



The role of forest and its management in times of rapid global change

Introduction to the ITTO C&I Workshop in Trinidad and Tobago

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Port-of-Spain, Feb. 2024





No exit

Present and future challenges: the quadruple squeeze

What has changed over the past five decades?

(based on Rockstrom 2010, adapted)

Population growth and
growth in consumption
The 20/80 Dilemma

Ecosystem services:
60% loss Dilemma



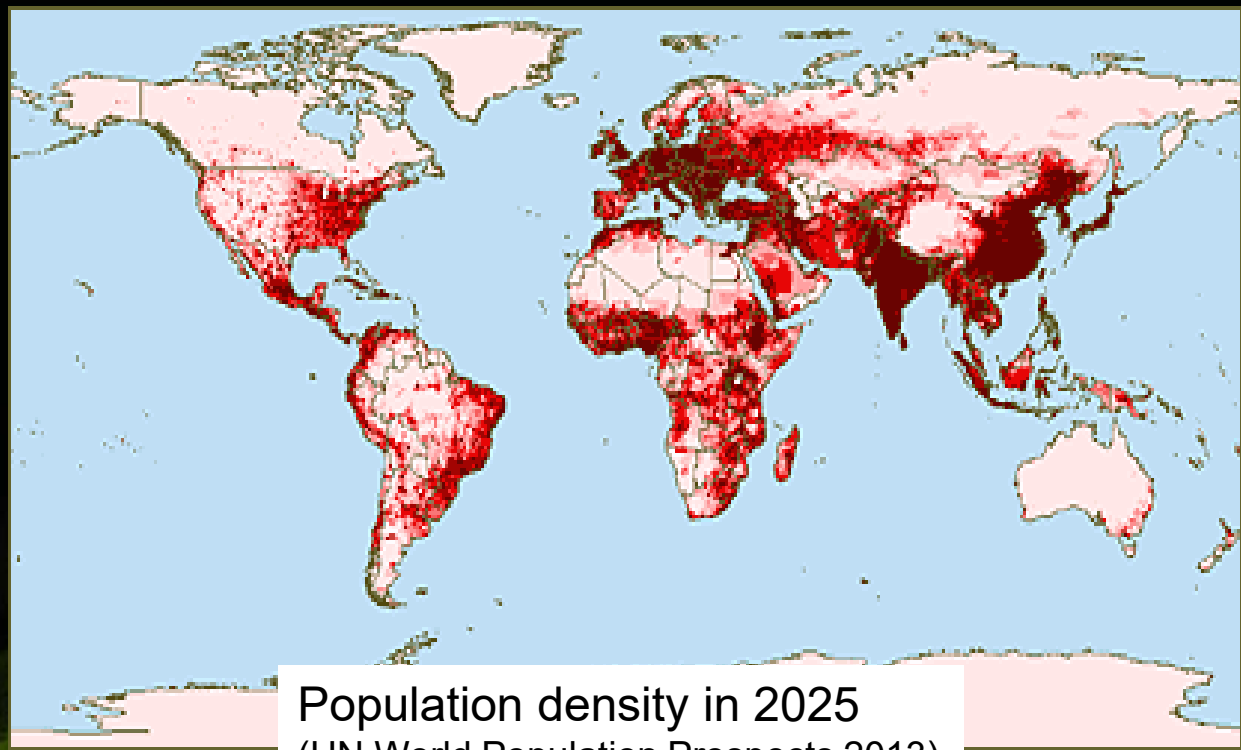
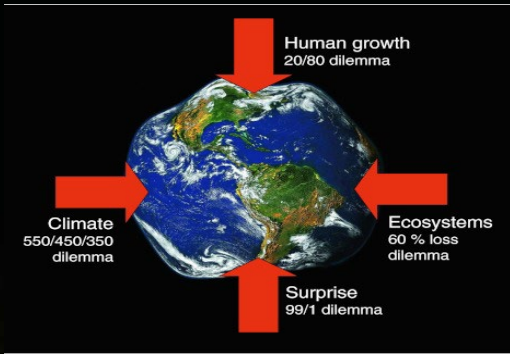
Global warming:
Temp: 13.8 → 18° C?
GHG: 320 → 550 ppm
Dilemma

Surprises/Extreme events
The 99/1 Dilemma



Population growth, Consumption growth The 20/80 Dilemma

<u>Year</u>	<u>World Population</u>
1700:	600 million
1990:	5,300 million
2024:	8,100 million

