

# **Forest and Carbon Accounting**

for the sustainable management of forestry and  
silvopastural systems, and their mitigation and  
adaptation to climate change



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# Carbon Accounting

**Definition:** Carbon accounting is measuring and reporting greenhouse gas emissions

**Calculating GHG Emissions:** Calculating their GHG emissions is the starting point from which the organizations can participate to the low-carbon transition

**Reporting:** Sustainability Reporting: Environmental Accounting:

- International Financial Reporting Standards (IFRS)
- International Standards Organization (ISO) 14064

# Carbon Accounting Approach



Monthly reports at different levels can provide insightful analysis to different stakeholders in the business



Having a centralized internet based accounting system or a specific person that is a facilitator to record carbon accounting is important



Usually a carbon accounting team collects monthly or quarterly data



By building cost data into the accounting systems, businesses can improve their sustainability

Office and Data Centers

Business Travel

Fuel Electricity Heating Water Waste Gas

Flights Buses Subway Cars Trains Taxi Hotel

Fig 1. Carbon accounting approach in a modern business



# Project Specific Carbon Accounting

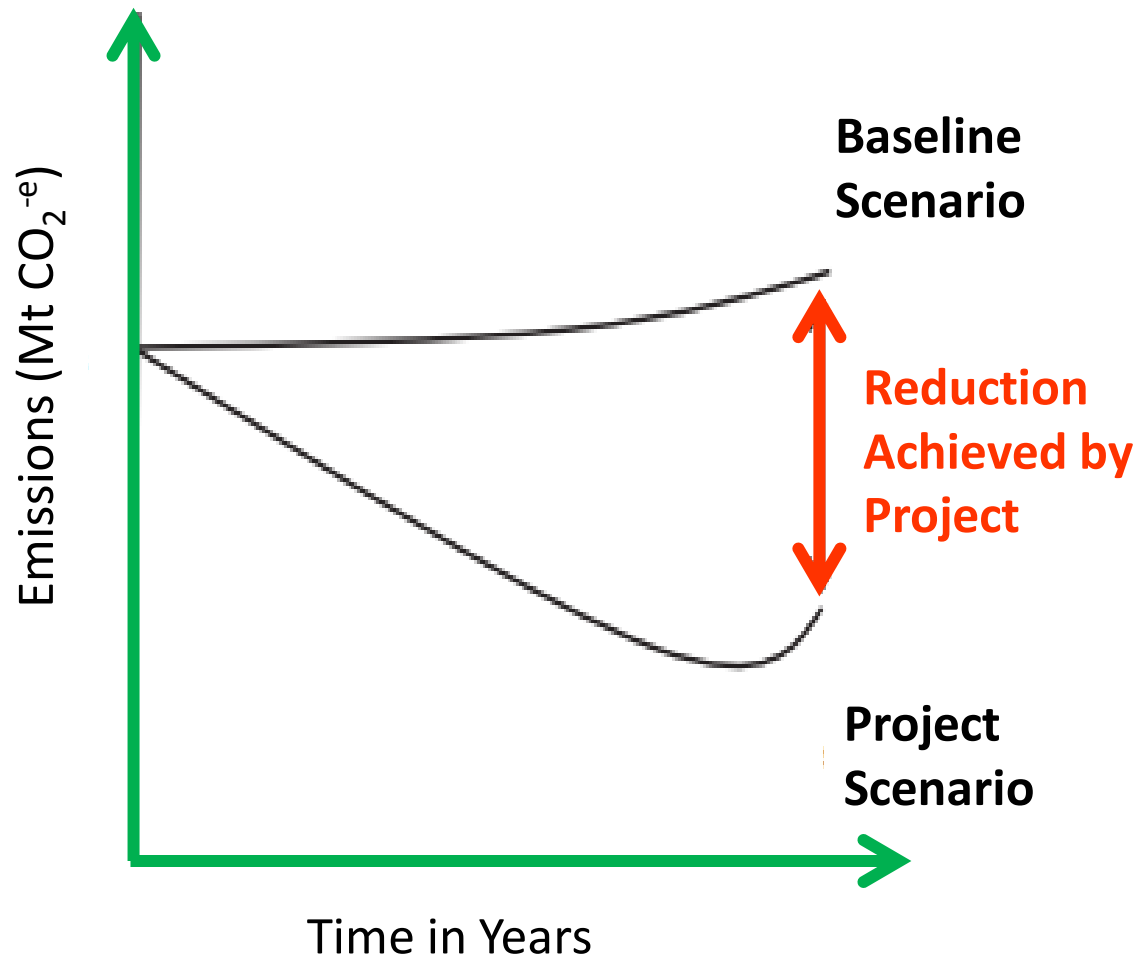


Fig 2. Project specific carbon accounting (Adapted from Brander, 2016, p.4251)

