

Collapse or resilience of civilization: A role for forests and trees?

Forests, trees and agroforestry for diverse sustainable landscapes

22-24 June 2021

Robert Nasi, CIFOR



THE Sun
NEWS WEBSITE OF THE YEAR

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< EWS FABULOUS MONEY MOTORS TRAVEL TECH DEAR DEIDRE

All Tech Science Phones & Gadgets Gaming

HU-MOAN-ITY Human civilisation 'will collapse by 2050' and intelligent life could be 'annihilated', shock paper warns

By Sean Keach, Digital Technology and Science Editor
4 Jun 2019, 11:56 | Updated: 4 Jun 2019, 13:18

13 COMMENTS

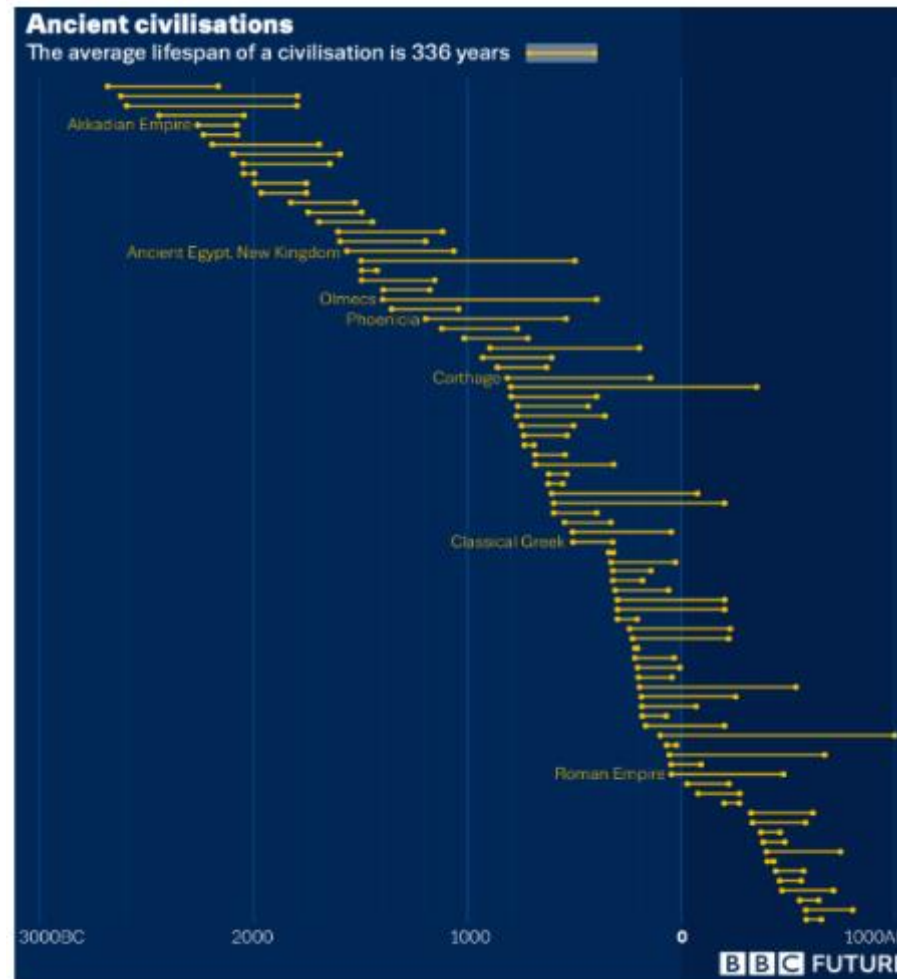
HUMAN civilisation could be well on its way to total collapse by 2050, according to a shocking new research paper.

Researchers have modelled the potential for climate disaster and warn that such a catastrophe risks "annihilating intelligent life" within our lifetimes.



Researchers warn that rising sea levels could devastate humanity Credit: Alamy

The average lifespan of a civilization is 336 years

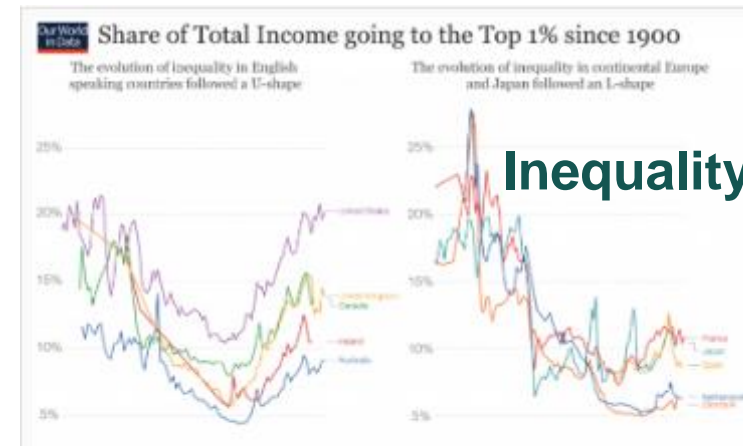
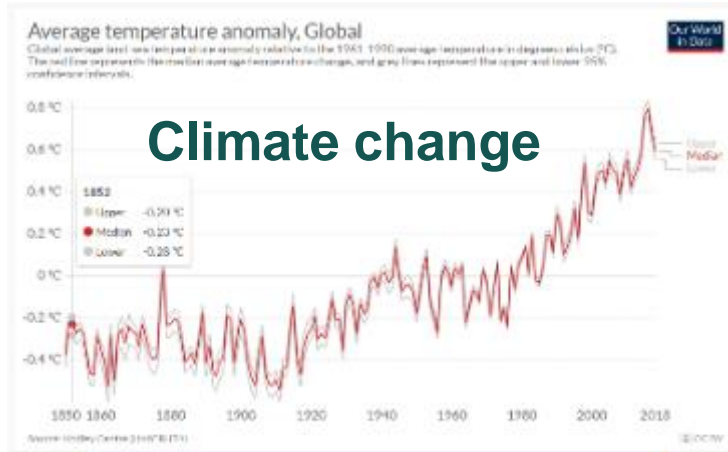