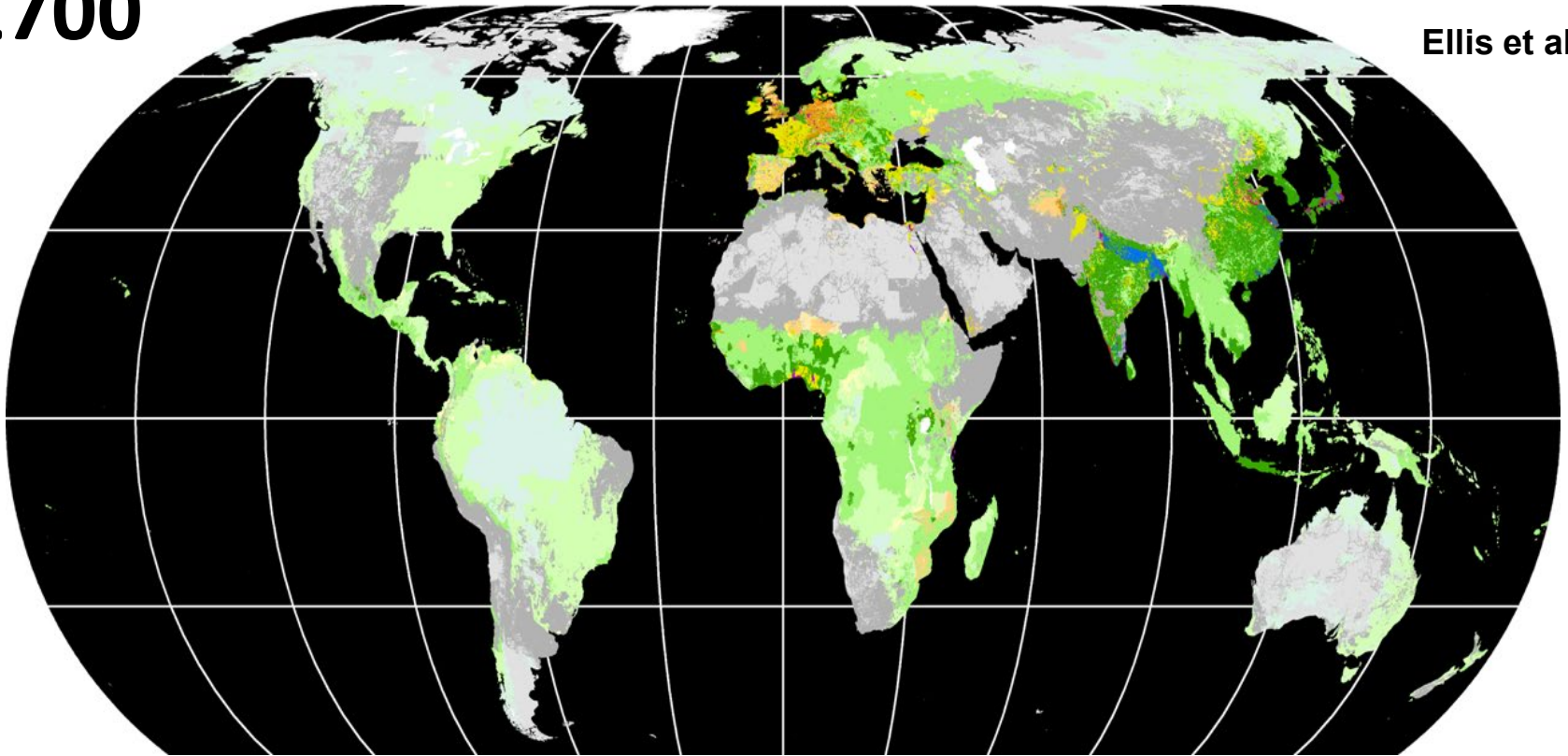


Population density in 2025
(UN World Population Prospects 2013)

