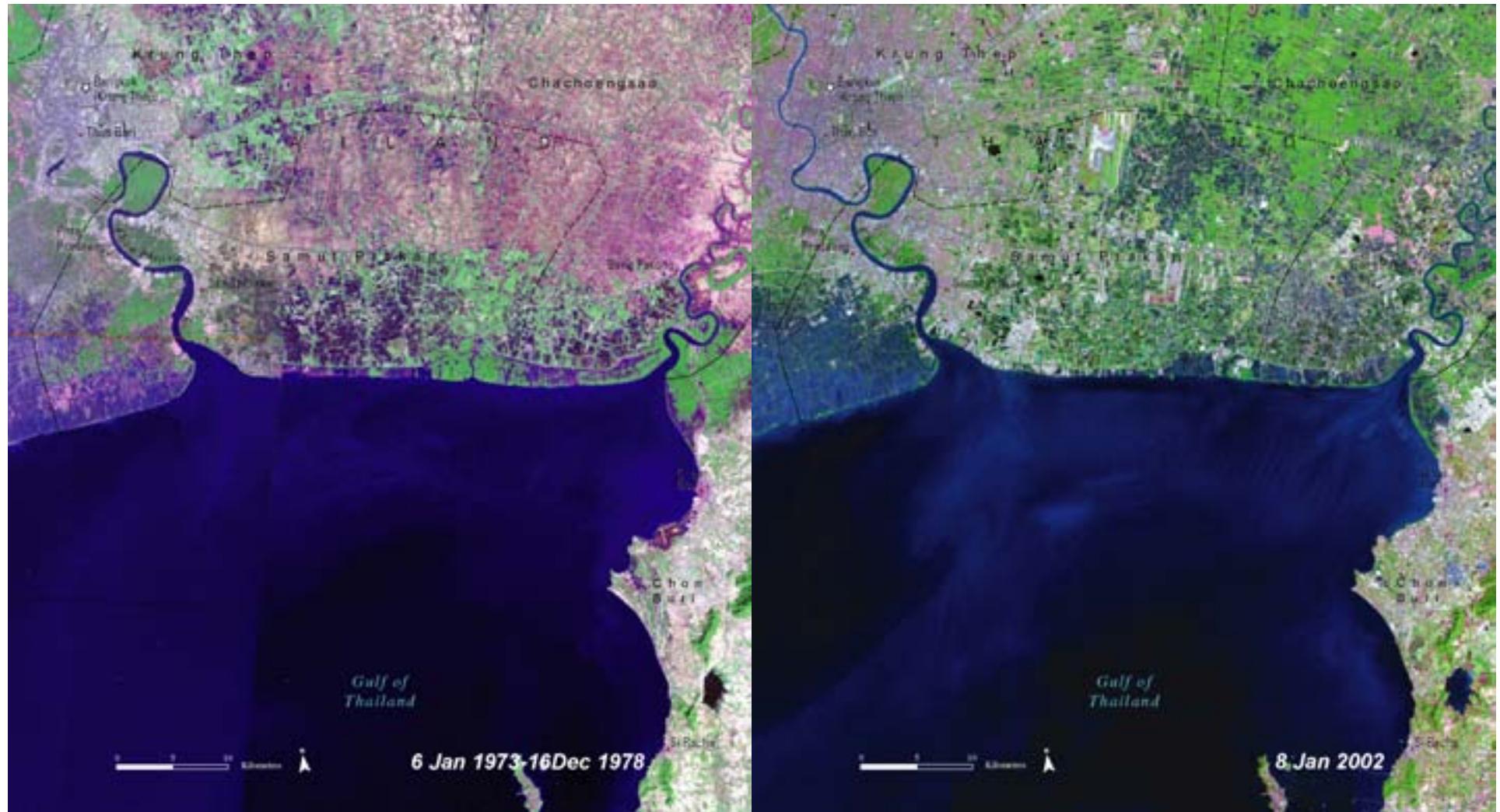
In 1973, signs of deforestation are evident, but the forest cover is extensive throughout the region.

By 2003, the protected national park is sharply defined in the dark green enclave to the right of the images.



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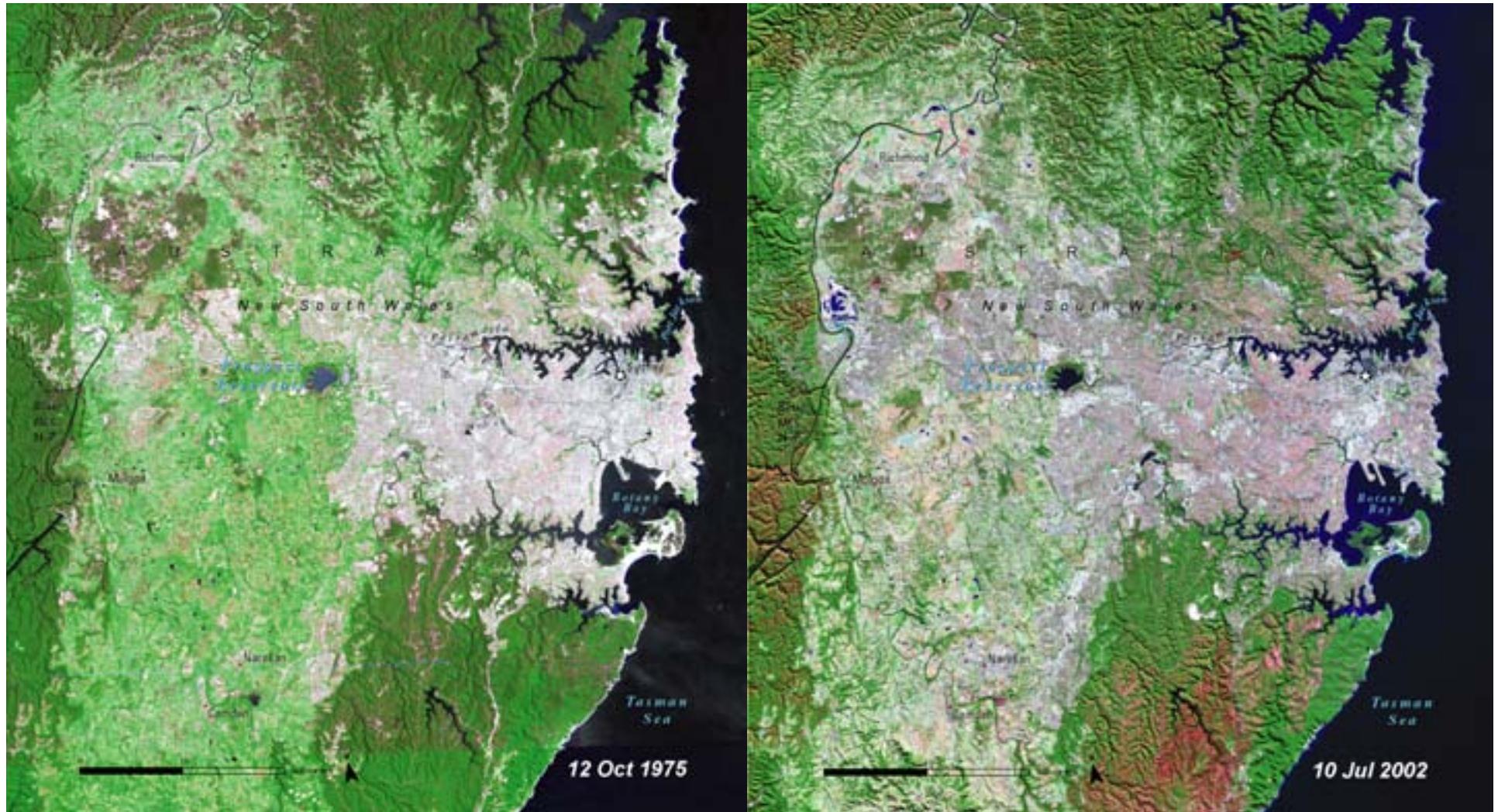


Bangkok, Thailand – 1978 and 2002



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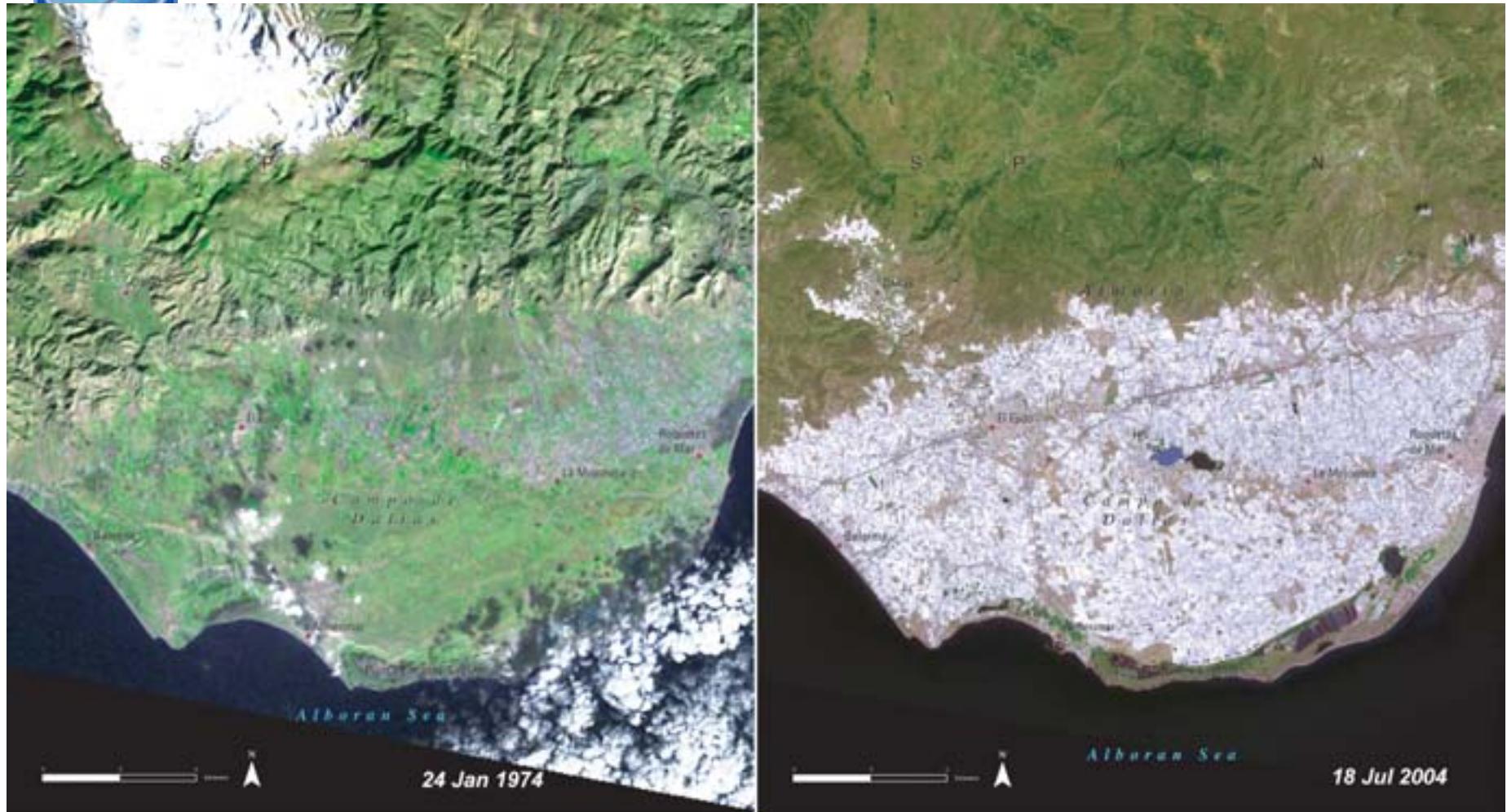


Sydney, Australia – 1975 and 2002



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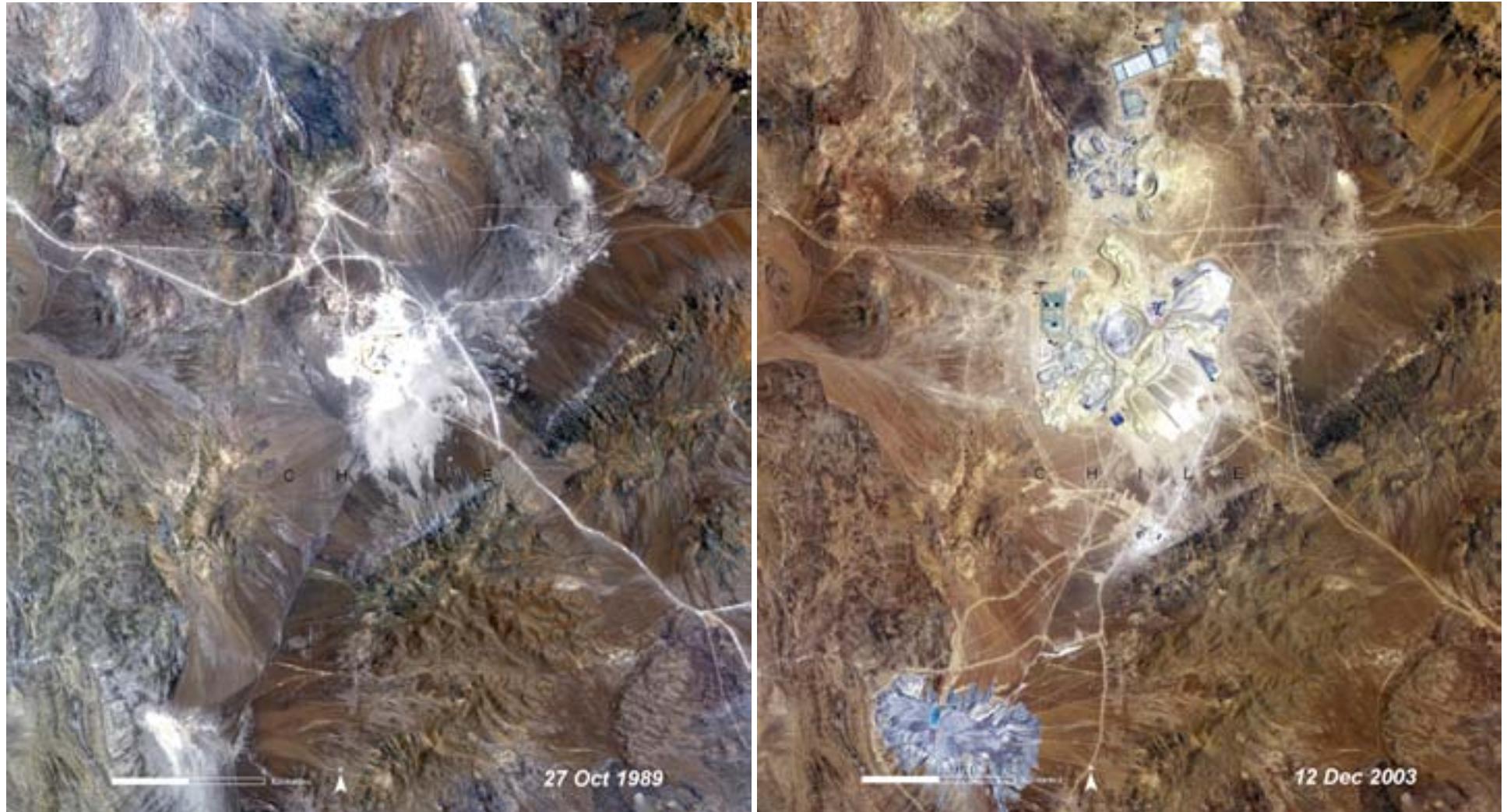


This pair of satellite images shows the impact of massive and rapid agricultural development in Almeria Province along Spain's southern coast. In the 1974 image, the landscape reflects rather typical rural agricultural land use. In the 2004 image, much of the same region – an area covering roughly 20,000 hectares (49,421 acres) – has been converted to intensive greenhouse agriculture for the mass production of market produce. (Greenhouse-dominated land appears as whitish-gray patches.) In order to address increasingly complex water needs throughout Spain, the government adopted the Spanish National Hydrological Plan (SNHP) in 2001. Initially, this water-redistribution plan involved the construction of 118 dams and 22 water-transfer projects that would move water from parts of the country where it was relatively abundant to more arid regions. In 2004, the Spanish government announced that it would begin exploring more environmentally friendly water-saving technologies, such as wastewater recycling and seawater desalination.



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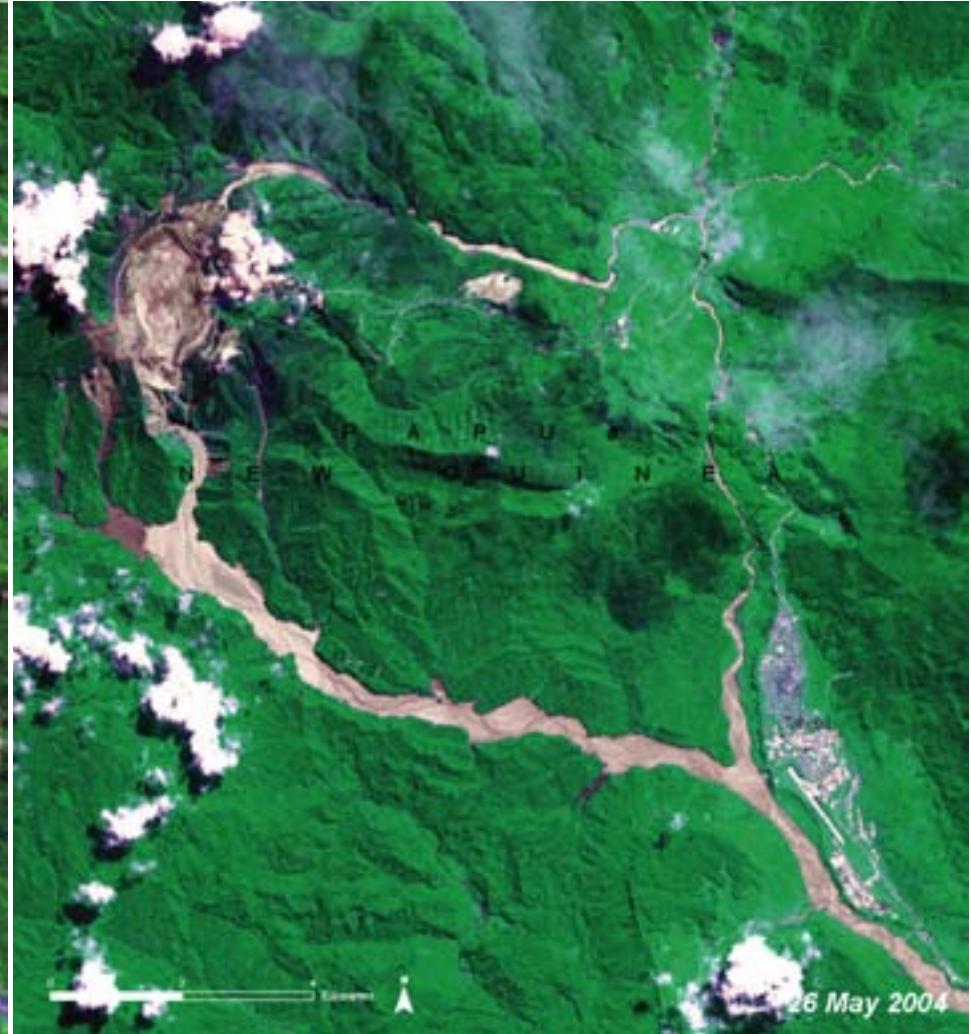


Escondida, Chile – 1989 and 2003



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Mining in Papua New Guinea – 1990 and 2004



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Rondonia, Brazil – 1975 and 2001



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### Santa Cruz, Bolivia



1975 – Bolivian lowlands – suitable for agriculture



2003 – Large, corporate agricultural fields transform the landscape.



