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Increasing concern as to how human activities impact the Earth has led to documentation and quantification of environmental changes taking place on land, in the water, and in the air. Through a combination of ground photographs, current and historical satellite images, and narrative based on extensive scientific evidence, this publication illustrates how humans have altered their surroundings and continue to make observable and measurable changes to the global environment. This publication underscores the importance of developing, harnessing and sharing technologies that help provide deeper understanding of the dynamics of environmental change. The words and pictures within these pages also serve as a vivid reminder that this planet is our only current home, and that sound policy decisions and positive actions by societies and individuals are needed to sustain the Earth and the well-being of its inhabitants. The information we provide will not only be useful in the context of the selected locations, but will also underscore the intrinsic value of the harnessing, visualizing and communicating technologies to gain a deeper understanding of the dynamics and impacts of our environmental changes.

UNEP NASA USGS science for a changing world UNIVERSITY OF MARYLAND

ONE PLANET MANY PEOPLE

Atlas of Our Changing Environment

ONE PLANET MANY PEOPLE

Atlas of Our Changing Environment

Ashbindu Singh email: as@rona.unep.org

WHAT

What is happening where?

WHY

- Trend over time is the most compelling information

- Hope images will contribute to change the way we perceive the environment

HOW

Story of environmental changes told using current and historical satellite data, ground photographs and a short narratives

One Planet Many People
Atlas of Our Changing Environment

Objectives

- Provides visual evidence of environmental changes taking place around the world;

- Communicating scientific information to a wider audiences

Assumptions:

"A picture is worth a thousand words"

"Seeing is believing"

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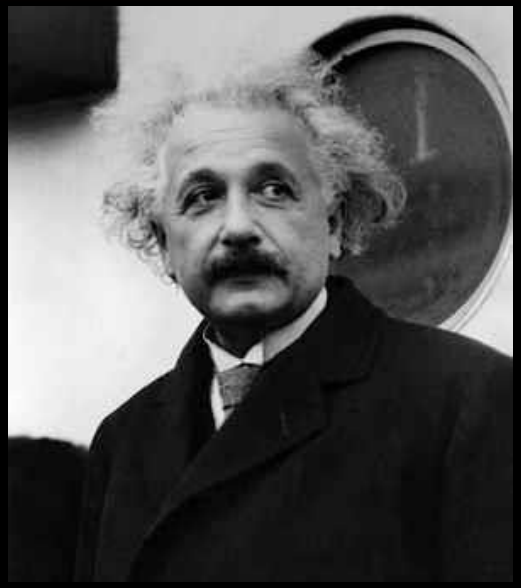
Image vs. Concept

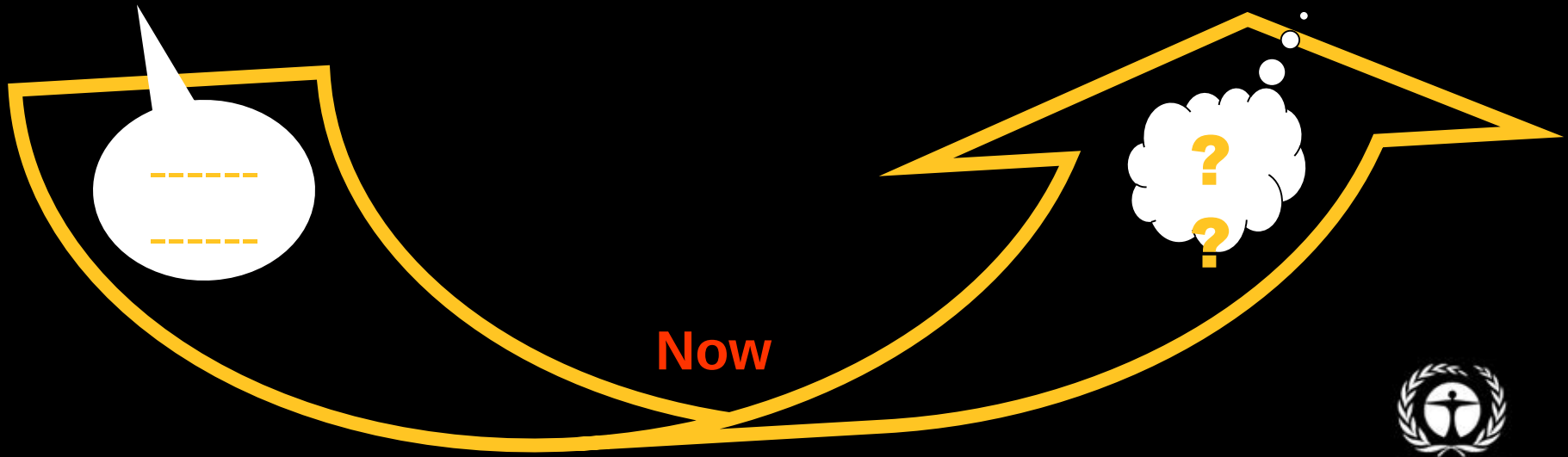
Sustainable Development

Connecting Science with Policy



Needed:

Communication



Contrasting Cultures of Scientists and Policy Makers

Science	Policy
Incremental Progress	Deadlines and Crises
Objective Facts	Subjective Values
Proof	Beliefs
Measurements	Perceptions
Theory and Models	Applications and Results

A Real Example

Policy Maker's Question:

How much forest are we losing and where?

Conservationist Reply:

Which definition of forest should we use?

Technologist Query:

Which satellite data you want us to use--Landsat, MODIS, ASTER, etc?

One Planet Many People

Atlas of Our Changing Environment

- A collection of “before and after” historical and current satellite images on various themes for 80 sites (271 images) around the world.
- Over 30 environmental case studies supported by narratives (93,000 words), images and 215 ground photographs .
- A compilation of 66 environmental maps.
- 334 pages large format book

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Atlas of Our Changing Environment

SCOPE

- Focus on trends over time
- Significant environmental changes that could be easily visualized
- Regional and thematic balance
- Landsat series of satellite data as a primary tool due to the longest historical record of the earth surface since 1973

One Planet Many People
Atlas of Our Changing Environment

Focus on human ecology and planet's geography

- Atmosphere, Energy consumption, Resources Extraction
- Urbanization
- Forests, Biodiversity
- Croplands
- Grasslands
- Freshwater and Coastal regions
- Tundra/Polar regions

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Atlas of Our Changing Environment

- Intended for sensitizing

  - policy makers,

  - non-governmental organizations,

  - private sector

- Provides resources on environmental change to academics, teachers and citizens.

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Worldwide Media Coverage and Demand

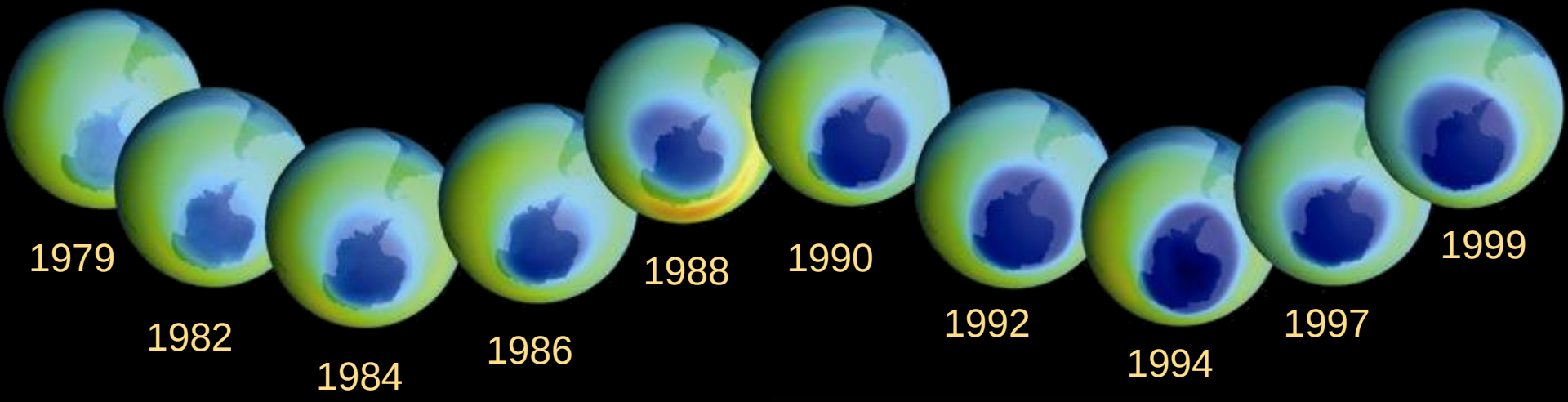
- UNEP bestseller ever (released on June 3, 2005).
- 8000 copies distributed & sold; 6000 CDs distributed including to the UN Secretary General, documentary film by Al Gore and Ministers of Environment of all countries.
- 14 TB of PDF files downloaded; equivalent to about 7000 paper copies of the Atlas.
- Over 250 TV, radio, online news, and newspaper and magazine articles around the world.
- Request for materials for text books, exhibition in museums and Botanical Gardens.