# New Zealand's Emissions and Targets

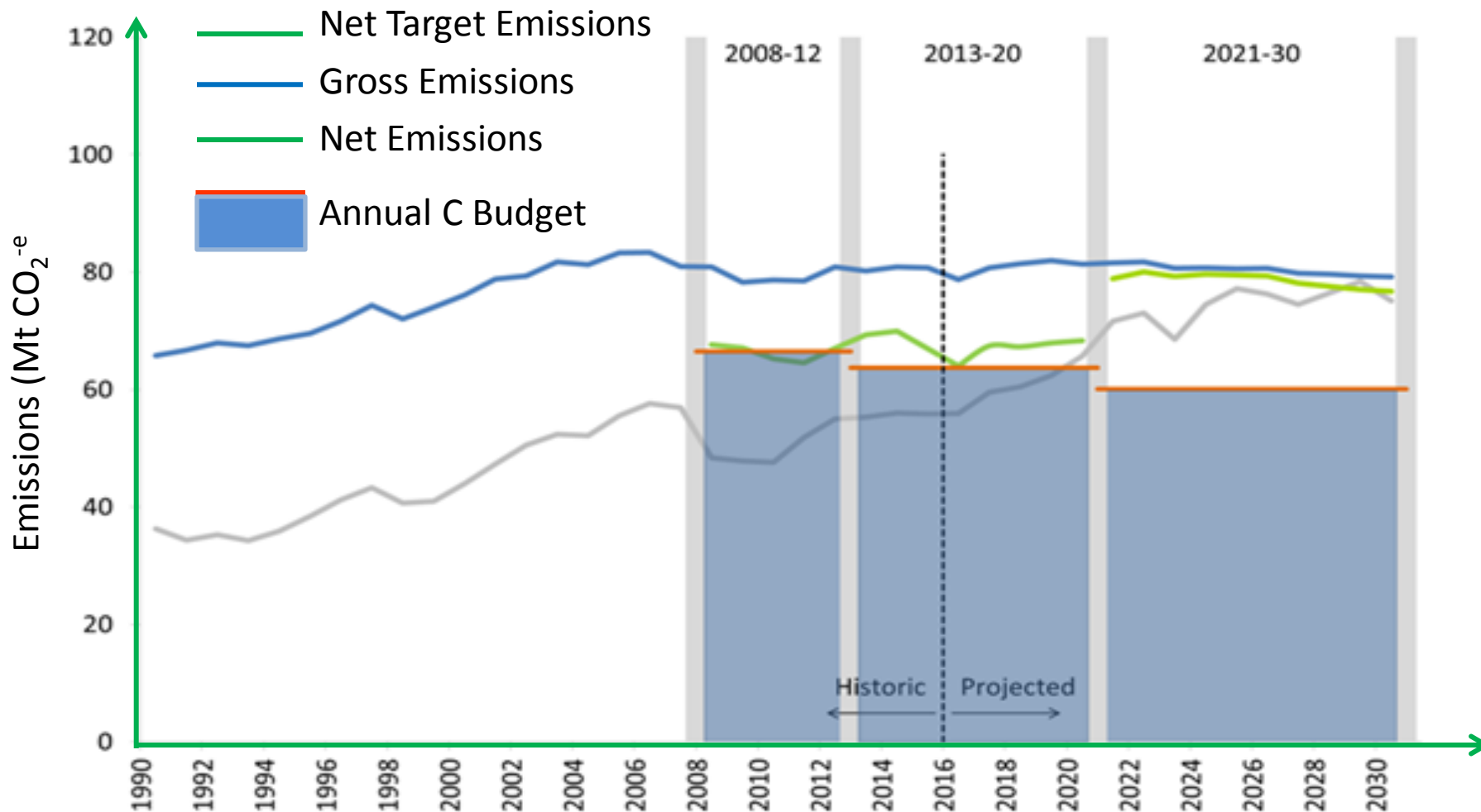


Fig 3a. New Zealand's projected gross emissions, and units held during the 2013 to 2020 period, as at 12 April 2018 (Adapted from Ministry of Environment , 2018)