Luke Kemp, BBC, Feb 2019

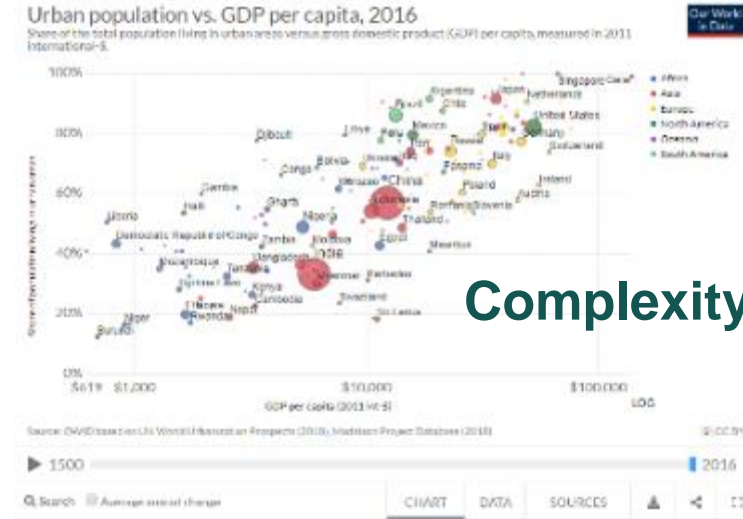
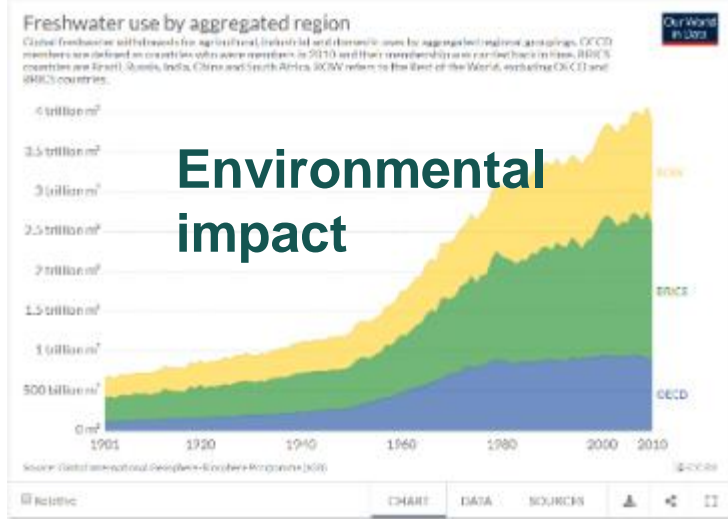
Societies collapse because:

- Climate changes
- Environment is degraded
- (Natural) resources are depleted
- Inequality increases
- Society becomes too complex
- Hit by external shocks
- Bad luck (“s...t happens”)



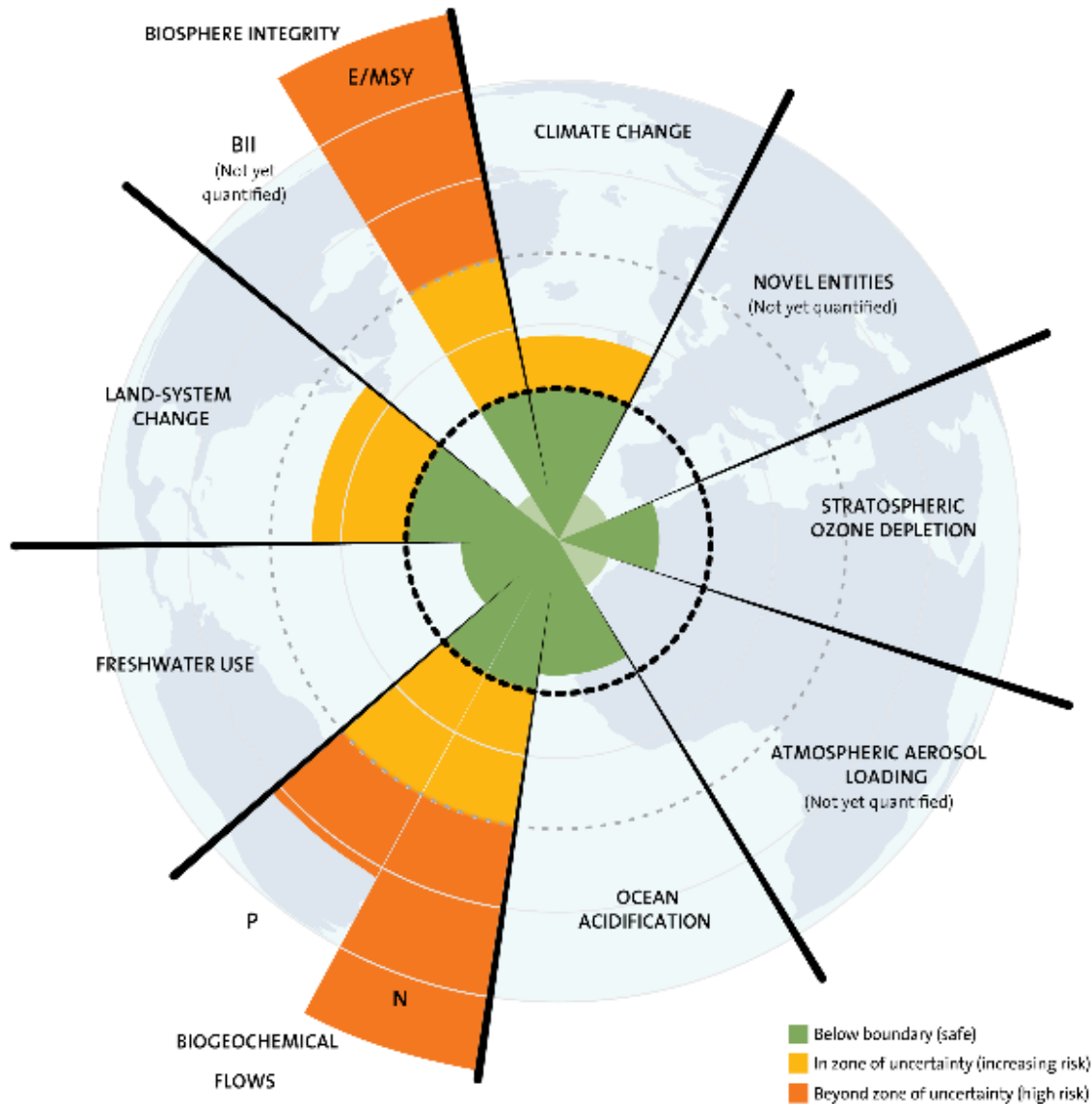


History suggests when these indicators rise, the risk of collapse is increasing



All graphs from "Our World in Data, accessed 9/06/2019





Four of nine planetary boundaries have now been crossed as a result of human activity

The four are: climate change, loss of biosphere integrity, land-system change, altered biogeochemical cycles (phosphorus and nitrogen).

Steffen et al. 2015. Planetary Boundaries: Guiding human development on a changing planet. Science Vol. 347 no. 6223



Is collapse in the near to medium term certain or is there a brighter future?

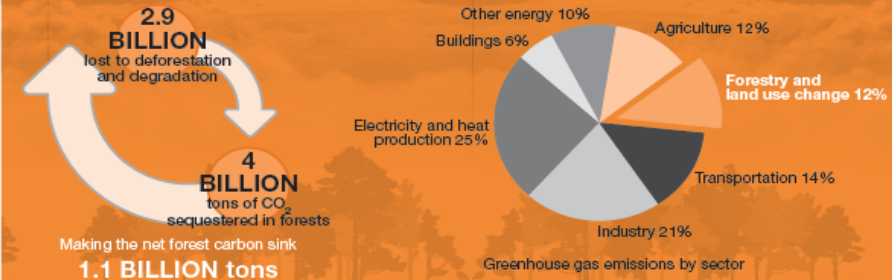
Why forests matter?