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Santa Cruz, Bolivia – 1975, 1986, and 2003



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Rio Negro, Honduras – 1987 and 1999



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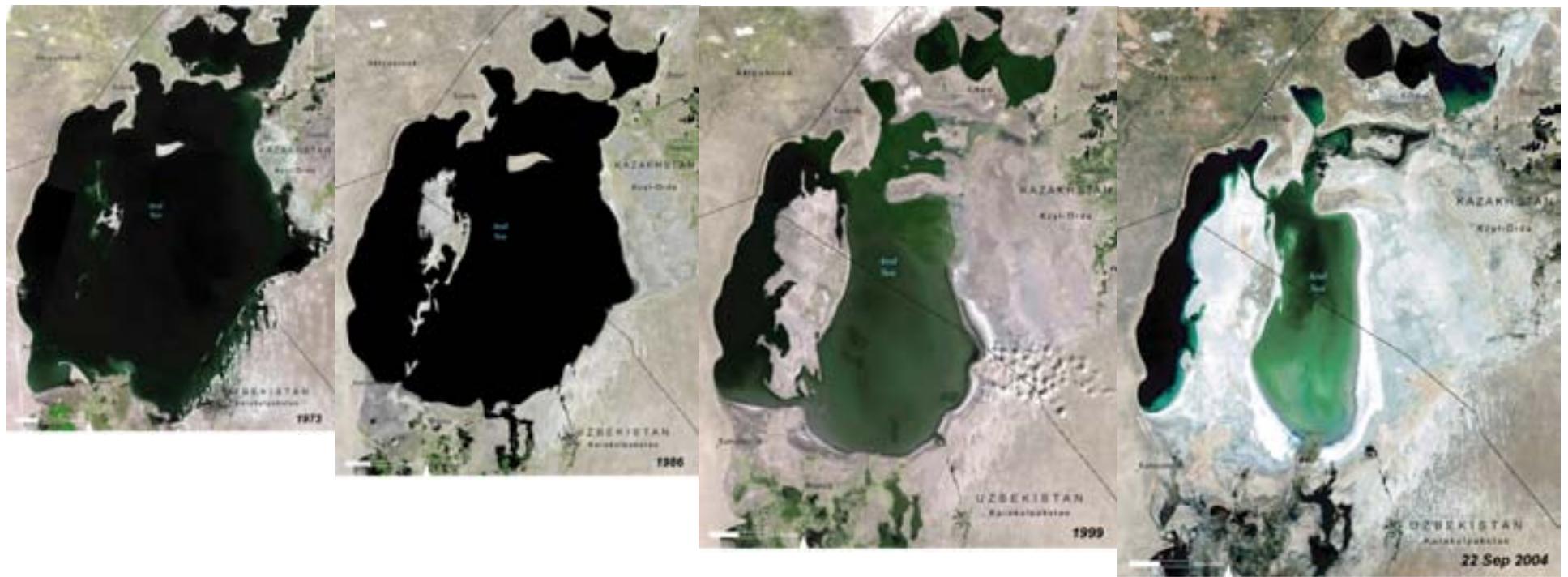


Huang He Delta – 1979 and 2000



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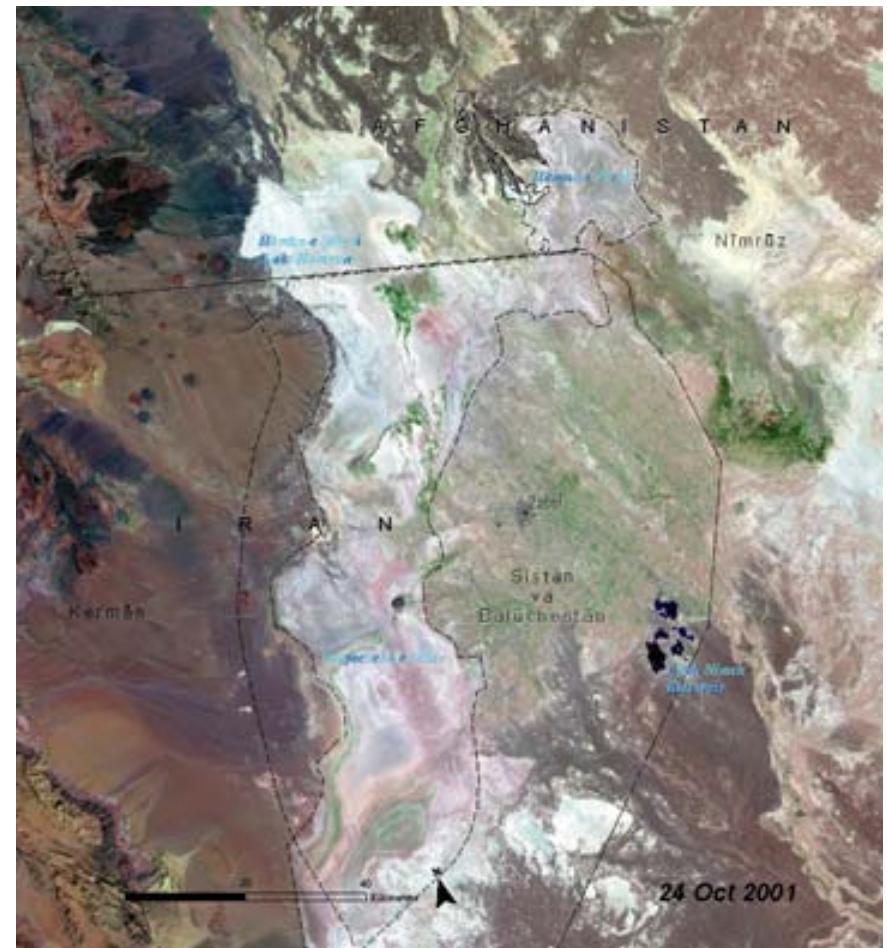
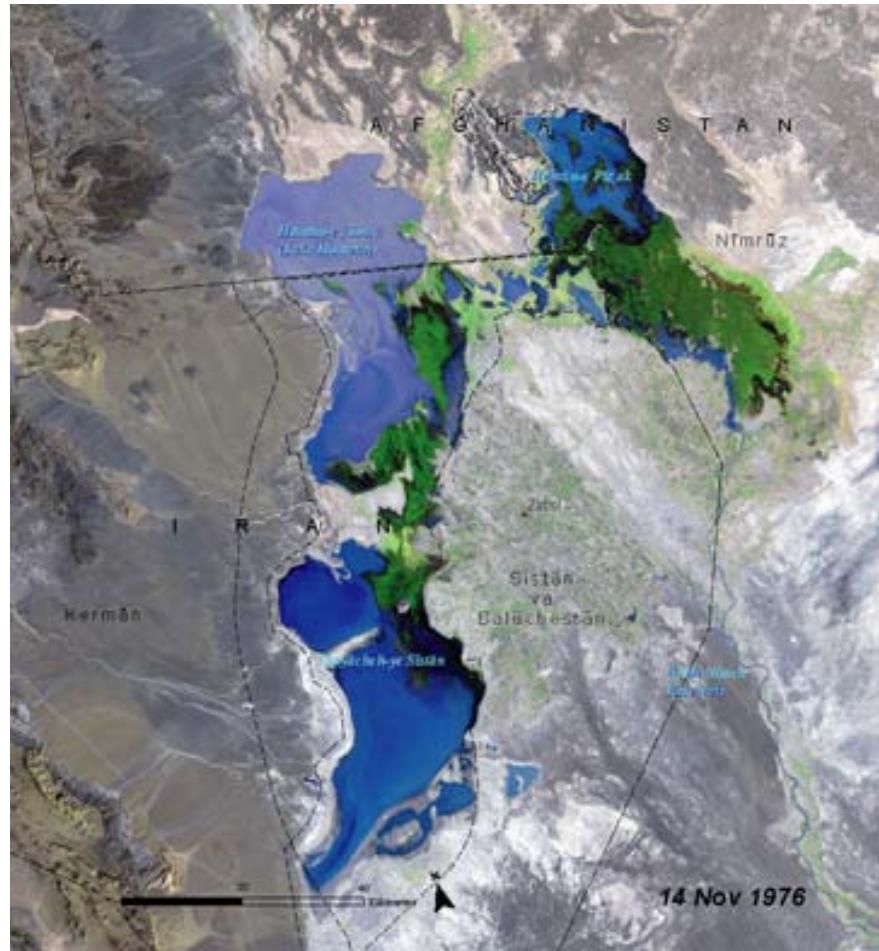
The Aral Sea, Kazakhstan, over 30 years: 1973, 1986, 1999, and 2004



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### Lake Hamoun, Iran/Afghanistan



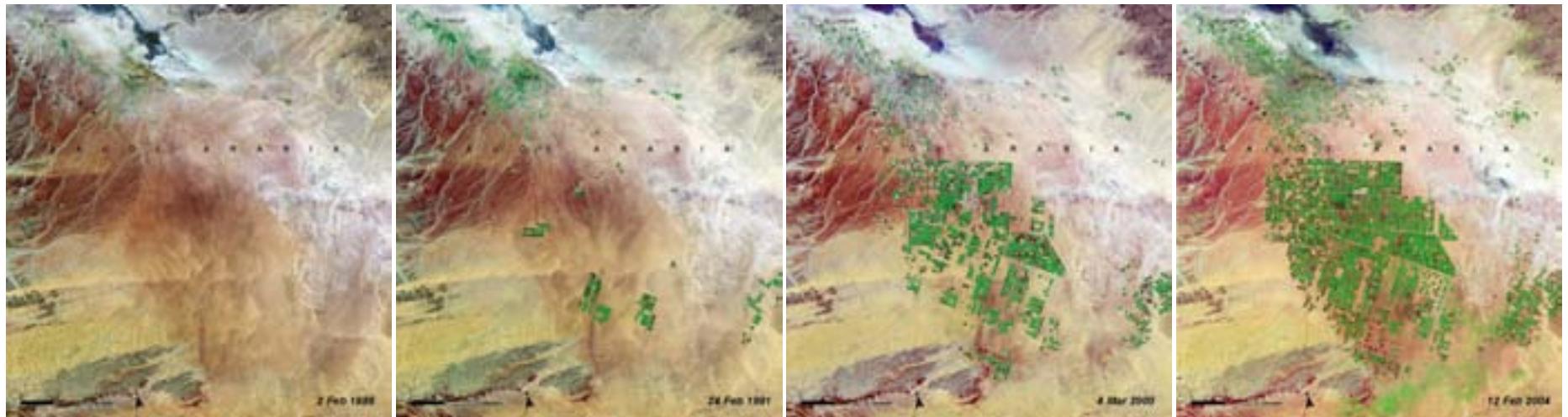
Changes in water levels between 1976 and 2001 in Lake Hamoun



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### Al Isawiyah, Saudi Arabia

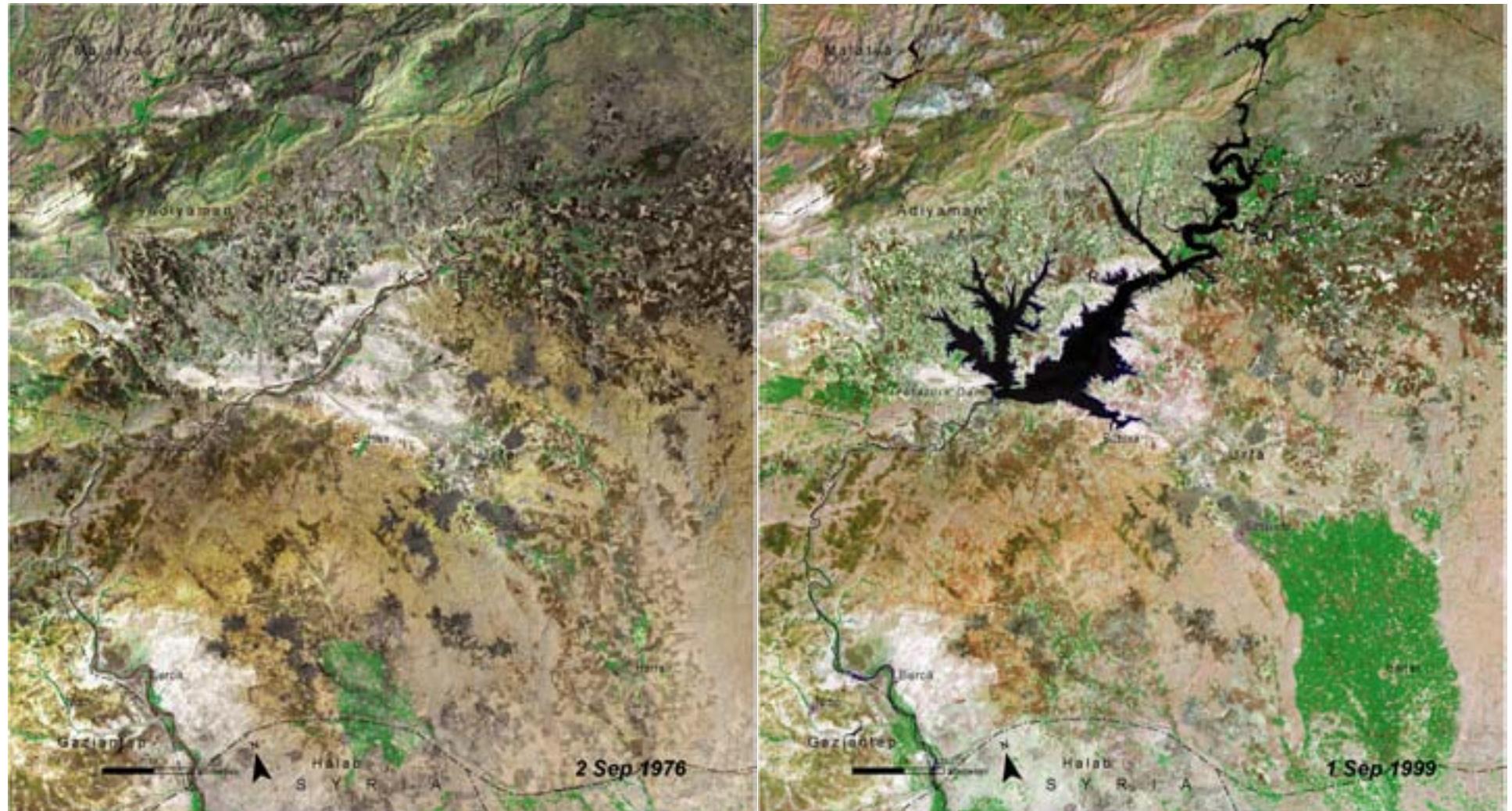


<p>1986 A desert landscape</p>	<p>1991 Irrigation begins</p>	<p>2000 And transforms the desert</p>	<p>2004 Irrigation intensity increases</p>
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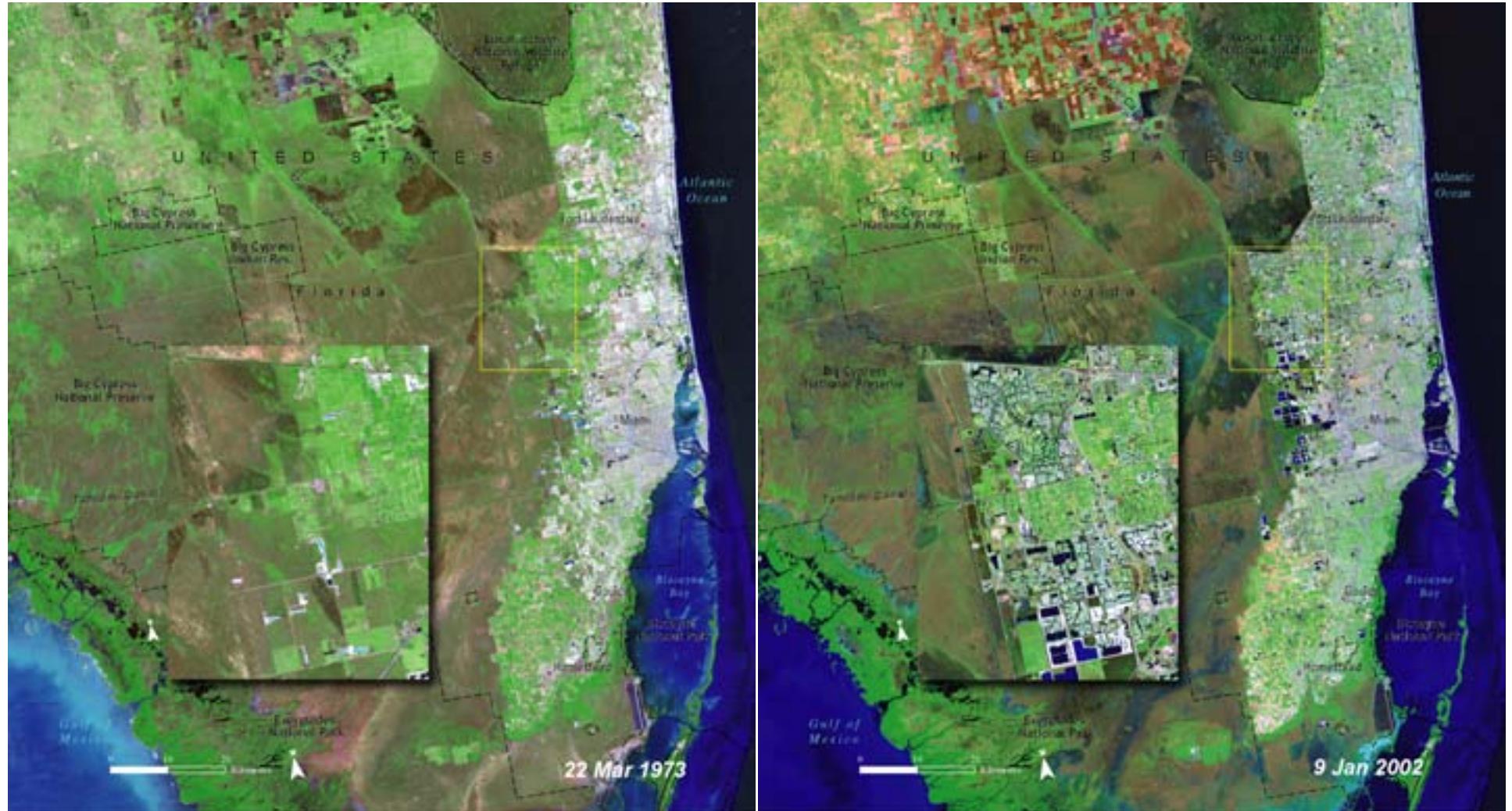


Ataturk Dam, Turkey – 1976 and 1999



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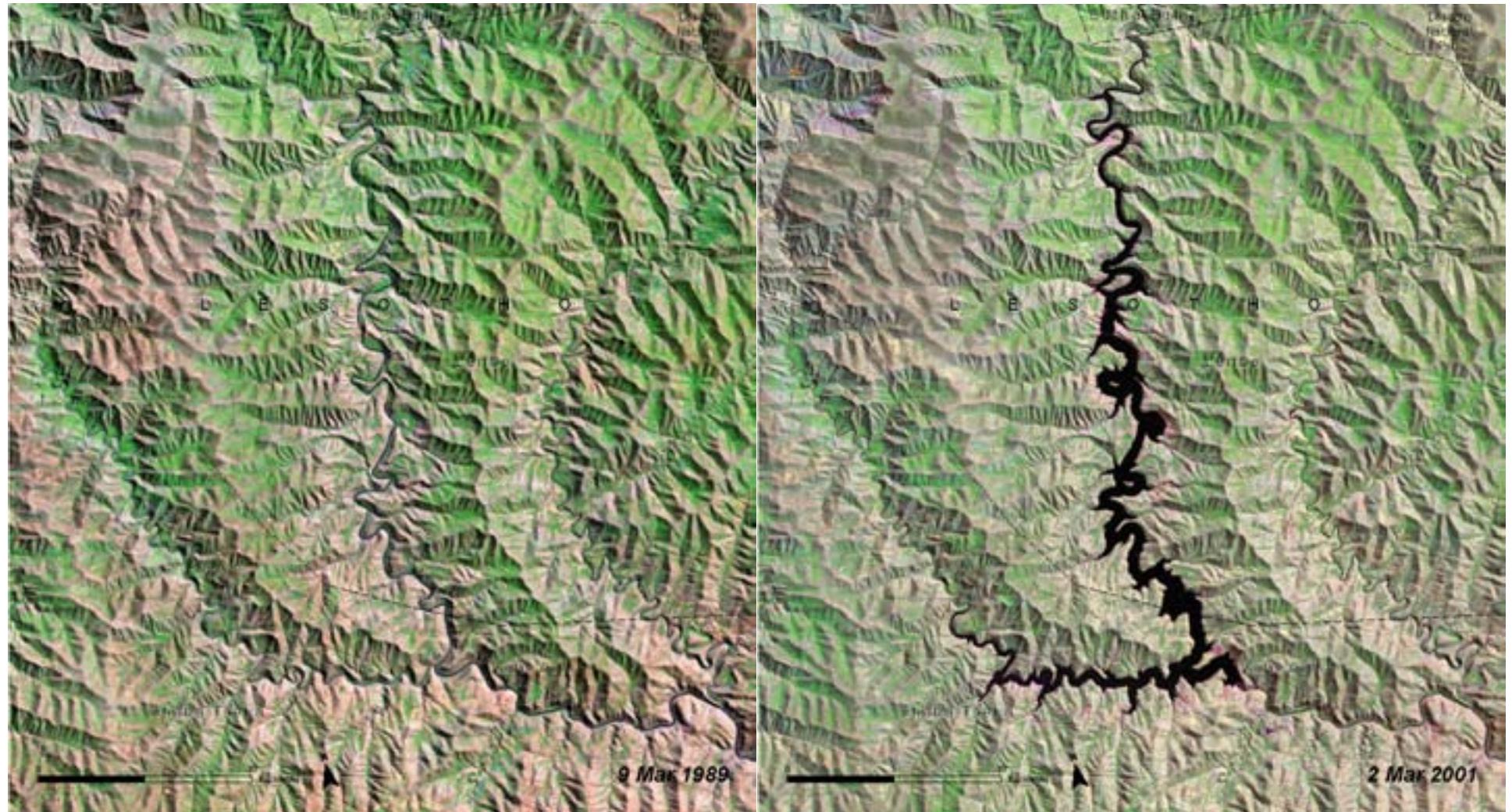


