

GRIPS Development Forum Workshop

How can Japan effectively support economic growth in Africa?

Tokyo, 2008.07.25

Japan's support to Africa's economic growth in the age of global climatic change

- Challenges and opportunities -

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Self introduction: Prof. Dr. Alfred Kazadi SANGA-NGOIE

- Nationality Dem. Rep. of Congo (ex-Zaire), Africa
- 1952.04.08 Born in Likasi City, Dem. Rep. of Congo (ex-Zaire)
- 1982.04.11 Arrrival in Japan.
 - Osaka Gaidai (Foreign Students Division)
- 1989.03.23 Doctor of Sciences (Geophysics)
 - Graduate School of Sciences, Kyoto University
- 1993.04.01 Associate Professor, Mie University
- 1995.04.01 Professor, Mie University (Fac. of Education)
- 1996.04.01 Professor, Mie University (Fac. of Bioresources)
 - Professor, Grad. School of Bioresources, Mie Univ.
- 2007.04.01 Professor, Ritsumeikan Asia Pacific University
- 2008.06.13 Professor Emeritus, Mie University



- Dean, International Cooperation and Research Division, APU
- Vice-Dean, Institutes Headquarters, APU
- Founder and Chairman: -SAVE AFRICA PROJECT (NPO) (Japan, 1989)
 - The SANGA FOUNDATION (Legal Status in DRC, 1994)

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1. Introduction
2. Global eco-climatic changes, impacts and risks in Africa
3. Japan's role in the Global village
4. Africa: the perfect partner for Japan?
5. Concluding remarks

Contents

1. Introduction

- End of Cold War
- New global order
- New issues: socio-economic, eco-climatic
- New Geopolitics, for survival

Contents

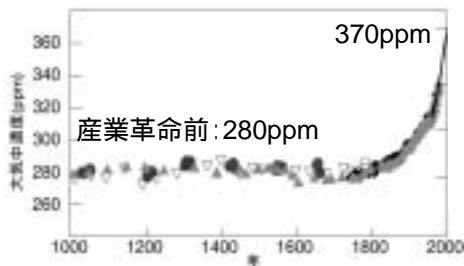
2. Global eco-climatic changes, impacts and risks in Africa

- Global warming
- Acid rains
- Stratospheric Ozone depletion
- Deforestation (rainforests) and lands degradation
- Tropospheric Ozone
- Coastal ecosystems

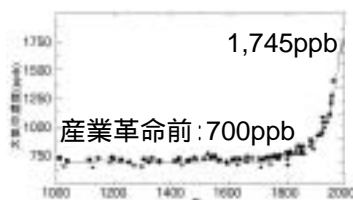
Changes in Atmospheric Greenhouse Gases

二酸化炭素: CO₂

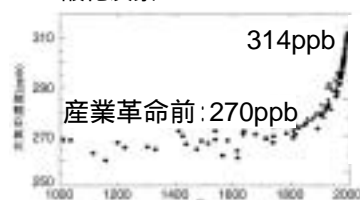
IPCC第三次報告書 (2007)



メタン: CH₄



一酸化炭素: CO



Global Warming

1 . Fossil fuels: >85% of global energy source-

- production, economy, progress
- thermal electricity generation
- heating, transportation (cars), petrochemistry...

2 . Deforestation

- forests development: plantations, ranches, timber, city building, golf court, industrial complex...
- shifting cultivation, fuelwood, bushfires
- acid rain

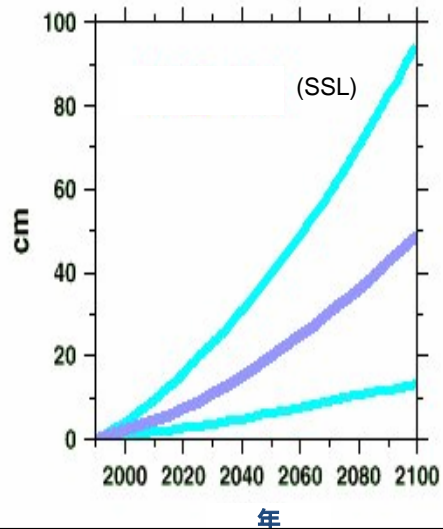
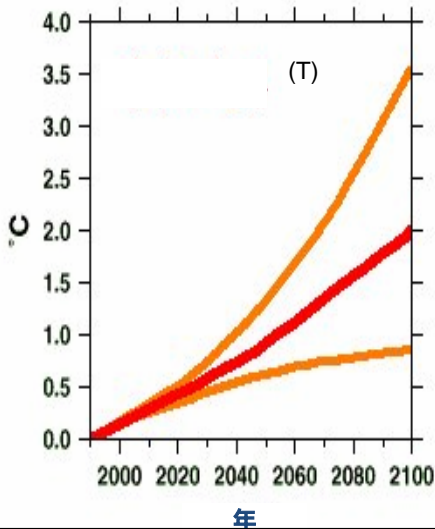
 Fast increase of atmospheric CO₂