Apollo Image of the Planet

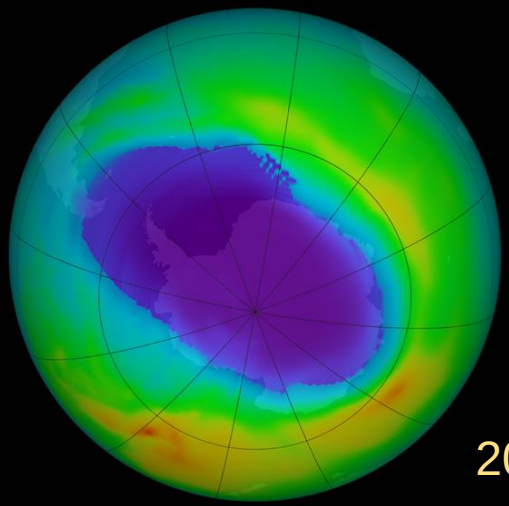
This view of the Earth from space drove home how finite, interconnected and fragile our planet is.

Inspired Earth Day Celebration in the United States.

Growth of the Antarctic ozone hole



Darkest blue areas represent regions of maximum ozone depletion.



Raising awareness about Tropical Deforestation

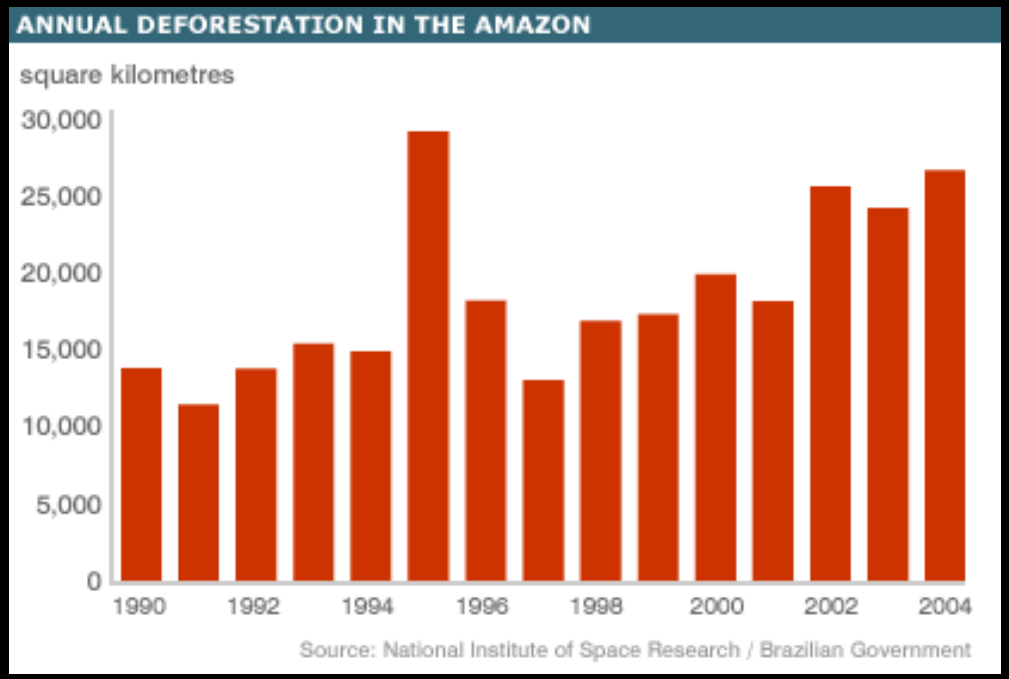
Rondonia, Brazil

- 1975 -Healthy natural vegetation
- 1989 -“Fishbone” pattern on the landscape indicate agriculture fields
- 2001 -Agriculture continues to replace forest cover

Regular Monitoring of Amazon Rainforest

Deforestation was worst in the state of Mato Grosso

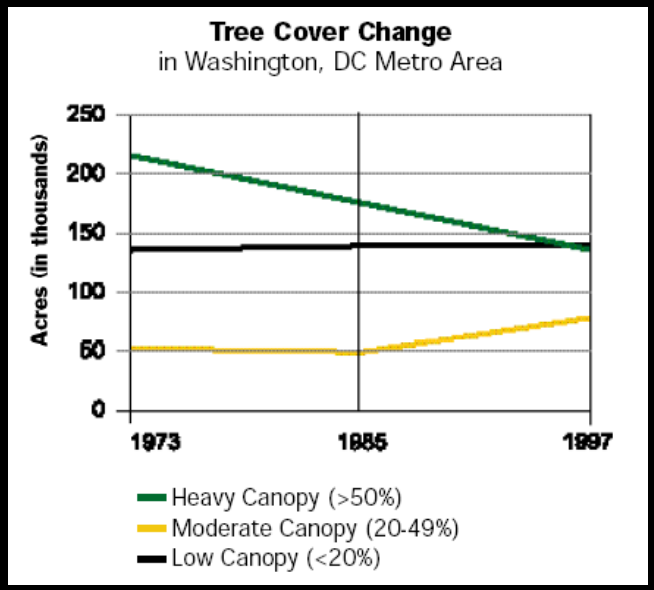
Almost one fifth of the Amazon rainforest has been cleared. 26,000 sq km August 2003 to August 2004 alone; 6% higher than the previous 12 months.



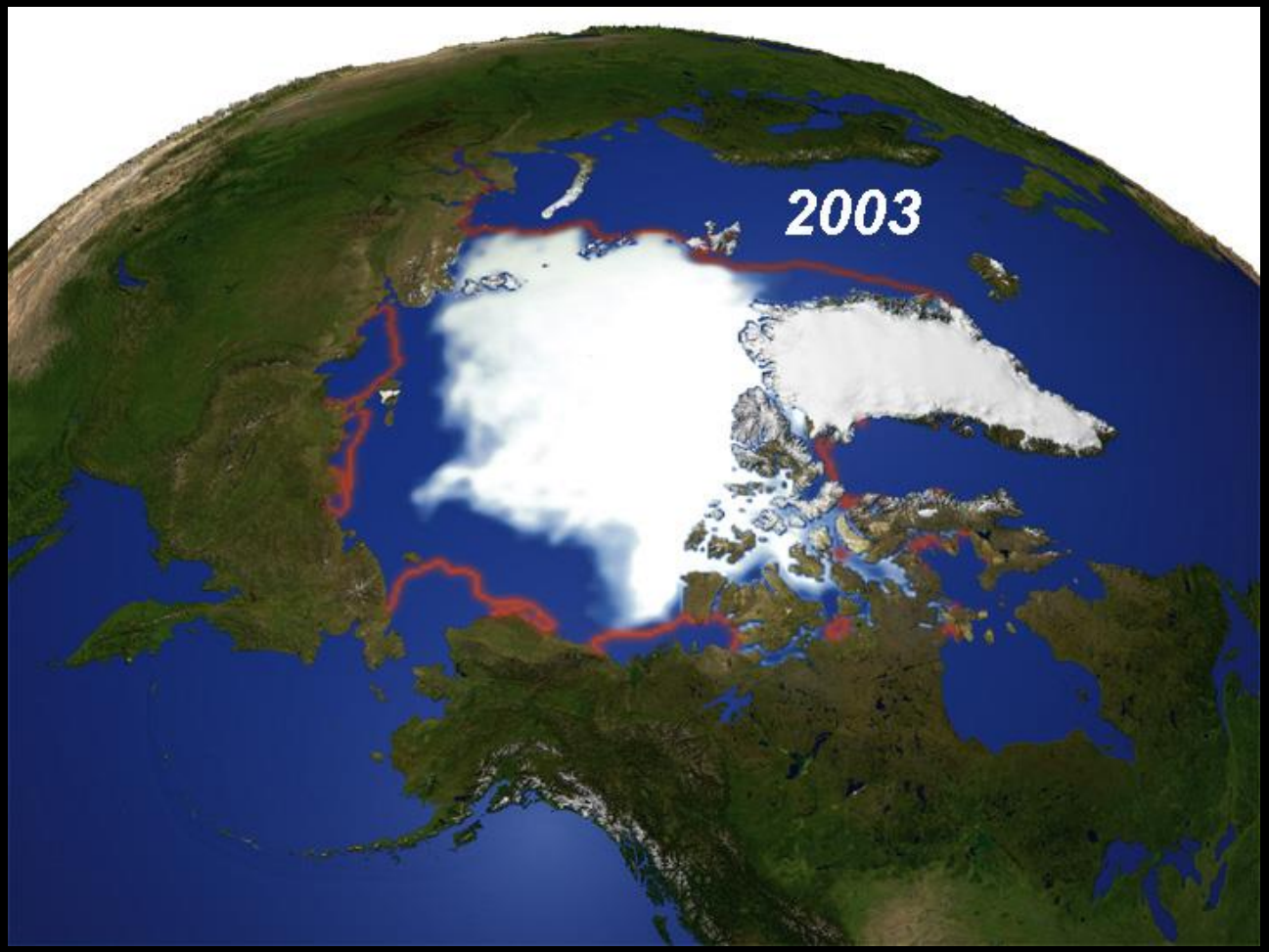
Source: Steve Kingstone, BBC News, Brazil

Casey Trees, Washington, D.C.

- Satellite images showing the dramatic loss of trees in the District moved Mrs. Casey to action.
- Casey Trees Endowment Fund was created to restore the tree cover of the District of Columbia.