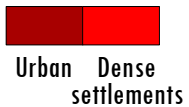
The dramatic change in land use

1700

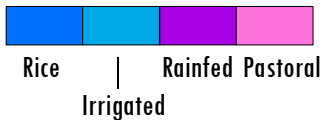
Ellis et al. 2010



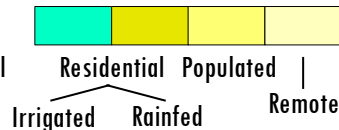
Urban



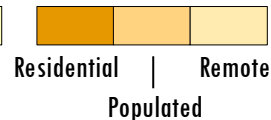
Villages



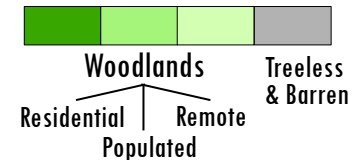
Agricultural land



Pasture

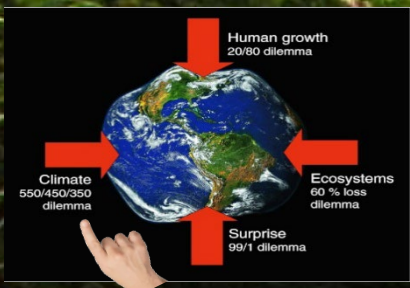


Semi-natural

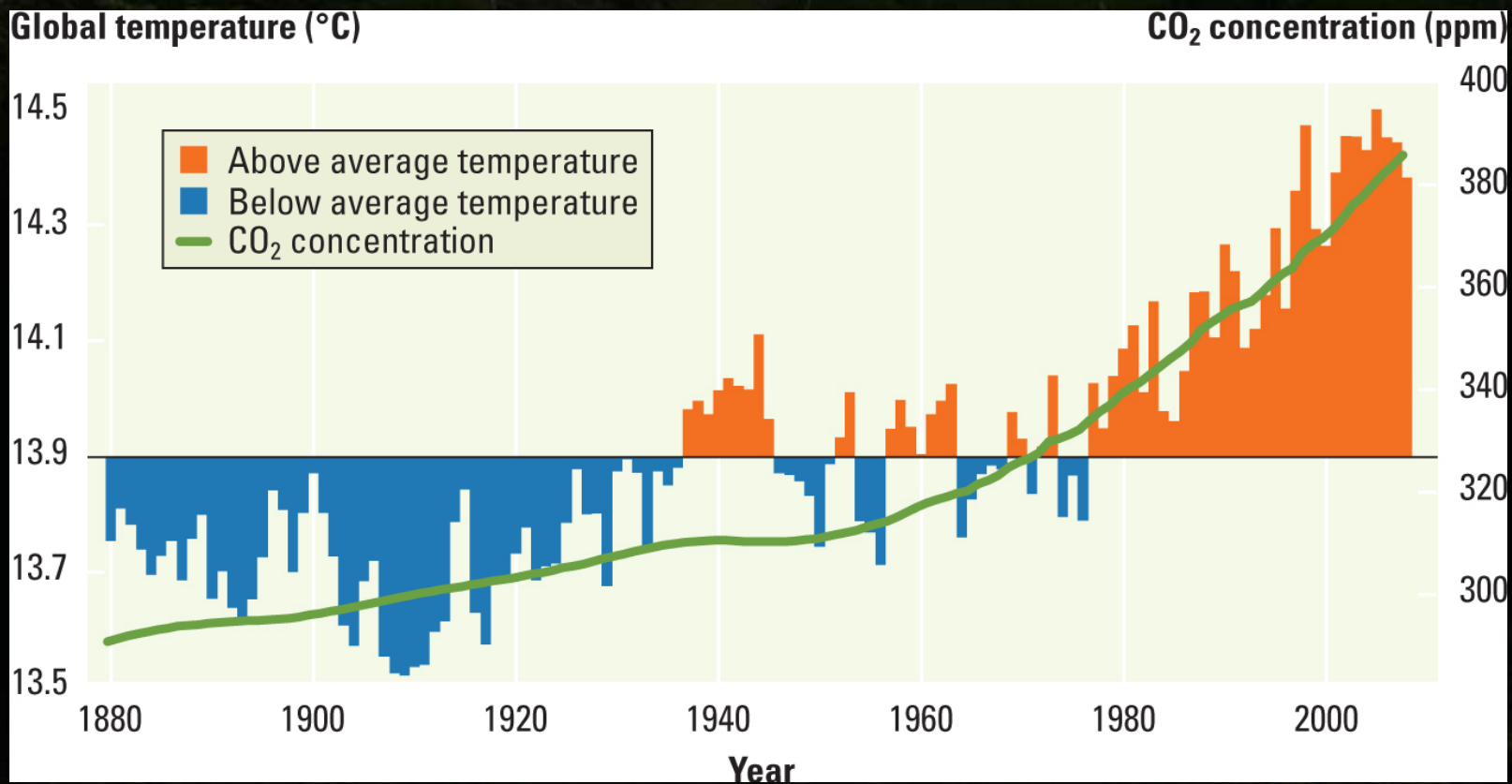


Natural



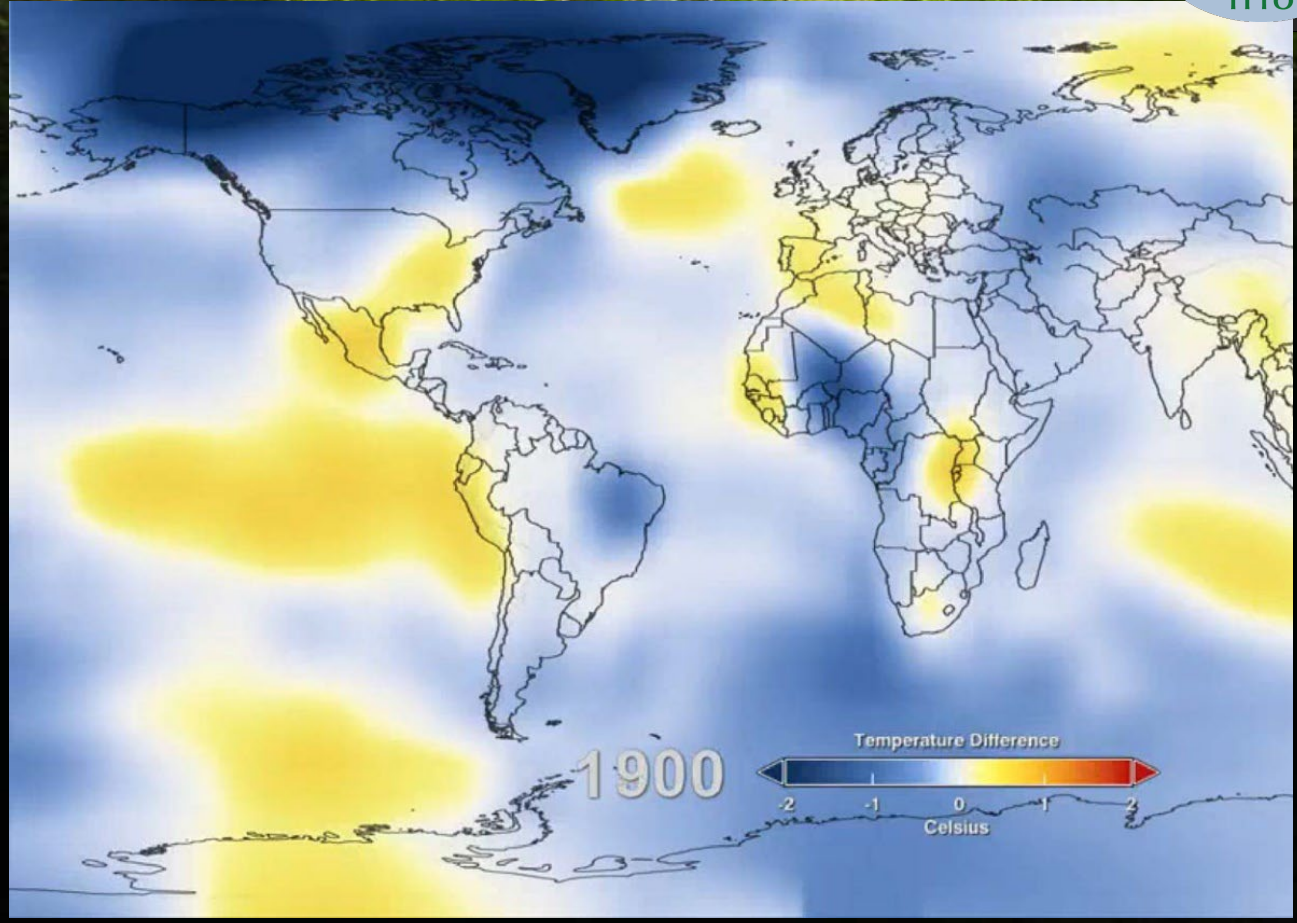
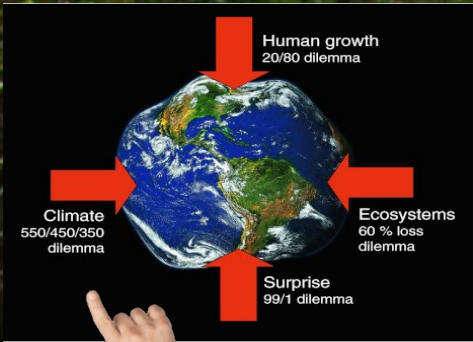


[Jan 2024: 422 ppm]

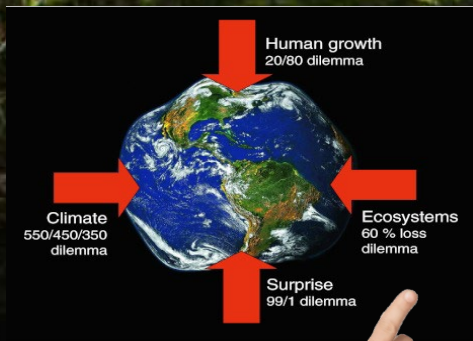


Source: Adapted from Karl, Melillo, and Peterson 2009.

Note: Orange bars indicate temperature above the 1901–2000 average, blue bars are below average temperatures. The green line shows the rising CO₂ concentration. While there is a clear long-term global warming trend, each individual year does not show a temperature increase relative to the previous year, and some years show greater changes than others. These year-to-year fluctuations in temperature are attributable to natural processes, such as the effects of El Niños, La Niñas, and volcanic eruptions.