# New Zealand's Emissions and Targets

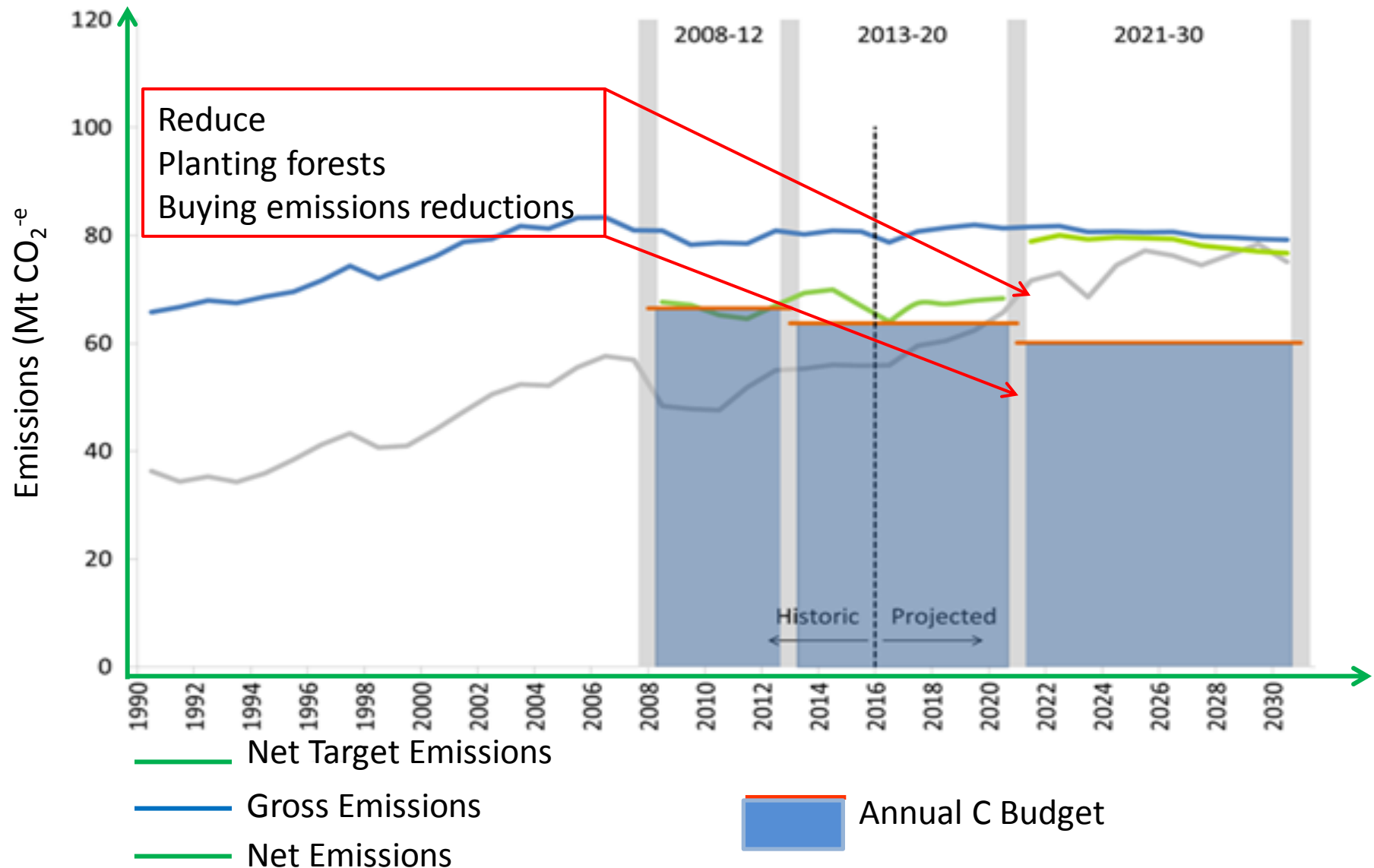


Fig 3b. New Zealand's projected gross emissions, and units held during the 2013 to 2020 period, as at 12 April 2018 (Adapted from Ministry of Environment , 2018)

