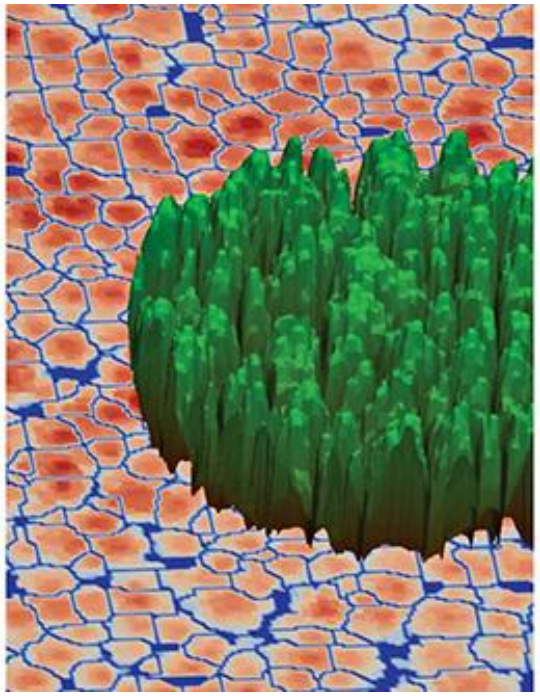
Growing confidence in forestry's future Research Programme

IUFRO

SCION forests · products · innovation

Planted Forest Production and Intensification

Tim Payn
Scion, New Zealand


International Scientific Seminar: Sustainable Intensification of Planted Forests: how far can we go?
Biarritz, France. 13th June 2016

supported by forestgrowers commodity levy

FOREST OWNERS ASSOCIATION

OUTLINE

- THE GLOBAL ENVIRONMENT
- PLANTED FORESTS GLOBALLY
- APPROACHES TO INTENSIFICATION
- CASE STUDY RESEARCH PROGRAMME
- THINGS TO CONSIDER

THE GLOBAL ENVIRONMENT

The Great Acceleration

 Steffen, Broadgate, Deutsch, Gaffney, Ludwig (January 2015) Anthropocene Review

futureearth

The 2030 Agenda for Sustainable Development

PARIS2015

UN CLIMATE CHANGE CONFERENCE

COP21·CMP11

PARIS CLIMATE AGREEMENT

Historical document that legally binds the whole World to participate in climate change fight.

196 countries
Adopted the Agreement
officially recognizing human influence on climate

Finance
Rich countries will provide minimum of **$100 billion** to developing ones for climate change adaptation by 2020

2020
Will come into force by 2020
If signed by **55 countries** covering **55%** of global emissions

Goal
Holding the increase in the global average temperature well below
2°C
Pursue efforts to limit the temperature increase to
1.5°C

5 years
Ambitious
Every 5 years countries shall revise their emissions reduction targets and measures

Climate neutrality 2050
The balance between emissions and sinks should be reached in the second half of XXI century