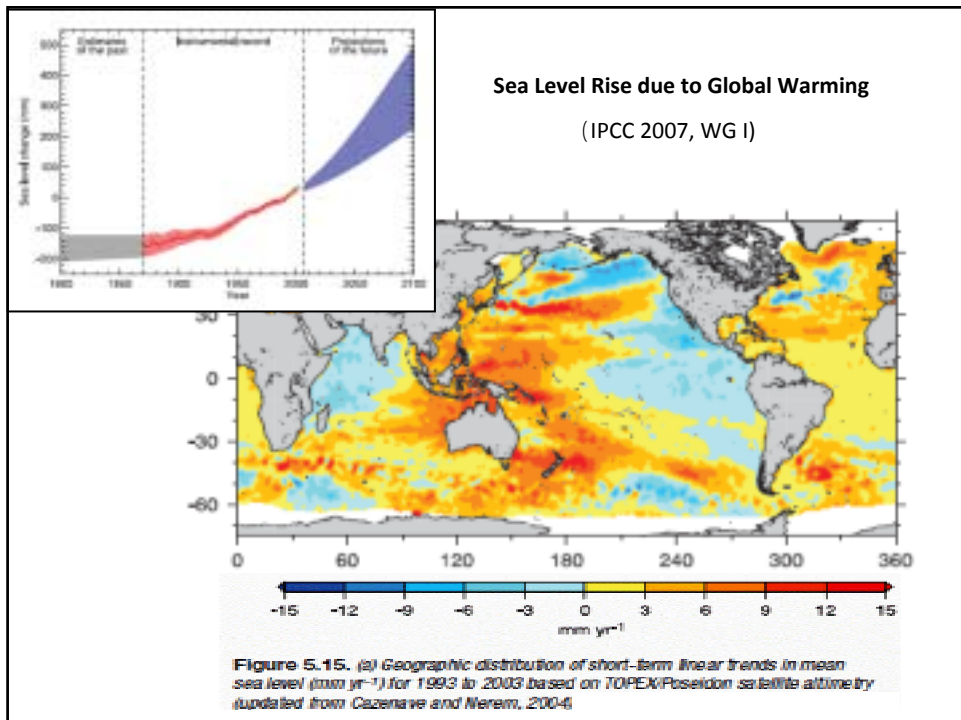
Global Warming



Global Mean Temp: 2 up

Japan Summer temp.: 3-4 up





Climate Change and Extreme Weathers



Frequent Typhoons, Severe Storms, Floods and Water Disasters

Land Cover Changes Upland

- Natural (fires , landslides, El Nino, foen)
- Climatic change and extreme weathers
- Land development by human activities



Heat Waves and Forests Fires,
Deforestation
Desertification, Drought and Famine

Global Warming, Air Pollution, Land Cover Change



1. Natural?

Man made?

2. Atmosphere?

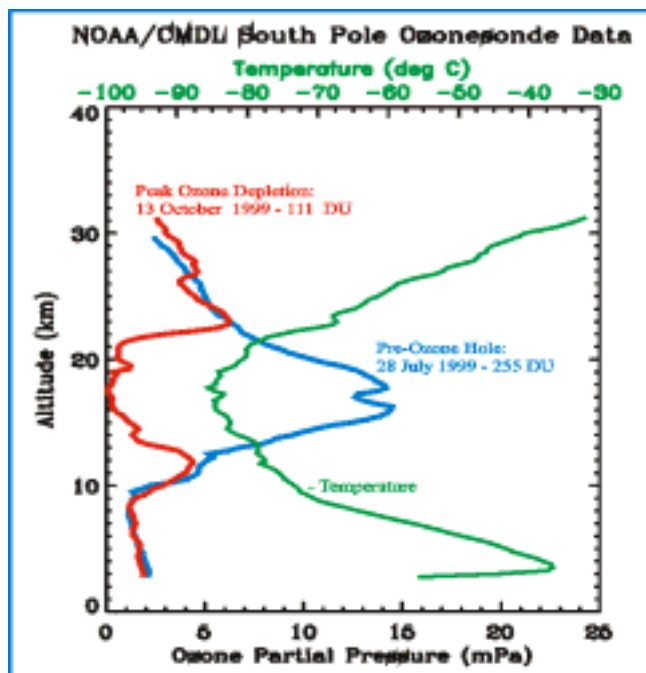
- Pollution
- Fossil fuel
- Cattle, bogs