# Global change in forest area as a % of land area

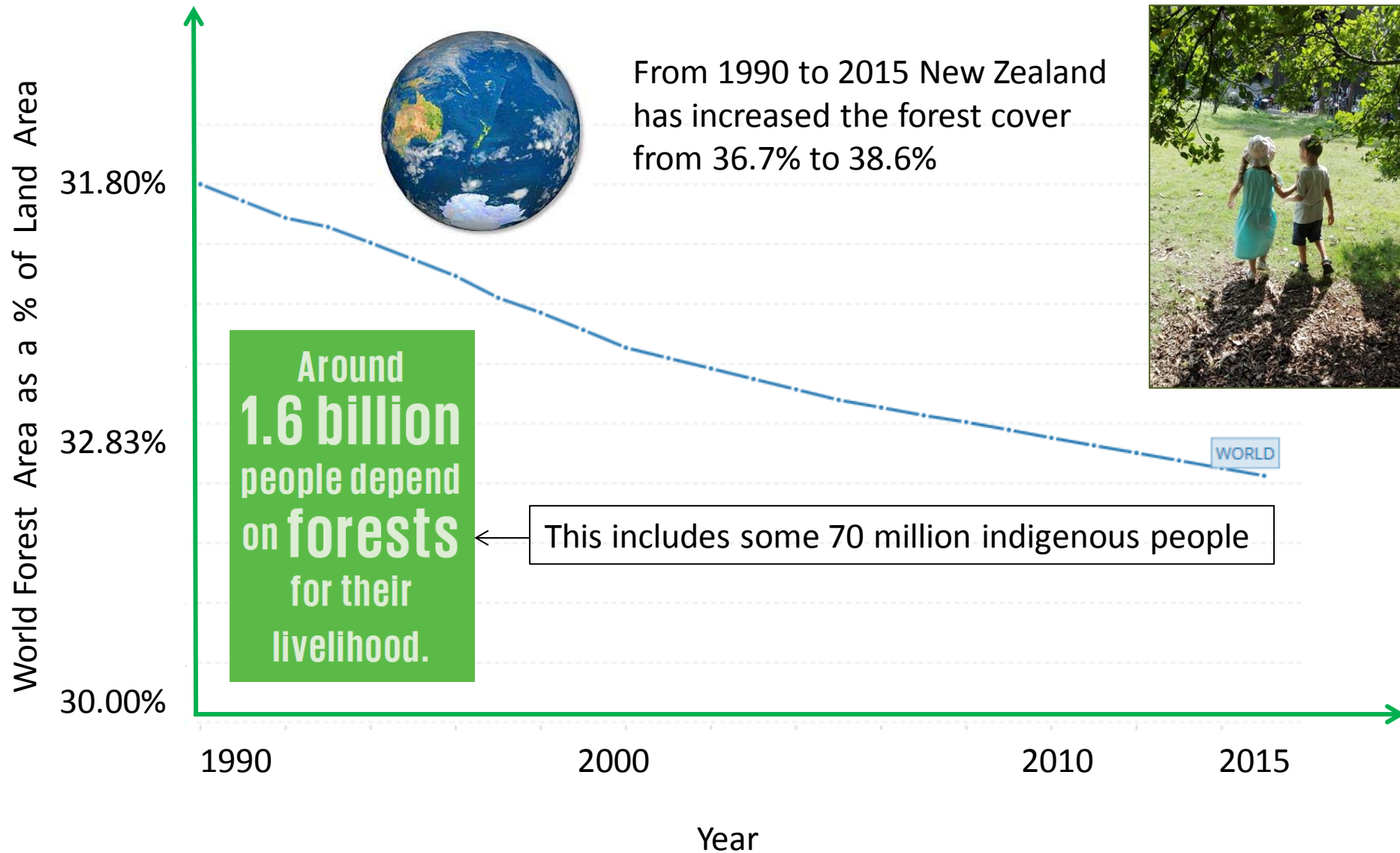


Fig 4. Forest area - % of land area (Adapted from The World Bank Group, 2018)

# Sustainable Forest Management (SFM) and Carbon Accounting

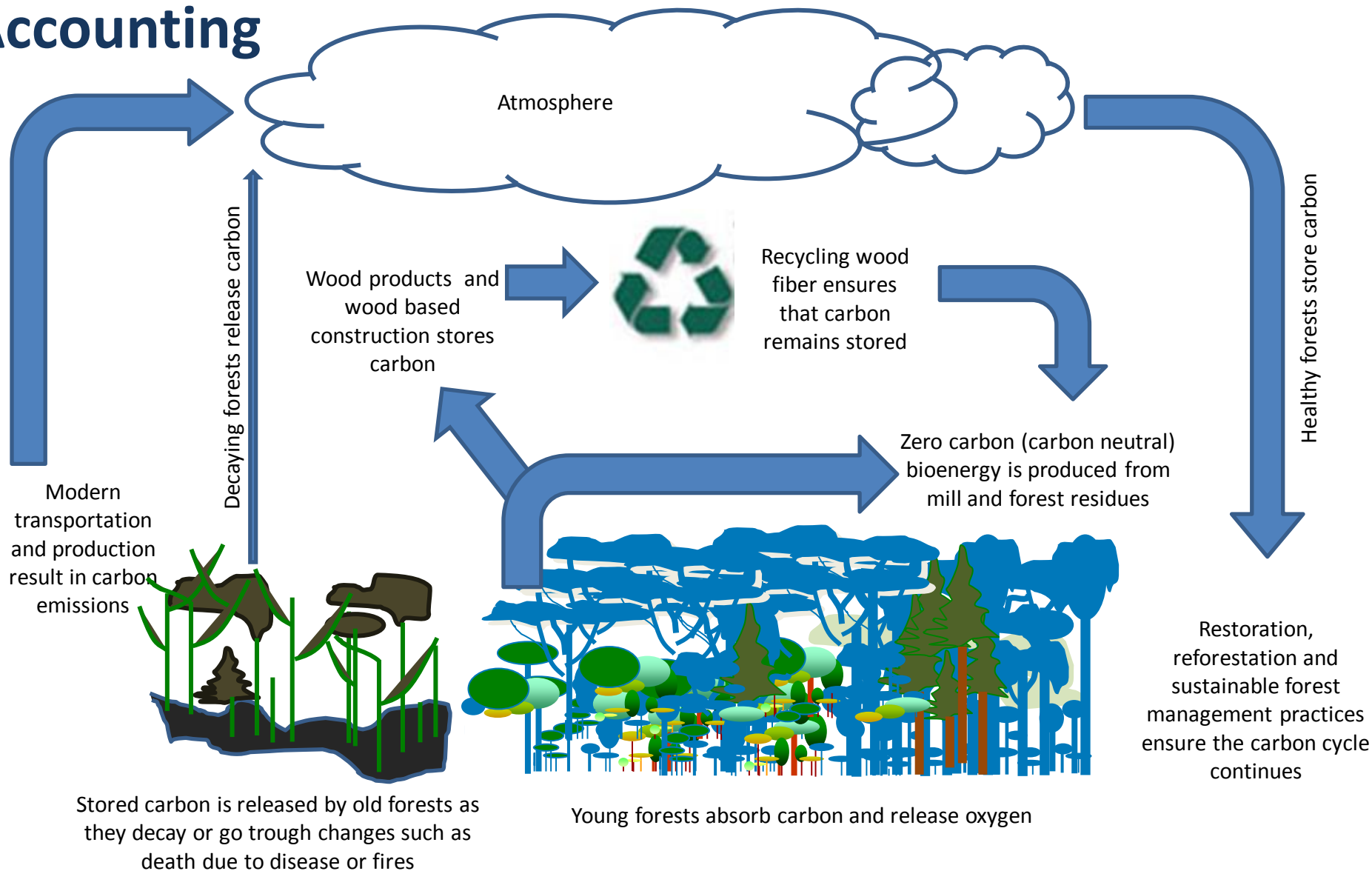


Fig 5. The relationship between sustainable forest management and carbon



# SFM Historical Background and Resources and Tools

## Earth Summit

### The United Nations Conference on Environment and Development

Rio de Janeiro, 1992



Participants: 172 Countries and 108 heads of state  
2400 non-governmental organizations

Out Comes: Rio declaration;  
Agenda 21; Conventions on climate change and  
biodiversity; declaration of forest principles

A screenshot of the Sustainable Forest Management (SFM) Toolbox website. The header features the FAO logo and navigation links. The main content area is titled 'Sustainable Forest Management (SFM) Toolbox' and includes a search bar, a list of tools, and filter options. A specific tool, 'C&I: a tool for enhancing SFM, from policy to practice', is highlighted in the filter section.