The Florida Everglades, USA – 1973 and 2002



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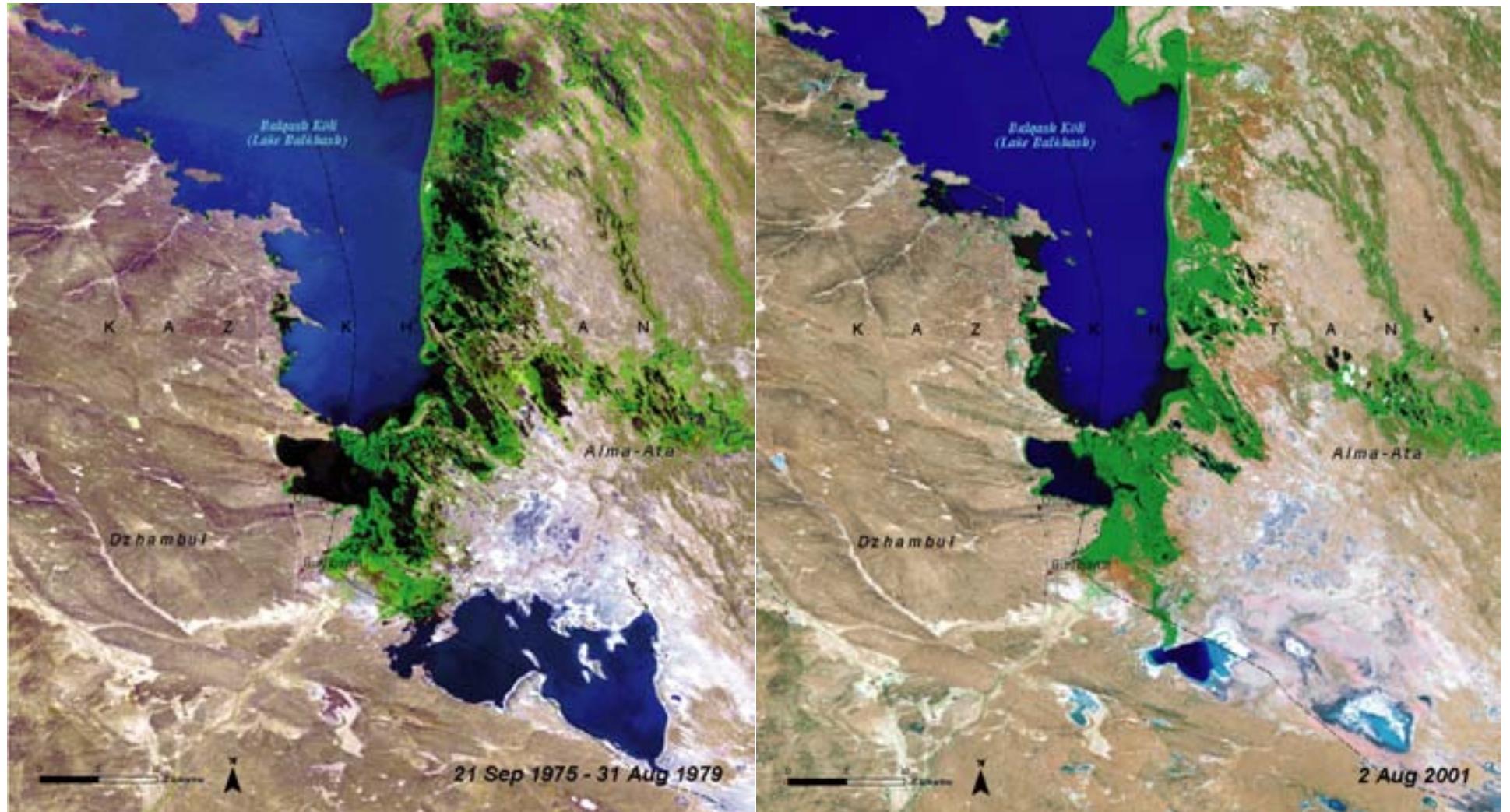


Lesotho Highlands – 1989 and 2001



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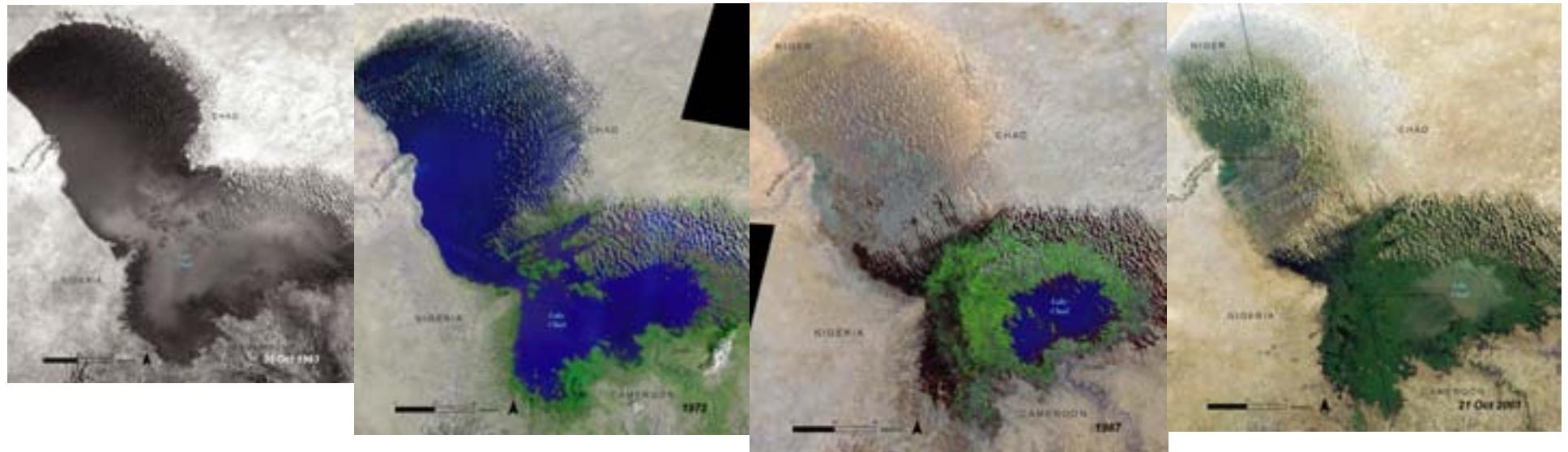


Lake Balkhash, Kazakhstan – 1979 and 2001



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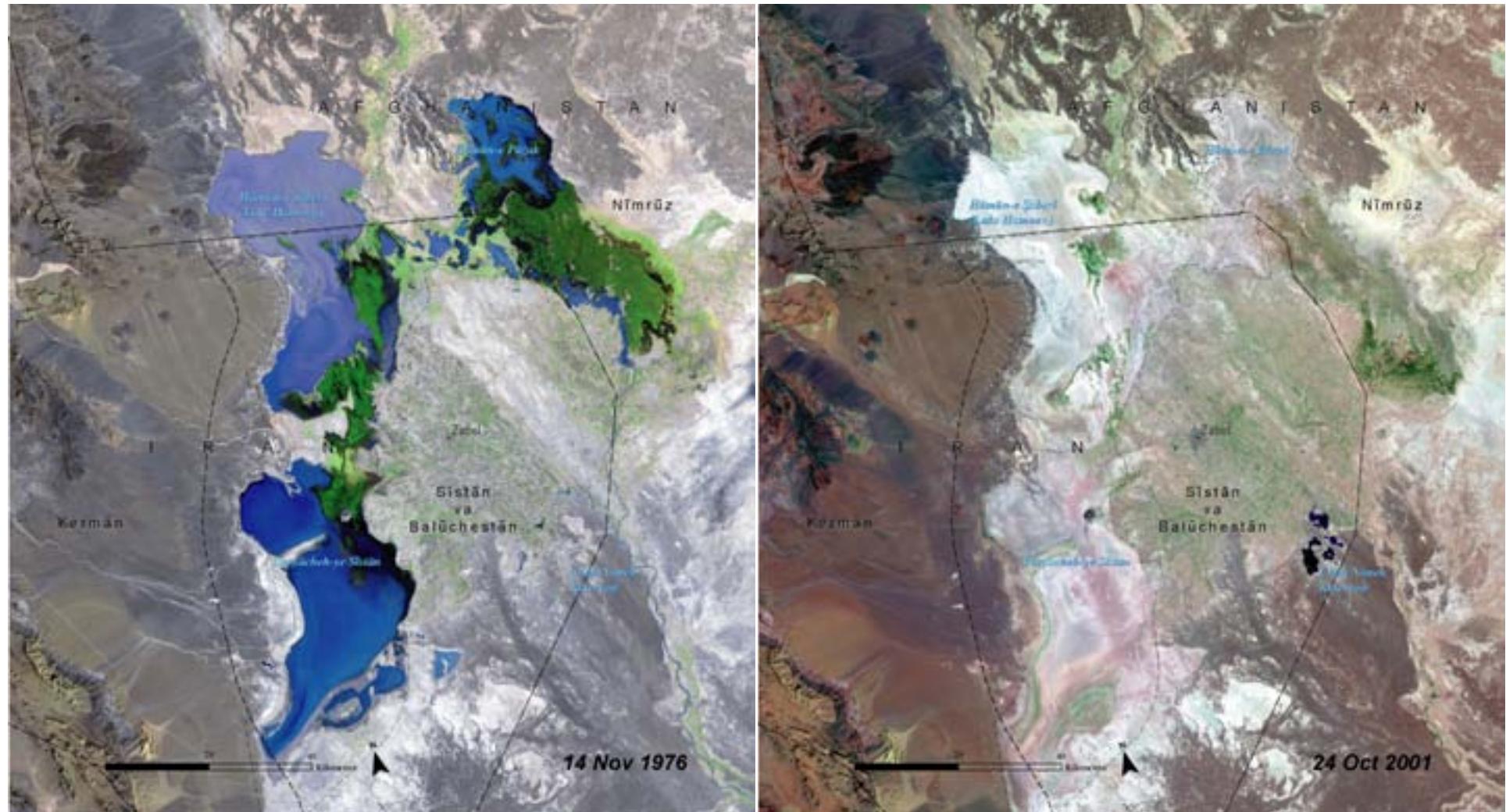


Lake Chad, Nigeria/Chad – 1963, 1972, 1987, and 2001



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Lake Hamoun, Iran/Afghanistan – 1976 and 2001



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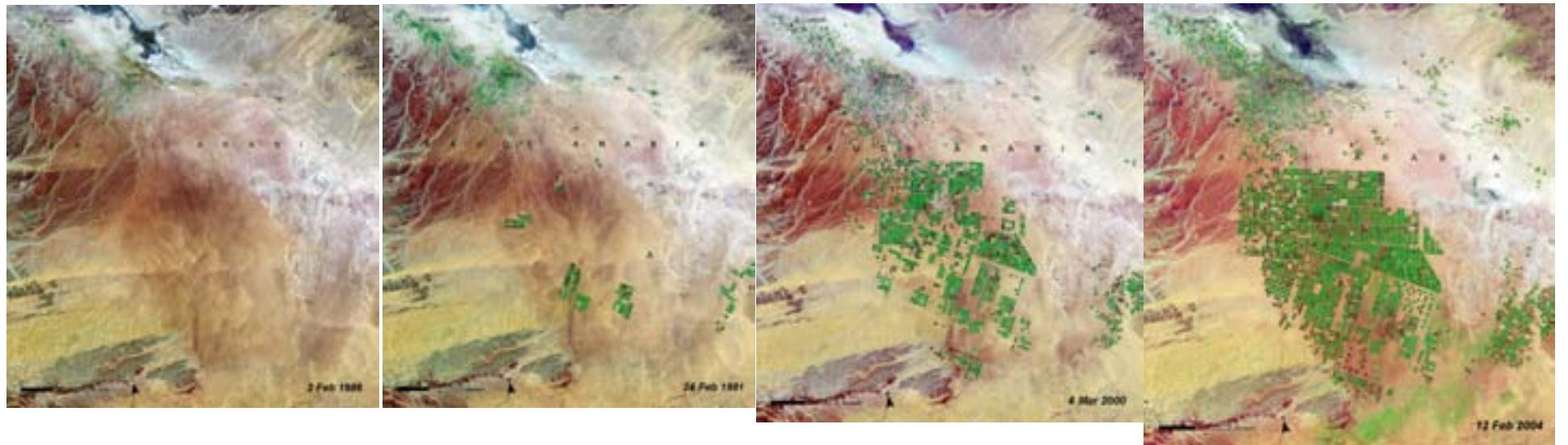


Itaipu Dam, Paraguay – 1973 and 2003



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Al Isawiyah, Saudi Arabia – 1986, 1991, 2000, and 2004



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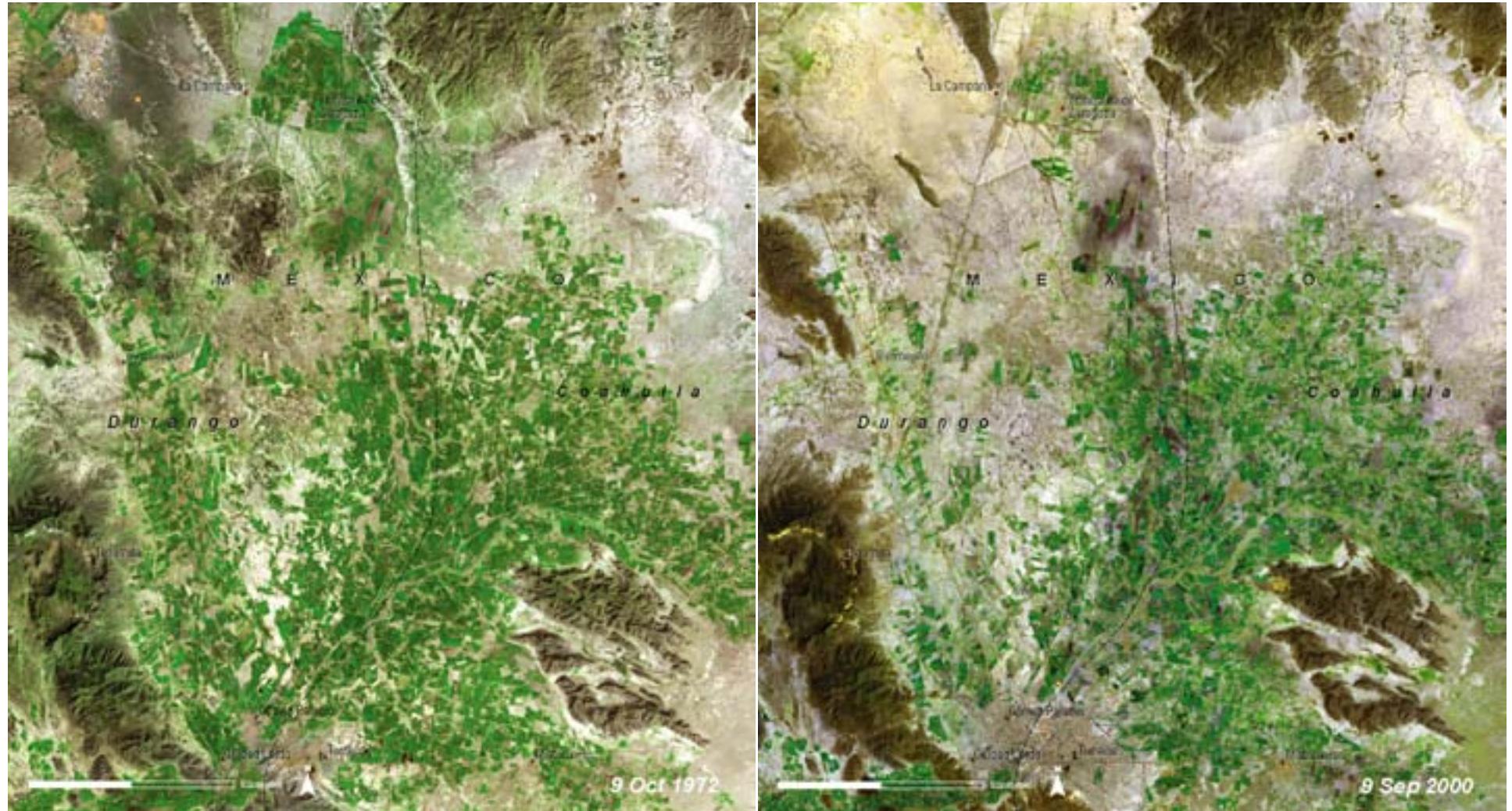


Louisiana, USA – 1972 and 2001



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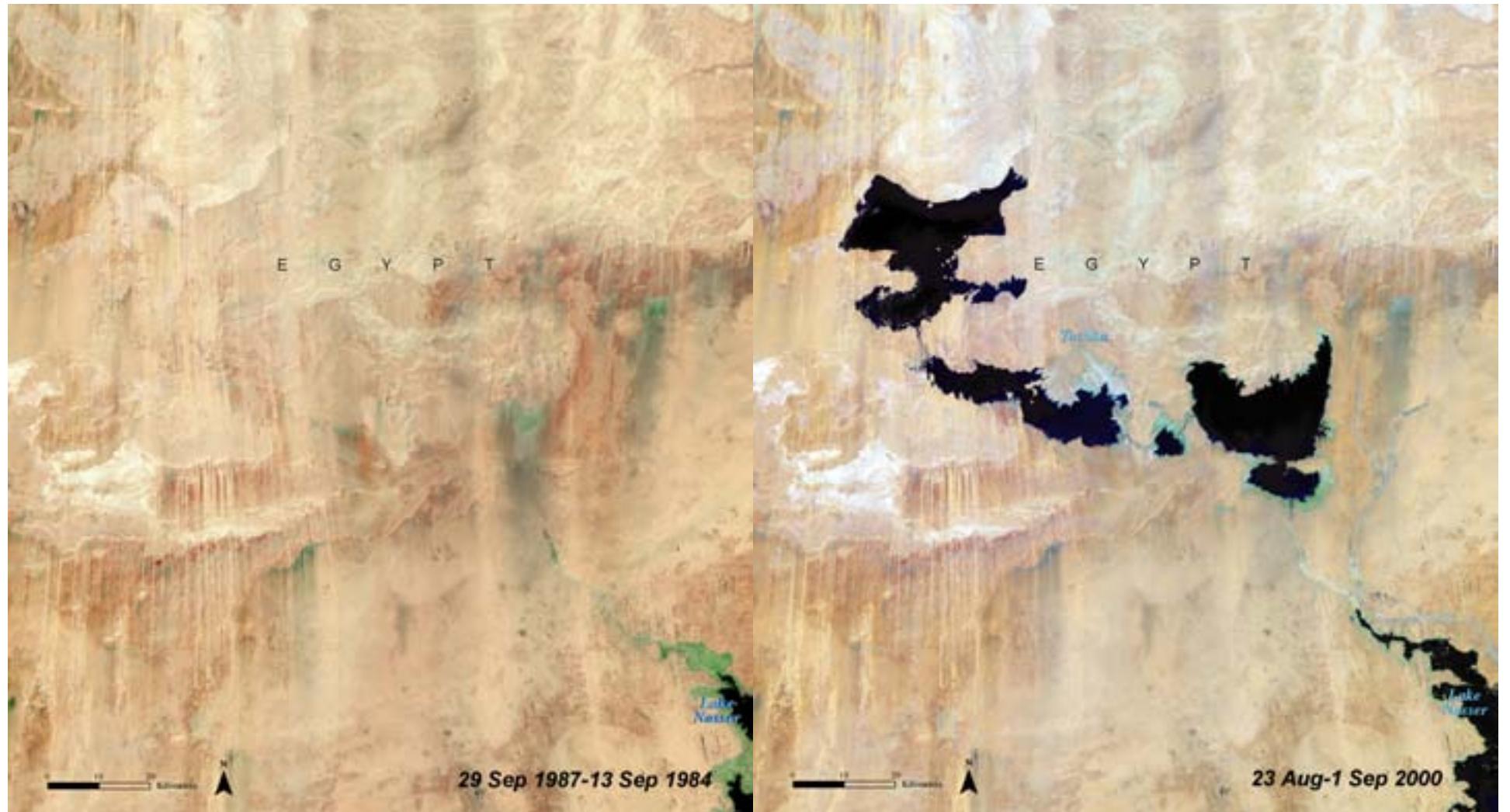


Torreón, Mexico – 1972 and 2000



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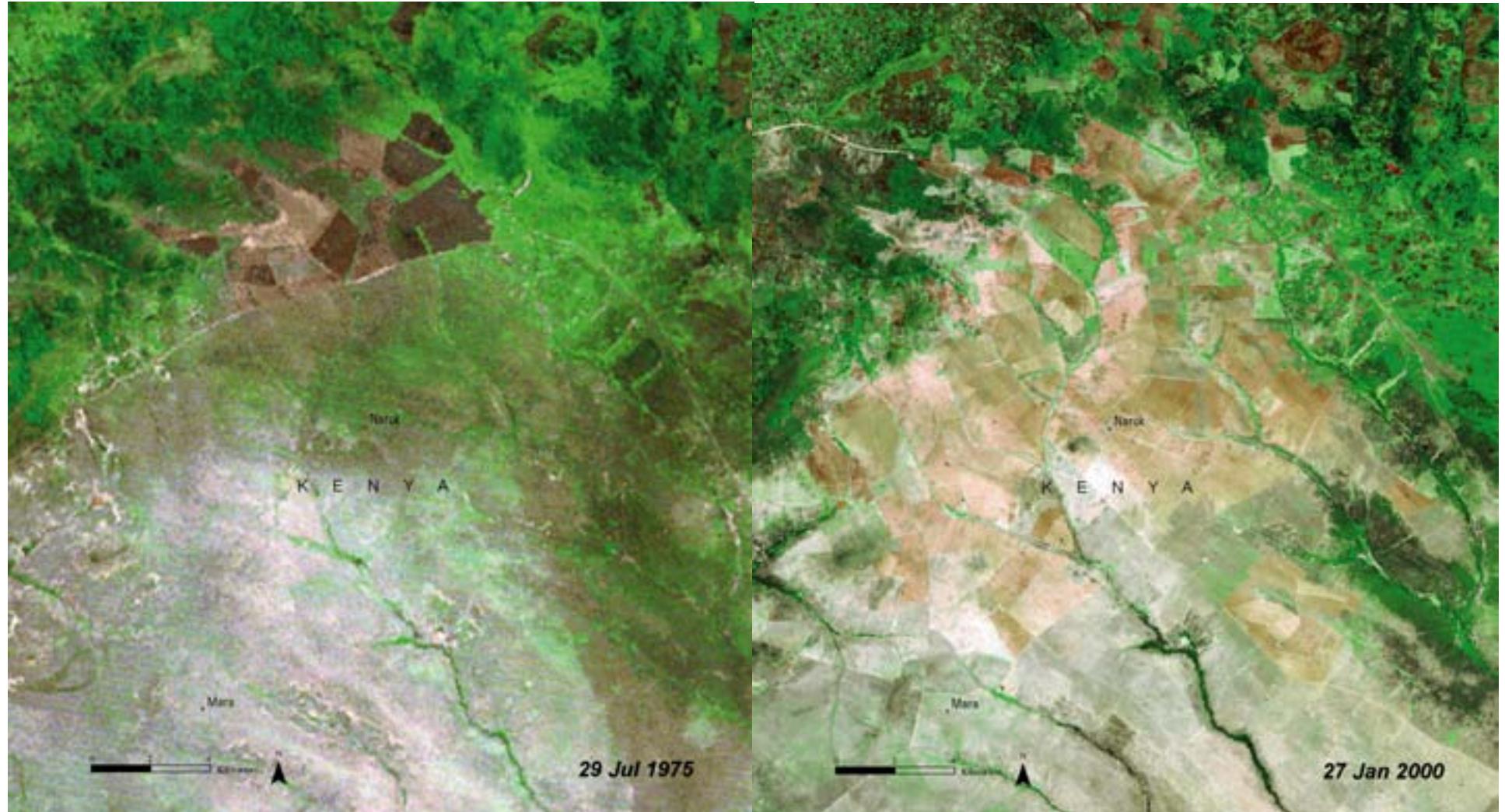