Dramatic Changes in Arctic: Imagine an Ice-free Arctic



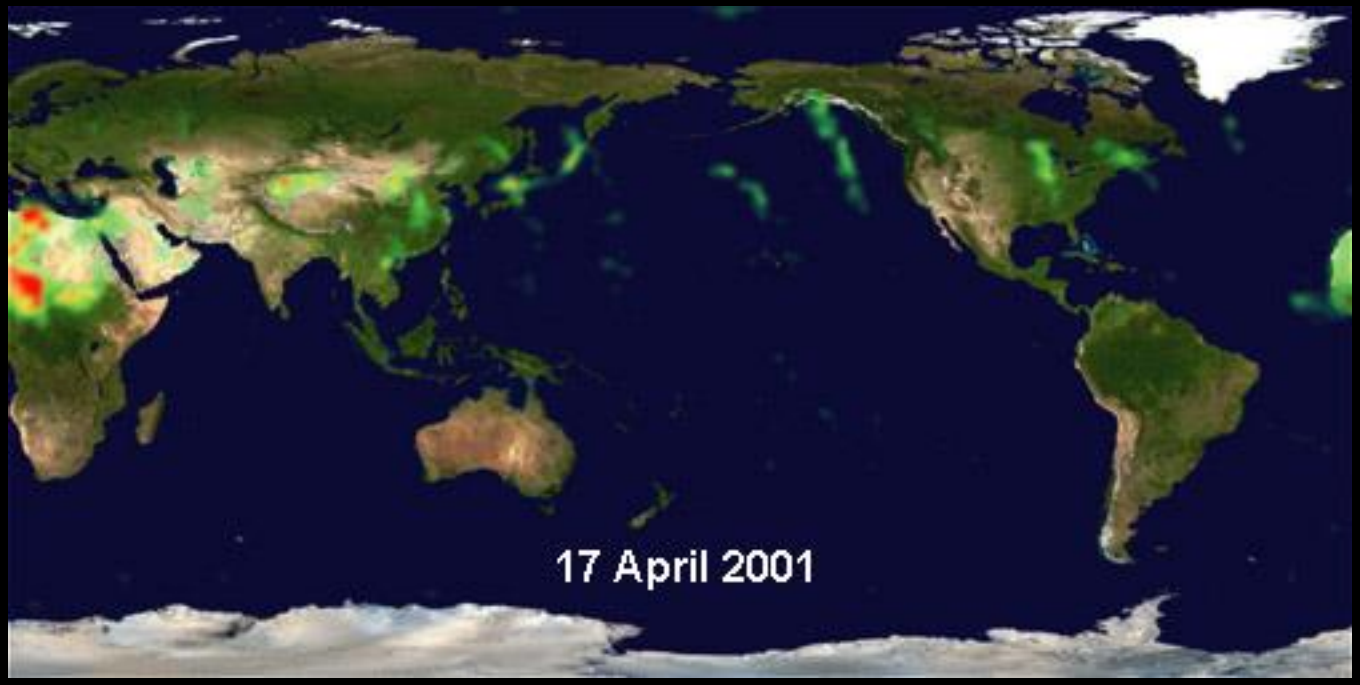
1979-2003: Progressive Loss of Arctic Ice

Mt. Kilimanjaro, Tanzania: Glacial Retreat

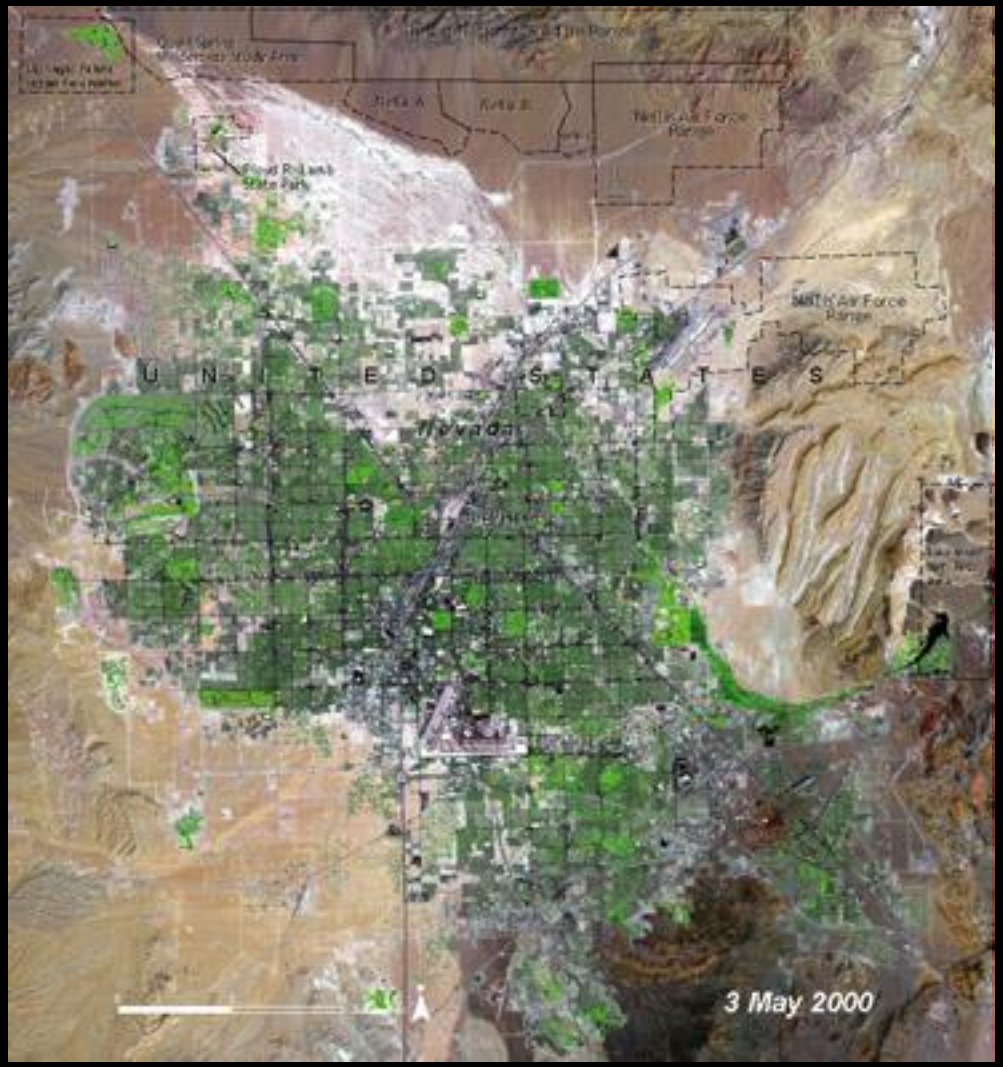
An estimated 82% of Kilimanjaro's icecap has disappeared since 1912.

Movement of Transboundary Pollutants

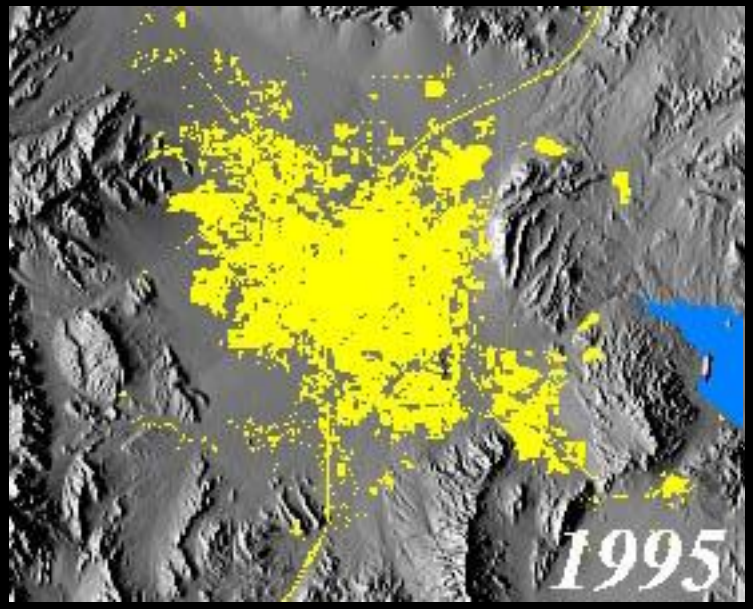
A large dust storm developed in East Asia on 6-7 April 2001, moving over Russia, Japan, the Pacific Ocean, Canada, and ultimately over the United States on 17 April 2001.