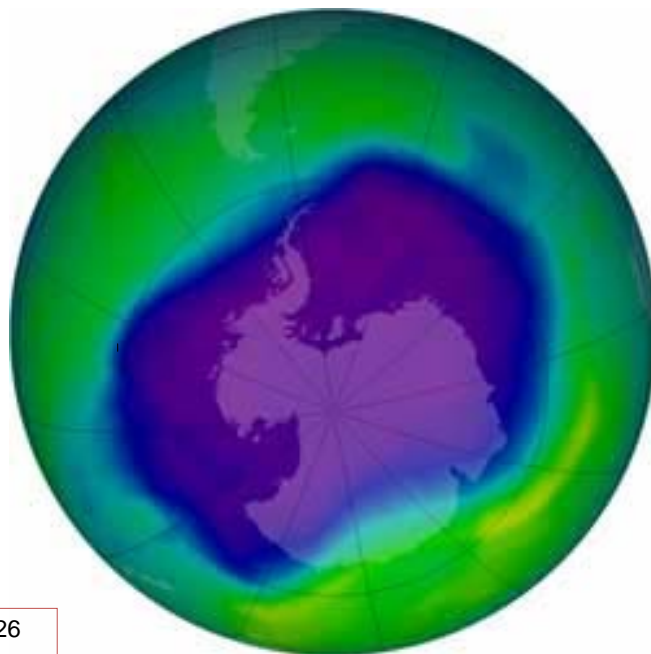
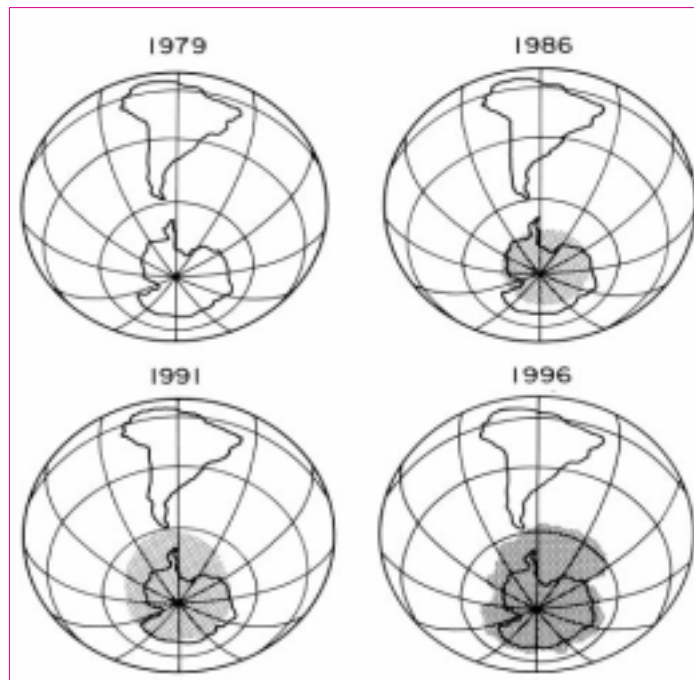
3. Land cover?