Toshka Project, Egypt – 1984 and 2000



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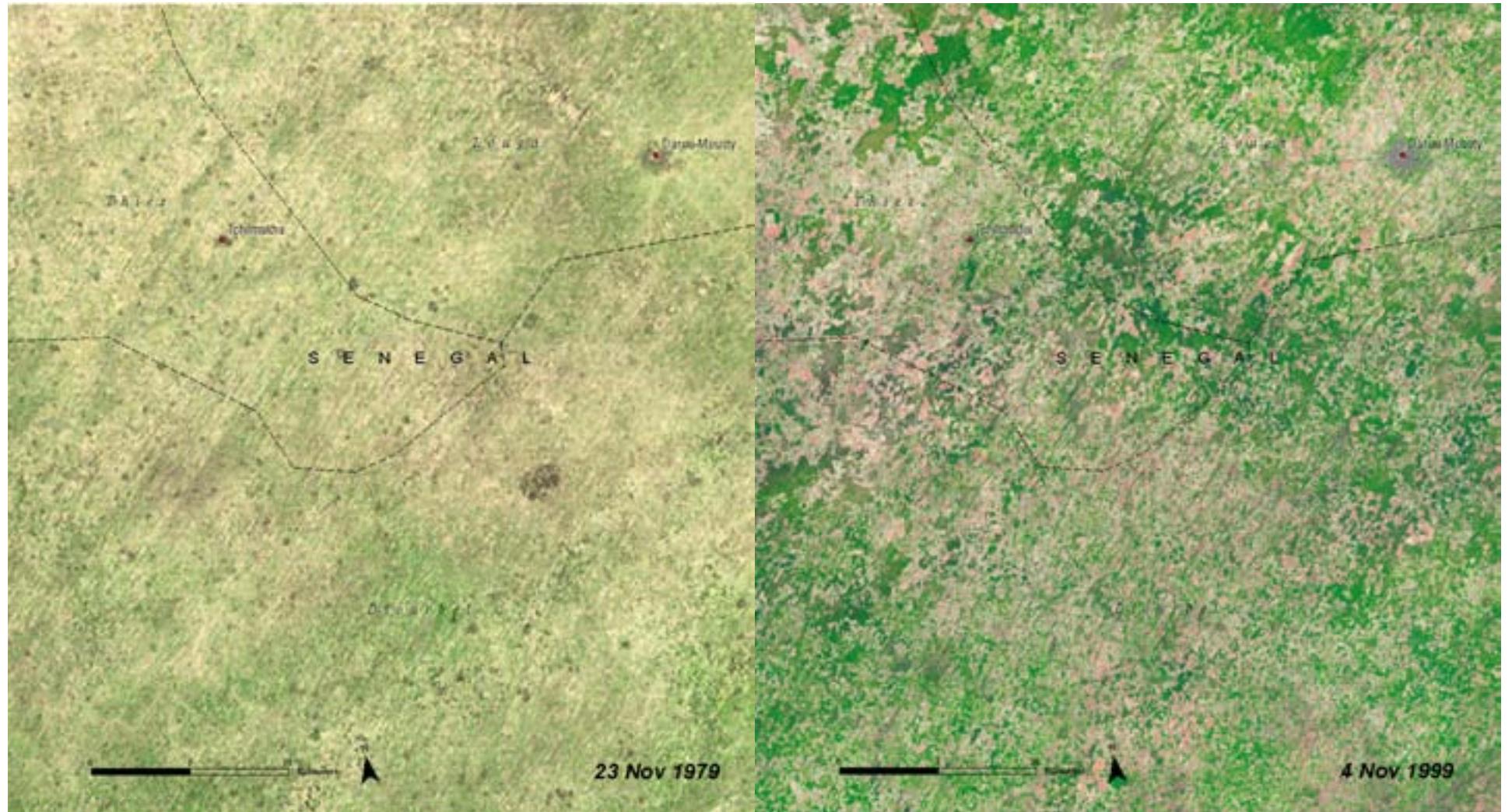


Narok, Kenya – 1975 and 2000



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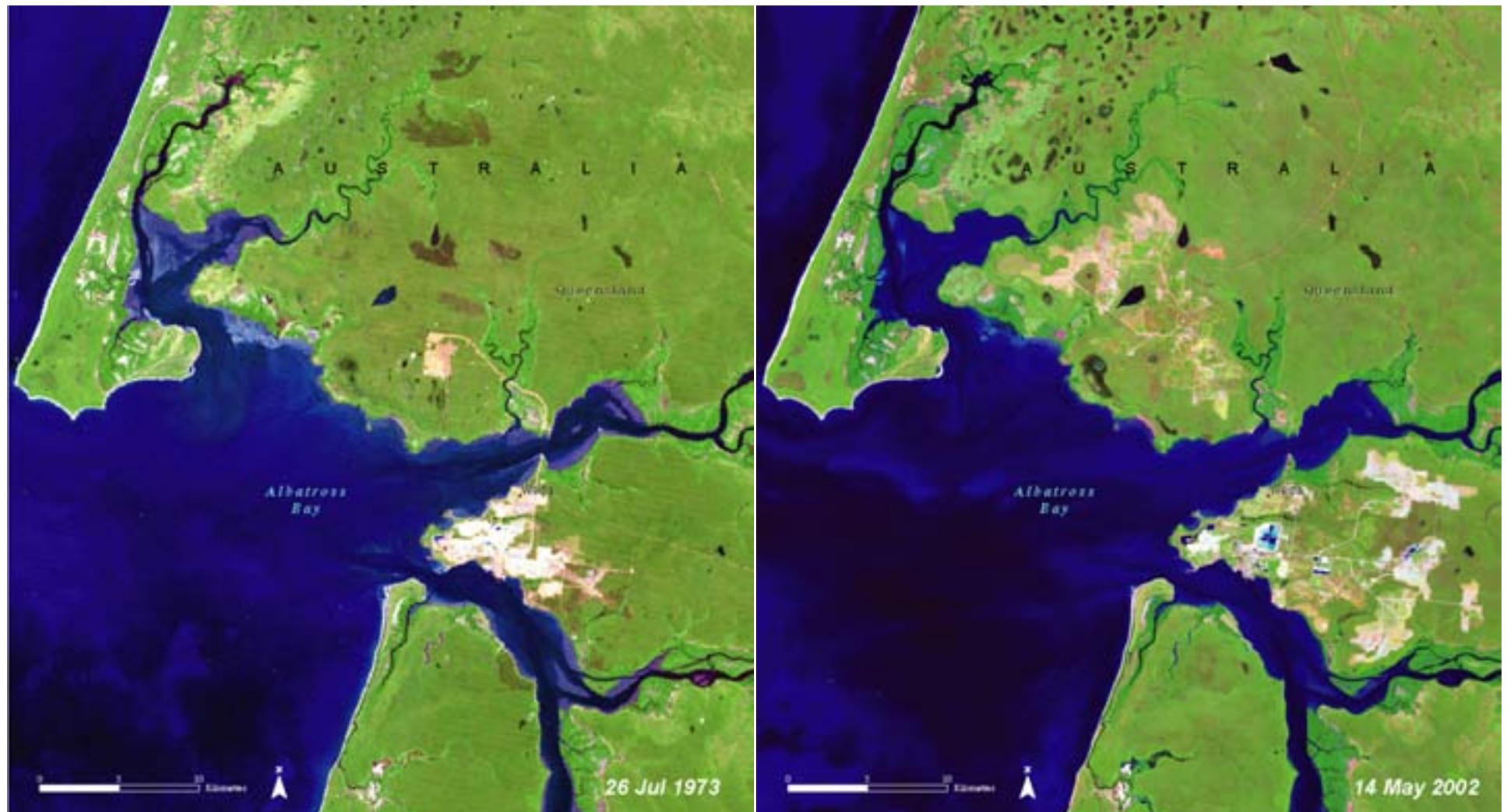


Peanut Basin, Senegal – 1979 and 1999



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Weipa Bauxite, Australia – 1973 and 2002



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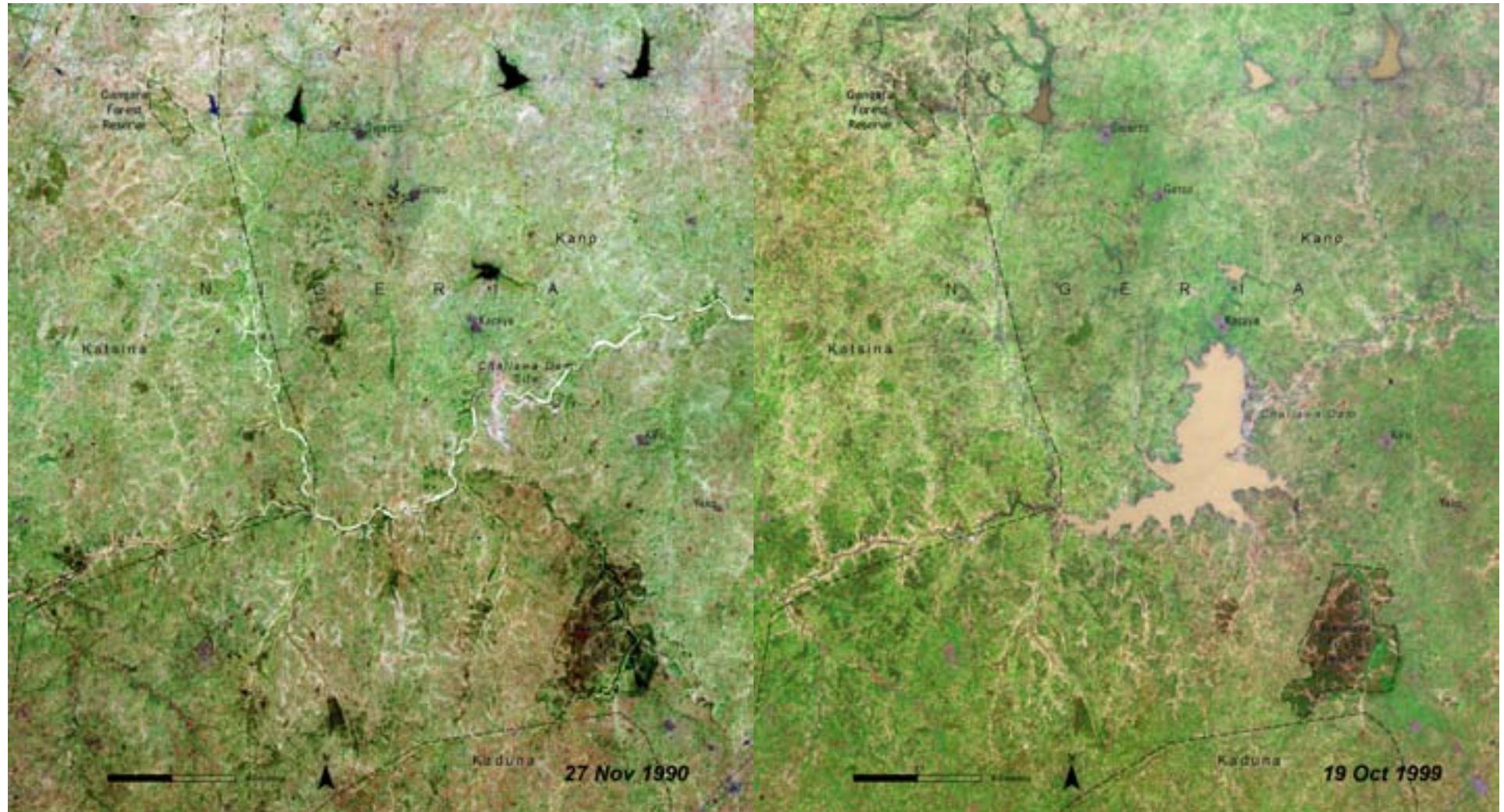


Isahaya Bay, Japan – 1993, 2001, and 2003



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Challawa Dam, Nigeria – 1990 and 1999



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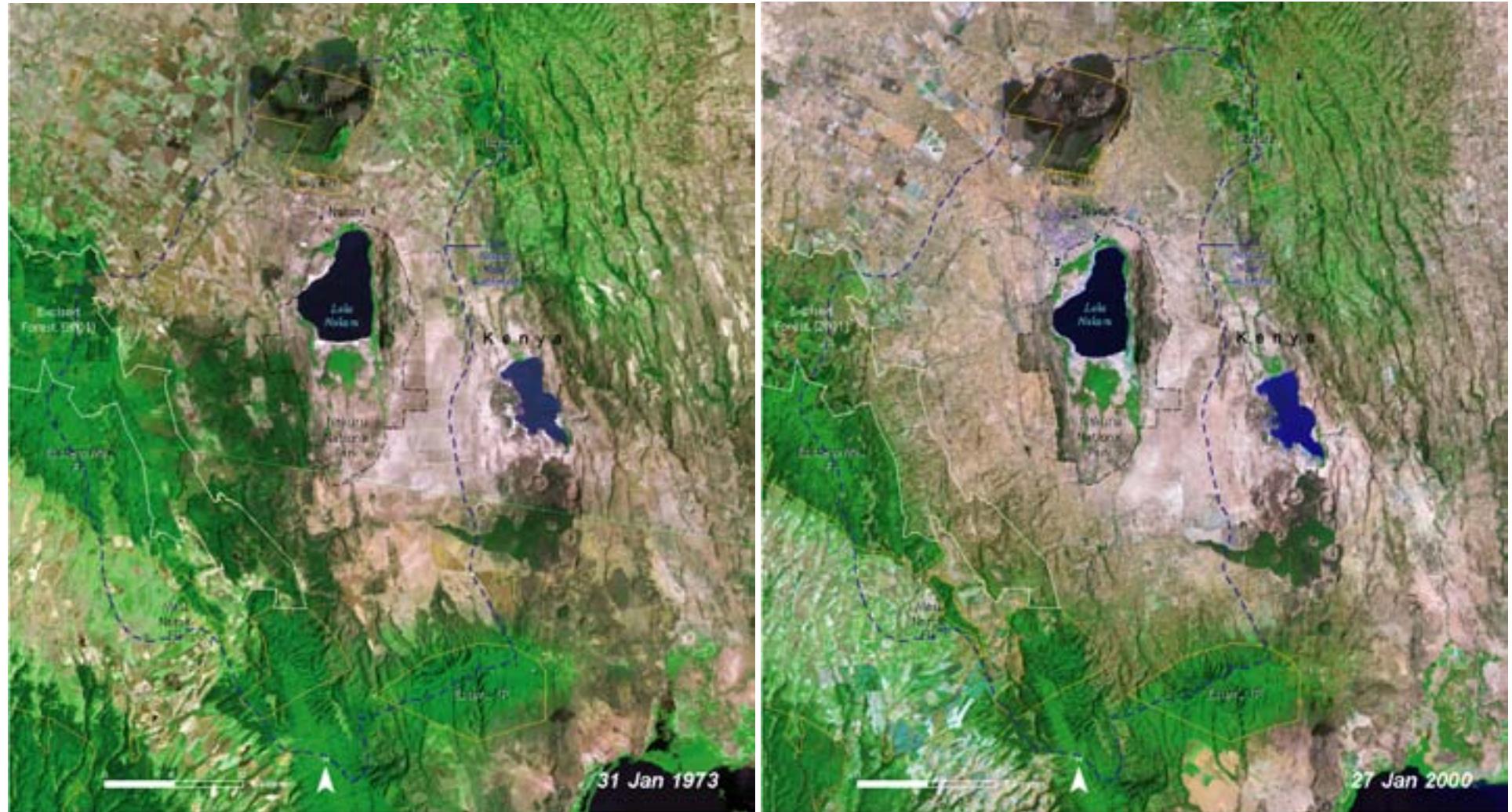


Laguna de Chapala, Mexico – 1983 and 2001



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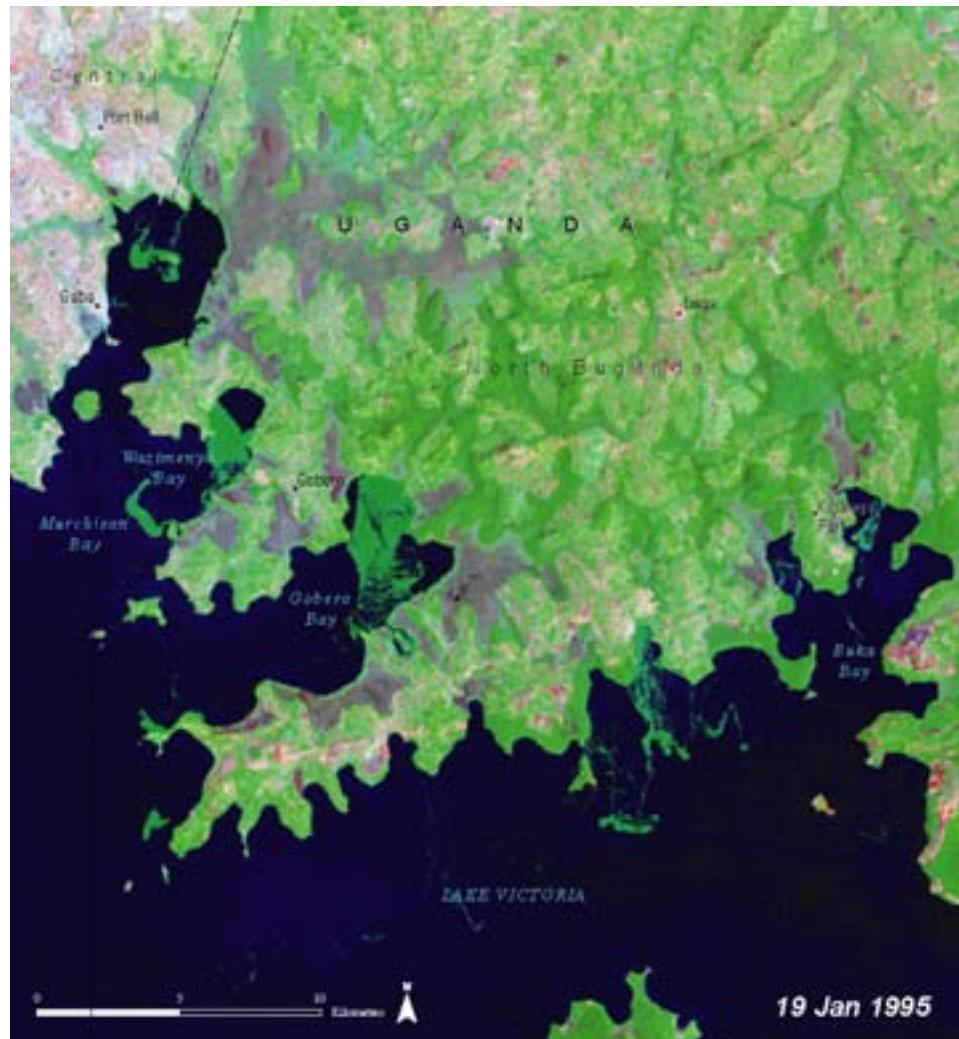


Lake Nakuru, Kenya – 1973 and 2000



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Lake Victoria, Uganda – 1995 and 2001



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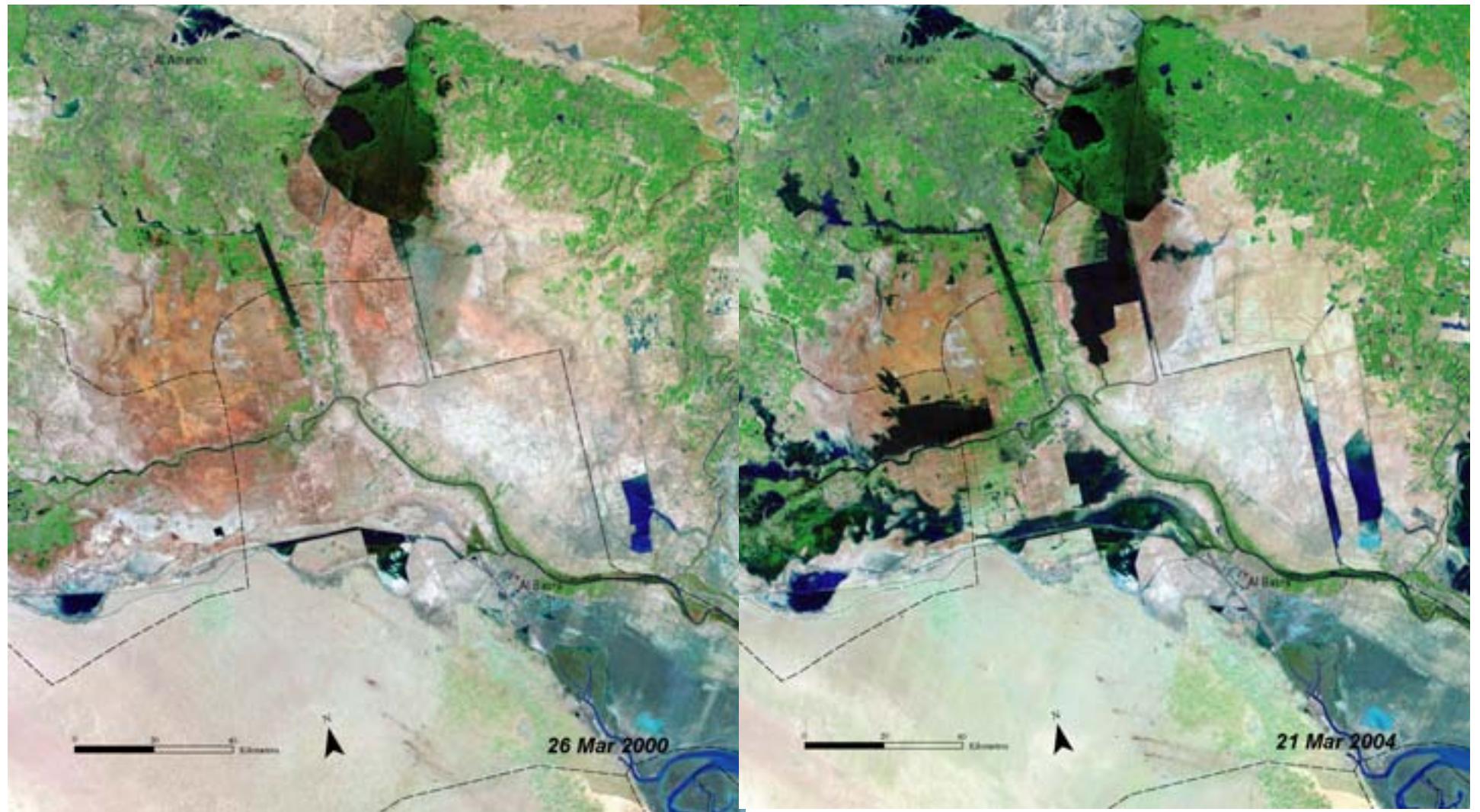