Expanding Las Vegas



- 1973 -A small settlement
- 2000 -The landscape is now dramatically modified

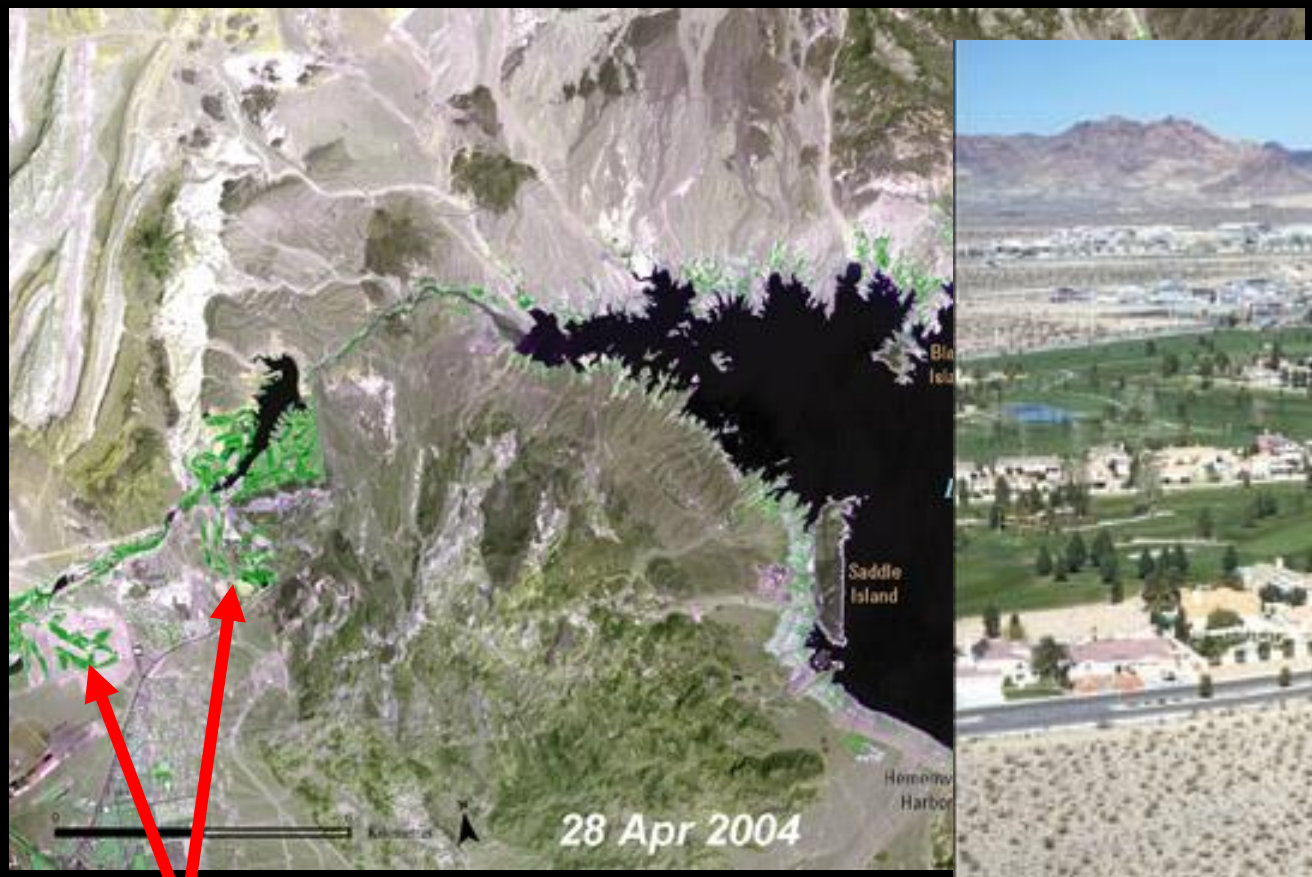


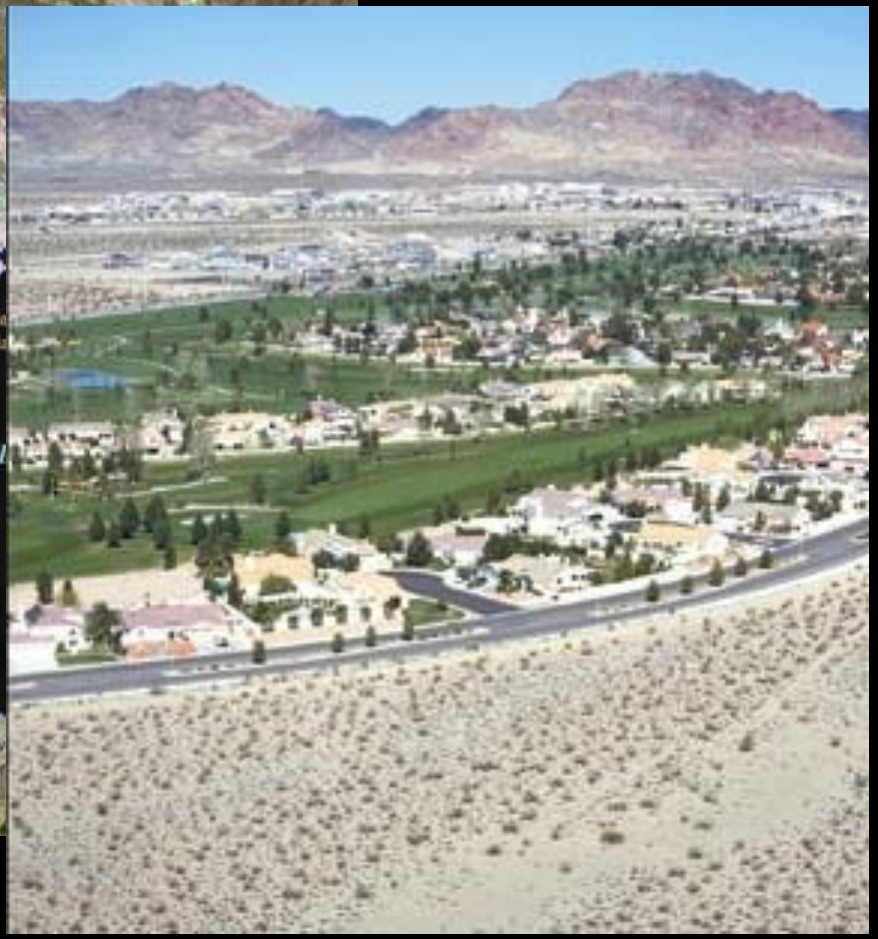
Images courtesy USGS

Drought in the Western United States

Hoover Dam and Lake Mead

Lake Mead, United States





New Golf Courses since 2001

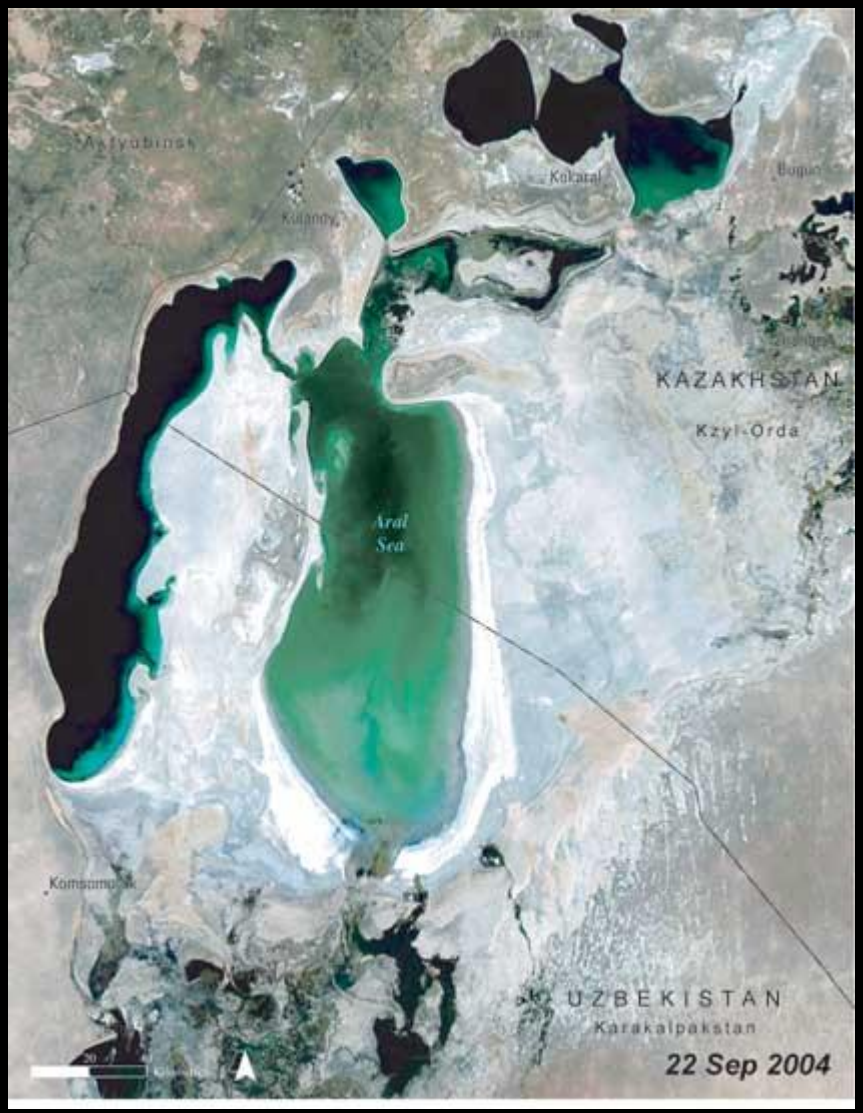
Gulf of Fonseca,Honduras: Shrimp Farms Replacing Mangroves

1987-1999: shrimp farms and ponds have mushroomed, carpeting the landscape around the Gulf of Fonseca, Honduras, in blocks of blue and black shapes.