<https://medforest.net/2018/10/24/european-commission-promotes-new-bioeconomy-action-plan/>

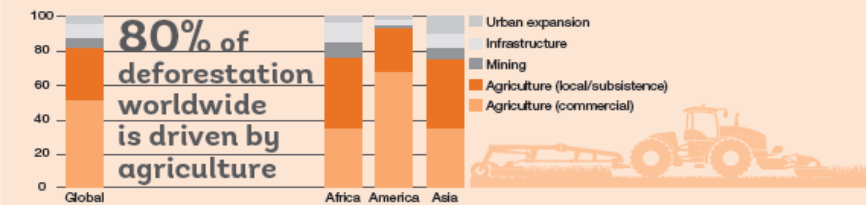
Forests, Trees and Agroforestry systems: why they matter?

FORESTS SLOW CLIMATE CHANGE AND INCREASE RESILIENCE

Forests provide a critical carbon sink. It is eroded however by deforestation and forest degradation.



Sustainable management of rural landscapes can reduce pressure on forests.



About 2 billion hectares of degraded forest land could be restored to functional, productive ecosystems that help fight climate change.

In Niger, planting nitrogen-fixing trees among crops increased sorghum yields by 20–85% and millet yields by 15–50%, while enhancing people's resilience in times of drought.

By integrating trees on their farms, cattle ranchers in Colombia, Costa Rica and Nicaragua increased average milk productivity by 18%, decreased soil erosion by 88%, and increased their net income per hectare by 55%.

Restoring just 350 million hectares of forest could produce an estimated \$170 billion of yearly benefits in watershed protection, agricultural productivity, and forest products.

In Ethiopia, the restoration of native forest in Humbo will absorb about 880,000 metric tons of CO₂ over the next 30 years, generating carbon payments and income from forest products.

Sources: Pan, Y., et al. (2011). *A large and Persistent Carbon Sink in the World's Forests*; IPCC (2014). *Summary for Policymakers, Climate Change 2014: Mitigation of Climate Change*; Hosonuma N., et al. (2012). *An assessment of deforestation and forest degradation drivers in developing countries*. Environmental Research Letters; Global Partnership on Forest Landscape Restoration (2011); World Bank (2011). *Climate-smart Agriculture: a call to action*; World Bank (2006). *Colombia, Costa Rica, and Nicaragua—Integrated Silvopastoral Approaches to Ecosystem Management Project—Implementation Completion Report*; New Climate Economy (2014). *Better Growth, Better Climate: The New Climate Economy Report*; World Bank (2013). *Ethiopia Humbo Community Based Natural Regeneration Project—Implementation Status Result Report*.

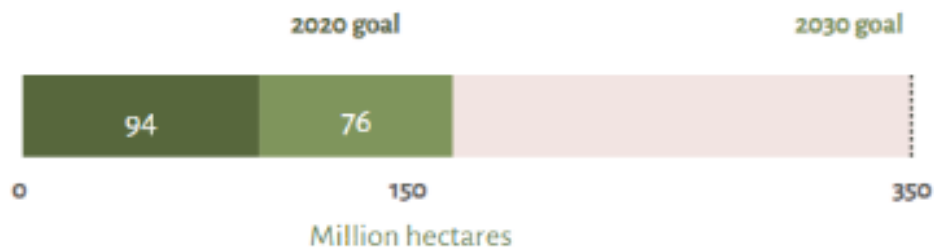


Forest Landscape Restoration

- Around 12 million hectares of land are lost each year to degradation.
- Harming the wellbeing of at least 3.2 billion people,
- Costs more than 10% of annual global GDP in lost ecosystem services
- \$6.3 trillion lost per year to land degradation

- Net benefit \$0.7 - \$9 trillion by achieving Bonn Challenge
- \$7–30 in economic benefits for every dollar invested

170.43 million hectares pledged



Commitments



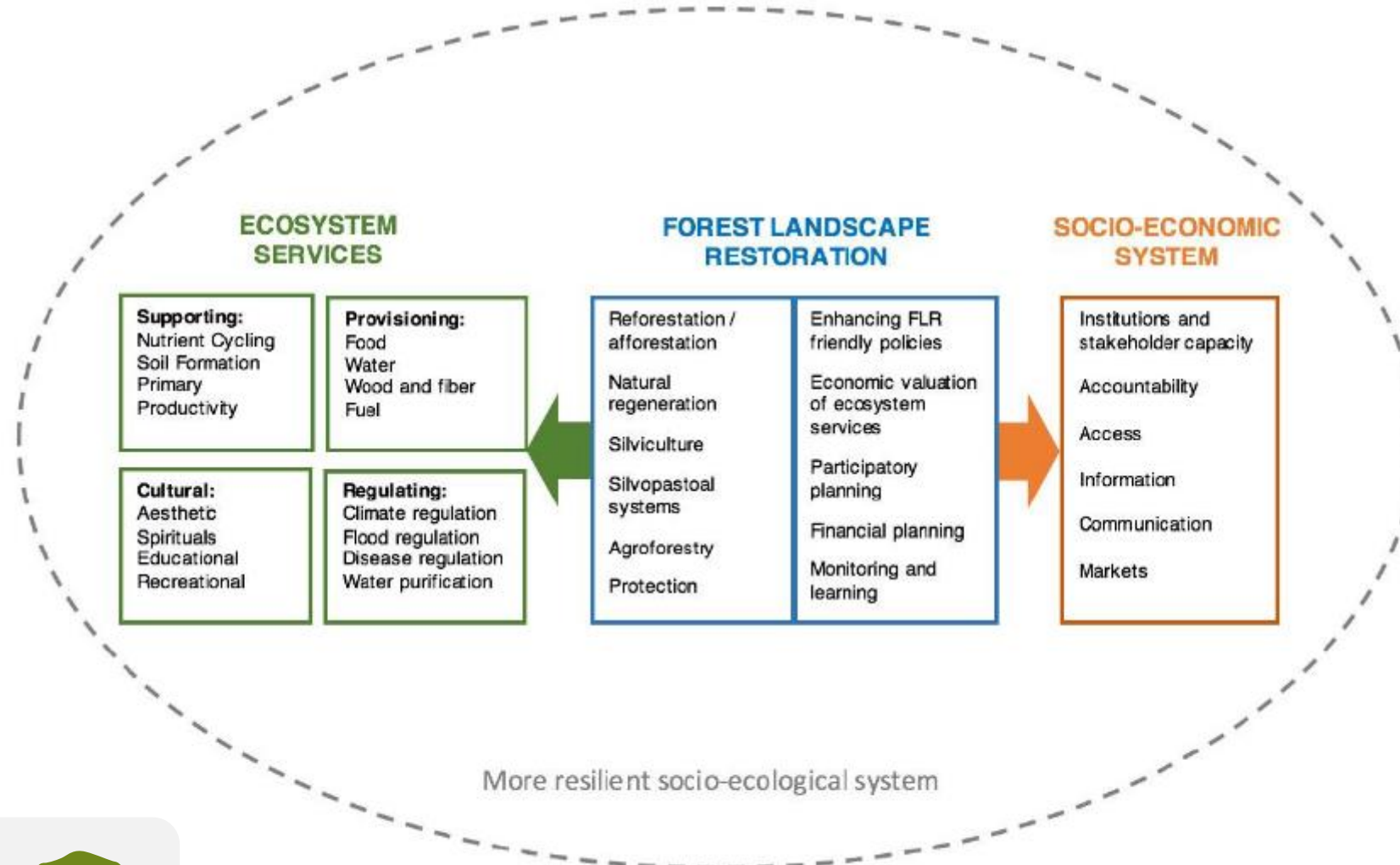
Potential

Climate benefit:
15.66 GtCO₂ sequestered

Economic activity:
48,424 million USD



Forest Landscape Restoration enhance resilience of socio-ecological systems



Bio-economy

Wood in construction...