Gabcikova, Slovakia – 1973 and 2000



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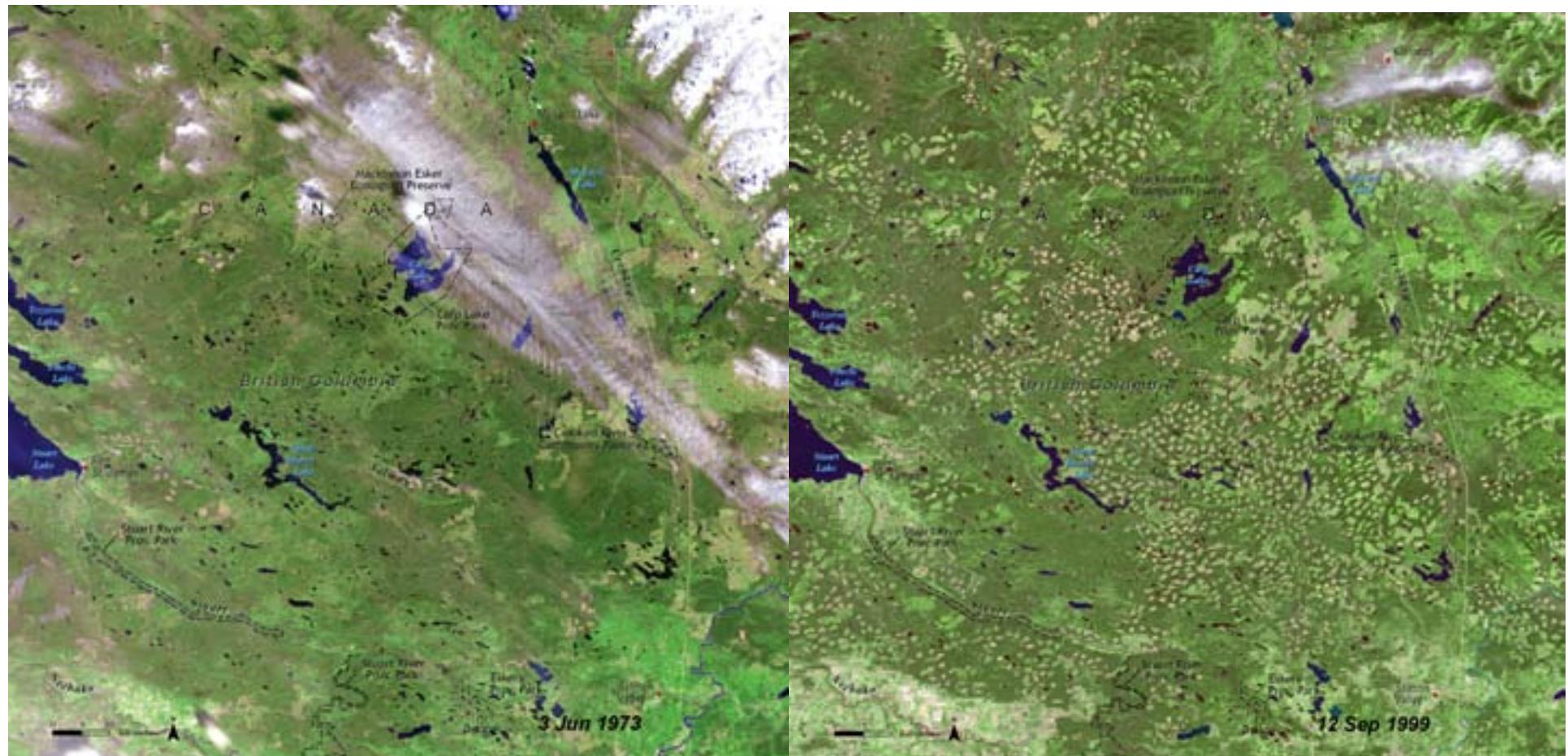


Mesopotamia, Iraq – 2000 and 2004



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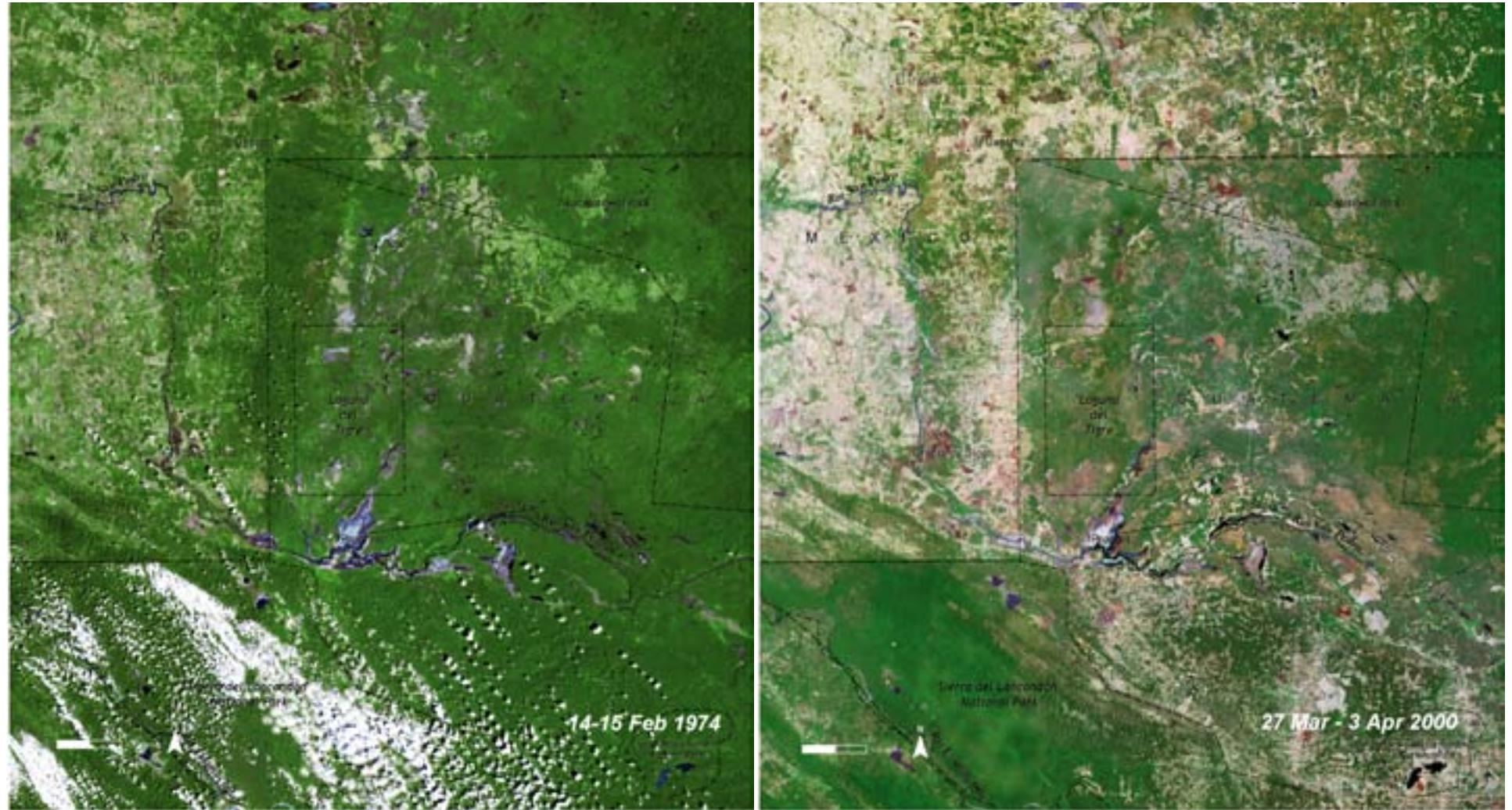


British Columbia, Canada – 1973 and 1999



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Mexico/Guatemala Border – 1974 and 2000



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Toliara, Madagascar – 1973 and 2001



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Kisangani, Congo – 1975 and 2001



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Lappi, Finland – 1987 and 2002



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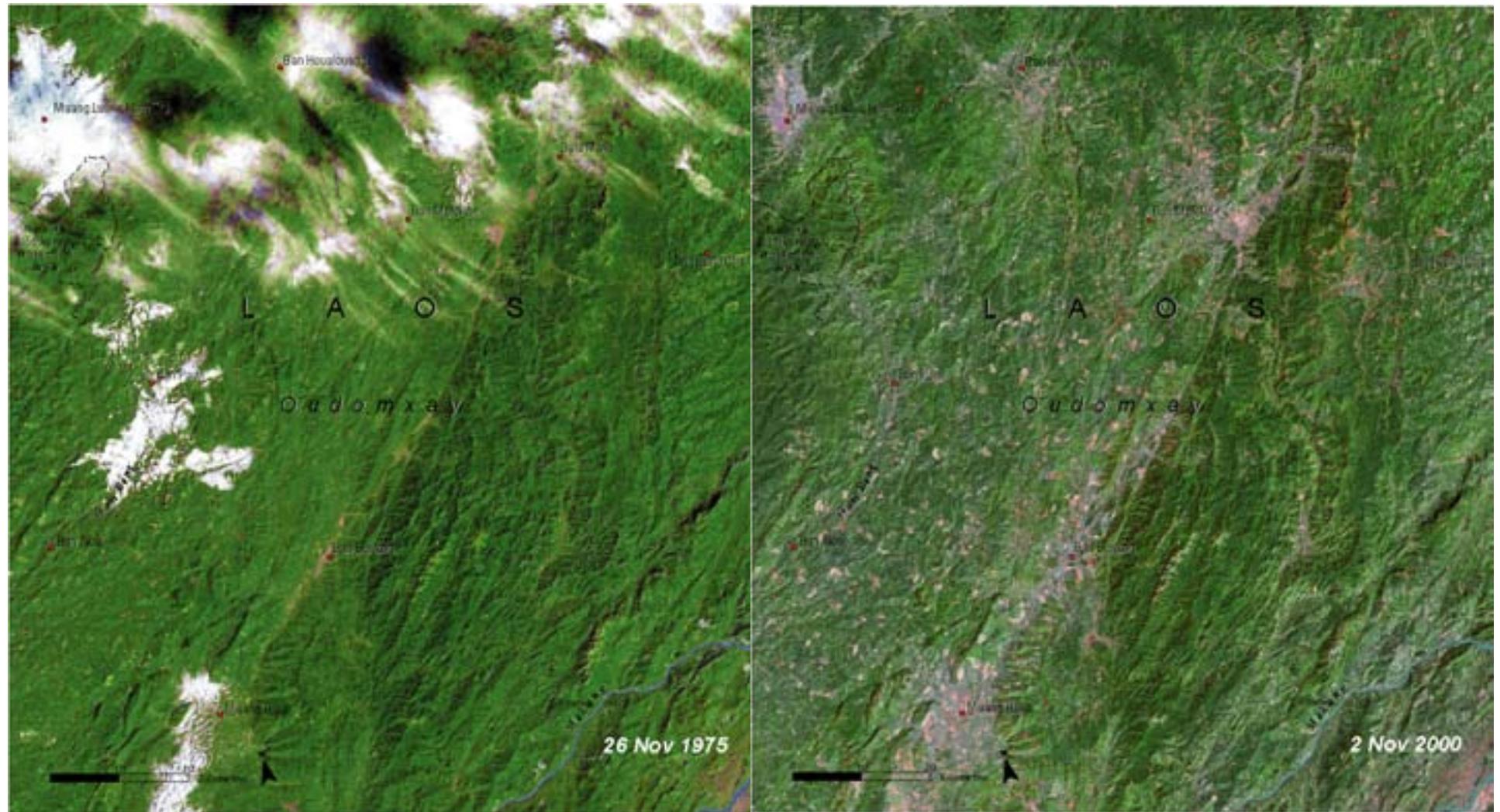


Olympic Peninsula, USA – 1974 and 2000



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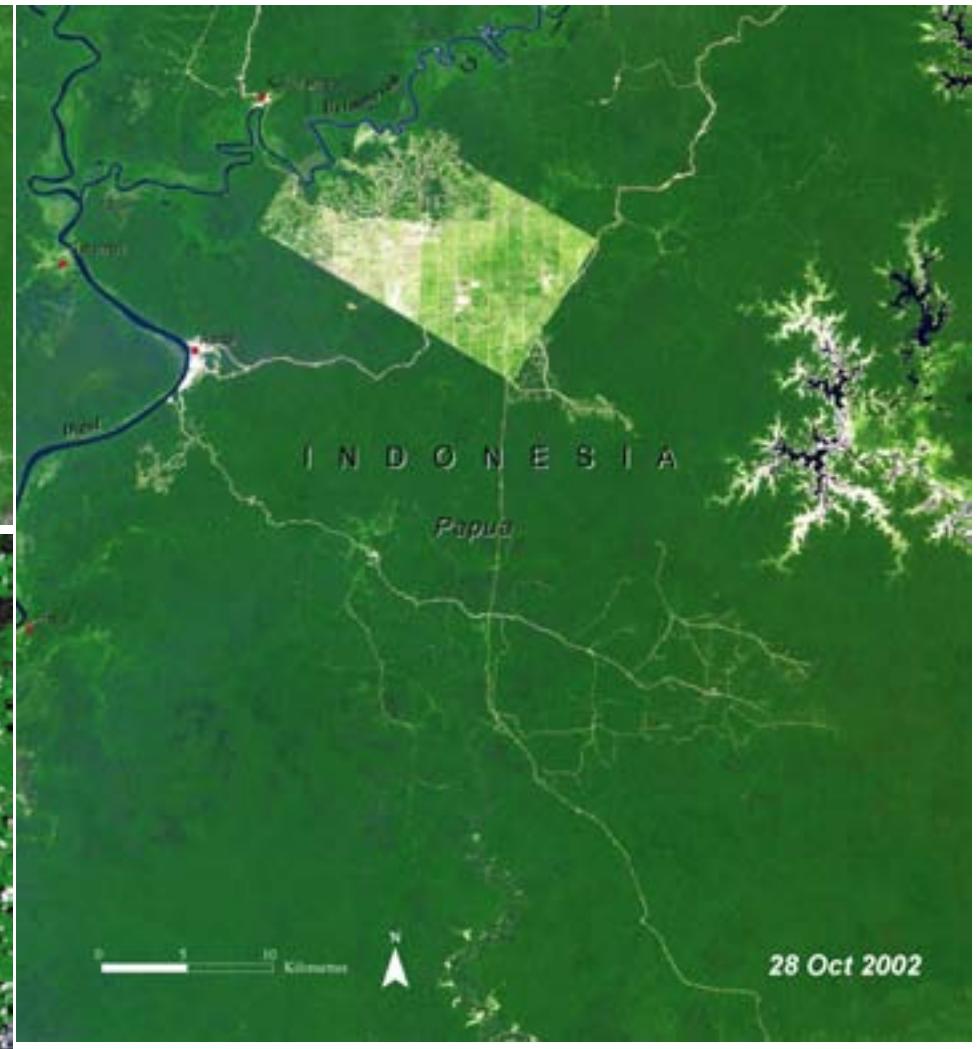
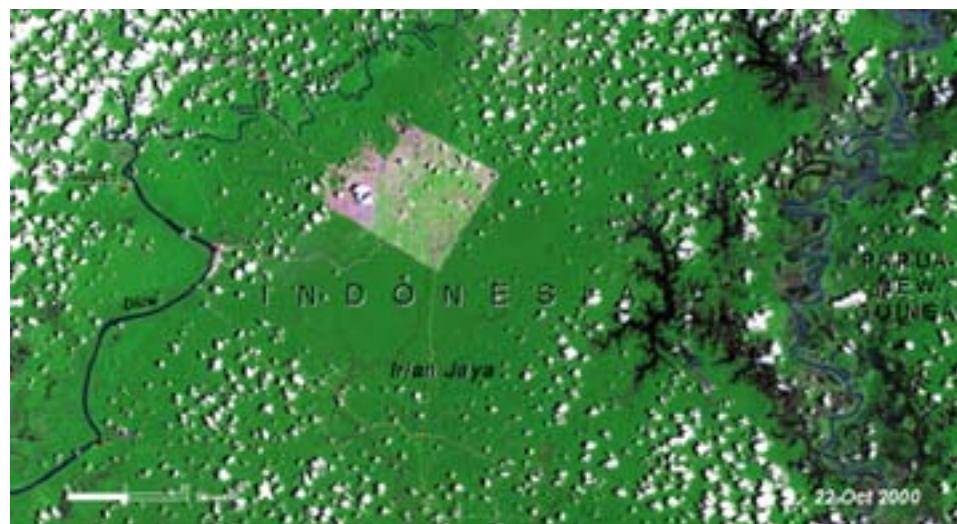


Oudomxay, Laos – 1975 and 2000



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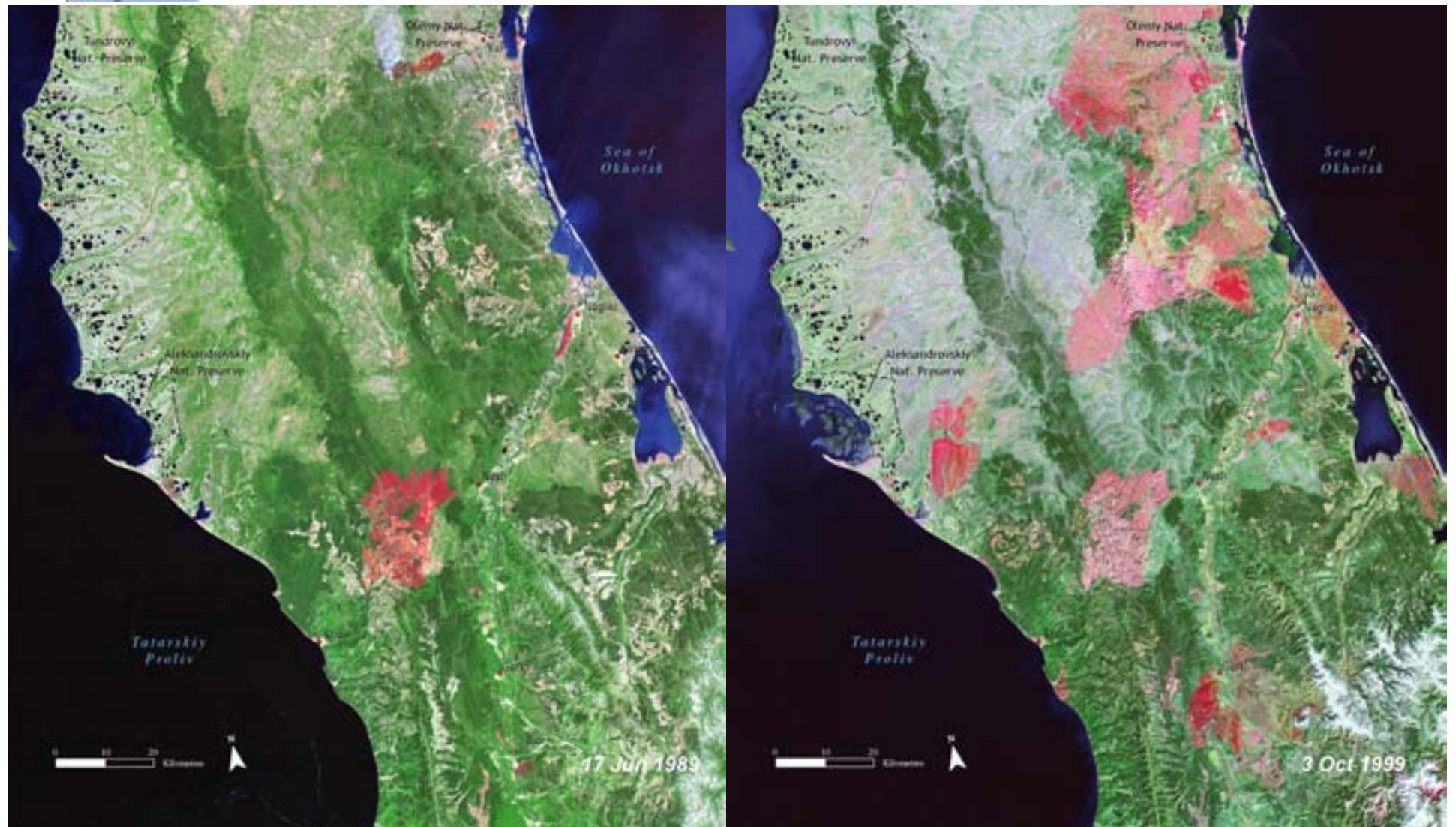