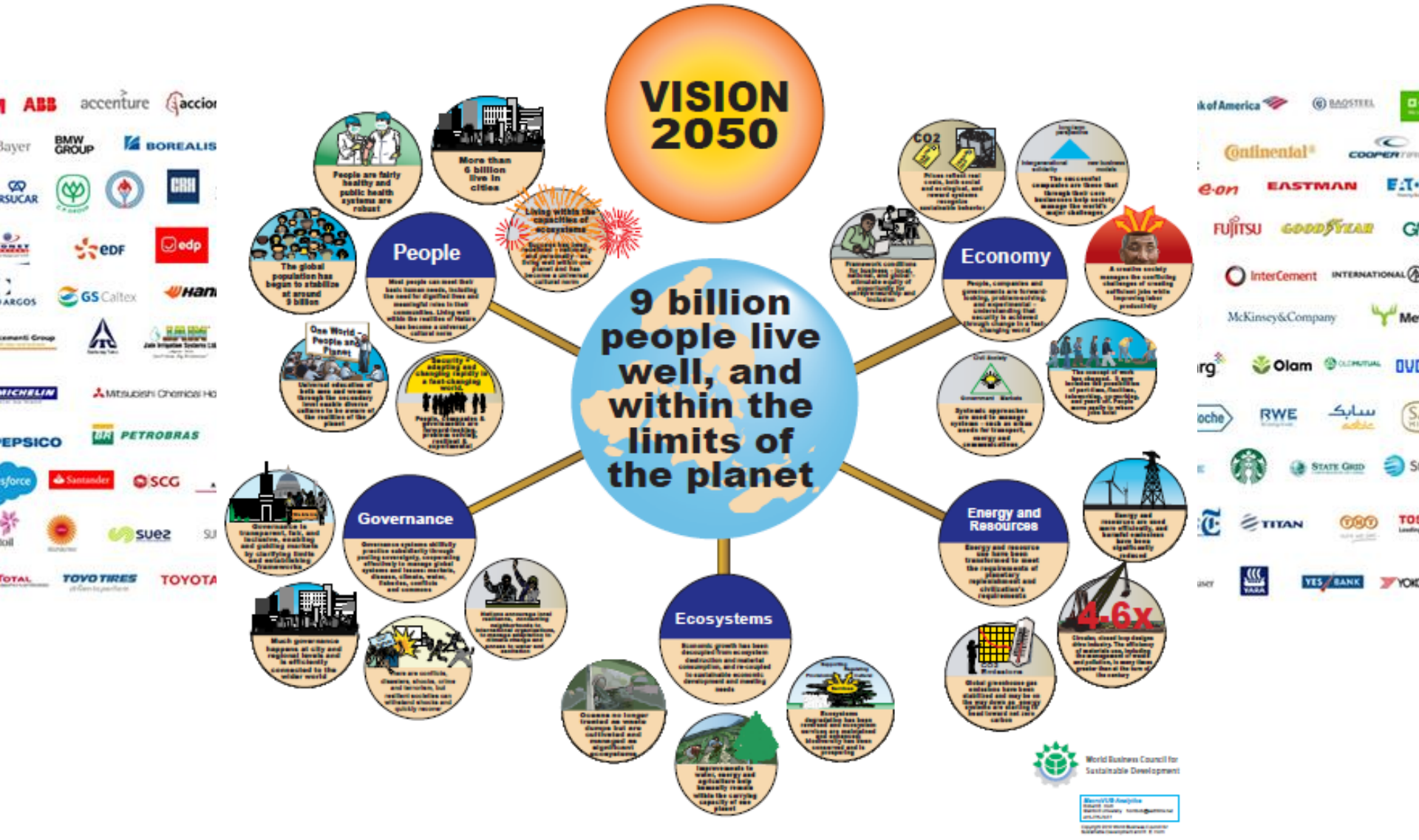
Climate damage
For the first time ever the Agreement defines climate loss and damage terms **but** liability and compensation are not mentioned

Clean technologies
The Agreement urges to speed up clean tech development and international technology transfer

Role of forests
The Agreement binds saving and increasing forest area in order to capture GHGs from the atmosphere