<https://svs.gsfc.nasa.gov/5060>
<https://svs.gsfc.nasa.gov/vis/a000000/a005000/a005060/GISTEMP-2022-TemperatureAnomalyBothCelsiusFahrenheit.mp4>



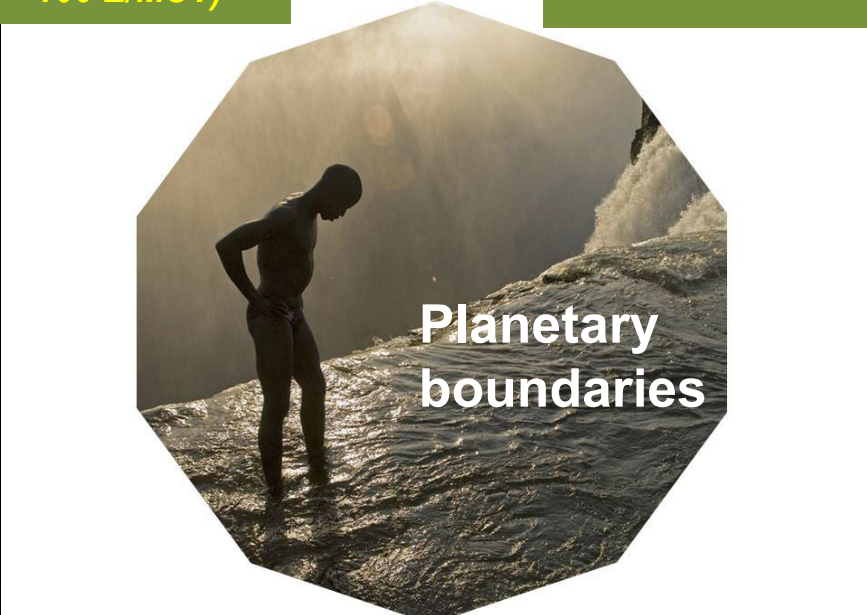
Loss of biodiversity
< 10 E/MSY
(< 10 - < 100 E/MSY)

Carbon
< 350 ppm CO₂ < 1W m²
(350 – 550 ppm CO₂ ;
1-1.5 W m²)

Ecosystem services

The 60% loss dilemma

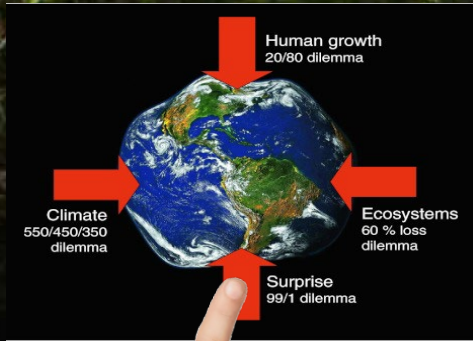
New Scientist, 2009; Rockstrom 2012)



Planetary boundaries

Forest and Land Use
≤15% of cultivated land
How much deforestation can we afford?

Fresh water
Storage and run-off
<4000 km³/yr
(4000 – 6000 km³/yr)



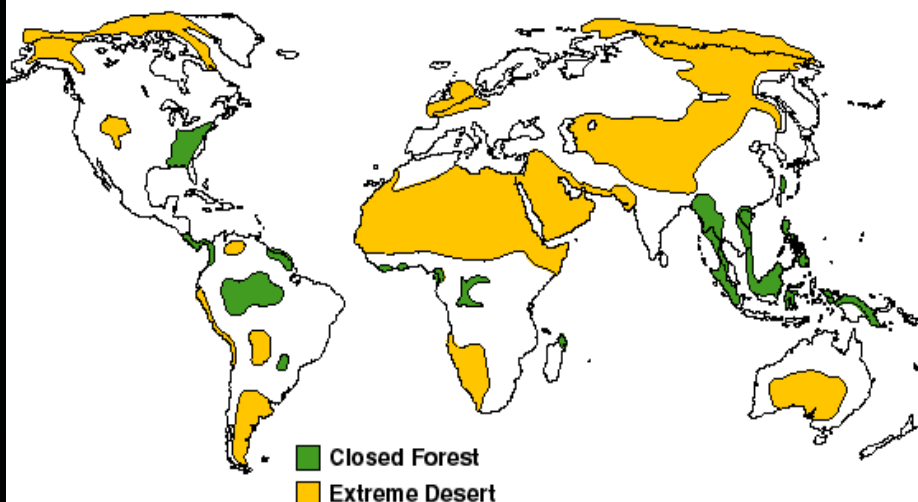
“Only humans know catastrophes – if they survive them; nature does not – it adapts”

**Unexpected
events, surprises
The 99/1 Dilemma**

(Max Frisch, 1981,
Man in the holocene)

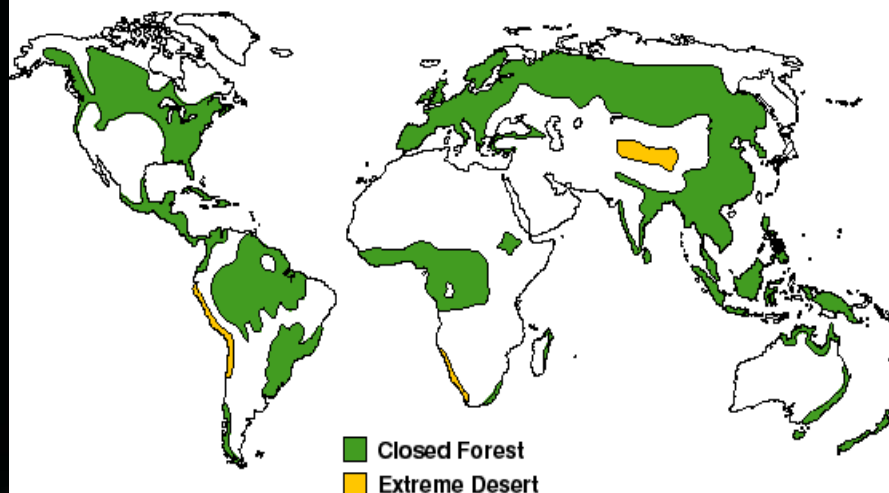
And forests? ...panta rhei*

Last Glacial Maximum (18,000 ¹⁴C years ago)