Irian Jaya/PNG – 1990, 2000, and 2002



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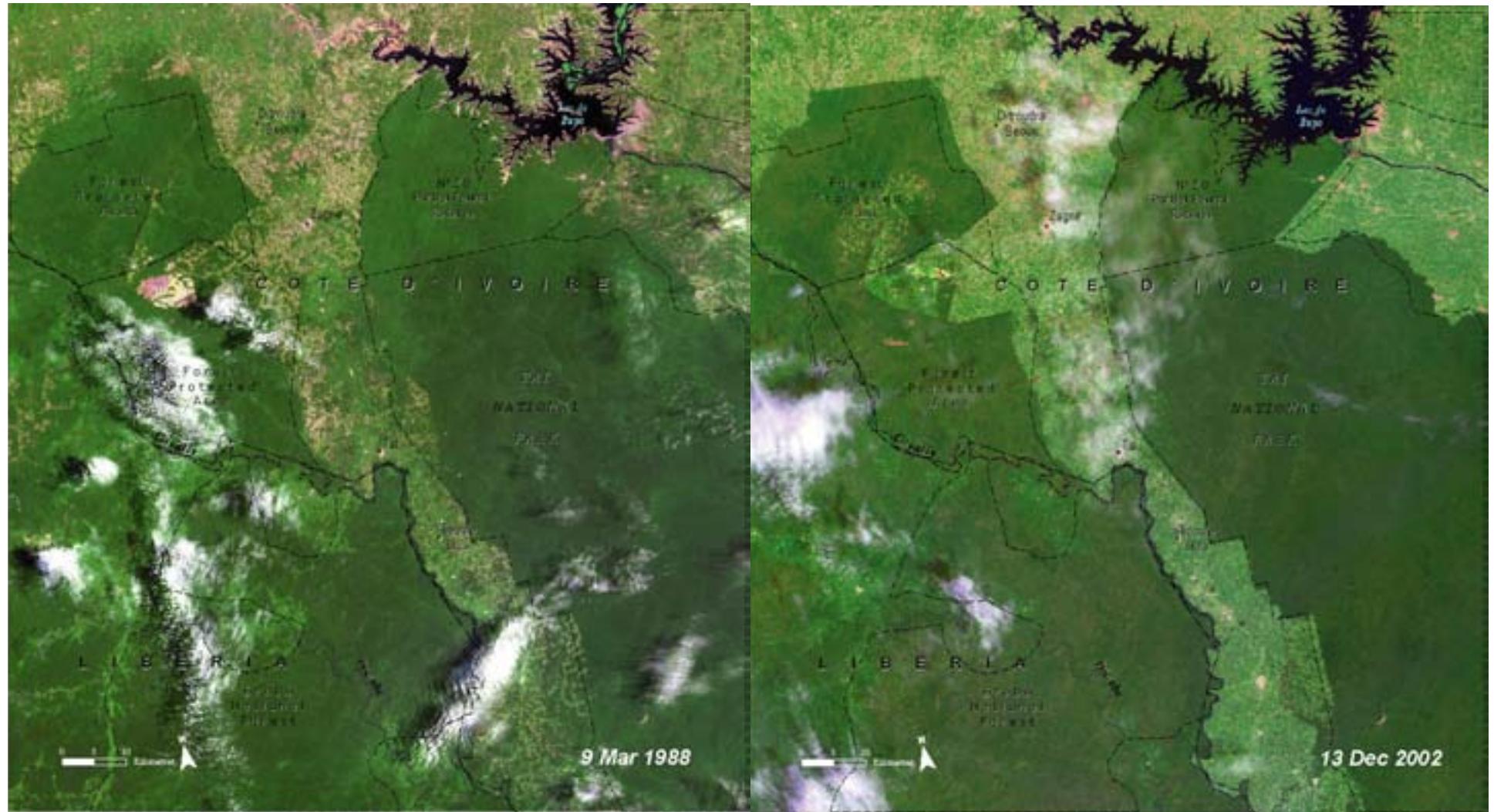


Sakhalin, Russia – 1989 and 1999



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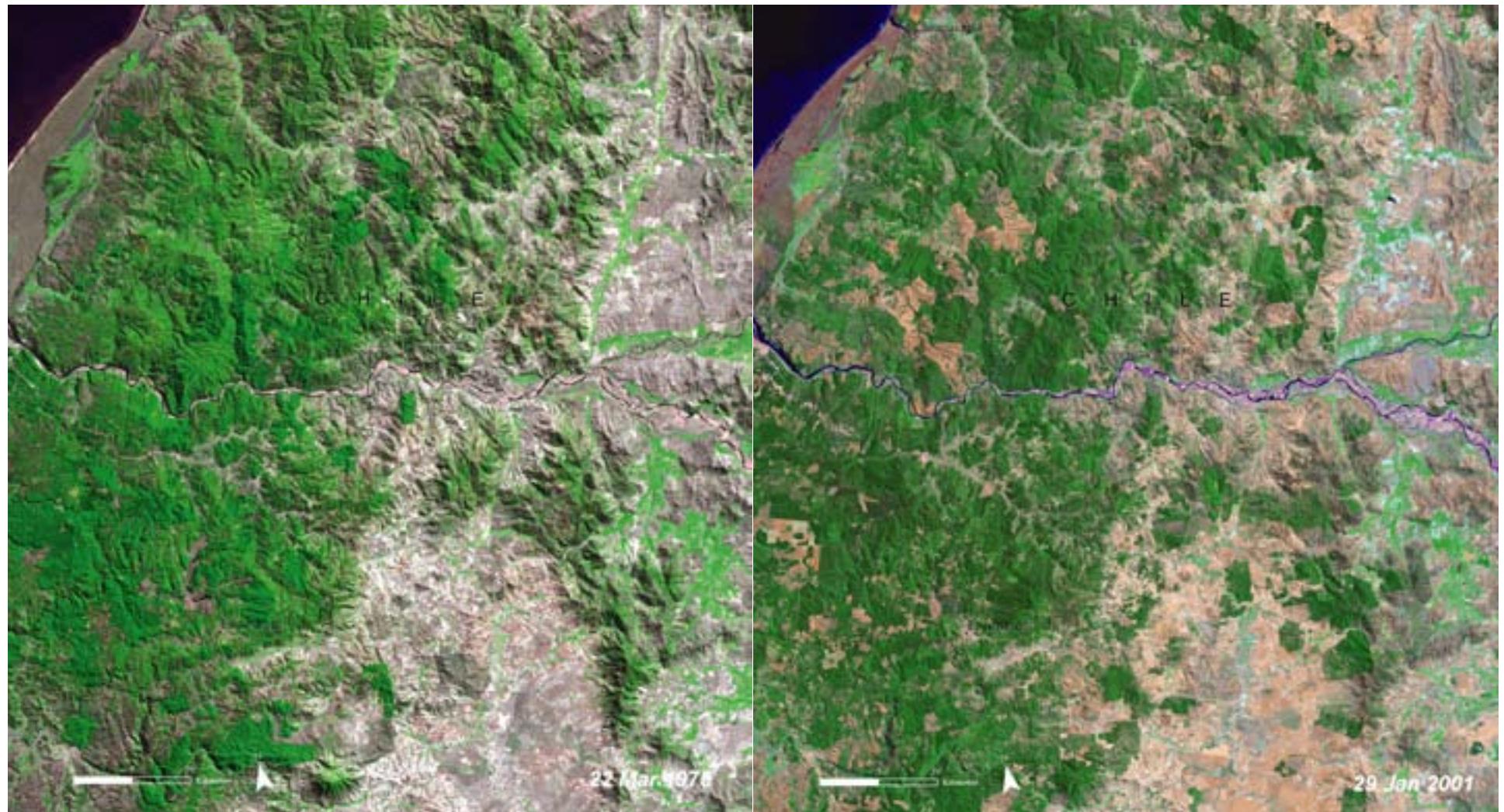


# Tai National Park, Ivory Coast – 1988 and 2002



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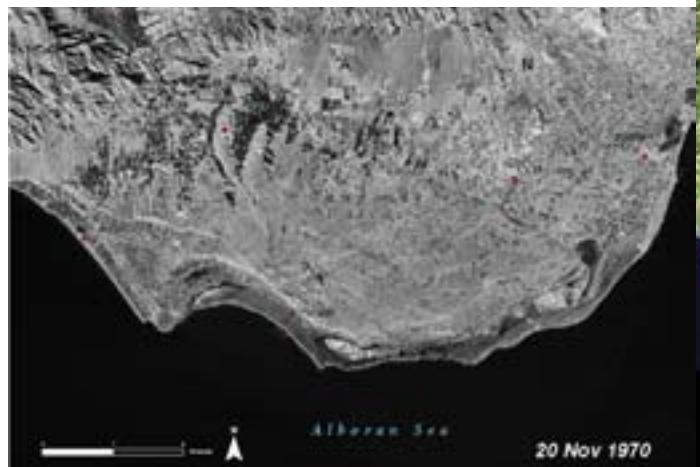


Valdivian, Chile – 1975 and 2001



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Altimira, Spain  
1970, 1974, 1987,  
2000, and 2004



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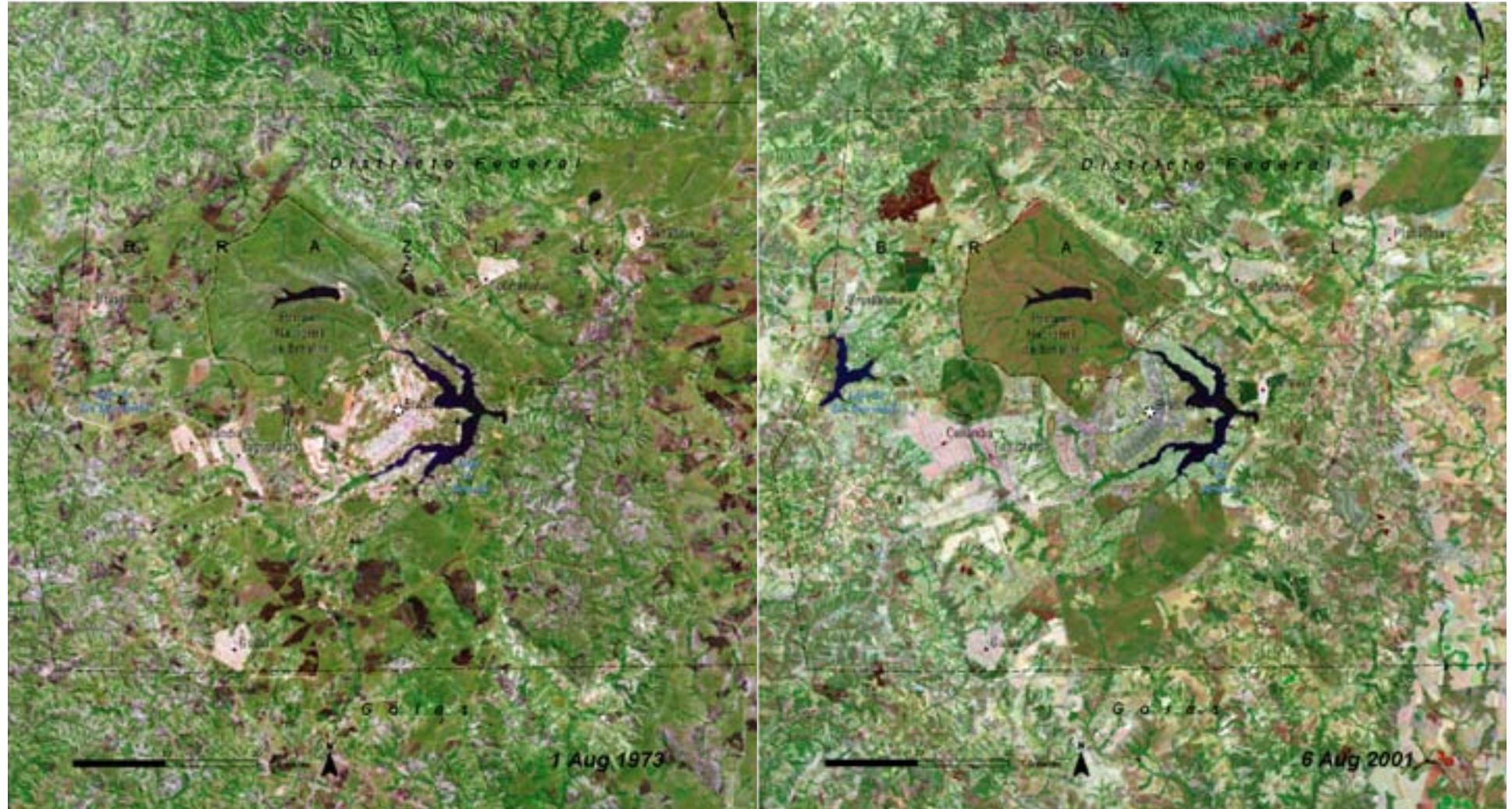


Novovolynsk, Ukraine – 1988 and 2000



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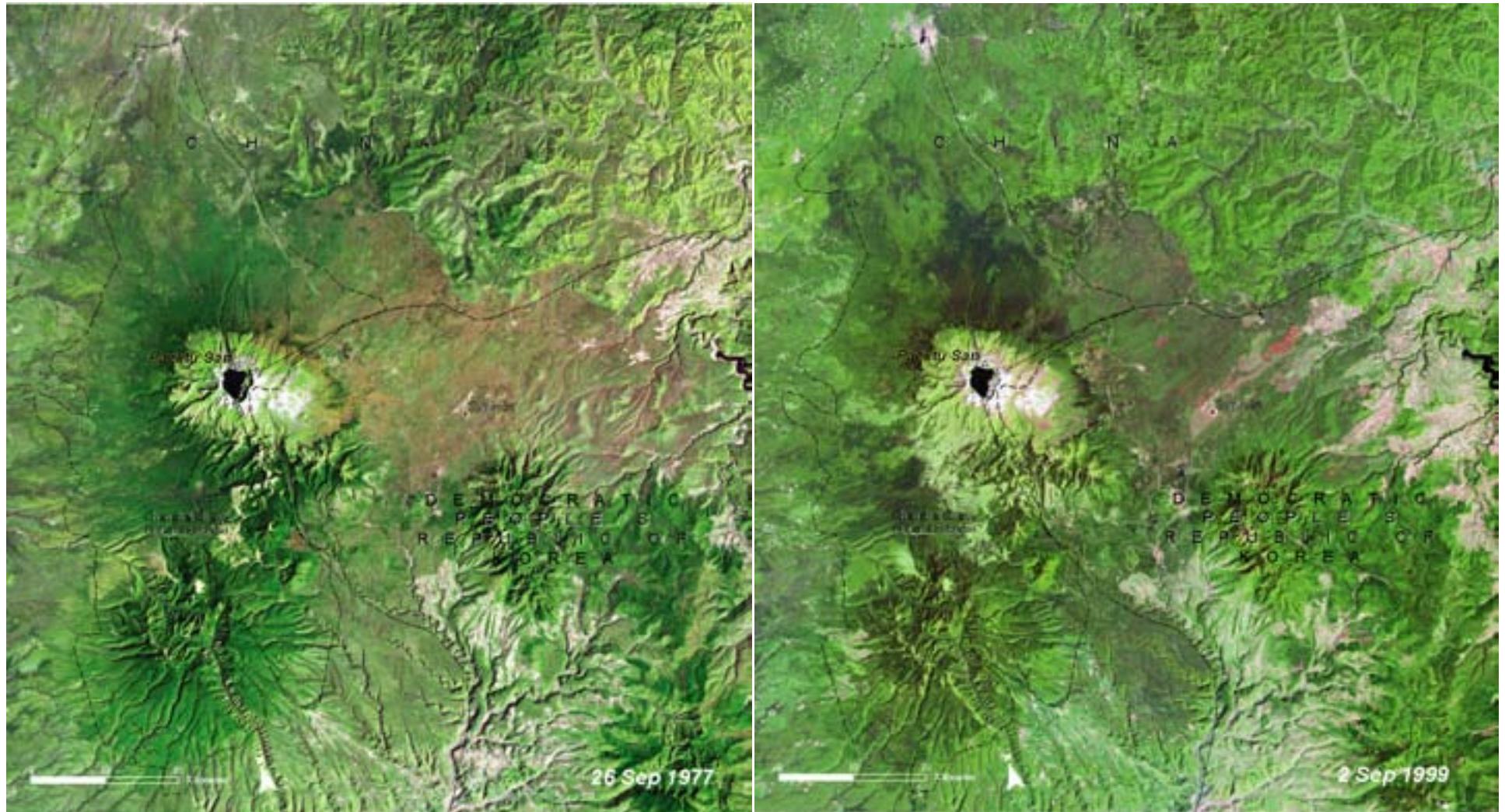


Brasilia, Brazil – 1973 and 2001



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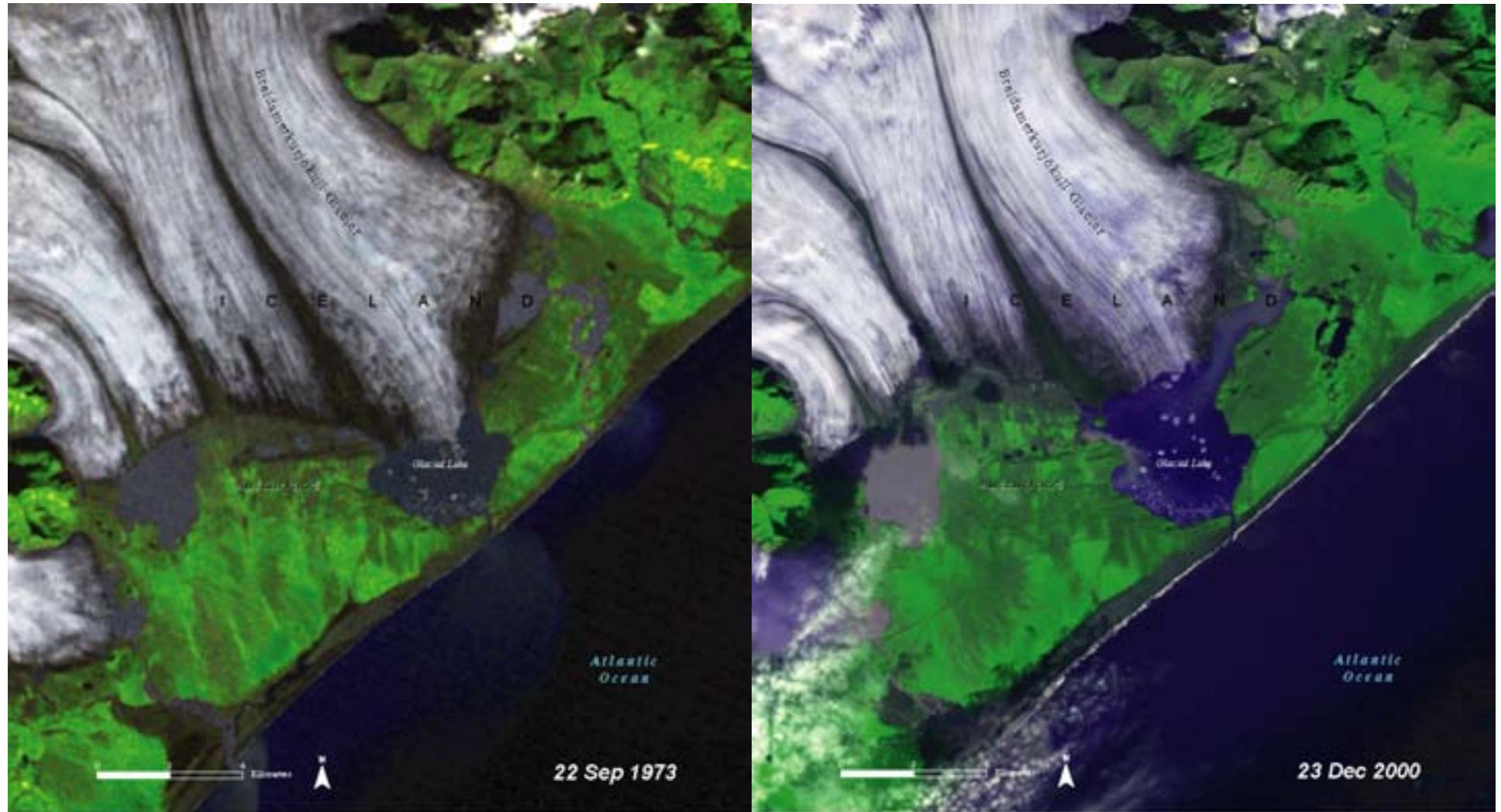