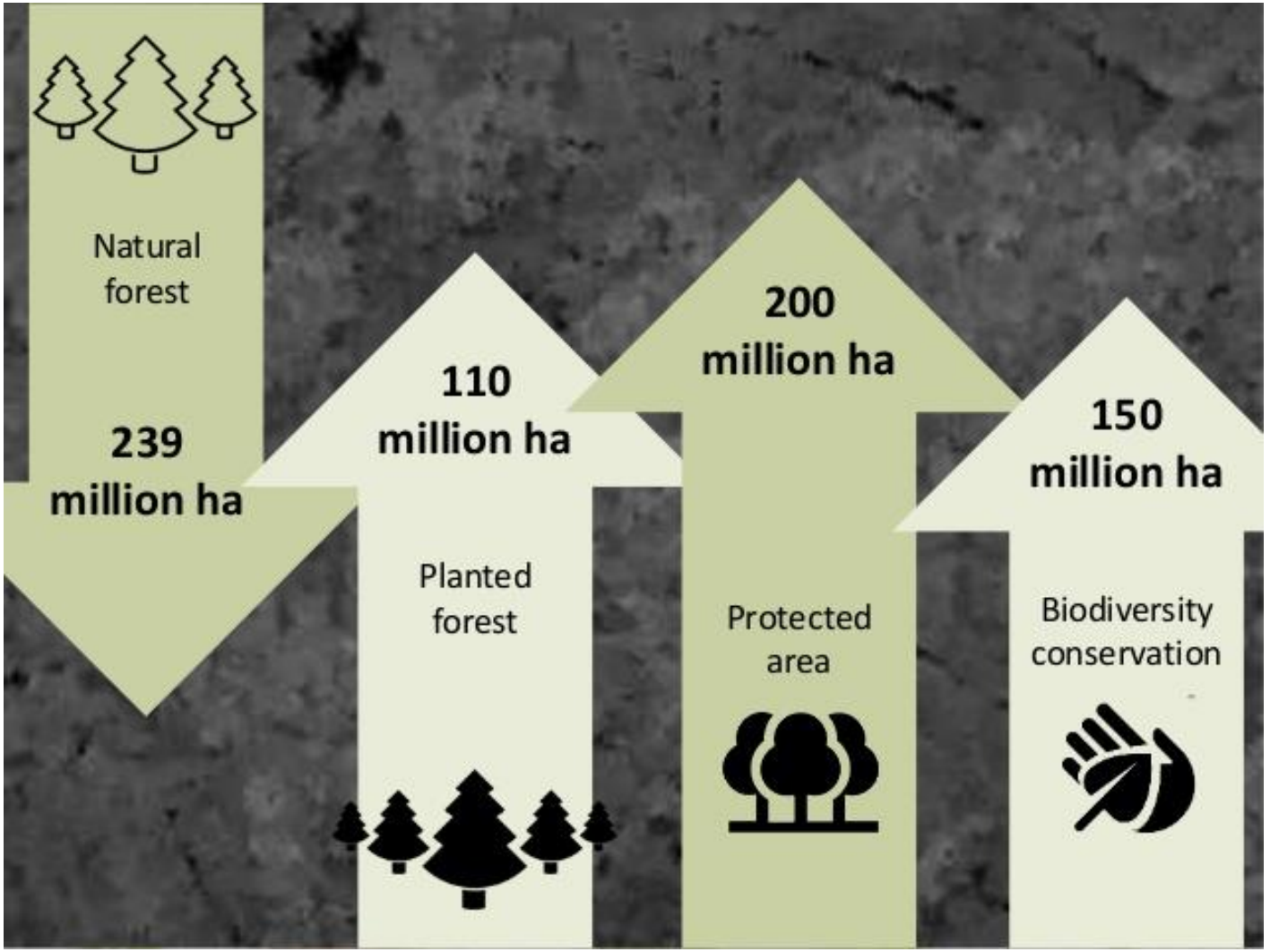
@CLIMATERUSSIA CLIMATERUSSIA.RU

World Business Council for Sustainable Development



PLANTED FORESTS

Global Forest Trends 1995-2015



http://www.fao.org/3/a-i4895e/index.html

Global planted forest trends

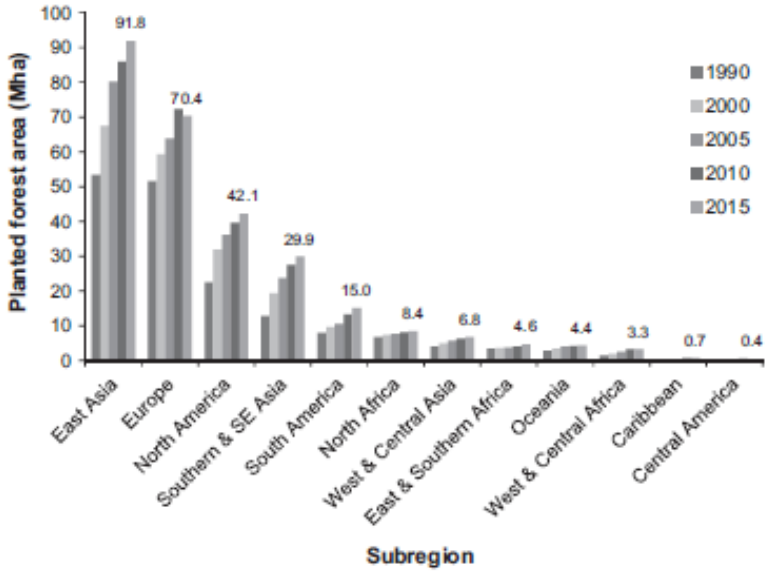


Fig. 3. Changes in Planted Forest Area by FAO subregion 1990–2015.