- **2.2 t of CO₂ are avoided by using 1 t of wood instead of Portland cement**
- **Better thermal efficiency**
- **Material use** is reduced by 50% compared to concrete

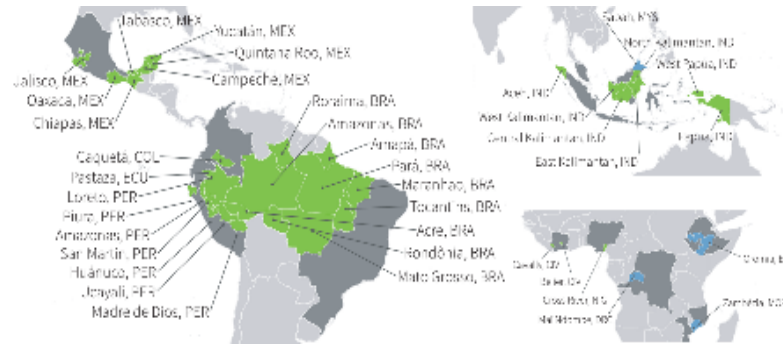
Wood-based textiles...

- Global production of textile fibres:
 - 93 Mt (2016)
 - 250Mt (2050)
- **Carbon footprint from “new” wood-based textile fibres can be up to 9 times lower than synthetic ones**

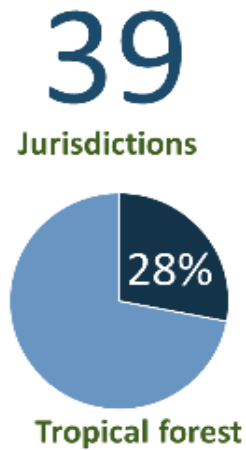
Product categories	Average substitution effect kg C / kg C wood product	Average substitution effect kg CO ₂ eq. / kg wood product
Structural construction	1.3	2.4
Non-structural construction	1.6	2.9
Textiles	2.8	5.1
Other product categories	1 – 1.5	1.8 – 2.7
Average across all product categories	1.2	2.2*