Huang He, China: Rivers carry sediments

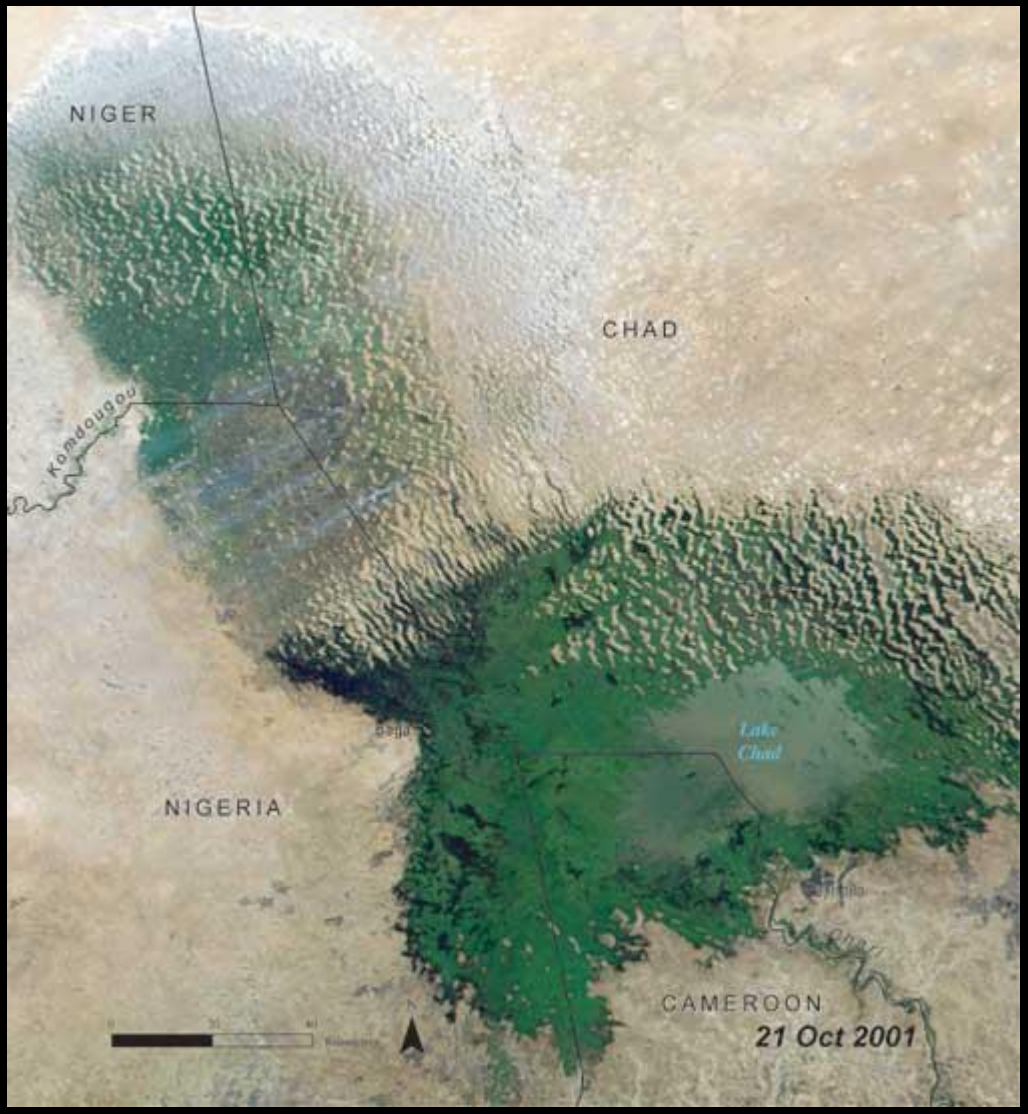
The changes in the delta between 1979 and 2000

Aral Sea: Death of a Sea



- The world's fourth largest lake before 1960.
- 1973-2004: More than 60 per cent of the lake has disappeared

Lake Chad: Sustainable Use of Water and Land in the Sahel

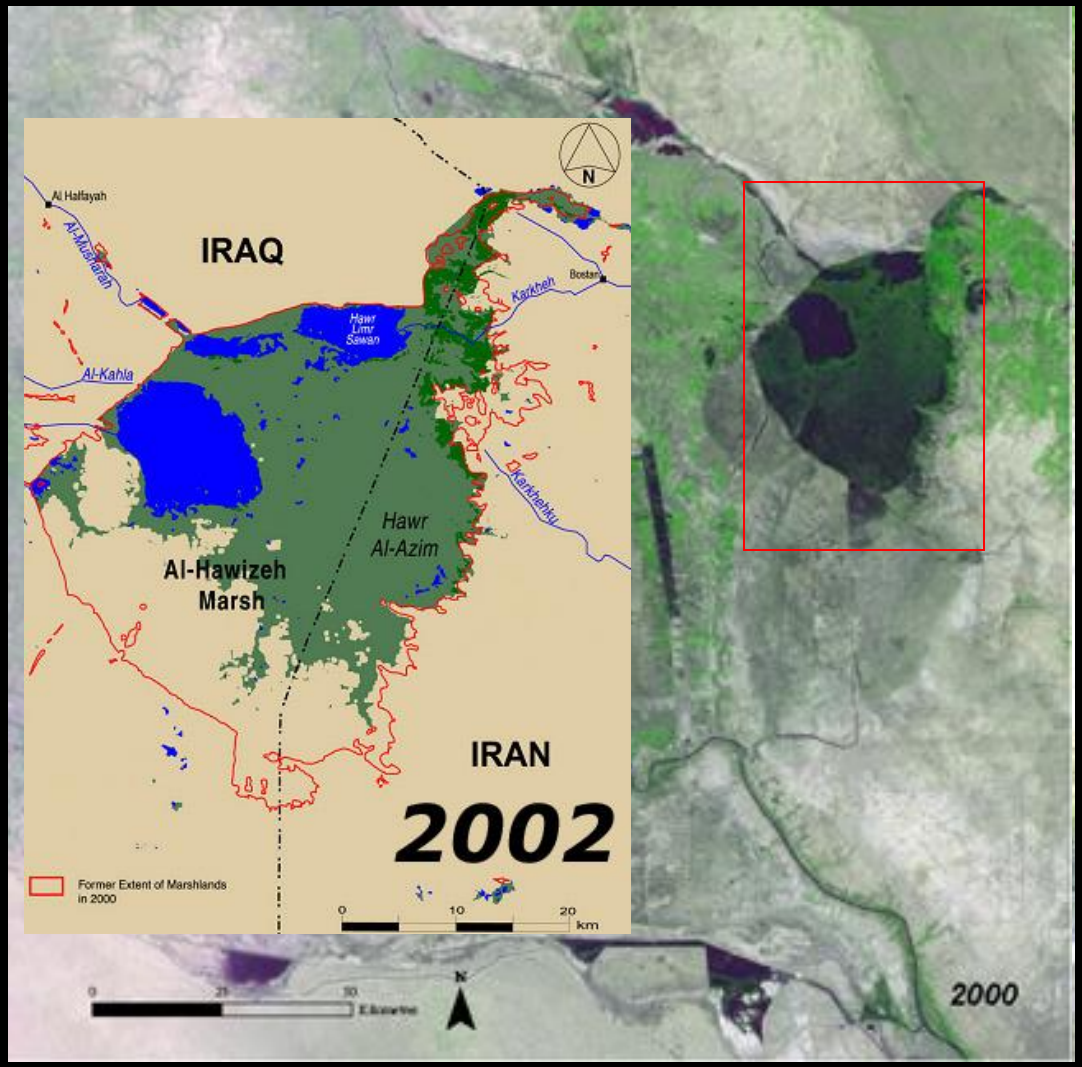


- The world's sixth largest lake in 1960
- 1963-2001: Has shrunk 95% in the last 35 years
- Causes: Climate change, seasonal variability, and human uses

Lake Hamoun, Iran and Afghanistan: Death of a Lake

1976-2001: Changes in water levels on Lake Hamoun

Mesopotamian Marshland, Iraq and Iran: Demise of an Ecosystem



1973-2000: Most of the wetlands disappeared

Water Returns to the Mesopotamian Marshlands

Greening of some of the Marshlands in recent years.

Toshka Project, Egypt: Agriculture in the Desert

- 1980's Toshka region before development
- 2000 –Water for agriculture

Water Hyacinth Infestation in Lake Victoria: Control of Invasive Species

1995-2001: Reduction of Water Hyacinth on Lake Victoria

Almeria, Spain: From Fields to Greenhouses

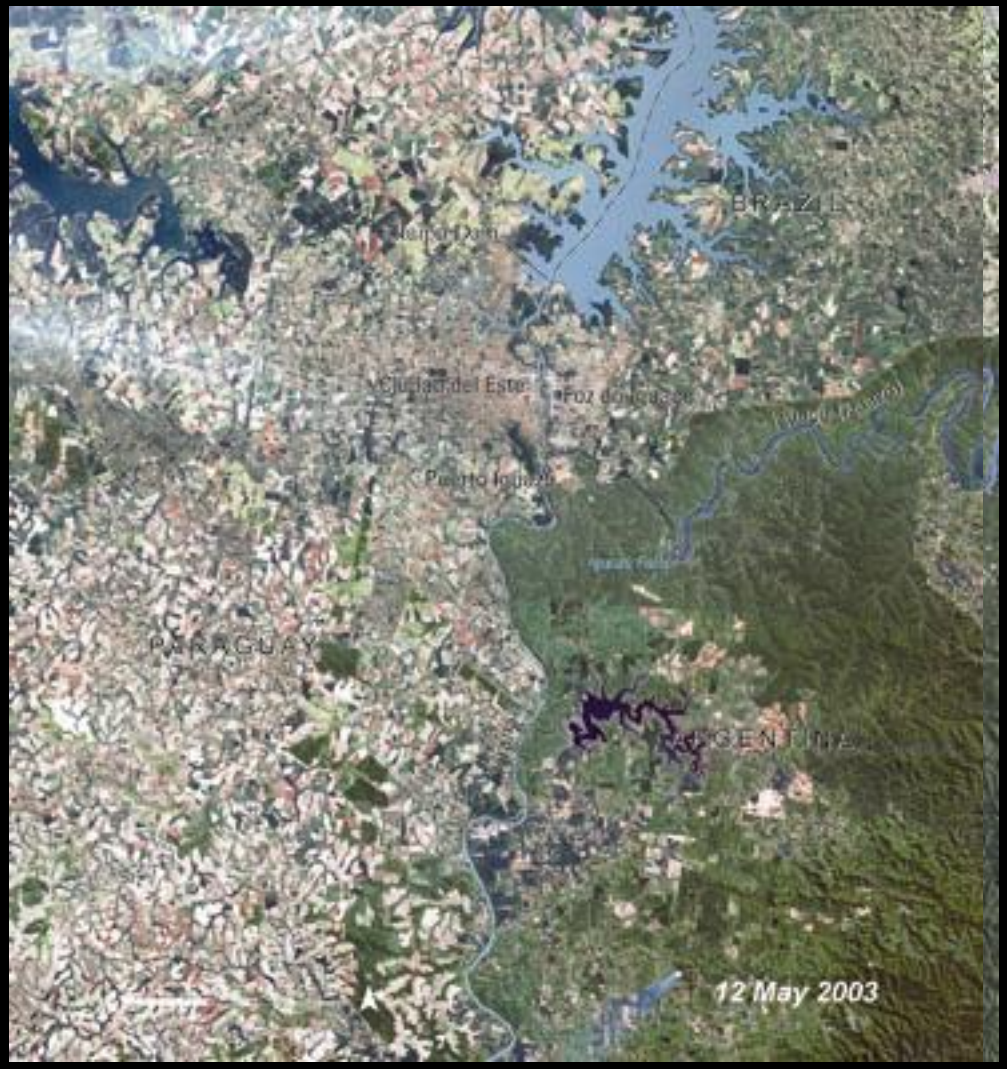
- 1974: Mixed landuse, including urban and traditional agriculture