- Forests
- Land dev.
- Acid rains
- Snow cover



Acid Rains Effects



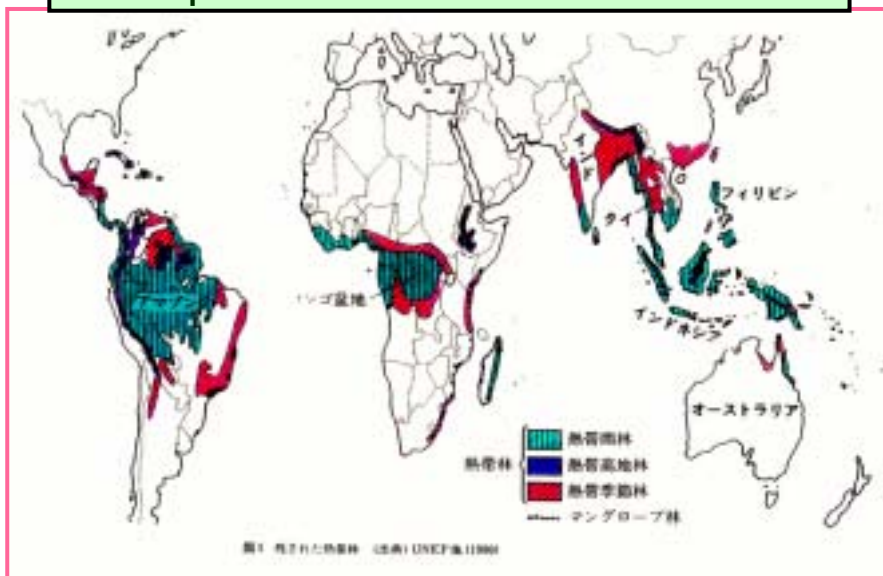


2006.09.26

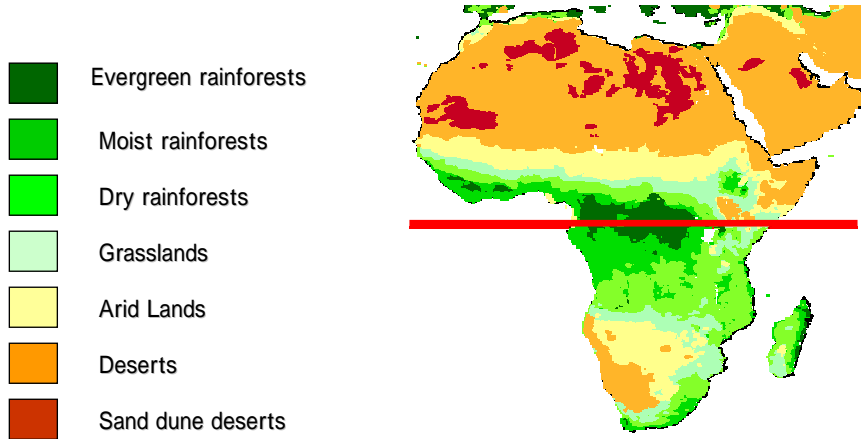
Damages related to the Stratospheric Ozone Depletion

- 1 . UV radiation increase (ground level)
- 2 . Weathering, skin cancer increase
- 3 . Eye damage/falling eyesight
- 4 . DNA and other biogenetic disorder

Tropical rainforests and climate



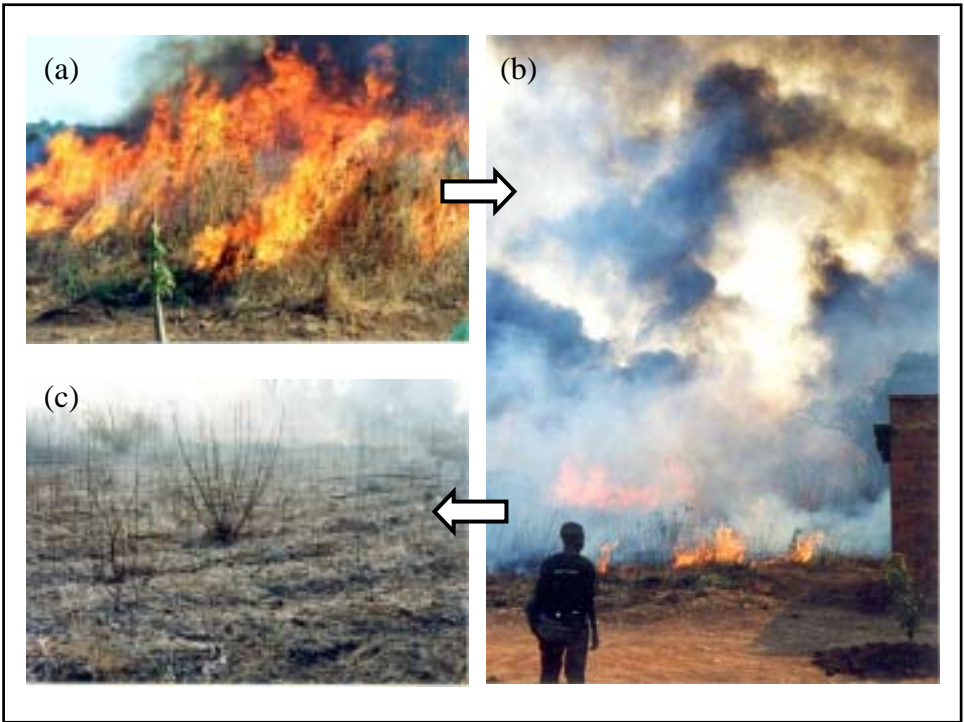
African Digital Vegetation Model



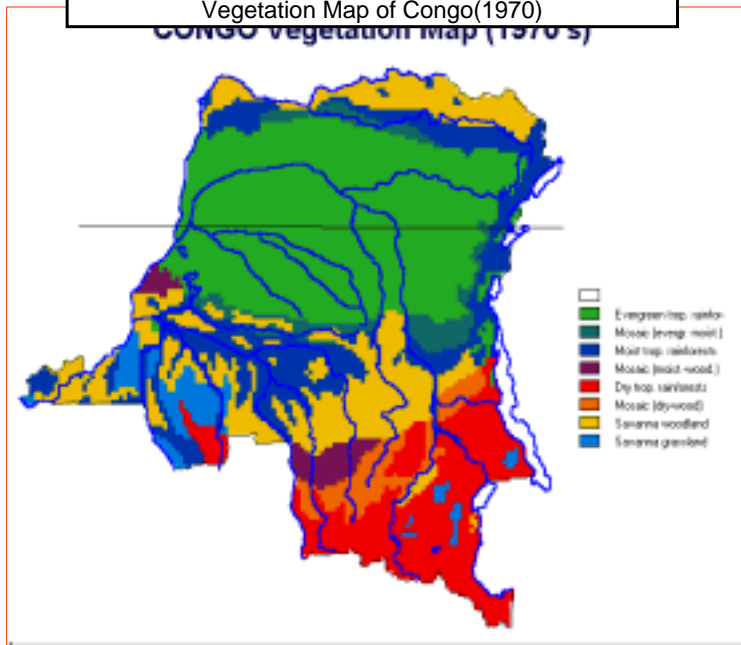
(Nonomura et al., 2002)