Food and Agriculture Organization  
of the United Nations

About FAO | In Action | Countries | Themes | Media | Publications | Statistics | Partnerships

English Français Español

### Sustainable Forest Management (SFM) Toolbox

Home Background Modules **Tools** Cases Partners Register Login

Custom Search

#### Tools

A tool is a resource that supports and guides the implementation of SFM. This section includes all the tools available in the SFM Toolbox, which can be in form of publications, e-learning videos, software etc.

You can browse the Tools through keywords in the free search box or you can narrow the search using the filters on the right side of the page.

ATO/ITTO principles, criteria and indicators for the sustainable management of African natural tropical forests 2003

For forests, one of the first 'post-Rio' moves was to promote the development and use of criteria and indicators (C&I) for sustainable forest management. This was made easier by the fact that the International Tropical Timber Organization (ITTO) had published the first set of C&I for the sustainable management of...

#### Filter by

Module

× C&I: a tool for enhancing SFM, from policy to practice

Type of Tool

All

Region

All

Forest Type

All

150 COUNTRIES HAVE PARTICIPATED

No data received for C&I for SFM for New  
Zealand

“It is important to highlight that there does not appear to be a commonly agreed definition of SFM. Without a standardized way of defining and collecting data on SFM, it seems that this indicator remains a challenge to operationalize.”

Fig 6. Sustainable Forest Management (SFM) Toolbox (Food and Agriculture Organization of the United Nations, 2018)

# SFM Assessment Examples

1. Food and Agricultural Organization's (FAO's) Global Forest Resources Assessment
2. Forests Europe
3. Forest Stewardship Council, Programme for the Endorsement of Forest Certification



- **FAO Global Forest Resources Assessment (FRA)** provides essential information for understanding the extent of forest resources, their condition, management and uses.
- **FRA 2020 Guidelines and Specifications** provides information about the country reporting process, including an introduction to the new FRA 2020 on-line reporting platform.
- FRA covers all countries and territories and contains a wealth of information structured according to seven thematic elements of Sustainable Forest Management (SFM).

Fig 7. Food and Agriculture Organization of the United Nations, 2018)

# SFM Assessment Examples

## 1. FAO Global Forest Resources Assessment

## 2. Forests Europe

## 3. Forest Stewardship Council, Programme for the Endorsement of Forest Certification

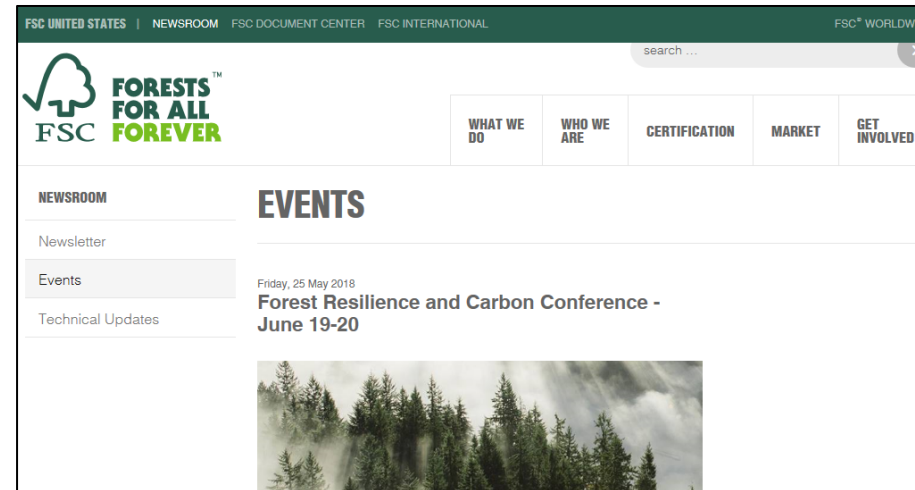
- The pan-European voluntary high-level political process for dialogue and cooperation on forest policies in Europe.
- FOREST EUROPE develops common strategies for its 47 signatories (46 European countries and the European Union) on how to protect and sustainably manage their forests.
- 34 quantitative and 11 qualitative indicators
- Since FOREST EUROPE has led to achievements such as the guidelines, criteria and indicators for sustainable forest management.



Fig 8. The updated pan-European indicators for sustainable forest management (Forest Europe, 2015).

# SFM Assessment Examples

1. FAO Global Forest Resources Assessment
2. Forests Europe
3. **Forest Stewardship Council, Programme for the Endorsement of Forest Certification**