Jurisdictional Approaches to Low Emissions Development



Key Global Findings



19 of 39
Reduction
relative to
FREL

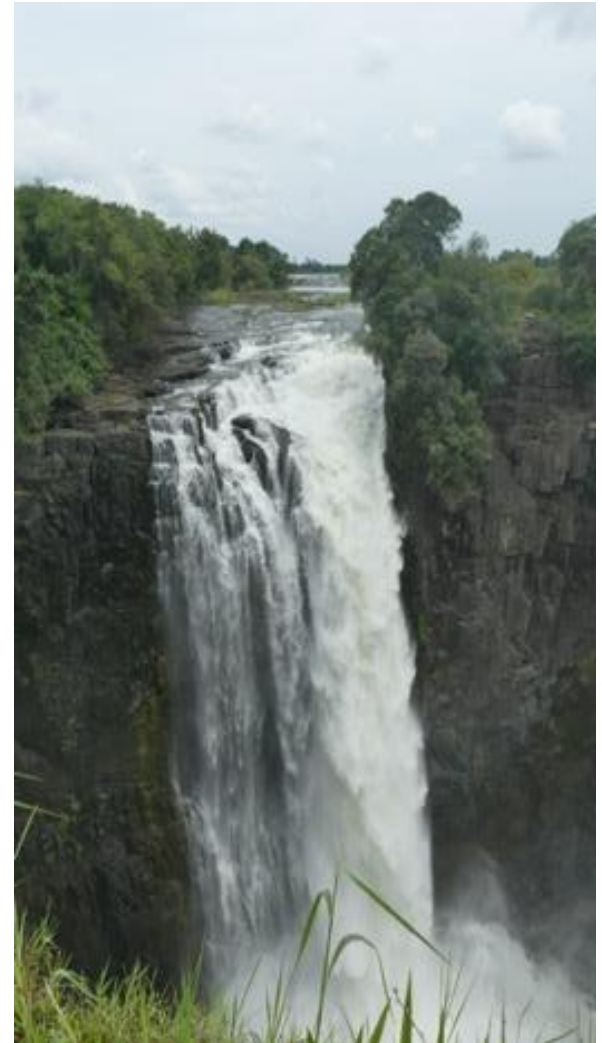


38 of 39
Formal
commitments &
concrete actions

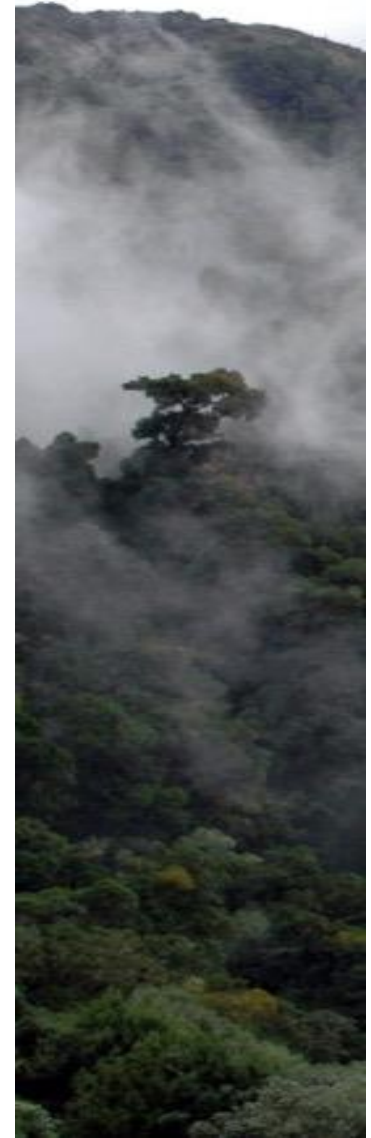
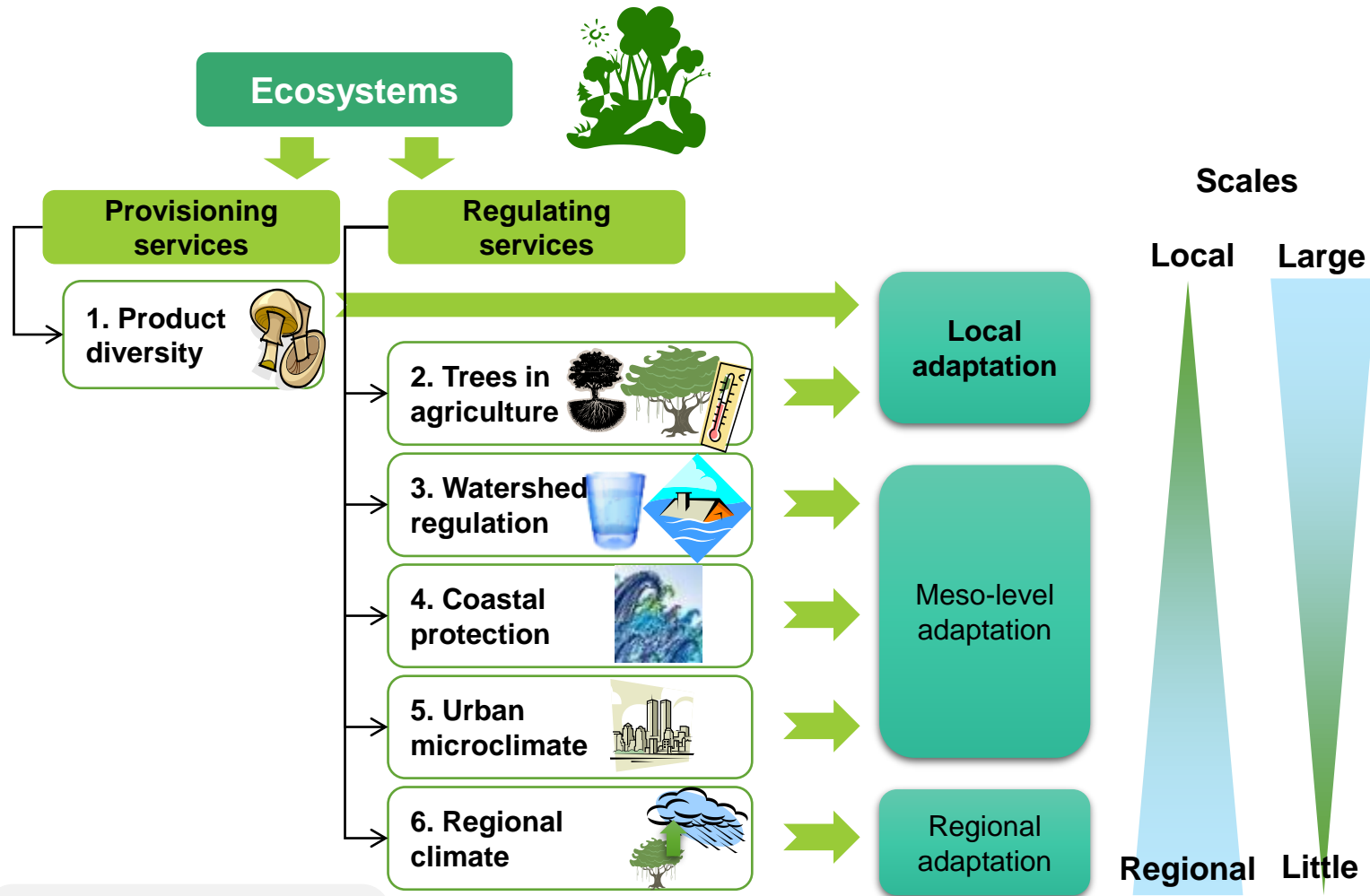


6.8 GtCO₂e
Avoided emissions

69.2 GtC
Total carbon stock



Ecosystem Based Adaptation



Forests, Trees and Agroforestry systems: Why they matter?

Forests create jobs and wealth.



\$600 BILLION

The formal timber sector contributes \$600 billion to the global economy —about 1% of GDP.

In Africa, including informal wood production in GDP estimates would double timber's contribution to GDP.

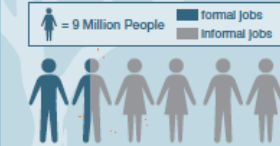
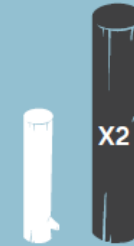
54.2 MILLION JOBS

The timber sector employs **13.2 million** people formally and another **41 million** people informally.



X4

World **DEMAND FOR TIMBER** is expected to **QUADRUPLE** by 2050.



Forests provide critical environmental services.

Agriculture

In Zambia, increased tree cover combined with conservation farming has doubled maize yields.

X2

Water



Thanks to watershed services from forests, New York City's water utility saved \$6.5-8 billion in filtration costs over some 9 years.

Energy

Reforestation in China's Loess Plateau significantly reduced the sediment load in the Yellow River, saving the Three Gorges Hydropower Plant \$40 million annually in reservoir enhancement costs.

Infrastructure

In Vietnam \$1.1 million invested in mangrove forests saved \$7.3 million annually in avoided flood control measures.

Sources: FAO (2014). *Contribution of the Forestry Sector to National Economies, 1990-2011*; FAO (2014). *State of the World's Forests*; World Bank (2013). *An 'Evergreen' revolution Cuts Fertilizer for Africa's Farms*; World Resources Institute (2011). *Forests for Water: Exploring Payments for Watershed Services in the U.S. South*; Zhao-Yin, W. et al. (2014) *River Dynamics and Integrated River Management*; International Federation of Red Cross and Red Crescent Societies (2002). *The World Disaster Report Focusing on Reducing Risk*.



Food security

Forests occupy 1/3 of the earth's land area.

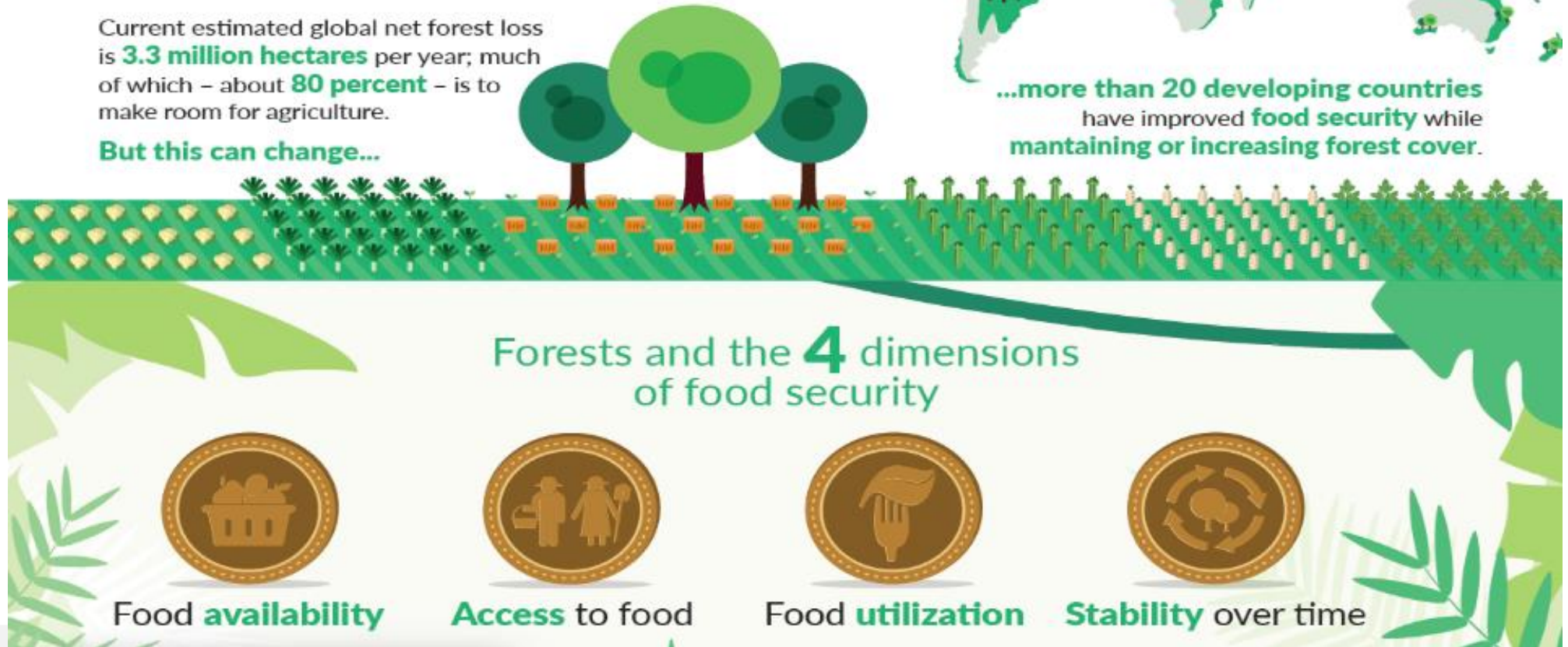
An estimated **1/3 of the global population** depends on forest goods and services such as food, woodfuel, medicines, employment and income.