About 2 billion ha of forests

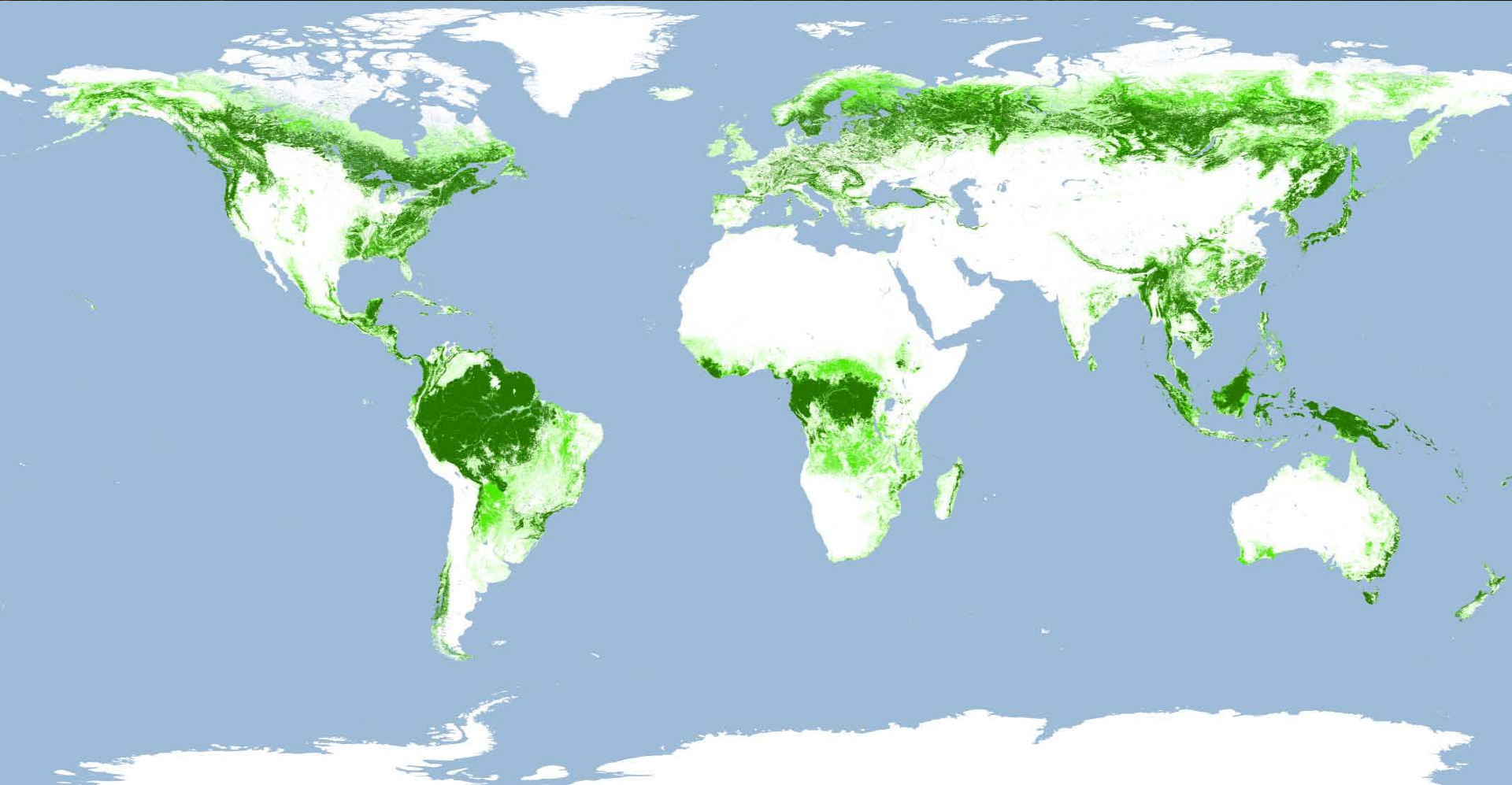
Early Holocene (8,000 ¹⁴C years ago)



About 9 billion ha of forests

* "Everything flows, and nothing remains"

Forest cover today



Forest area 2020: 4 billion ha

Boreal and temperate climatic zone

1,900 million ha
22% of the land
area



Nearly one-third of the land on earth is covered by forests

2,100 million ha
37% of the land
area



Tropical and subtropical climatic zone



Boreal

Temperate

Tropical



Total forest area in the climatic zone:

1.1 billion Ha

0.8 billion Ha

2.1 billion Ha

Change dynamic of the forest area:

stable

Slightly increasing

Decreasing (with variations)