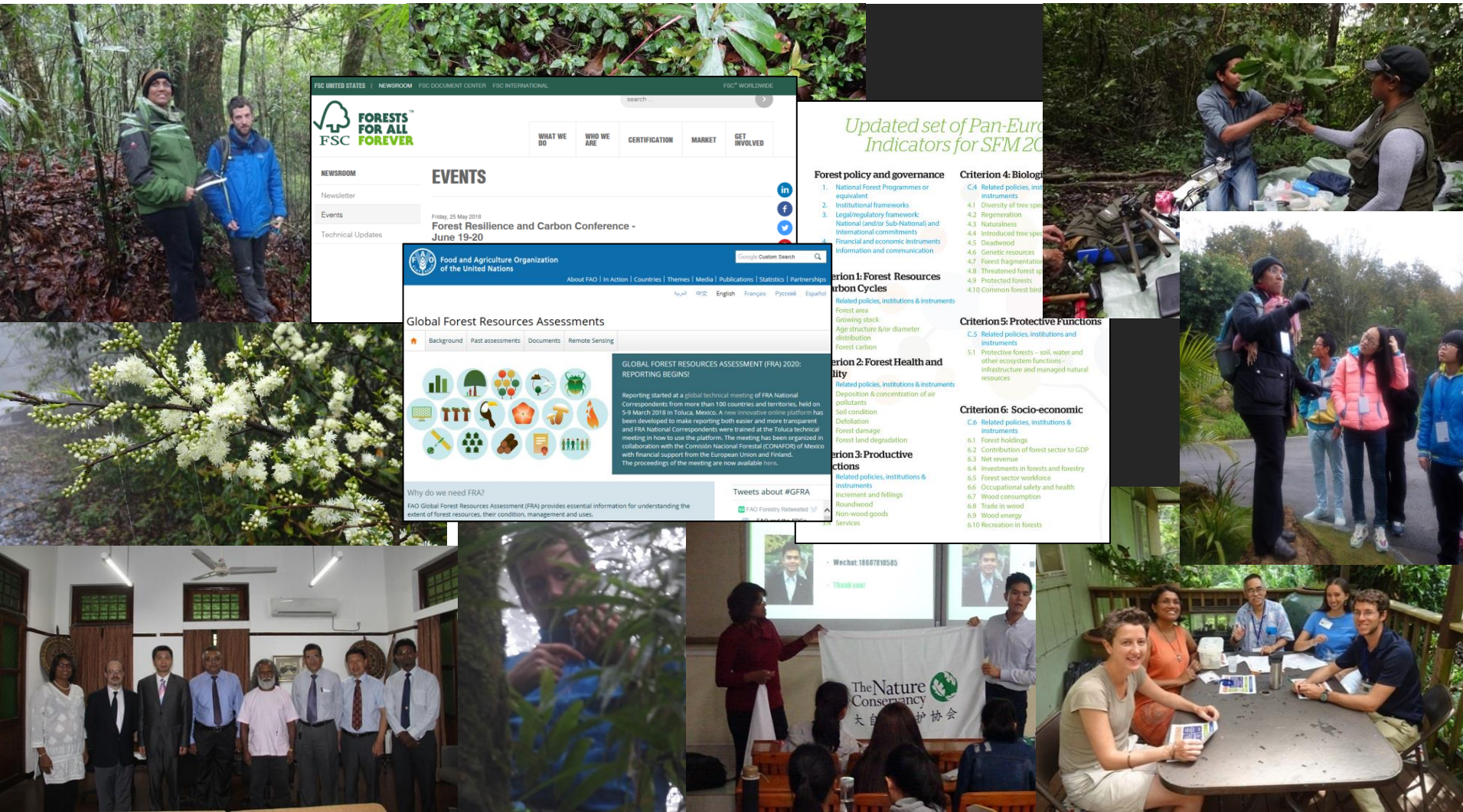


- FSC Forest Management certification confirms that a specific area of forest is being managed in line with the FSC Principles and Criteria.
- To achieve FSC Forest Management certification, the forest manager or owner contracts with an FSC-accredited Certification Body or joins a Forest Management Group. In either case, the forest is audited to FSC's Forest Management standards.
- In the United States, the FSC US Forest Management Standard (v1.0) was formally recommended by the FSC-US Board on May 25, 2010 and approved by FSC International on July 8, 2010.

Fig 6. (Forest Stewardship Council, 2018)



# SFM needs to be integrated across disciplines, across scales of time and space, across components of landscapes and across stakeholders





# SFM and carbon accounting needs to be tested for species, stands, forests in both time and space



Table S1 Allometric equations used to calculate the biomass (kg tree<sup>-1</sup>) of the various tree components of five age classes of eucalypt plantations at the Dongmen Forest Farm in Guangxi, China.

$W$ : biomass of the tree components;  $D$ : diameter at breast height;  $H$ : height;  $r$ : correlation coefficient.

Stand age (years)	Component	Allometric equations	$r$	$p$
4	Stem	$W=0.0227 \times (D^2 H)^{0.958}$	0.993	0.000
	Bark	$W=0.0086 \times (D^2 H)^{0.824}$	0.981	0.000
	Branch	$W=0.00048 \times (D^2 H)^{1.191}$	0.942	0.000
	Leaf	$W=0.00023 \times (D^2 H)^{1.196}$	0.918	0.000
	Stump	$W=0.0132 \times (D^2 H)^{0.769}$	0.879	0.001
	Coarse roots	$W=0.0004 \times (D^2 H)^{1.117}$	0.925	0.000
7	Small roots	$W=0.0003 \times (D^2 H)^{0.979}$	0.884	0.001
	Fine roots	$W=0.0011 \times (D^2 H)^{0.832}$	0.8436	0.001
	Bark	$W=0.052 \times (D^2 H)^{0.897}$	0.962	0.000
		$W=0.009 \times (D^2 H)^{0.796}$	0.997	0.000