Paektu San, Korea – 1977 and 1999



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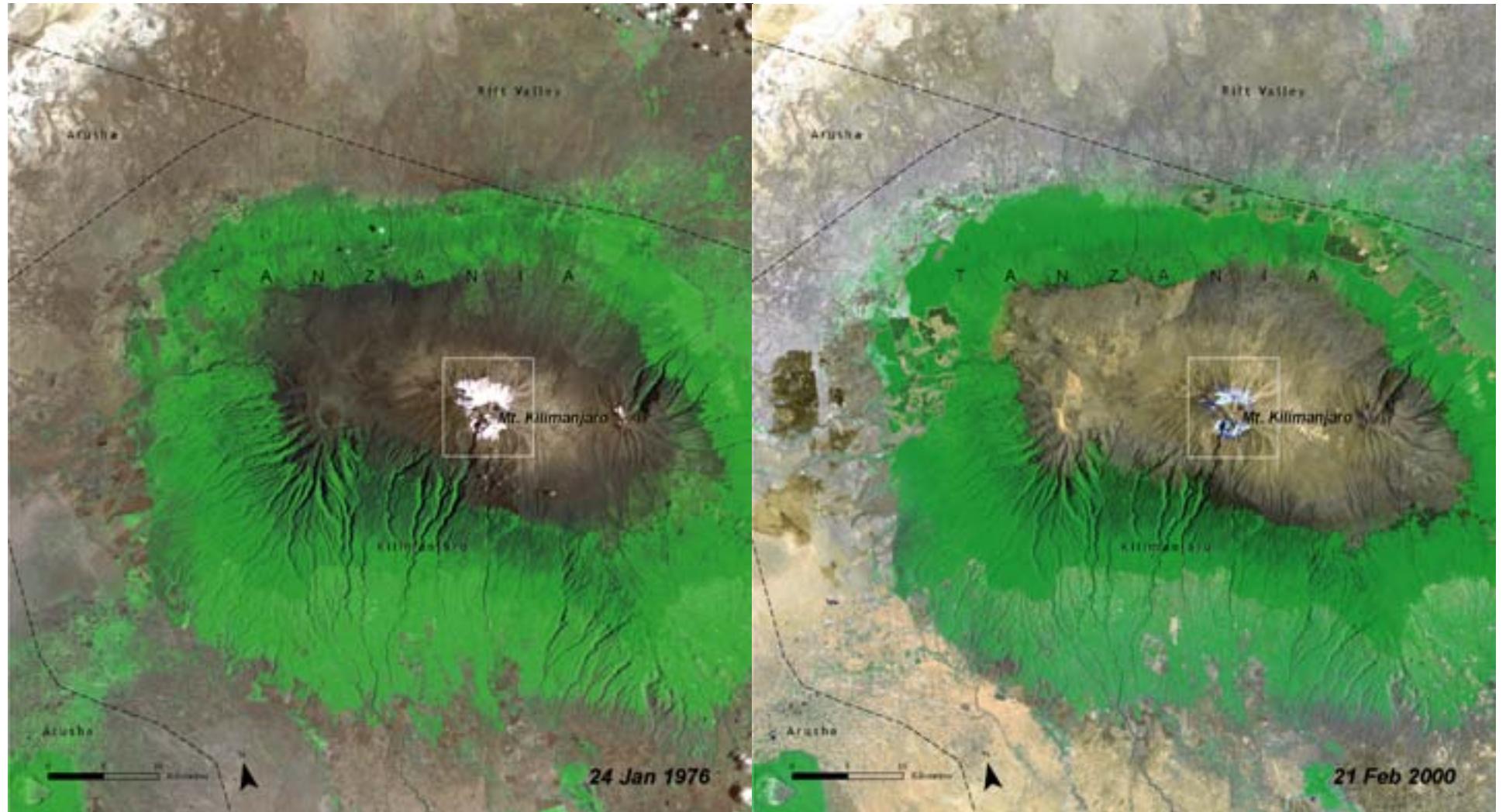


Breidamerkurjokull, Iceland – 1973 and 2000



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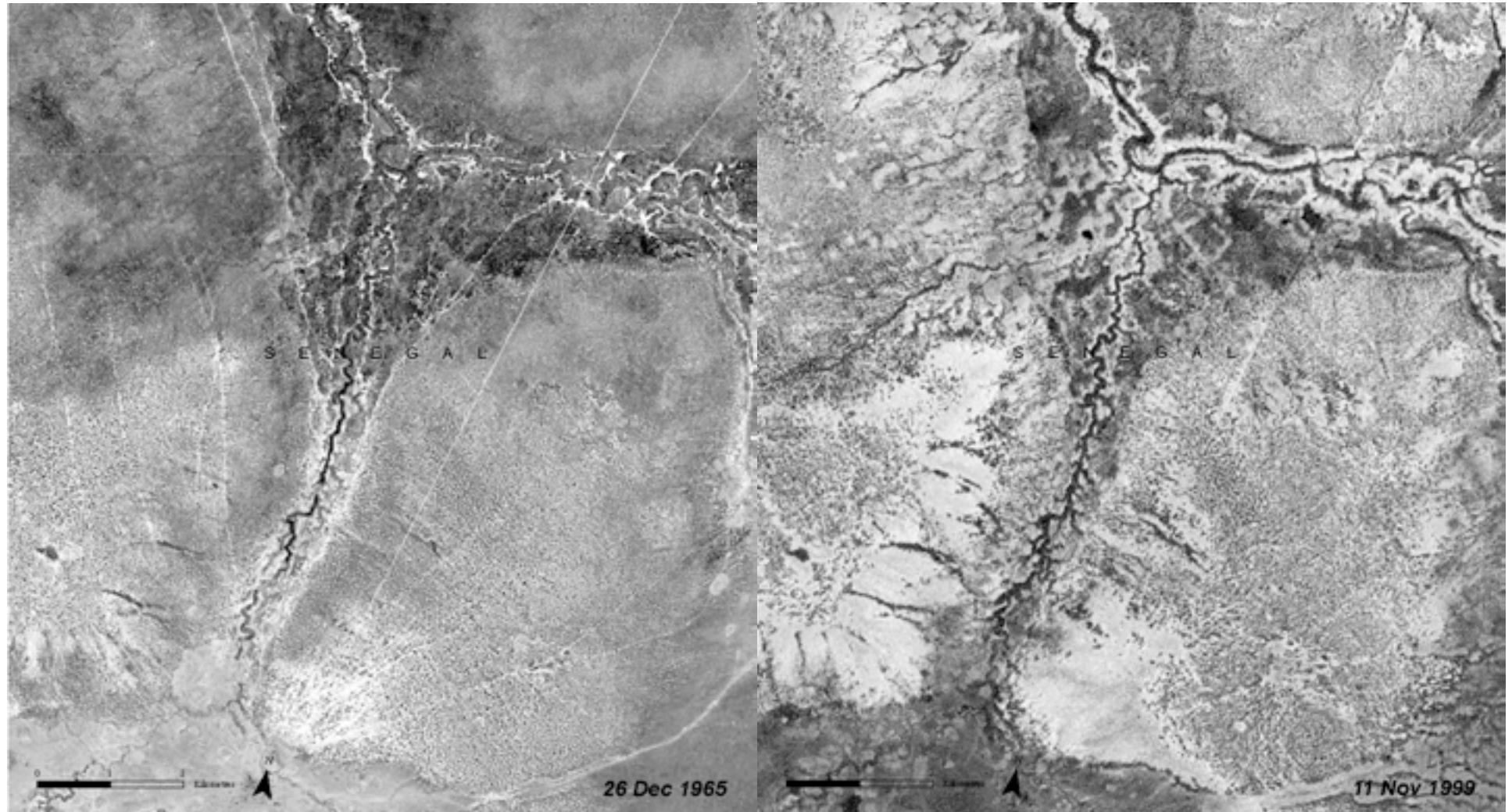


Kilimanjaro, Tanzania – 1976 and 2000



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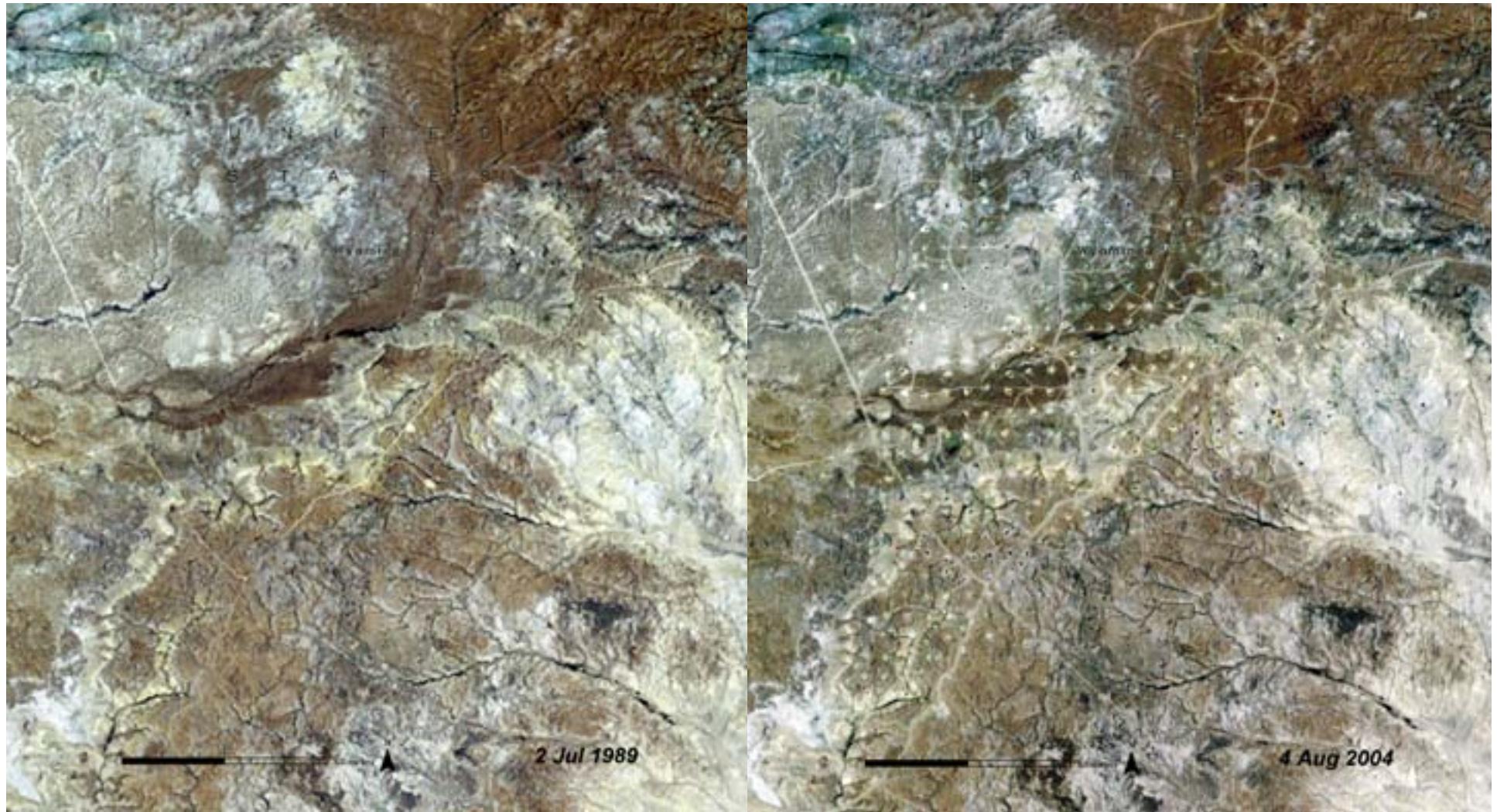


Revane, Senegal – 1965 and 1999



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Upper Green River, USA – 1989 and 2004



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Wyperfield, Australia – 1973 and 2004



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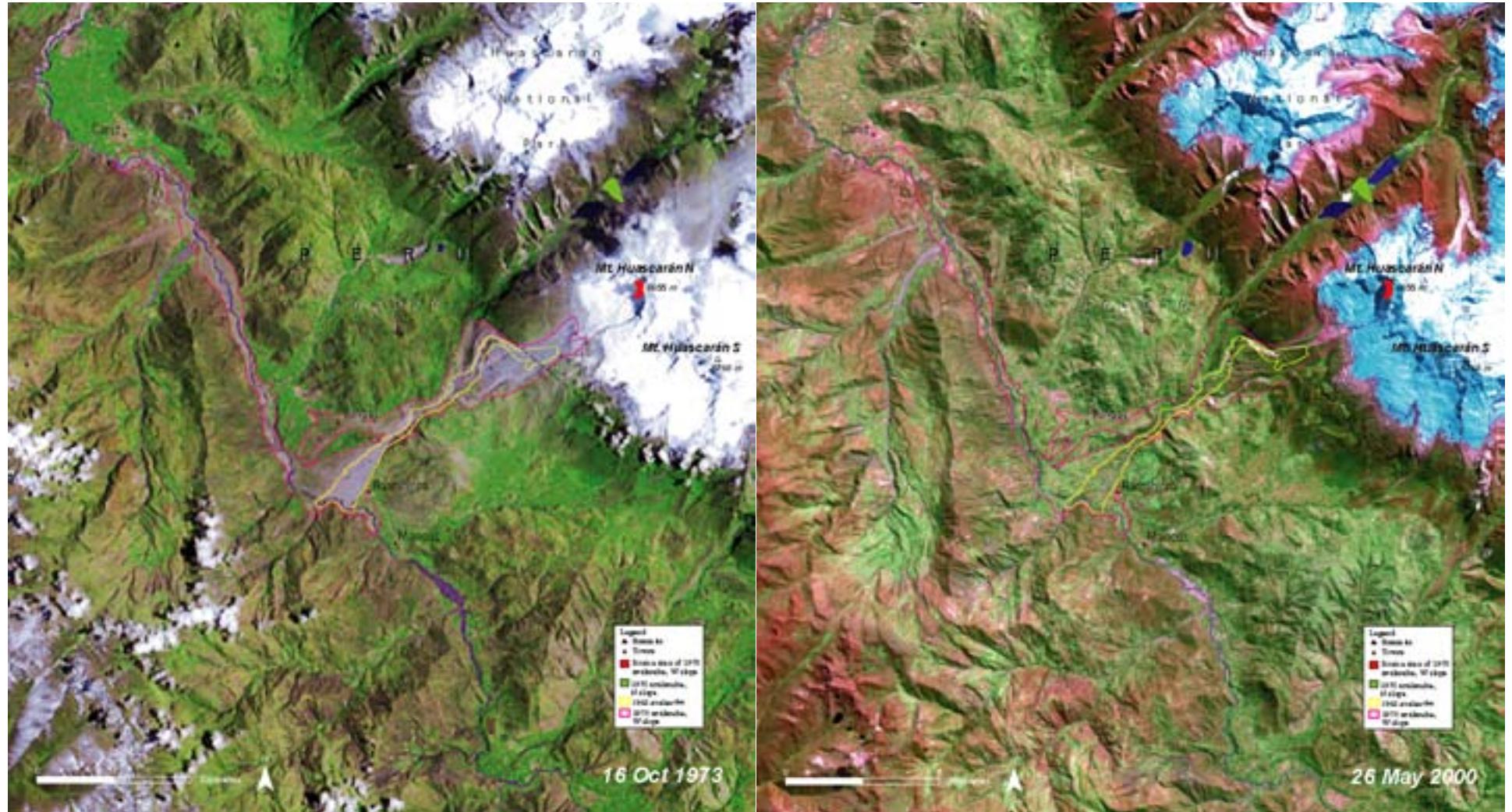


Honduras is second only to Ecuador in the production and export of cultured shrimp from Latin America. Vast areas of the delta have been converted into farms for the cultivation of shrimp. The rapid growth of shrimp aquaculture in Honduras has caused both environmental and social problems. Shrimp farmers are depriving fishers, farmers, and others of access to mangroves, estuaries, and seasonal lagoons; destroying mangrove ecosystems, altering the hydrology of the region, destroying the habitats of other flora and fauna, and precipitating declines in biodiversity; contributing to degraded water quality; and exacerbating the decline in Gulf fisheries through the indiscriminate capture of other species caught with the shrimps post larvae that are used to stock ponds. These two images provide a visual comparison of the increase in coverage by shrimp farms in the Gulf of Fonseca over time. It is evident from the images that between 1987 and 1999, a period of about 12 years, the total area under shrimp farming has increased tremendously.



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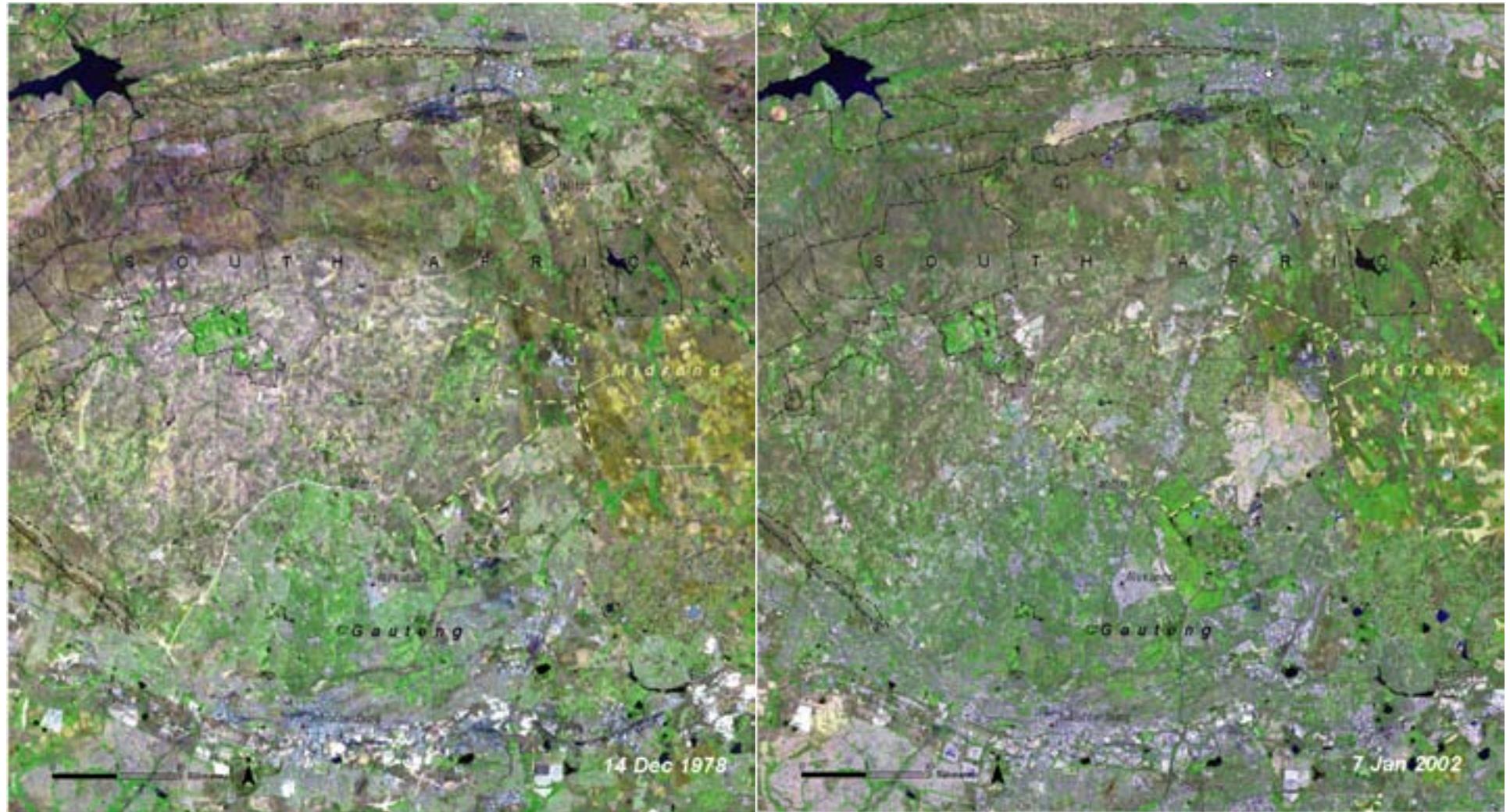


Yungay City, Peru – 1973 and 2000



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Midrand, South Africa – 1978 and 2002



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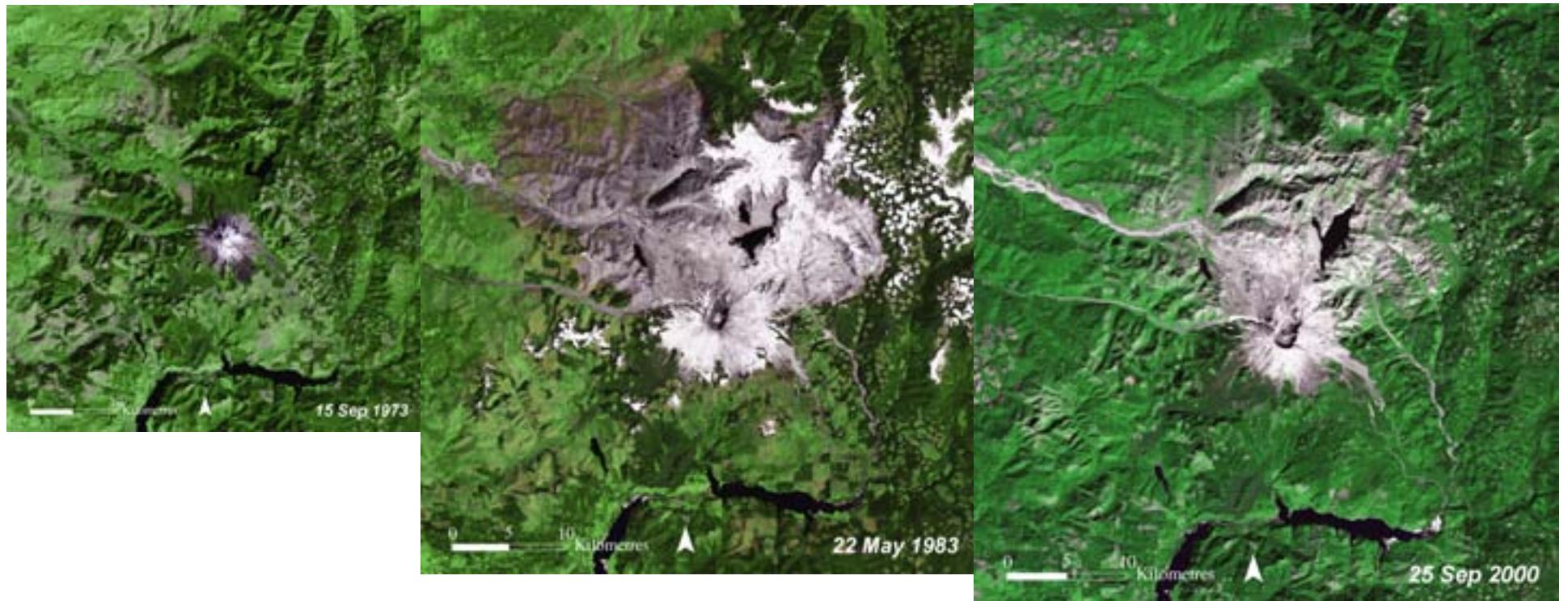