- 2004: Greenhouses blanket the plain from shoreline to the base of the mountain.

Santa Cruz, Boliva: Land Use Change

- 1975: Forested landscape
- 2000: Large corporate agricultural fields transform the landscape

Itaipu Dam and Iguazu River: Economic Development and Forest Survival



- 1973: Forest cover is extensive throughout the region

- 2000: Extensive deforestation in Paraguay

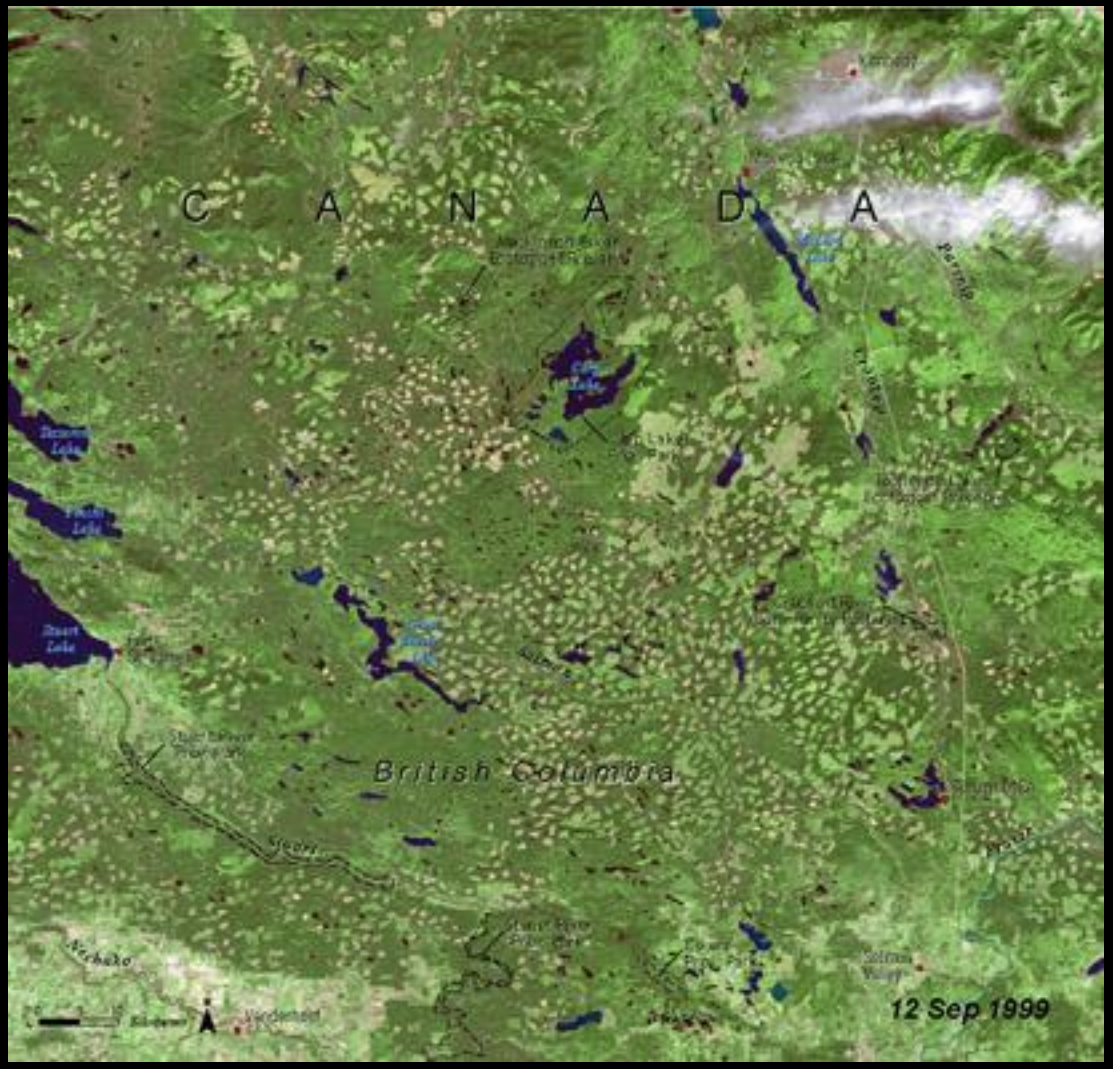
Mexico/Guatemala Border

1974 - 2000: Conversion of forest to agriculture. Now country border can be seen even from space

Papua, Indonesia: Tropical Forest and the Oil Palm Frontier

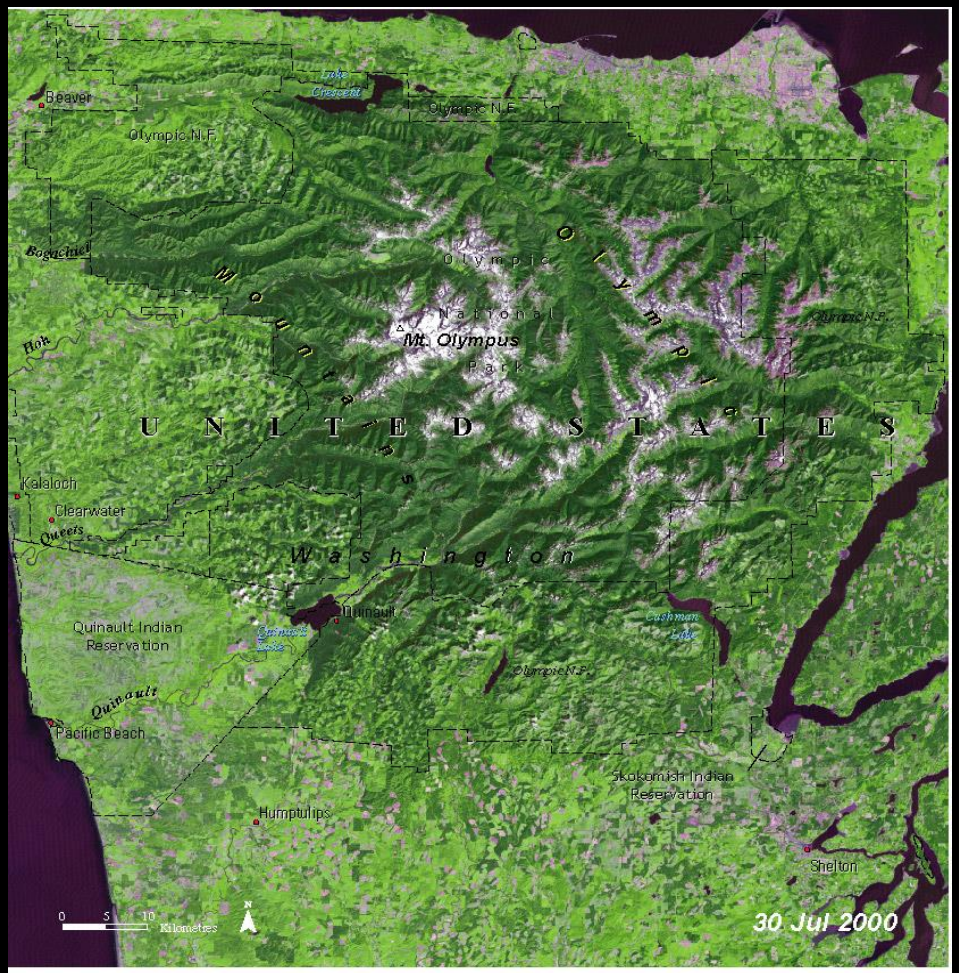
- 1990: a new human presence, earth colored roads provide access to the forest
- 2000: rectilinear patterns cover 10,000 ha
- 2002: Cleared area nearly doubles since 2000