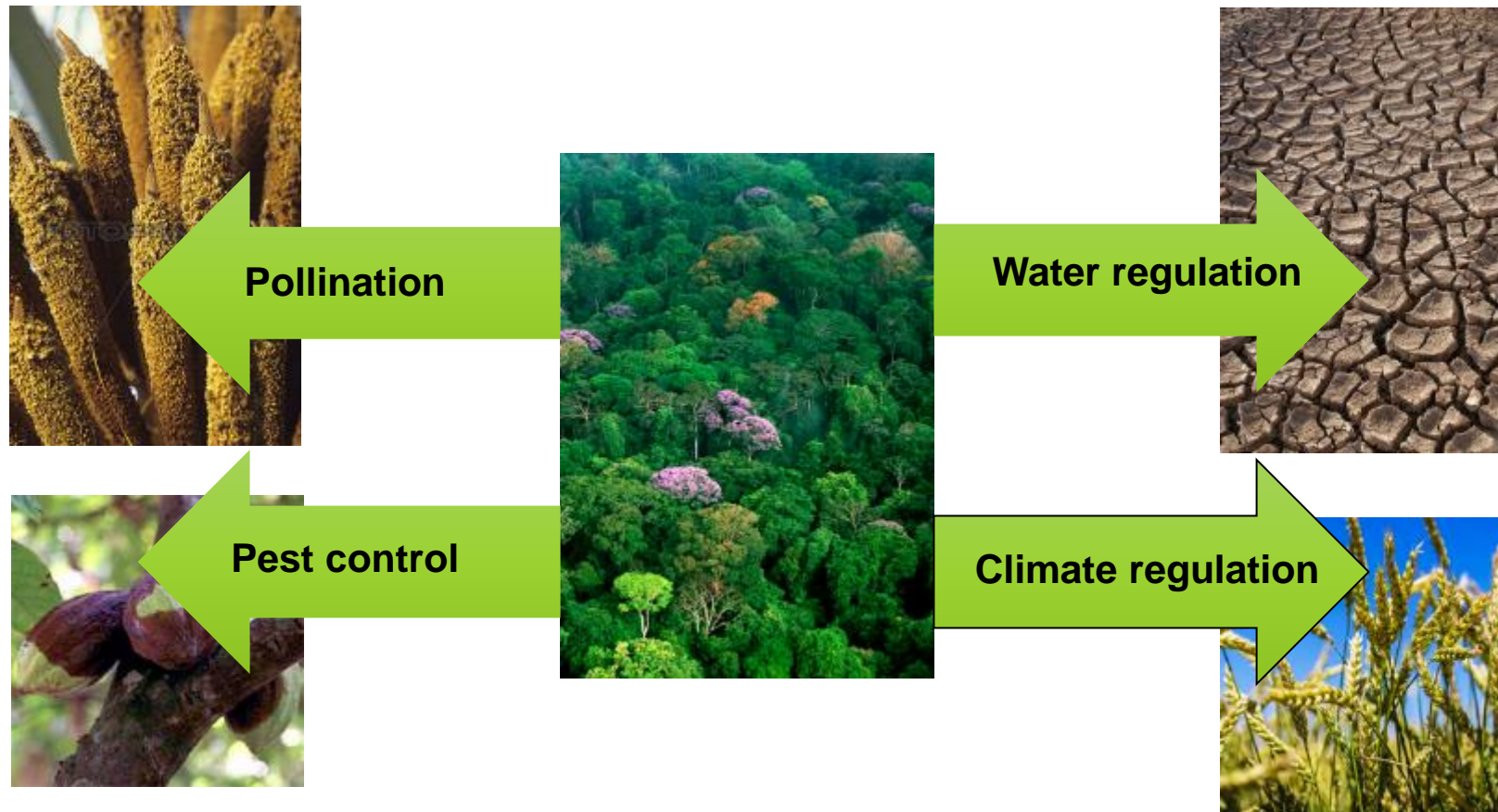
Current estimated global net forest loss is **3.3 million hectares** per year; much of which – about **80 percent** – is to make room for agriculture.

But this can change...

...more than 20 developing countries have improved **food security** while maintaining or increasing forest cover.



Forests and trees sustain agriculture



Relationship between agriculture and forests must change:

- Preserve permanent forest land and develop appropriate forest management plans.
- Promote an integrated landscape approach moving beyond the debate on land sparing vs. land sharing.
- Ensure full and effective participation of relevant stakeholders in forest policies and forest management.
- Adopt a rights-based approach and favour community vs agribusiness approaches



Food Sec. (2015) 7:535–554
DOI 10.1007/s12571-015-0466-5

ORIGINAL PAPER

Improving diets with wild and cultivated biodiversity from across the landscape

Bronwen Powell¹ · Shakuntala Haraksingh Thilsted² · Amy Ickowitz¹ ·
Celine Termote³ · Terry Sunderland¹ · Anna Herforth⁴