Slash and Burn Cultivation



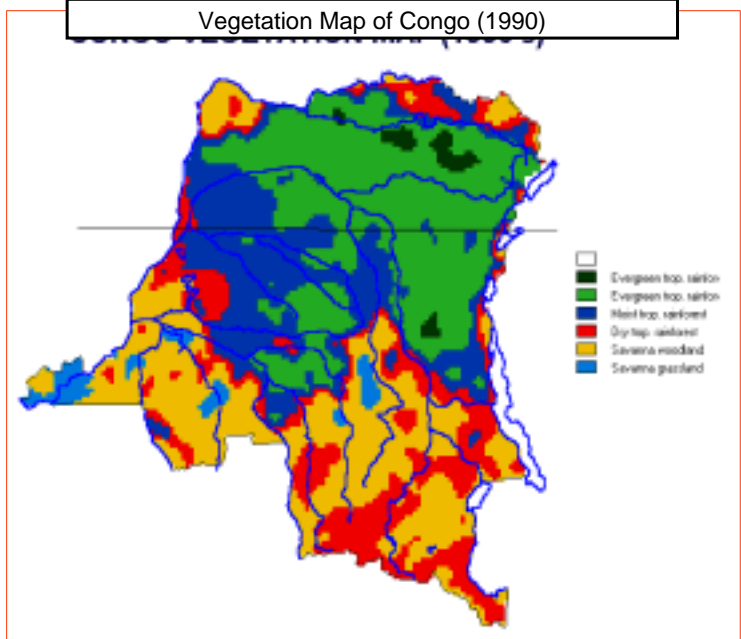


Vegetation Map of Congo(1970)

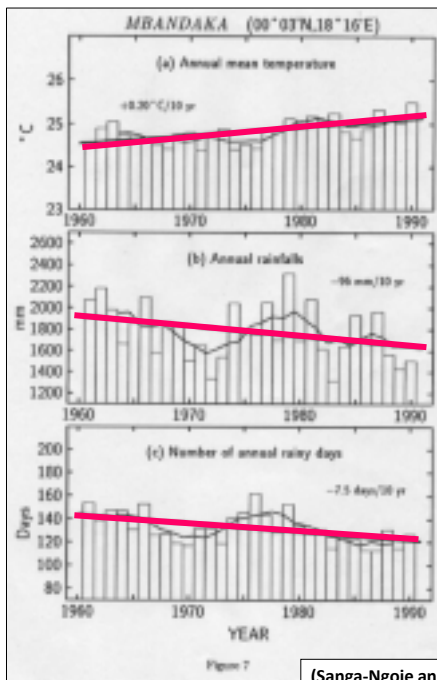


Atlas du Congo (J. Charlier, 1982, *Jeune Afrique*)

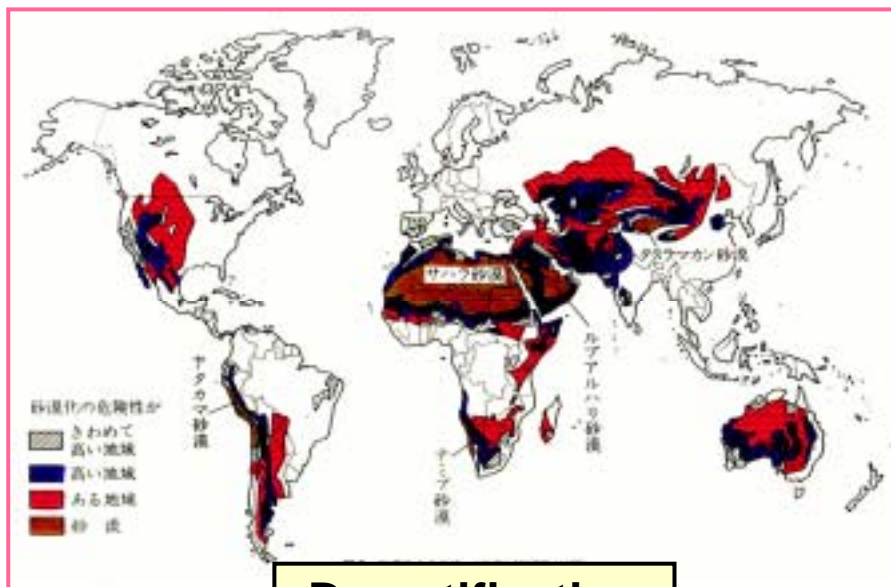
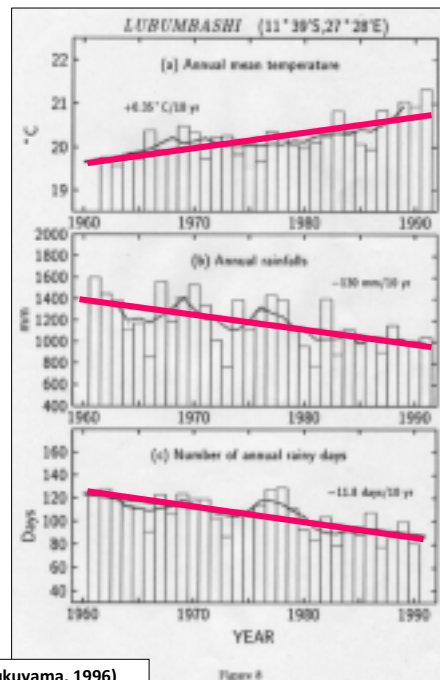
Vegetation Map of Congo (1990)