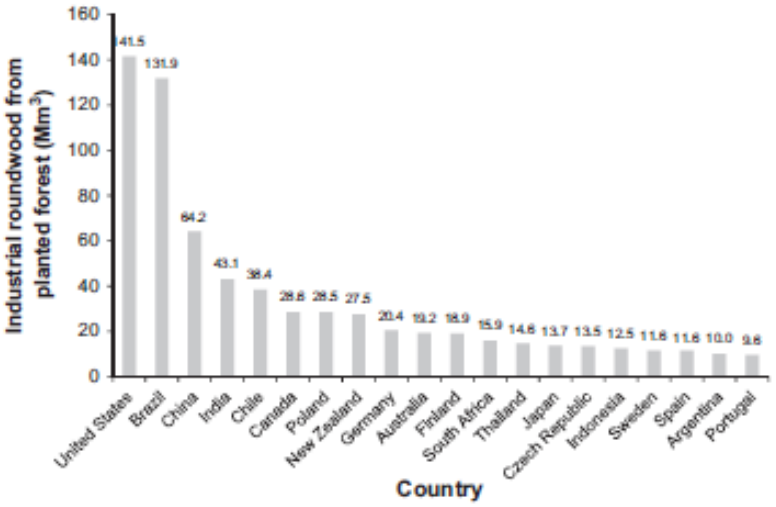


Fig. 7. The world's top 20 producers of industrial roundwood from planted forests in 2012.

Contents lists available at ScienceDirect

Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco

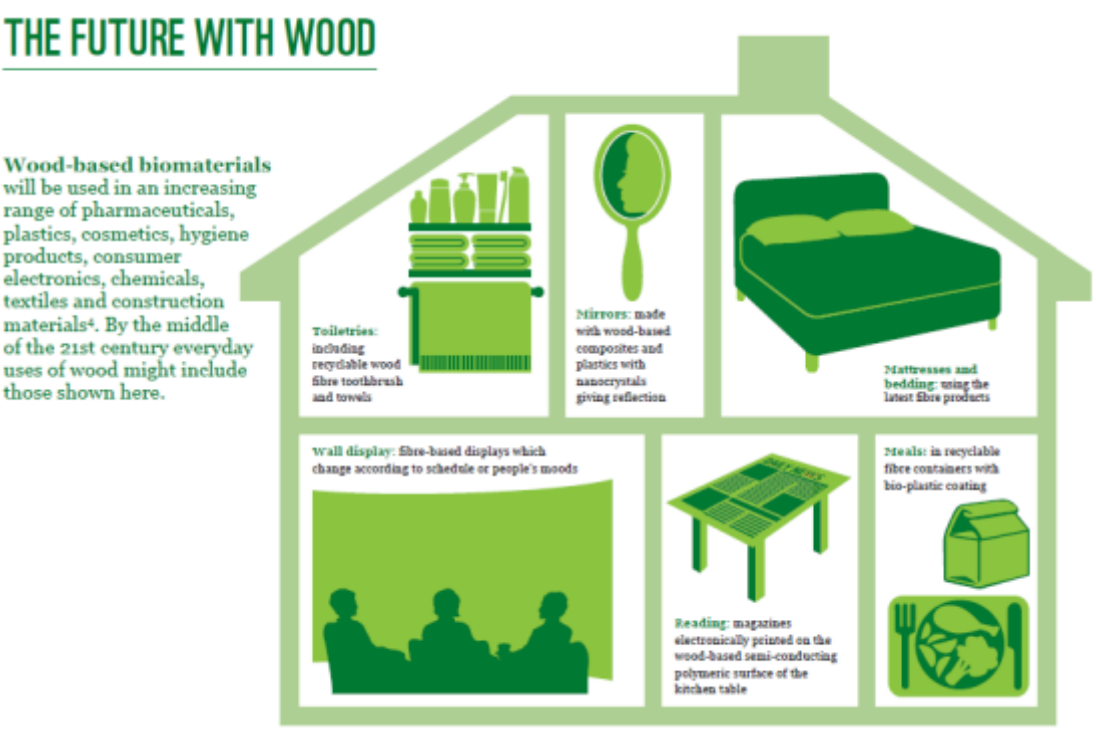
Changes in planted forests and future global implications ☆