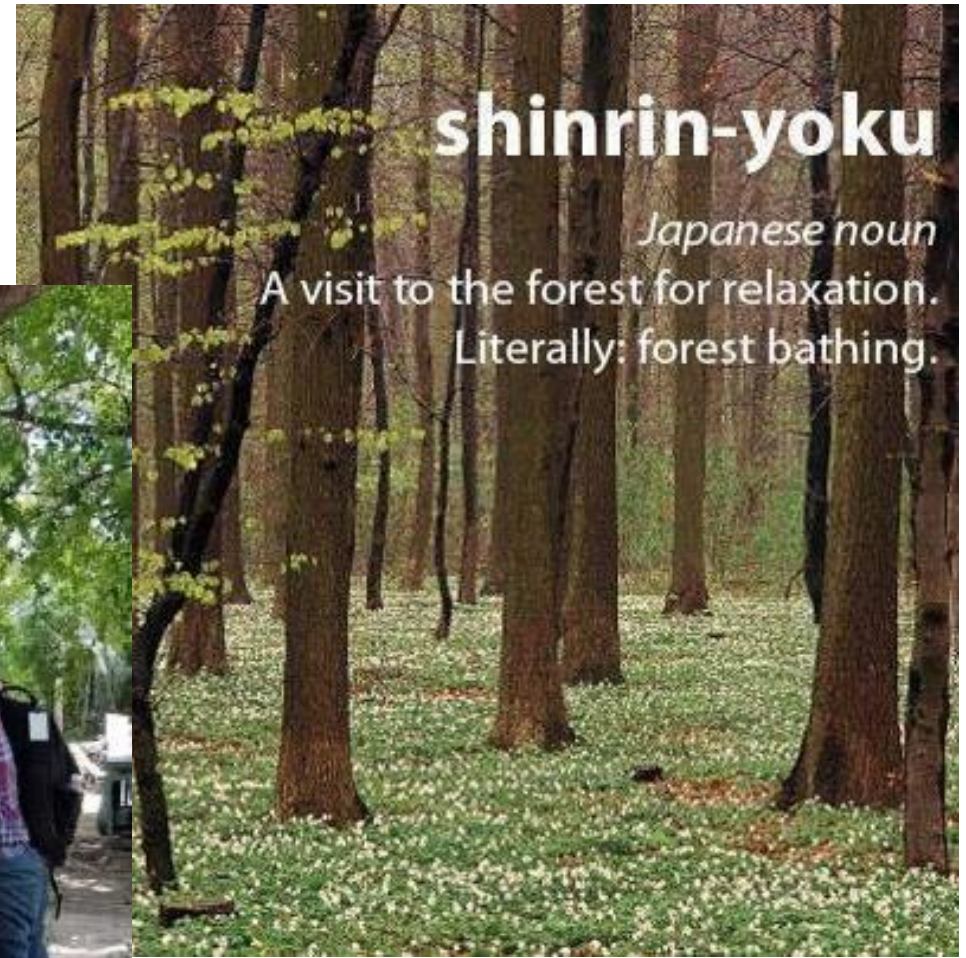
*“The relationship between biodiversity and nutrition, suggests that we need to **pay close attention to the potential of integrated approaches**. We must also seek to understand what the implications are for policy and what the messages to policy makers should be. **Primarily, it suggests there is a need for more systems and multi-sectorial approaches to address the contemporary concurrent challenges of sustainable food systems that include forestry, conservation, agriculture, food security and nutrition**”.*

Powell et al., 2015



Well-being

6 WAYS TREES BOOST OUR WELL-BEING



shinrin-yoku

Japanese noun

A visit to the forest for relaxation.
Literally: forest bathing.



Socio-environmental resilience requires a shift from fossil-based to a bio-based resource economy

We need more forests and trees and greater use of forest and tree resources!

Under which conditions?

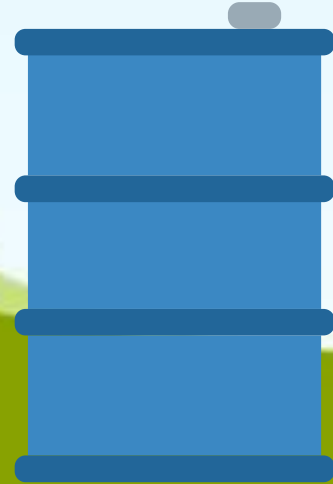
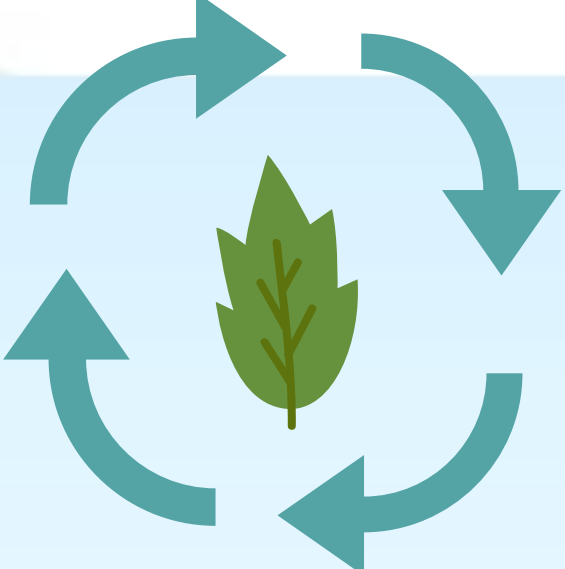
Following which actions?

The next challenge?



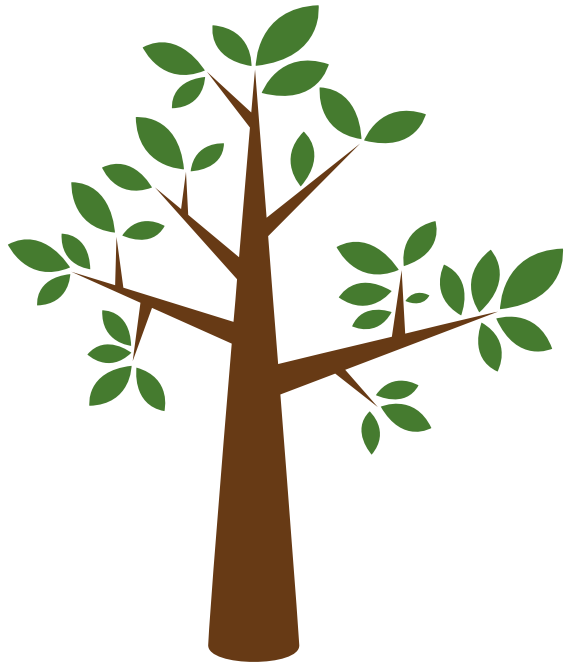
<https://medforest.net/2018/10/24/european-commission-promotes-new-bioeconomy-action-plan/>