(Calculated from NOAA/AVHRR NDVI 1985-90 data)



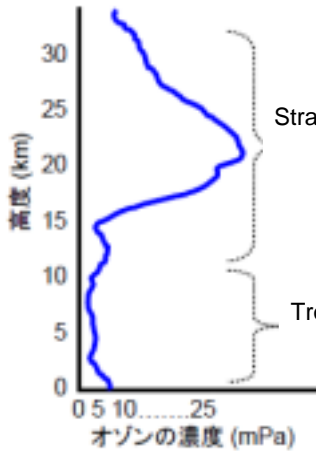
(Sanga-Ngoie and Fukuyama, 1996)



Desertification

対流圏オゾンと成層圏オゾンの違い

対流圏オゾンは成層圏オゾンと比べて
1/10の量しか存在しないが...



Stratospheric O3

Tropospheric O3

Good Ozone:
Protection from UV

オゾン層

Bad Ozone:

- GH Gas
- Damage to life

光化学スモッグ

原因物質
NOx
VOC

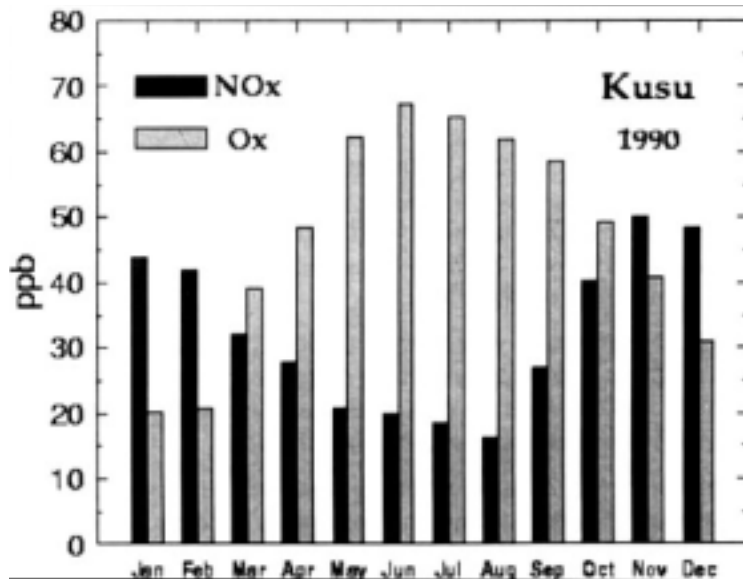
NOx: 窒素酸化物・VOC: 揮発性有機化合物



Ozone injury to milkweed.



Ozone injury to yellow-poplar.



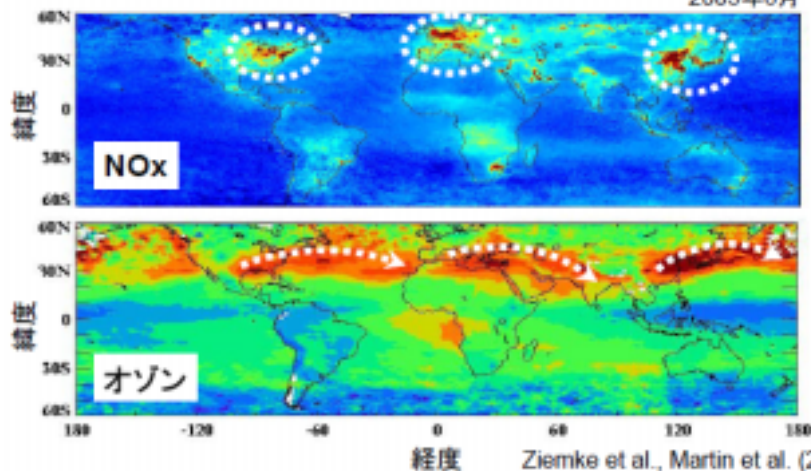
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Figure 3: Seasonal change of NO_x (black) and O₃ (grey) pollution levels at Kusu.
(Sanga-Ngoie and Fukuyama, 1998)