British Columbia: Impact of Logging



1975-1999: The impact of logging on reasonably pristine landscape

Forests: Olympic Peninsula



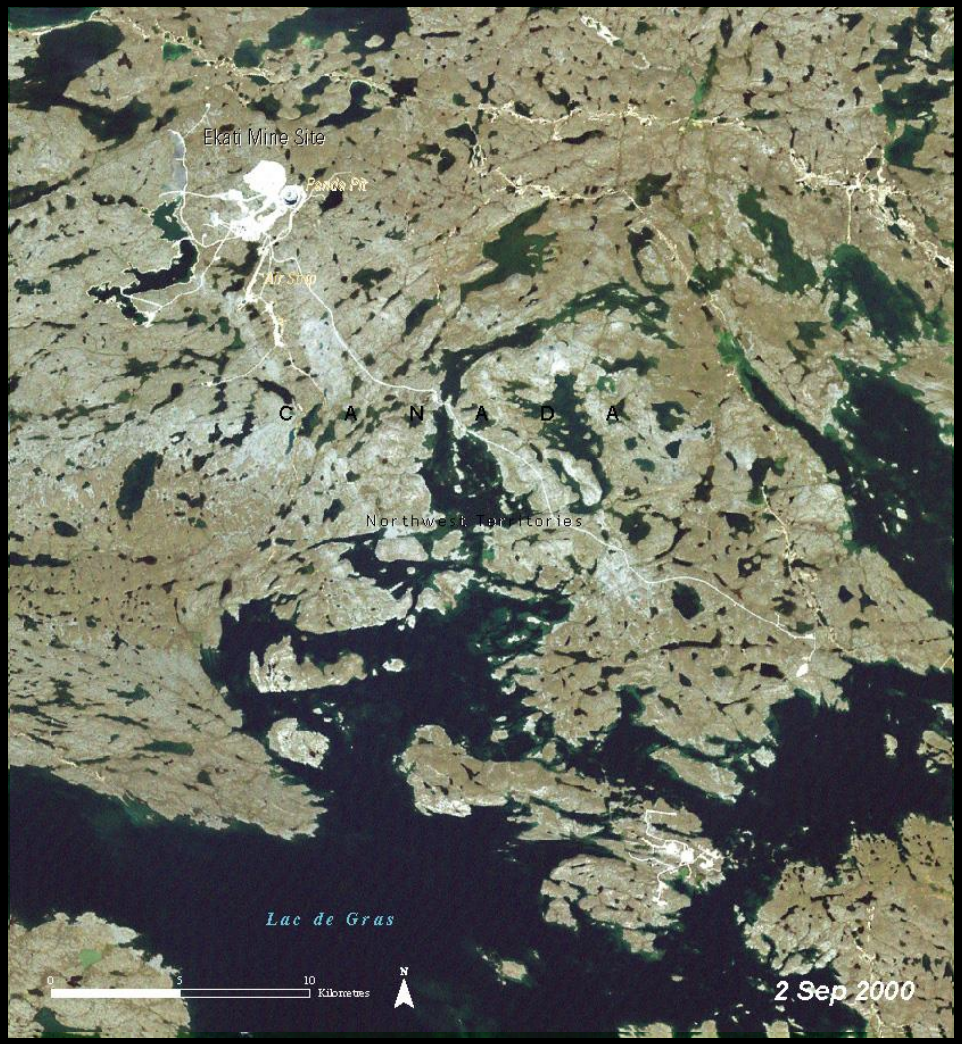
1974: Shows patchwork of purple and pink, indicating clear-cutting

2000: Evidence of good re-growth of trees in forest reserve areas

Forests: Gaspe Peninsula

Changes in the forest due to logging between 1993 and 2000

Ekati Diamond Mine, Canada: Mining

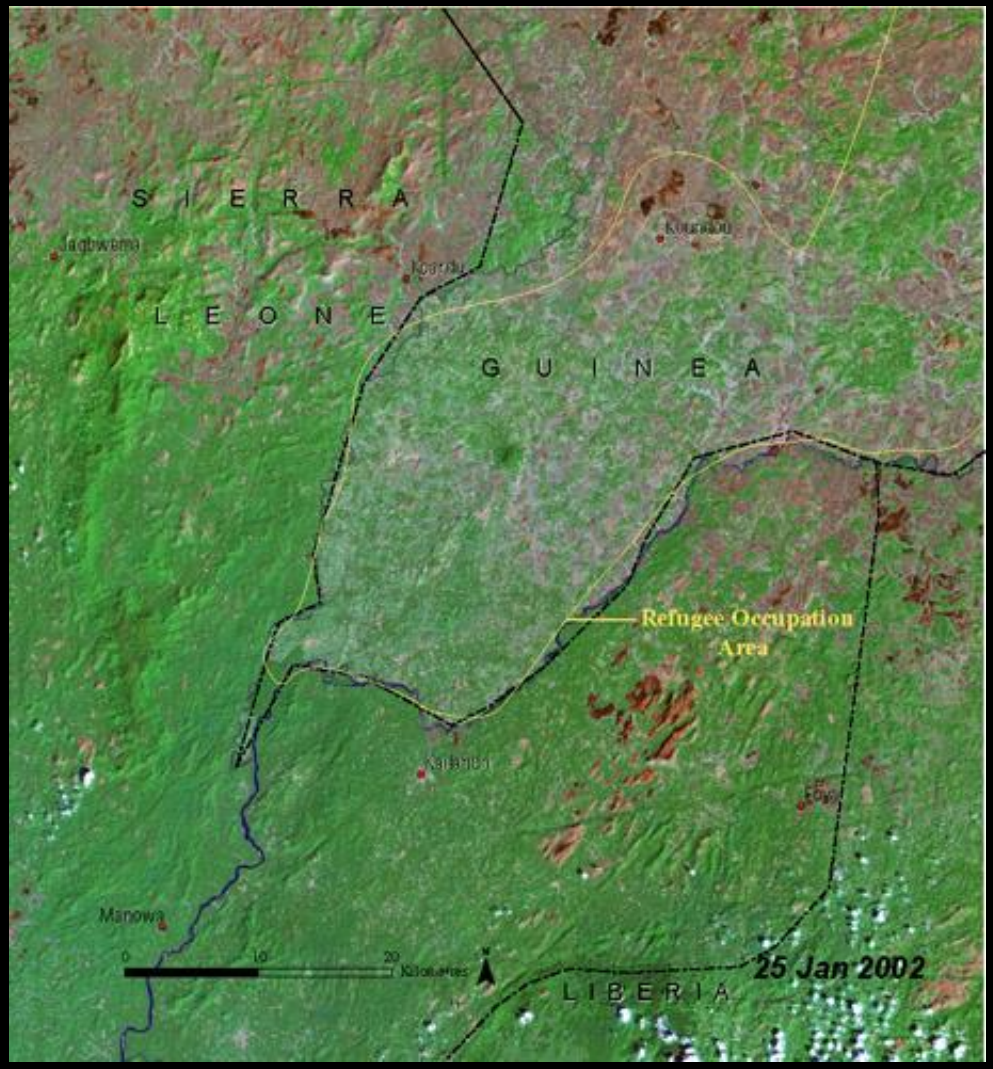


Mining in the Northwest Territories, impacting migration routes of native caribou.

Mt. St. Helens, USA: Ecosystem recovers after a major Volcanic Eruption

- 1973:The Mountain Peak 10 years before eruption
- 1983: 3 years after eruption
- 2000: Vegetation re-growth around the volcano

Impact of Civil Wars in Liberia on neighboring Guinea



- 1974: Image of the Parrot's Beak region in Guinea
- 2002: The light green color is the result of deforestation in the "safe area" where refugees set up camp

Narok, Kenya: Conversion of indigenous lands to cultivated agriculture

Cultivated agriculture replaces traditional hunting and gathering grounds

Copper Mine in Papua New Guinea: Discharge of Waste and Pollution of River

1990-2004: Impact of mining on river systems

READER'S FEEDBACK

"What an outstanding publication! Aesthetics, Science, and Message; this book has it all. First impression: interesting and beautiful pictures, intriguing maps and time sequences, and informative charts and graphs. Next impression: a thorough documentation of the nature and extent of the many ways humans have impacted our planet. Lasting impression: our planet is beautiful, fragile, to a limited degree self healing, but very dependent on our intelligent habitation for our well being and, eventually, our survival."

Ed Gibson, Sr. VP , Science Applications International Corporation (SAIC), Former Astronaut, USA

READER'S FEEDBACK

"The issue, then, isn't whether changes to the planet have happened--they have, and they will continue--but how such changes can be managed. Not all of the images in the atlas show unfettered expansion or ruin; some display caution and even repair. The value of One Planet, Many People for me is a guidebook, often times showing what not to do, but occasionally showing examples of what can work"

http://www.worldchanging.com/archives/002876.html dated 12.06.2005

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READER'S FEEDBACK

"The Book" is fabulous! I am still randomly looking at the pictures but it is impressive. Good job by your team"

Bernadine Johnson
Special Security Officer
USGS/National Center, EROS

Sioux Falls, SD

CHALLENGES

- Collecting information about globally distributed targeted areas
- Maintaining regional and thematic balance
- Acquisition, analysis and packaging of satellite data in an user friendly format and integration with GIS
- Lack of operational monitoring systems

Lessons learned

- "If the reader is to grasp what the writer means, the writer must understand what the reader needs" - G.D> Gopen and J.D. Swan;
- Integration of basic GIS data base i.e. scale, names, boundaries on remote sensing images is must for a increased public understanding
- Geographic location and ground photograph are must to improve public understanding
- Vegetation in 'red' on FCC versus natural 'green' color
- Use of media and internet for effective communication