Tim Payn [a,*], Jean-Michel Carnus [b], Peter Freer-Smith [c], Mark Kimberley [a], Walter Kollert [d], Shirong Liu [e], Christophe Orazio [f], Luiz Rodriguez [g], Luis Neves Silva [h], Michael J. Wingfield [i]

There will be a shortage of fibre in the future

>300% more fibre needed

"Humanity will likely use more wood in more ways as the future unfolds. If production forests are managed sustainably and wood products are used efficiently or replace others with a heavier footprint, this should be good for the planet." *(WWF 2012 The Living Forest report)*



	FAO 2010	LIVING FORESTS MODEL 2030		2050	
		Do Nothing	Bioenergy Plus	Do Nothing	Bioenergy Plus
Saw logs & veneer logs	853	1,444	1,444	1,763	1,773
Pulpwood*	527	754	754	905	893
her industrial roundwood[19]	153	153	153	153	153
Energy wood	1,868	2,753	3,138	6,317	8,209
Household fuelwood		2,064	2,064	2,218	2,054
Total wood supply	3,401	7,168	7,553	11,356	13,082

Units: millions of cubic metres (roundwood equivalent)

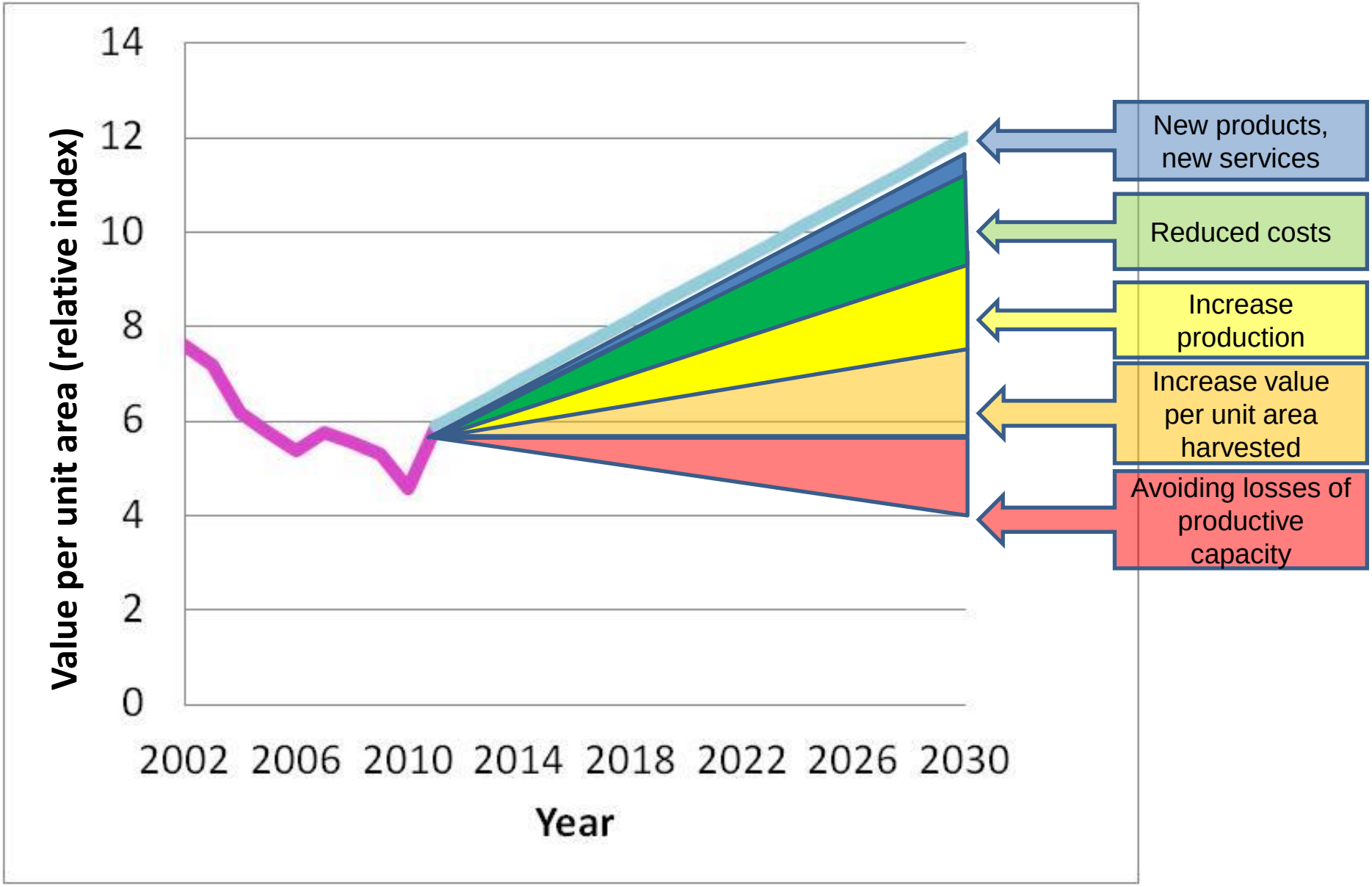
The Food, Fuel, Fiber and Forests (4Fs) Challenge

- Agricultural expansion is the leading cause of deforestation worldwide;
- Food security interests clash with mitigation and conservation strategies;
- Conflicts over land-use priorities arise because agriculture, forest sectors and civil society do not engage effectively.

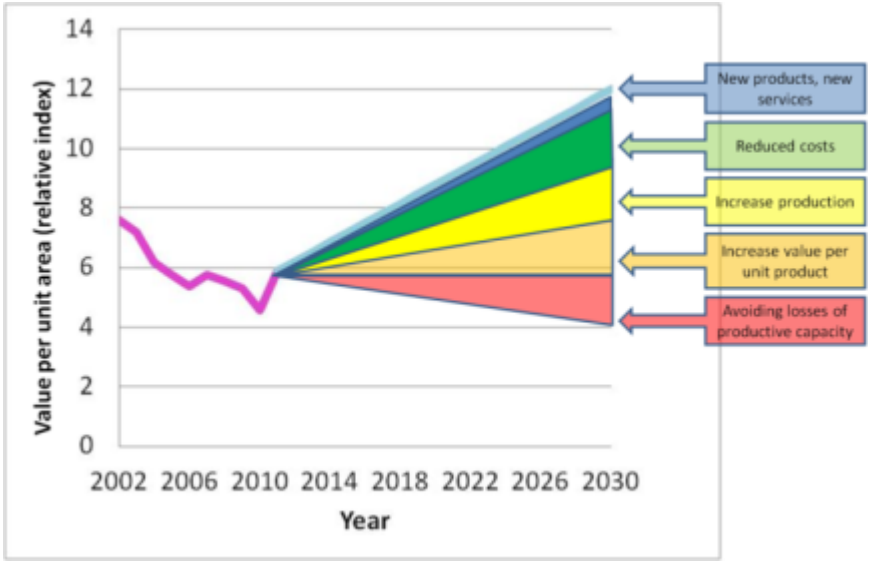
- CAN WE INTENSIFY?
- SHOULD WE INTENSIFY?
- WHAT MIGHT STOP US?