Tripoli, Libya – 1976, 1989, and 2002



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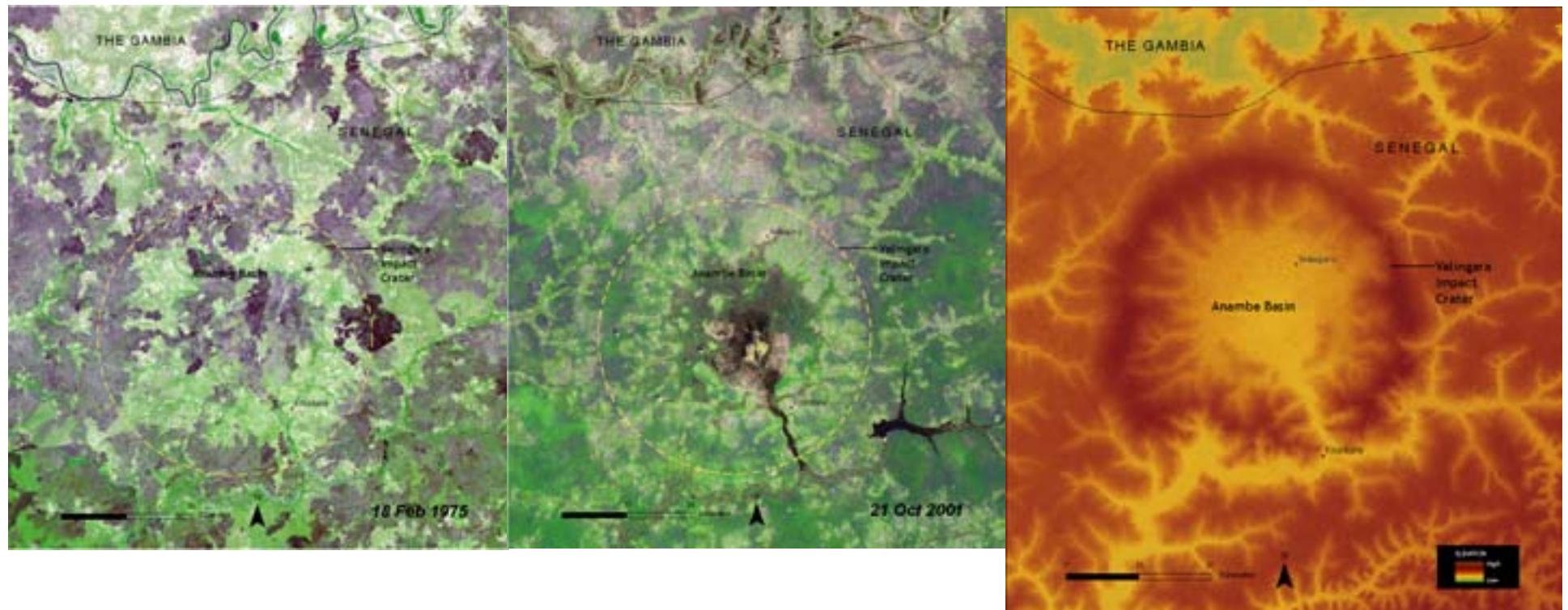


Mt. St. Helens, USA – 1973, 1983, and 2000



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Velingara, Senegal, Anambe Impact Crater – 1975 and 2001



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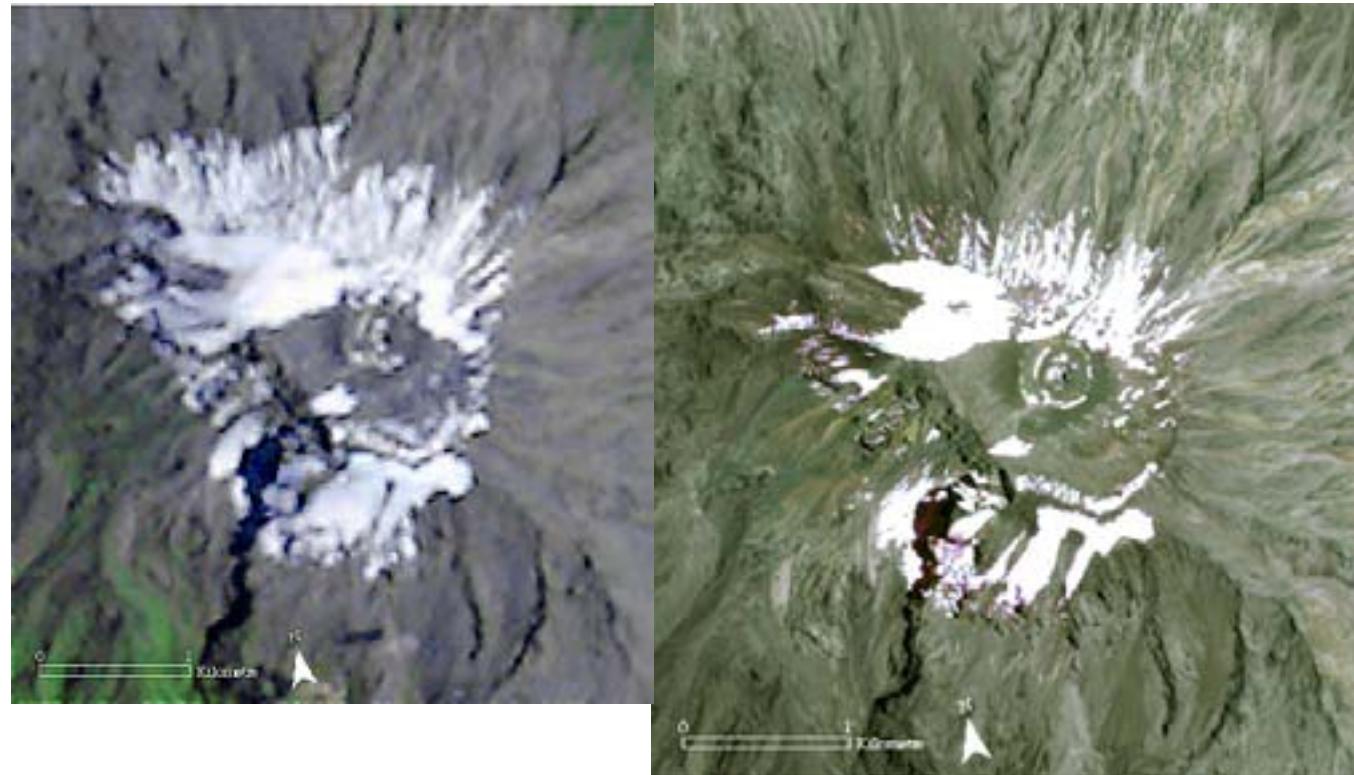


Banjul, The Gambia – 1973 and 1999



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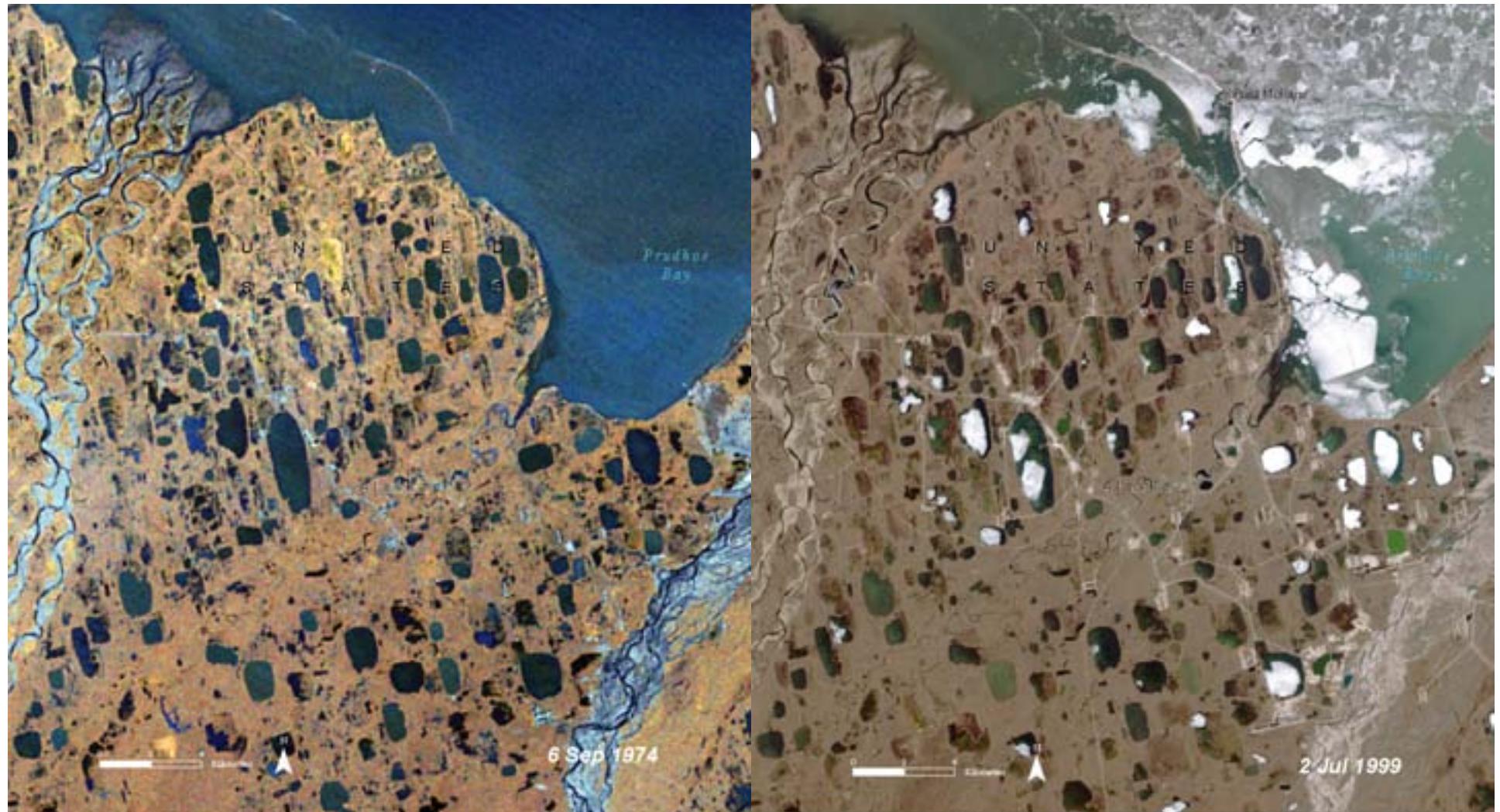


Kilimanjaro Ice Cap – 1976 and 2000



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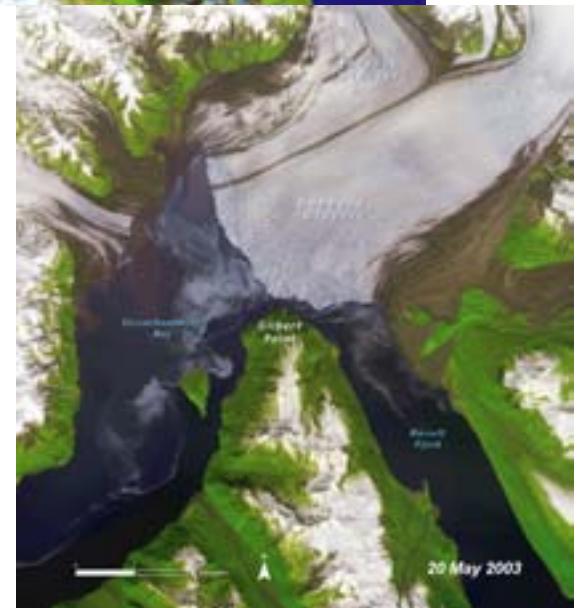
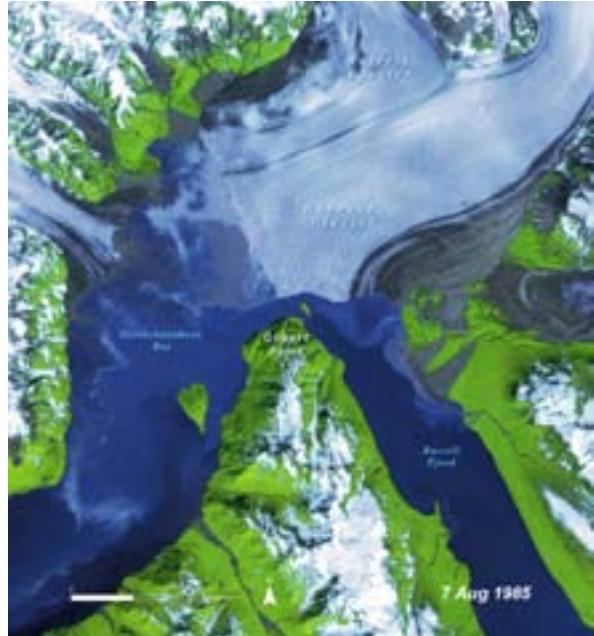


Prudhoe Bay, USA – 1974 and 1999



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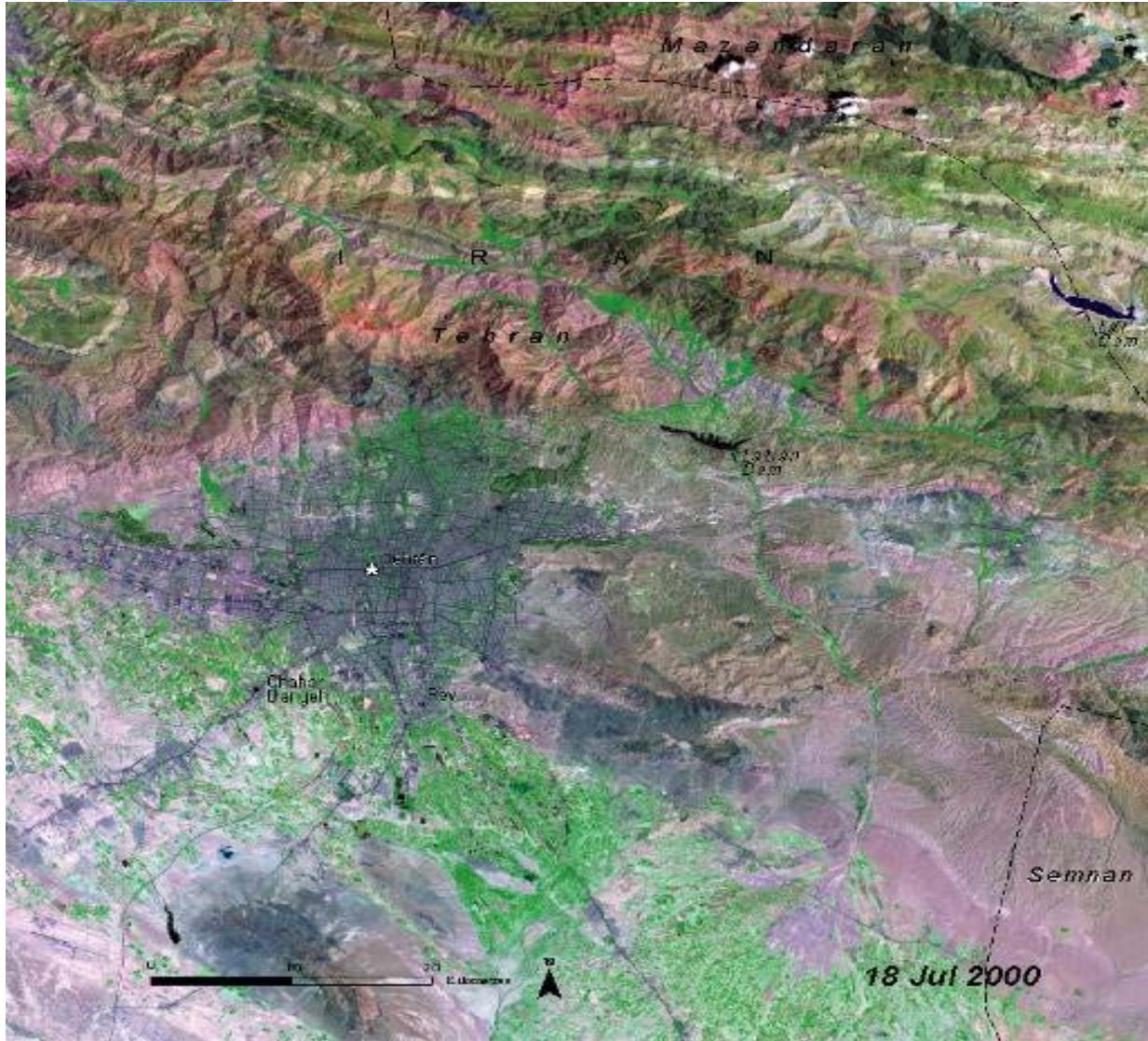


Hubbard Glacier, USA – 1985,  
1986, 2002, and 2003



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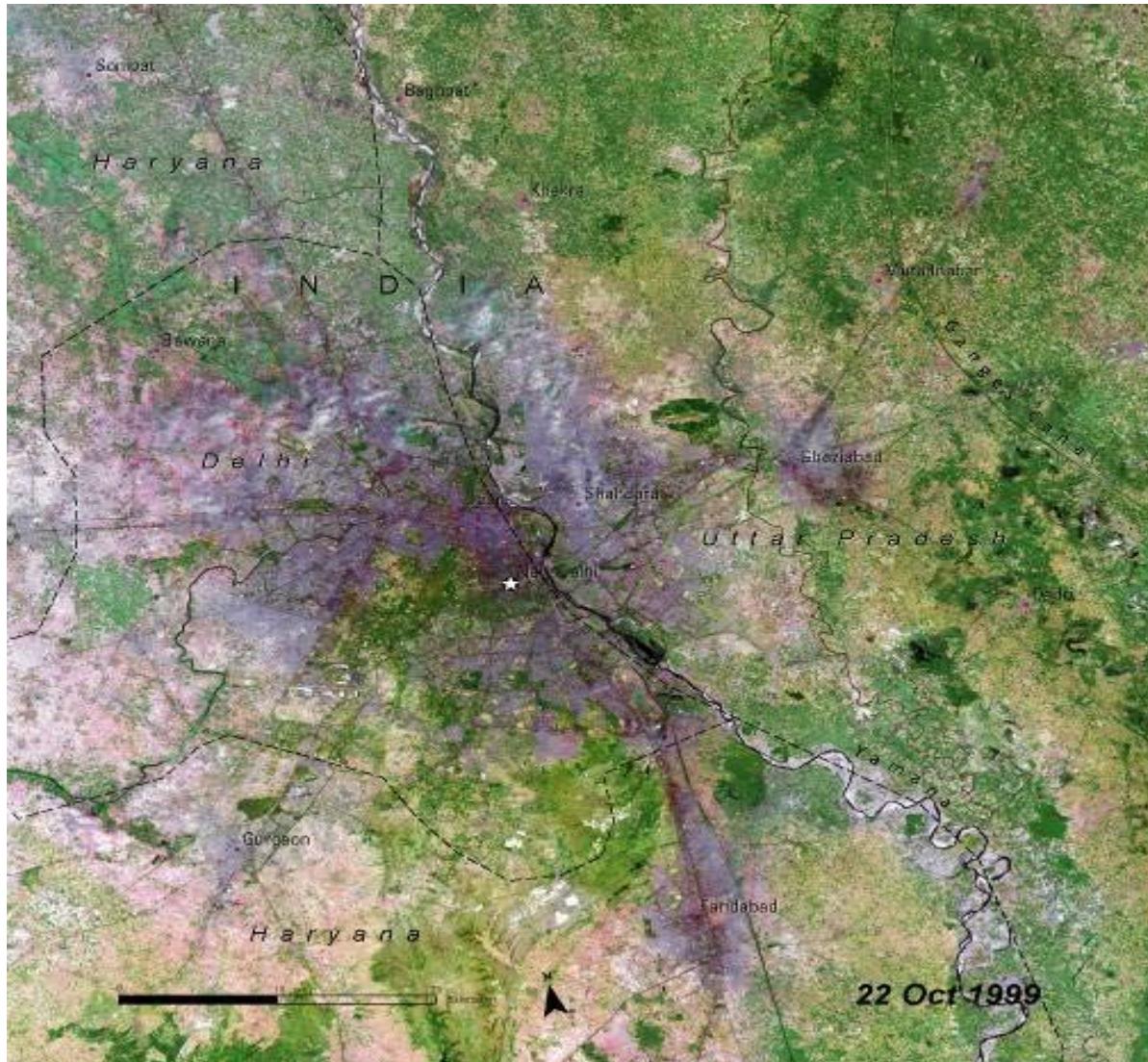


- 1975: The population of Tehran has grown three-fold since 1970.
- 2000: Rapid expansion has had adverse impacts on the environment.



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1977–1999: The population of Delhi was at 4.4 million in 1975. That grew to 12.4 million in 2000.



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The Huang He (Yellow River) is the muddiest river on Earth and is China's second longest river, running 5,475 km (3,395 miles) from eastern Tibet to the Bohai Sea. The Huang He's yellow color is caused by its tremendous load of sediment, composed primarily of mica, quartz, and feldspar particles. The sediment enters the water as the river carves its way through the highly erodable loess plateau in north-central China. (Loessial soil is called huang tu, or "yellow earth," in Chinese.) Centuries of sediment deposition and dike building along the river's course have caused it to flow above the surrounding farmland in some places, making flooding a critically dangerous problem. Where the Huang He flows into the ocean, sediments are continuously deposited in the river delta, where they gradually build up over time. Between 1979 and 2000 – as these satellite images show – the delta of the Huang He expanded dramatically. Several hundred square kilometers of newly formed land were added to China's coast during this period.



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For More Satellite Imagery go to:

<http://www.futurefoundation.org>

<http://www.globio.info/>

<http://www.unep.net/explorer/geonet>