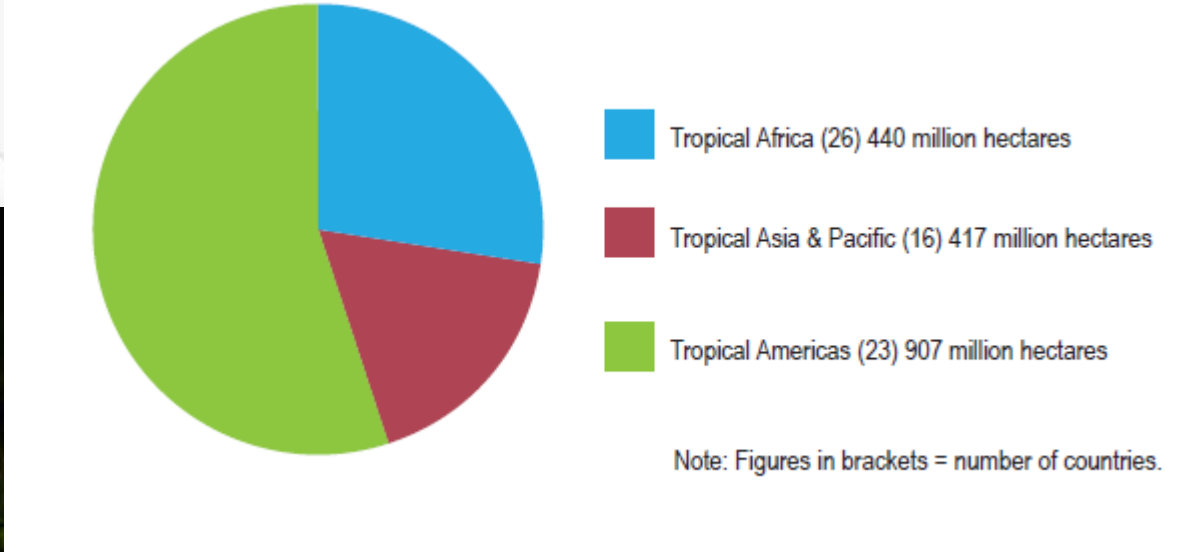
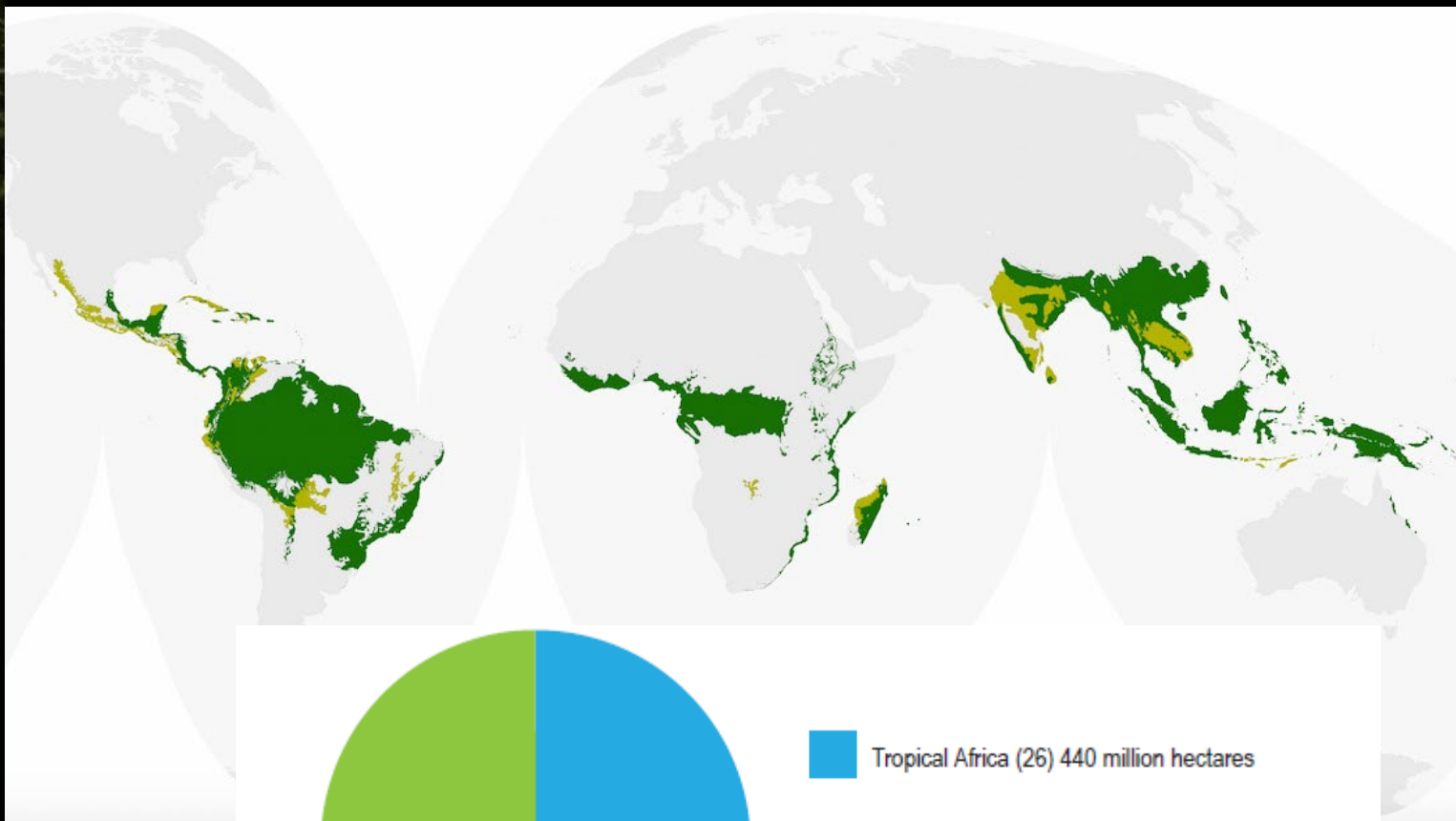
Population (billion) und change dynamic (UNPC 2022):