APPROACHES TO INTENSIFICATION

Pathways to doubling the value of forest production by 2030



Avoiding losses to productive capacity



- Climate change
  - eCO2 vs drying
  - Possible down in Northland and East, up elsewhere
- Pests, diseases, fire, weeds
  - Warming is generally bad news
- Loss of site quality
  - Inter rotation management, slash mgte and steep country harvesting
- Reduction in forest area
  - Conversion to dairy etc
- Social licence to operate and constraints on practice
  - Restrictions chemicals
  - Ecosystem services, sustaining carbon/GHG, landscapes

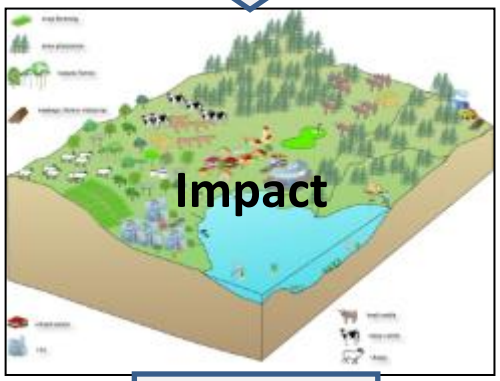
Sustainable Intensification: An Opportunities and Constraints Wheel

Things we need to consider

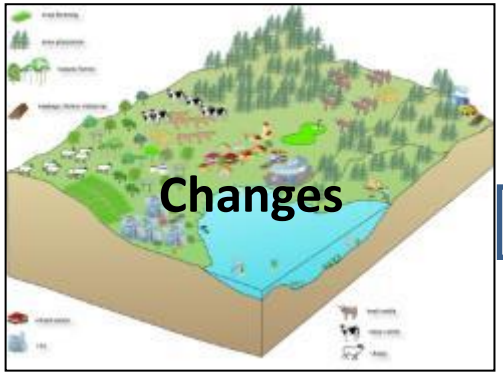
- What our markets will want in the future
- Is there potential to increase
- What will happen to the environment if we intensify
- What unintended consequences may occur
- What our current markets think of us
- How we are perceived by our neighbours
- How perceptions are affecting our ability to do forestry
- How forestry policy and regulation will change into the future
- The scale and intensity of climate change
- What land values will do in the future
- Whether we will have enough skilled people for our forests
- How export prices and exchange rates will fluctuate

Drivers:
Pressure:
State:
Impact:
Response:
Benefits

Pressure:
Climate
Perceptions
Economics
Regulations



Response



Different:
Land Use Patterns
Economic Returns
Environmental Impacts
Social and Cultural Impacts

Interconnectedness of the forest system

Criterion 1: Conservation of biological diversity

1.1. Ecosystem Diversity

1.1.a Area and percent of forest by forest ecosystem type, successional stage, age class, and forest ownership or tenure

1.1.b Area and percent of forest in protected areas by forest ecosystem type, and by age class or successional stage

1.1.c Fragmentation of forests

1.2. Species Diversity

1.2.c Status of on site and off site efforts focused on conservation of species diversity

1.3. Genetic Diversity

1.3.a Number and geographic distribution of forest-associated species at risk of losing genetic variation and locally adapted genotypes

1.3.b Population levels of selected representative forest-associated species to describe genetic diversity