地球規模で広がる対流圏オゾン汚染

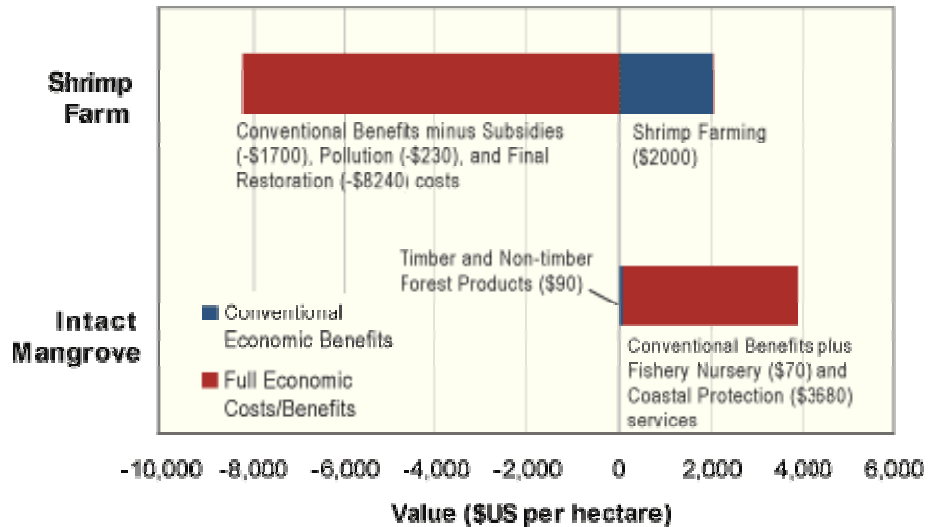
Global Distribution of Tropospheric Ozone Pollution

2005年6月



- 北米・欧州・アジアにオゾン原因物質の大きな排出源がある
- オゾンは偏西風によって大陸間を西から東へ運ばれる

The Cost of Mangrove Conversion in Southern Thailand



EarthTrends 2006. Source: Millennium Assessment 2005; Sathirathai and Barbier 2001.

Coastal Ecosystems



- Estuaries, wetlands, intertidal flats,
- Mangrove and swamp forests
- Lagoons, salt ponds, rocks and sand beaches
- Seagrass, coral reefs, continental shelf

Sustainable land-ocean-atmosphere flow of matter and energy



1. Biochemical cycle of all land-driven material entering the sea
2. Most of geochemical & biological activities in the biosphere
 - 15% of oceanic primary production
 - 80% of organic matter burial
 - 90% of sedimentary mineralization
3. 40% of World ecosystem service value and natural capital
4. Human population (40% within 100 km) and human activities

Increasing human population and man-made transformations

(Cape Town, South Africa)



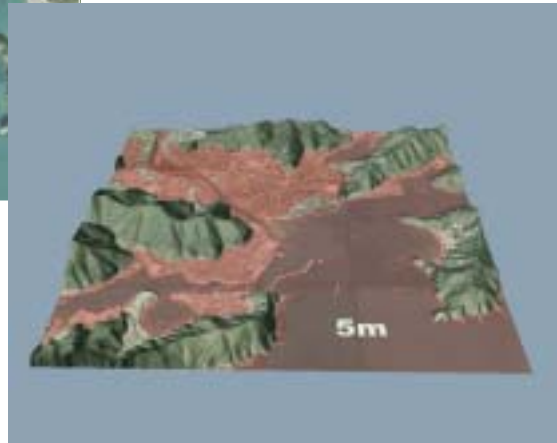
- 40% of world population living within 100 km from the ocean coasts
- Deep changes to the shape, contents and functions of the ecosystem
- Scenic shoreline cities, ports, resort beaches, land reclamation, etc...