10	Branch	$W=0.002 \times (D^2 H)^{0.993}$	0.913	0.000
	Leaf	$W=0.002 \times (D^2 H)^{0.876}$	0.835	0.001
	Stump	$W=0.005 \times (D^2 H)^{0.939}$	0.968	0.000
	Coarse roots	$W=0.004 \times (D^2 H)^{0.822}$	0.910	0.000
	Small roots	$W=0.017 \times (D^2 H)^{0.438}$	0.744	0.025
	Fine roots	$W=0.012 \times (D^2 H)^{0.355}$	0.688	0.031
	Stem	$W=0.032 \times (D^2 H)^{0.957}$	0.993	0.000
	Bark	$W=0.004 \times (D^2 H)^{0.876}$	0.978	0.000
	Branch	$W=0.0000008 \times (D^2 H)^{1.771}$	0.976	0.000
	Leaf	$W=0.00000015 \times (D^2 H)^{2.148}$	0.971	0.000
13	Stump	$W=0.010 \times (D^2 H)^{0.858}$	0.953	0.000
	Coarse roots	$W=0.000003 \times (D^2 H)^{1.470}$	0.951	0.000
	Small roots	$W=0.00002 \times (D^2 H)^{1.060}$	0.889	0.001
	Fine roots	$W=0.000057 \times (D^2 H)^{0.831}$	0.862	0.001
	Stem	$W=0.020 \times (D^2 H)^{1.026}$	0.997	0.000
	Bark	$W=0.005 \times (D^2 H)^{0.903}$	0.971	0.000
	Branch	$W=0.001 \times (D^2 H)^{1.074}$	0.779	0.008
	Leaf	$W=0.0005 \times (D^2 H)^{0.997}$	0.999	0.000
	Stump	$W=0.004 \times (D^2 H)^{0.945}$	0.948	0.000



# SFM Accounting takes place at the local level and has global Implications as they provide data for global data for decision making

Forest accounting can provide information to support discussion and analysis of global initiatives established to ensure that forest resources are available for future generations and they continue to provide benefits to society, including climate change mitigation.



United Nations  
Sustainable  
Development Goals  
(SDGs)

Convention on  
Biological Diversity

Green Growth and  
Green Economy

Reducing Emissions  
from Deforestation  
and Forest  
Degradation (REDD)

# SDG 15

## Targets



15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation neutral world

15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development

15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species



# SDG 15

## Your Voice?



**Follow up and review processes at all levels will be guided by the following principles:**

They will be open, inclusive, participatory and transparent for all people and will support reporting by all relevant stakeholders.

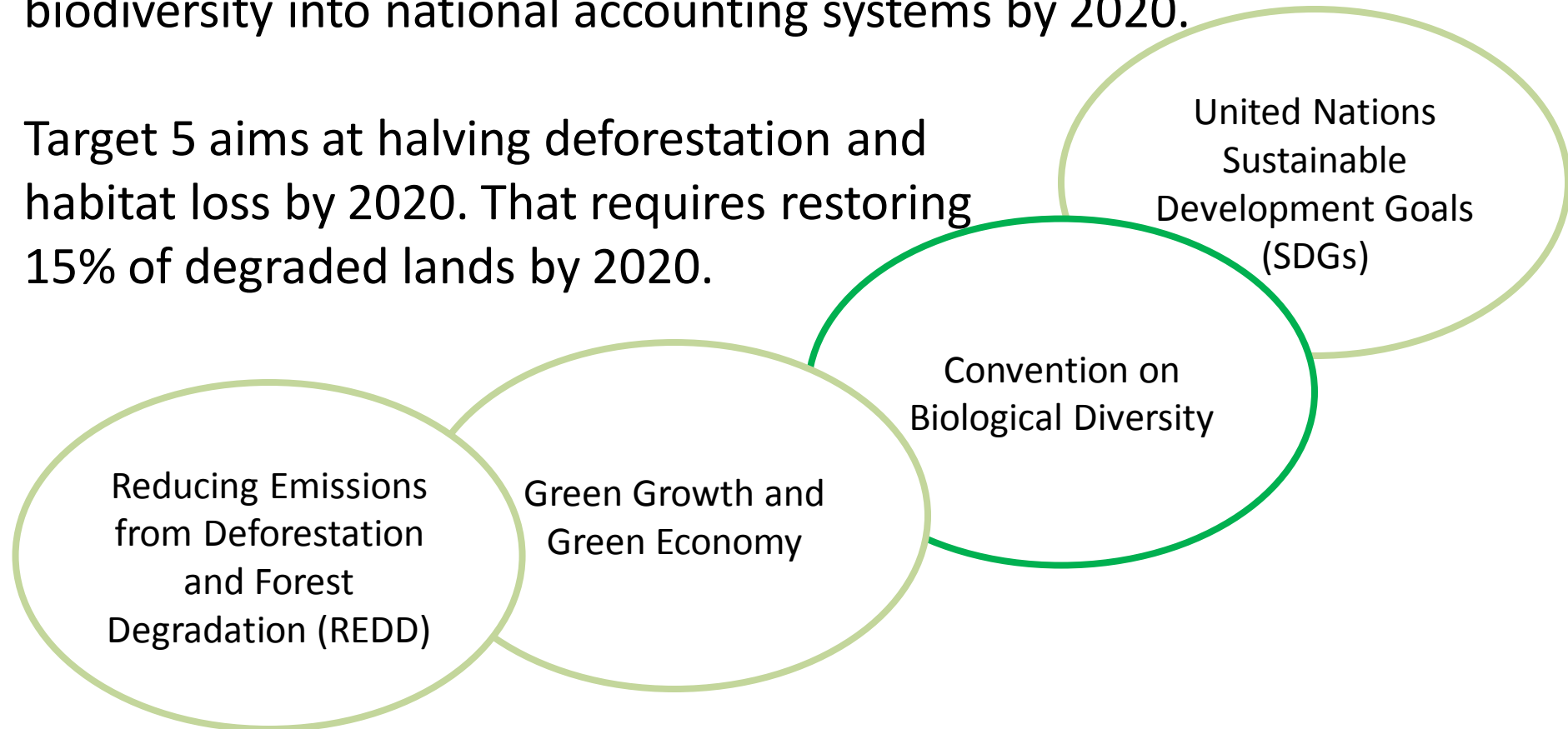
They will be people centered, gender sensitive, respect human rights and have a particular focus on the poorest, most vulnerable and those furthest behind.