**Bio-economy to
replace fossil
economy**

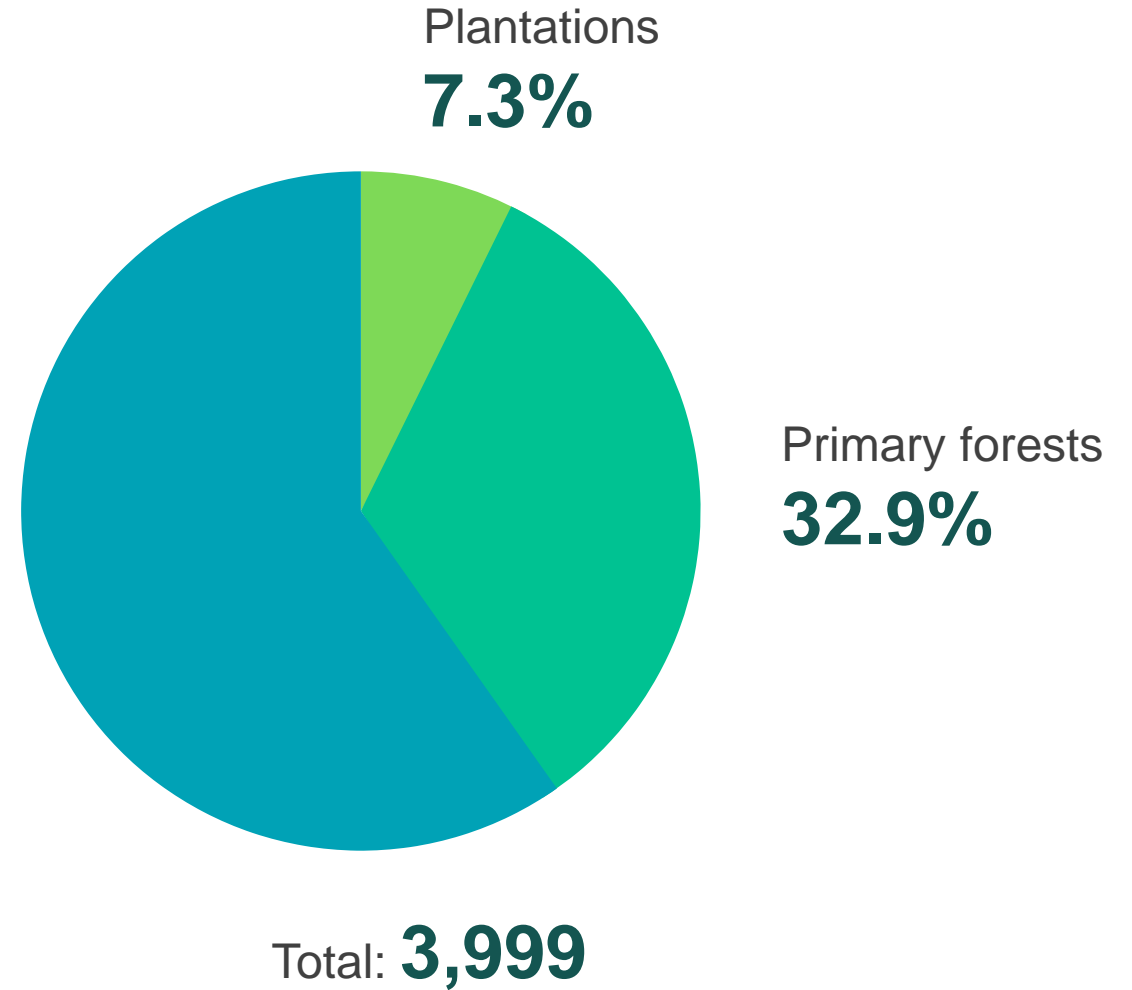


Forested land

215 figures in millions of hectare



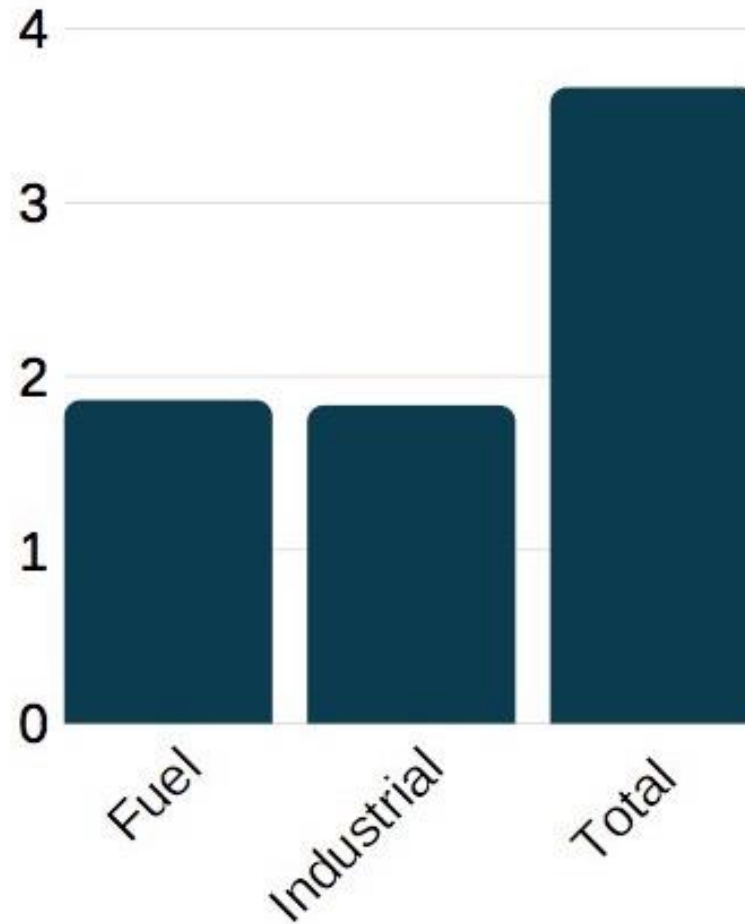
Natural regenerated forests
59.8%



FAO 2015, <http://www.fao.org/forest-resources-assessment/past-assessments/fra-2015/en/>

Wood production

2016 figures (in billion cubic meters)

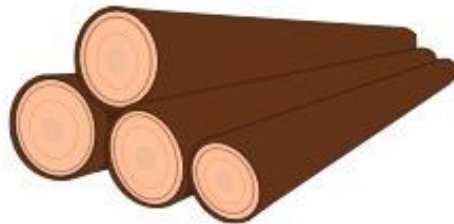
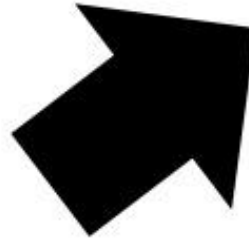
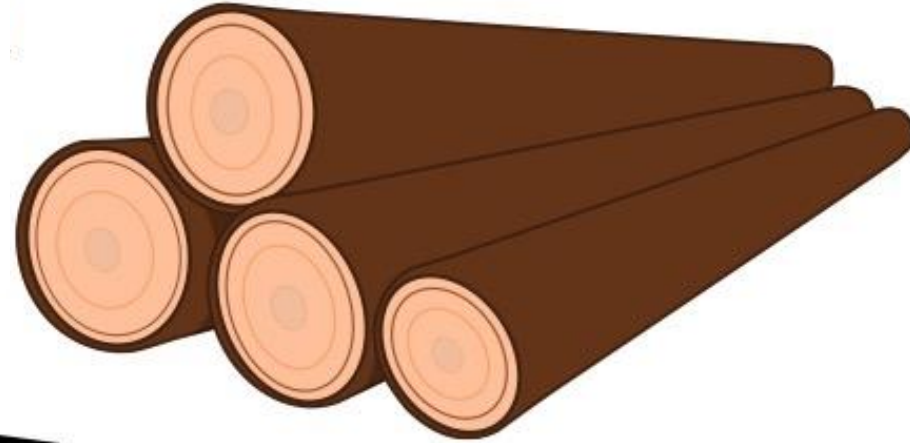


FAO 2015, <http://www.fao.org/forest-resources-assessment/past-assessments/fra-2015/en/>

+ 950
million people



Wood demand to rise by
450 million
cubic meter by 2030



Where will it
come from?

FAO 2015, <http://www.fao.org/forest-resources-assessment/past-assessments/fra-2015/en/>



We have a moral obligation
to remain optimistic and not
resign to fate and
Judgement Day

THANK YOU

cifor.org | worldagroforestry.org | foreststreesagroforestry.org | globallandscapesforum.org | resilient-landscapes.org

The Center for International Forestry Research (CIFOR) and World Agroforestry (ICRAF) envision a more equitable world where forestry and landscapes enhance the environment and well-being for all. CIFOR–ICRAF are CGIAR Research Centers.



RESEARCH
PROGRAM ON
Forests, Trees and
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