Tsunami disaster simulation

Kii-Nagashima, Mie

95% of the Town submerged under a 5m wave



- Awareness
- Preparedness
- Mitigation

Contents

3. Japan's role in the global village

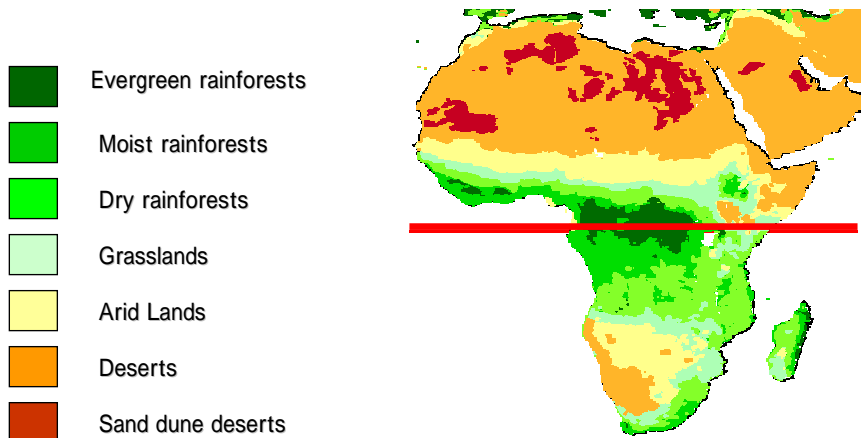
- Global awareness
- Environment-friendly technologies
 - production
 - communication
 - transportation
- Human capacity building
 - Professional training
 - Higher education (Graduate School)

Contents

4. Africa: the perfect partner for Japan?

- Historical background
- Mutual needs, mutual profits
 - infrastructure development?
 - untapped natural resources
 - vast lands favorable eco-climate
 - young and dynamic population
- Political stability and accountability?

African Digital Vegetation Model



(Nonomura et al., 2002)

Global Warming Mitigation

1 . Global Approaches

COP3: Kyoto Protocol (京都議定書): 1997 Dec

2. Sustainable Energy Sources

- Solar Energy
- Wind Power
- Hydroelectricity

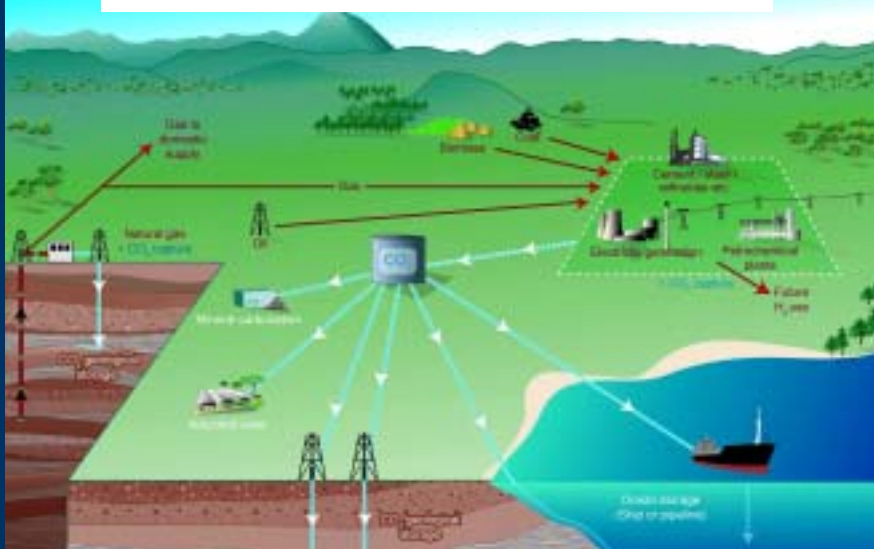


3 . Envir. Friendly Technology & Lifestyle

4 . Enhancing CO2 Sequestration by Forests

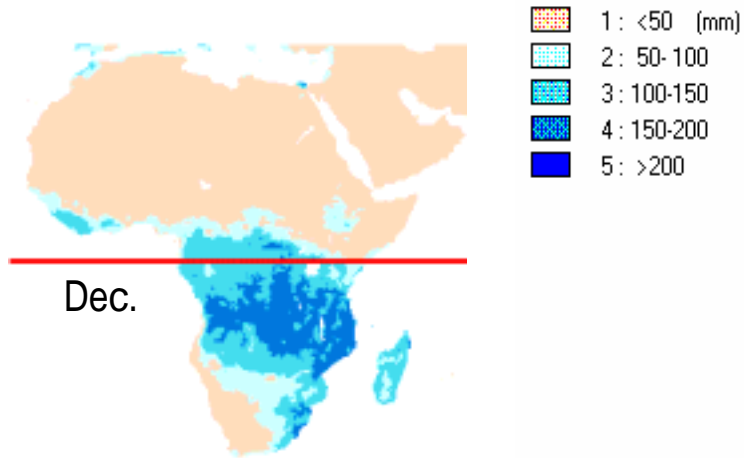
- Forests Management (森林管理)
- Reforestation (植林活動)

CO2 Sequestration in Oceans and Geosphere



SRCCS Figure TS-1

Monthly Rainfall



Contents

5. Concluding remarks

- Africa: not only aid receiver, but business partner
- Africa: large market where Japan can buy and sell
- Africa needs first hand,
environment-friendly technologies
- New paradigm for ODA
involving Japan-Africa joint ventures?

Japan + Africa = Win-Win Partnership

The End

*Thank you very much
for your attention!*

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