0.2, stable

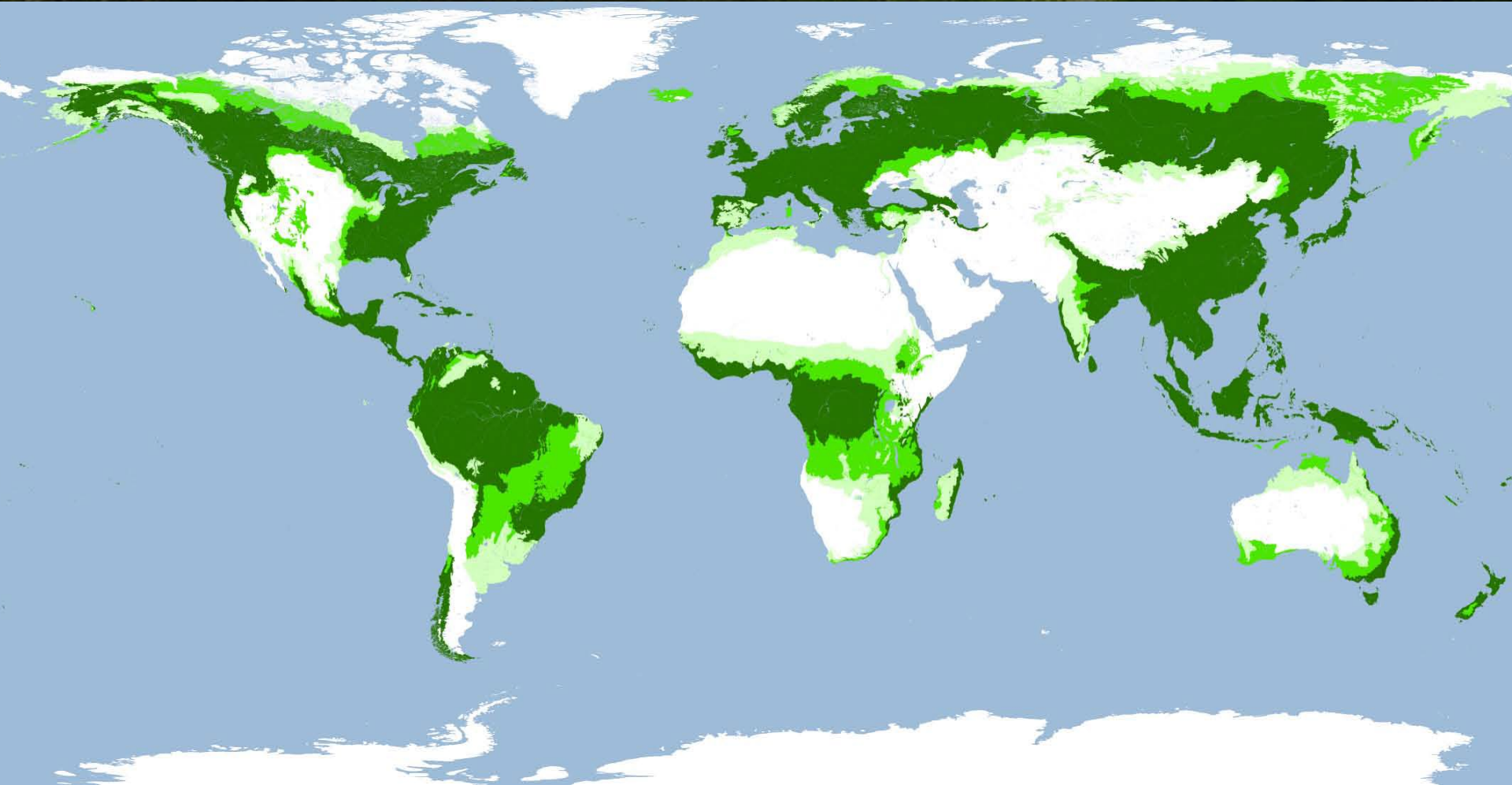
3.2, stable

4.7, increasing

Natural tropical PFE estimated at 761 m ha, comprising 403 m ha of production PFE and 358 m ha of protection PFE

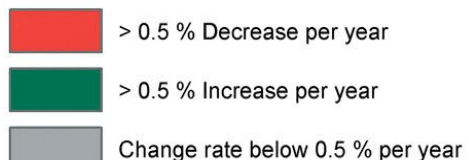
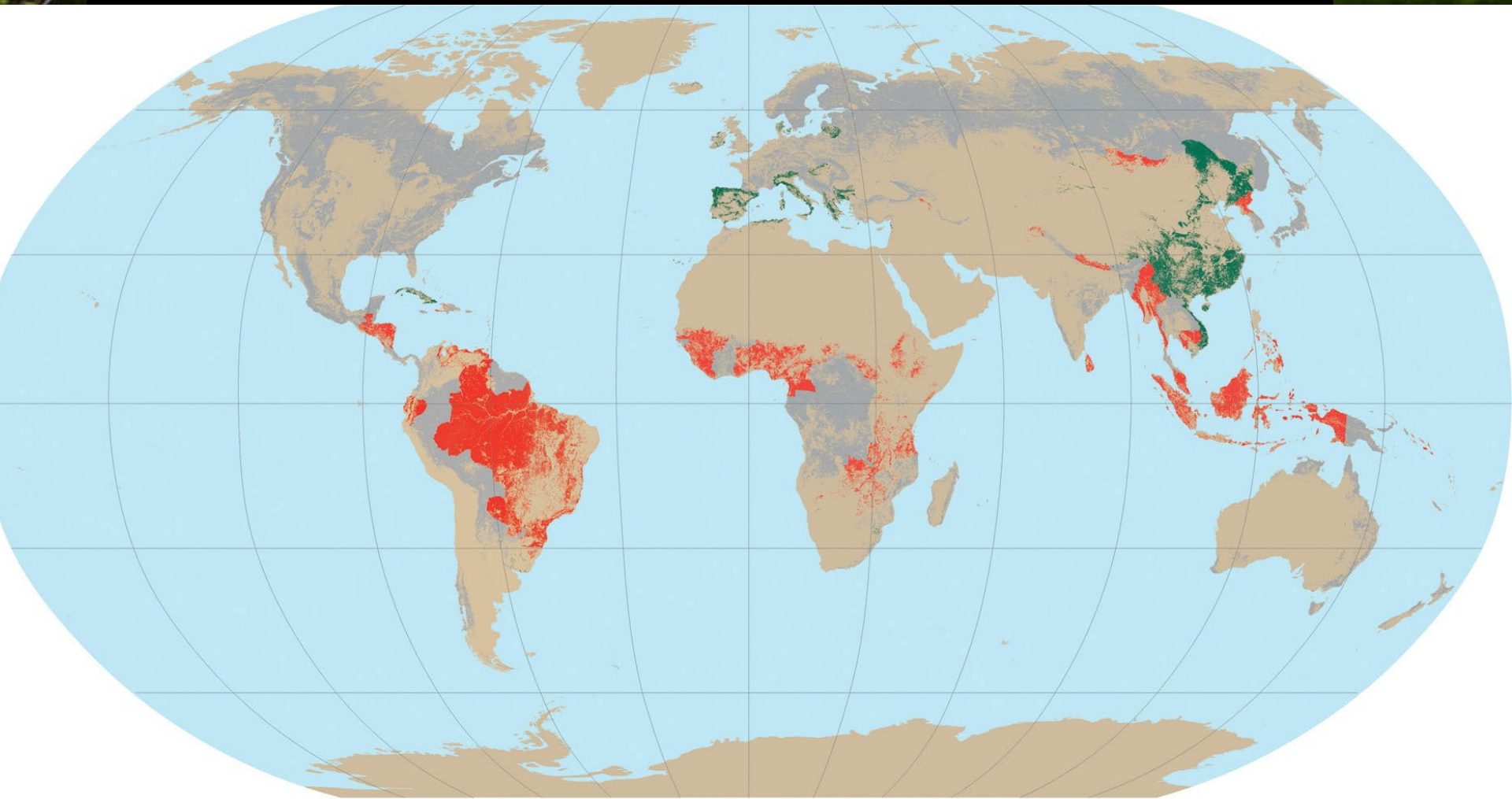


Panta Rhei – Where forests could possibly grow (under the current climatic conditions)



Forest cover dynamics 2000-2020

(FAO, 2020)



Forests are living space for indigenous communities



boreal/Siberia



Kuna Yala



Baka



Penan

Living space but endangered

Deforestation for pasture (Western Amazon)





Deforestation: soy (*first or second stage*)



Deforestation for Agriculture (oil palm, pineapple,...)