Derived Products

- Integration and release on Google Earth
- Live document : keep on updating with interesting materials (120 sites data to Google Earth)
- Over 400 Power Points released for educational purposes
- Develop a multimedia product

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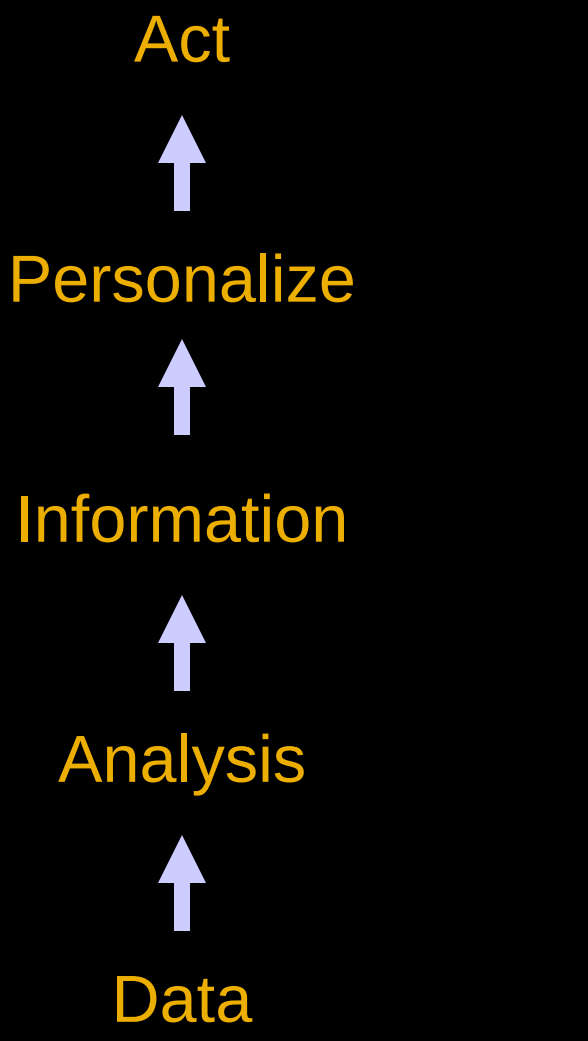
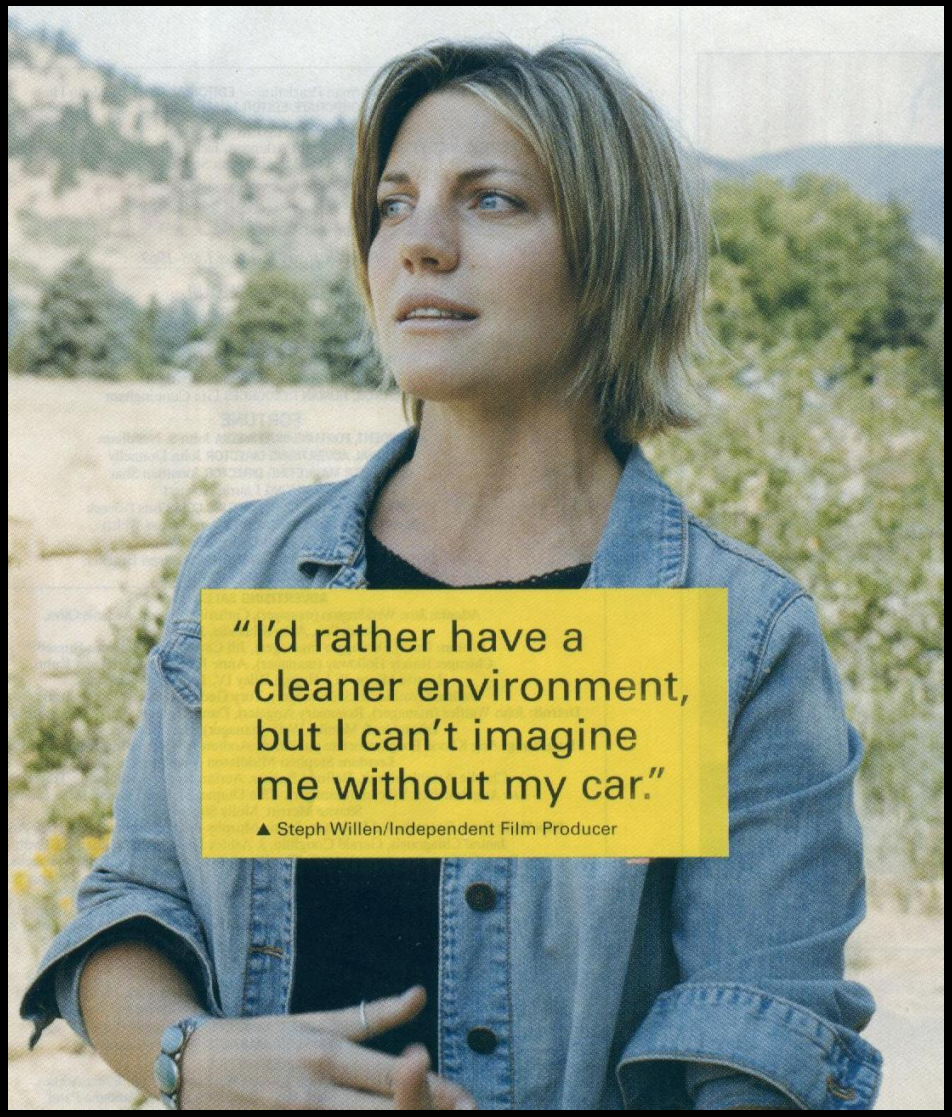
Information for Decision-Making



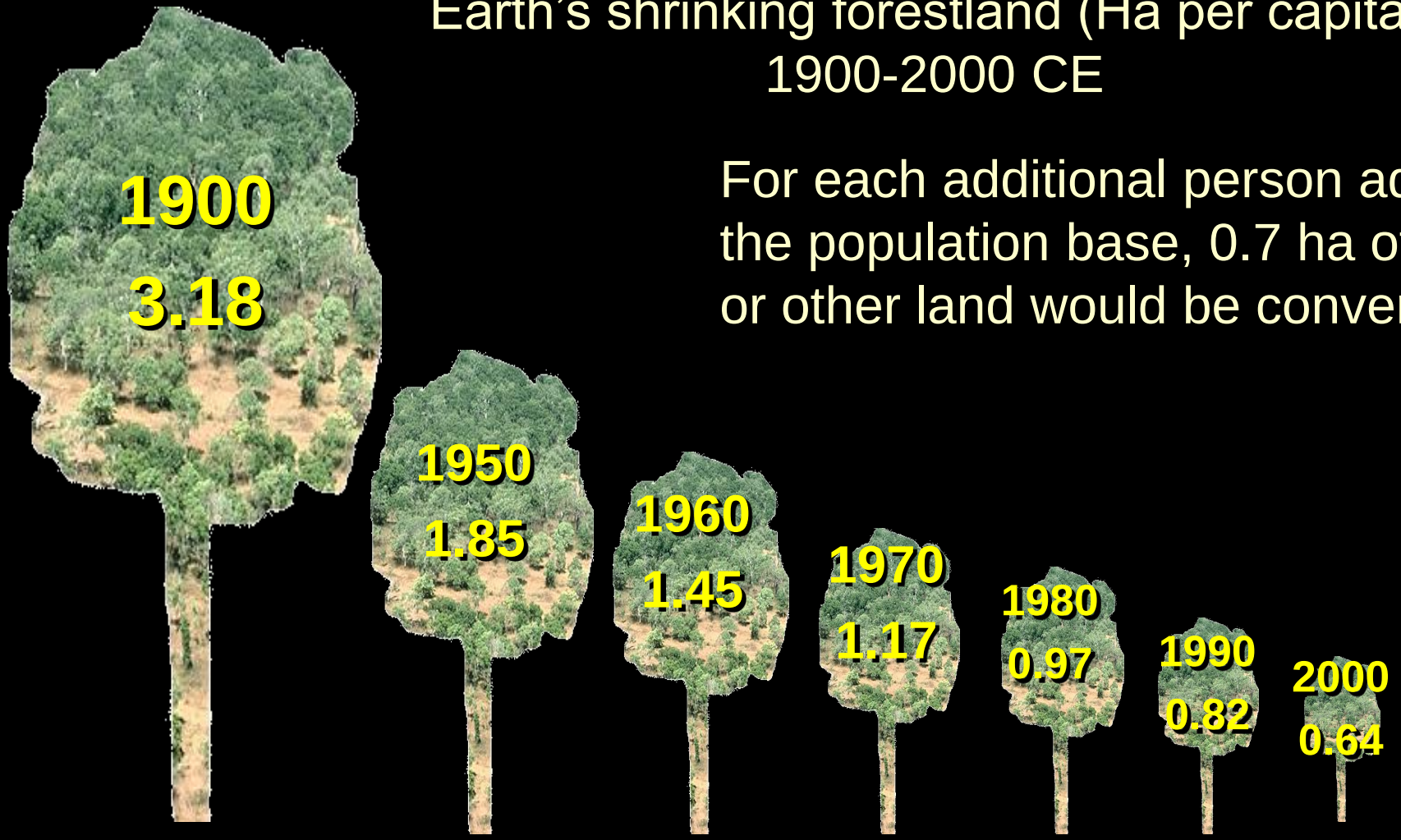


An advertisement in the Fortune magazine by BP

Forests

Earth's shrinking forestland (Ha per capita)
1900-2000 CE

For each additional person added to the population base, 0.7 ha of forest or other land would be converted



Thank You!

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