# CBD

CBD is a Strategic Plan for Biodiversity for 2011-2020 with 20 targets representing global action on protecting critical biodiversity and essential ecosystems.

Target 2 encourages countries to integrate the measurement of biodiversity into national accounting systems by 2020.

Target 5 aims at halving deforestation and habitat loss by 2020. That requires restoring 15% of degraded lands by 2020.



# Green Growth and Green Economy

UNDP Green economy and OECD Green growth proposals, are aimed at supporting countries to achieve economic growth and development, while ensuring the sustainability of the environmental assets and ecosystem services on which our well-being relies.

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and Forest  
Degradation (REDD)

# REDD and REDD+

United Nations Framework Convention on Climate Change (UNFCCC) and the resulting Paris Agreement reached at the December 2015 UN Climate Negotiations, is the primary force for climate action in the world right now.

United Nations  
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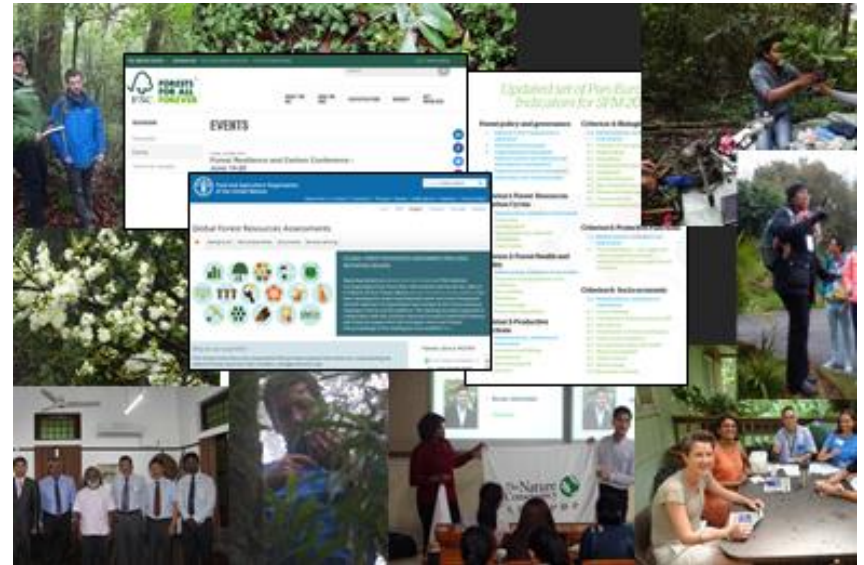
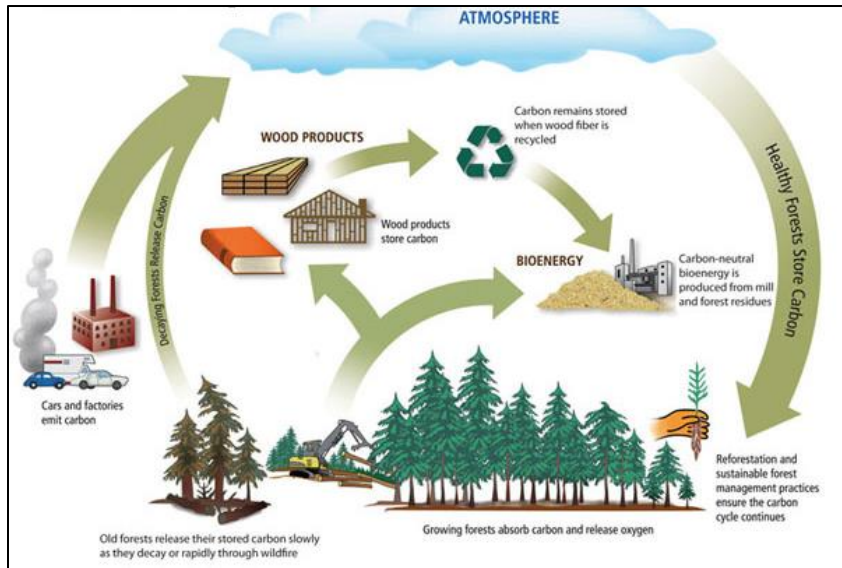


Fig 7. Biomass and Carbon Accounting (A New Century of Forest Planting, 2014).

**Thank You!**



**NorthTec**

TAI TOKERAU WĀNANGA



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