Peat-swamp forests – 2005 Sarawak

Peat-swamp forests – 2010 Sarawak





Peat-swamp forests – 2012 Sarawak

Peat-swamp forests – 2015 Sarawak





Peat swamp forests in Sarawak, year7 after conversion of natural forest



Allover the humid tropics: mining in forest massifs



Forest Degradation: Preparation for cocoa planting by smallholders



Deforestation: unsustainable swidden agriculture (Madagascar)





(Madagascar)

Changing landscape through “decent” deforestation

Forest Degradation through intensive forest management (Sarawak)





Brunei

Sarawak

Forest degradation through opening up forests for logging



The trouble with our times is that the future is not what is used to be

This is particularly true for forests



Saying attributed to Paul Valéry

Extent of tropical forest landscapes globally 2020 (1530 Mio. Ha)

420 Mio. ha

160 Mio. ha

650 Mio. ha

300 Mio. ha*



12 m ha
certified



Primary forests
Including protected
forests,
Inaccessible forests

Production forests:
Concessions/com-
munity, private
arrangements

Opened-up forests:
Degraded “primary” and
secondary forests, often
unsustainably managed

Planted forests,
Agroforests,
Commercial p.
Mosaic landscape
(*deforested over the past
40 years)

“original” forest landscapes

“Degraded/modified” forest landscapes



Soon from now: A picture of the past
timber harvesting, 1990, Gabon © JBlaser



In 20 years: another picture of the past

Timber harvesting, 2012, Sarawak © JBlaser



Year 2300: Possible future of the Congo Basin

Southern Rep. of Congo, 2012 © JBlaser



Year 2100: Boreal Forest: more fire, more heat, faster successions
Ural Forests in northern Svetlovsk oblast, 2012 © JBlaser



Where do we stand today in sustainably managing the world's forests?

We know (overall) how to manage forests sustainably, but we (generally) don't do it!



Inequal prediction to climate change; loss of natural tropical forests; more vulnerability, land degradation at landscape level, biodiversity loss, unsustainable timber/fiber production...

Why do we not advance in sustainability managing our forests?



- No real consensus and common approach at international level in respect to the recognition of forests as a „global public good“. This is mostly due to extra-sectoral interests on the land and its resources and the lack of incentives → deforestation
- Forest products and services use considered as a national (sovereign) good, nations might not see a priority for SFM (compared with other issues that are in their political interest) → forest degradation
- Forest tenure, access to land and resources insufficiently clarified in many countries
- Common interests for forest exist, but often reduced to particular issues, which can be a disadvantage (biodiversity; role of forests in climate change; carbon)
- The obvious problem of the forest sector in respect to forest governance and law enforcement

Global forest policy, national and local realities over the past 25 years



- Global priorities for the forest sector do not necessarily reflect the priorities given in specific regional, national and local contexts
 - Deforestation drivers different in space and time but the end result at global level is the same: we need to sustain the forests and avoid deforestation
- Global forest challenges that existed over the past quarter century are continuing ones from earlier periods
 - Expanding SFM, contribution to food security and poverty reduction is not new, but urgent
- Most global forest challenges are related to challenges facing other sectors and are common among many countries
 - Deforestation can directly affect food security, climate change, biodiversity loss, ...
- Forest related challenges exemplify the overall challenge to deal with the conservation/development trade-offs
 - Deforestation from foresters' perspective always negative. Managing forest is balancing negative and positive elements: Value judging is embedded in the emphasis given on the forest functions

What future for our forests?



- Forests are changing – faster than expected
 - No linear development
(the past will not be the future)
 - Life support systems become more important
(demand for ecosystem services will become more crucial and more political)
 - Increased demand for wood and fibres
(which in principle is good for sustainable forest management)
- Policy and Governance will be key, as well as the knowledge on how to manage forests sustainably

As the Material of the future: wood and fibers



Intelligent wood structures



Bioenergy



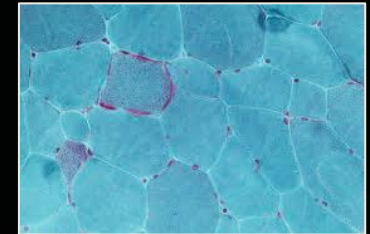
Clothing



Composites



Biochemicals



Pharma/well-being



Innovative paper & wood products



Packaging



Biopolymers

We need sustainable managed forests of all kind → remember, there is no exit...



Not 4 billion as today, maybe 5 or 6 billion ha..



Natural forests



**Forest-Landscape
mosaics**



Even urban forests



**Intensively managed
seminatural and planted
forests**



Forests Goals and global issues

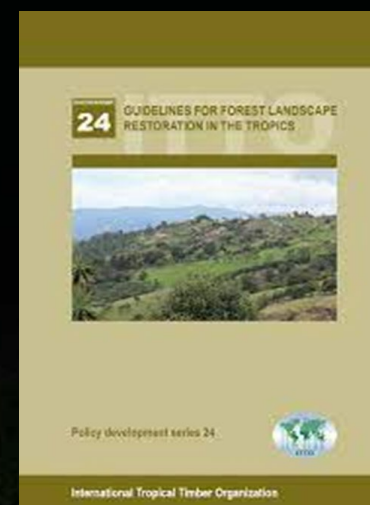
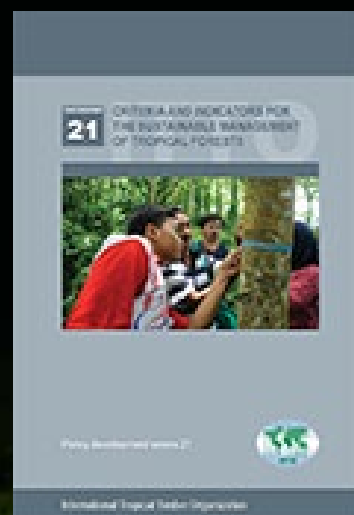
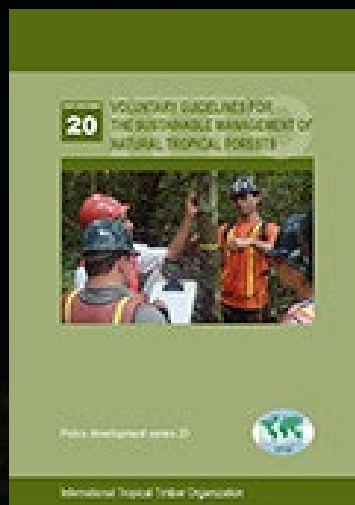
- Ecosystem services: resilience
- Permanence of forest carbon pools
- Wood: timber and fiber

$$\text{SFM}_{\text{future}} = \sum (\text{Eco}_{\text{Serv}} ; \text{Perm}_{\text{CaPo}} ; \text{Prod}_{\text{Fib}})$$



Our workshop:

Introducing ITTO C&I and Policy Guidelines as tools for assessing sustainable forest management and to address the role of forest in times of global change



Even if I knew that tomorrow the world would go to pieces, I would still plant my apple tree.
Martin Luther.