1.3.c Status of on site and off site efforts focused on conservation of genetic diversity

Criterion 2: Maintenance of productive capacity of forest ecosystems

2.a Area and percent of forest land and net area of forest land available for wood production

2.b Total growing stock and annual increment of both merchantable and non-merchantable tree species in forests available for wood production

2.c Area, percent, and growing stock of plantations of native and exotic species

2.d Annual harvest of wood products by volume and as a percentage of net growth or sustained yield

2.e Annual harvest of non-wood forest products

Criterion 3: Maintenance of forest ecosystem health and vitality

3.a Area and percent of forest affected by biotic processes and agents (e.g. disease, insects, invasive alien species) beyond reference conditions

3.b Area and percent of forest affected by abiotic agents (e.g. fire, storm, land clearance) beyond reference conditions

Criterion 4: Conservation and maintenance of soil and water resources

4.1 Protective function

4.1.a Area and percent of forest whose designation or land management focus is the protection of soil or water resources

4.2 Soil

4.3 Water

Criterion 5: Maintenance of forest contribution to global carbon cycles

5.c Avoided fossil fuel carbon emissions by using forest biomass for energy

Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits

6.1 Pr… …nption

6.1.d Total and *per capita* consumption of wood and wood products in round wood equivalents

6.1.e Total and *per capita* consumption of non-wood forest products

6.1.f Value and volume in round wood equivalents of exports and imports of wood products

6.1.g Value of exports and imports of non-wood forest products

6.1.h Exports as a share of wood and wood products production, and imports as a share of wood and wood products consumption

6.1.i Recovery or recycling of forest products as a percent of total forest products consumption

6.2 Investment in the forest sector

6.2.a Value of capital investment and annual expenditure in forest management, wood and non-wood forest product industries, forest-based environmental services, recreation and tourism

6.2.b Annual investment and expenditure in forest-related research, extension and development, and education

6.3 Employment and community needs

6.3.c Resilience of forest-dependent communities

6.3.d Area and percent of forests used for subsistence purposes

6.4 Recreation and tourism

6.4.a Area and percent of forests available and/or managed for public recreation and tourism

6.4.b Number, type, and geographic distribution of visits attributed to recreation and tourism and related to facilities available

6.5 Cultural, social and spiritual needs and values

6.5.a Area and percent of forests managed primarily to protect the range of cultural, social and spiritual needs and values

6.5.bThe importance of forests to people

Criterion 7: Legal, institutional and economic frameworks for forest conservation and sustainable management

7.1.b Cross sectoral policy and programme coordination

7.2.a Taxation and other economic strategies that affect sustainable management of forests

7.3.a Clarity and security of land and resource tenure and property rights

7.3.b Enforcement of laws related to forests

7.4.a Programmes, services and other resources supporting the sustainable management of forests

7.4.b Development and application of research and technologies for the sustainable management of forests

7.5.a Partnerships to promote the sustainable management of forests

7.5.b Public participation and conflict resolution in forest-related decision making

7.5.c Monitoring, assessment and reporting on progress towards sustainable management of forests

Species

Soil

Water

Carbon

Target

Employment

Community

Regulation

www.montrealprocess.org

GROWING CONFIDENCE IN FORESTRY'S FUTURE (GCFF)

'sustainable intensification of New Zealand's planted forests'

NATIONAL RESEARCH PROGRAMME CASE STUDY

New Zealand Forestry Industry Vision
increase exports from $4.3-$12bn by 2022

Forest and Wood Products Industry Strategic Plan

Prepared for Woodco by

New Zealand Farm Forestry Association

FOREST OWNERS ASSOCIATION

Wood Processors Association of New Zealand

New Zealand Pine Manufacturers Association

Forest Industry Contractors Association

Government Vision – increase exports from 30% to 40% of GDP by 2025

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Sustained growth from Natural Resources matters

Increasing value from our freshwater assets

Increasing productivity while maintaining and improving overall water quality.

Making the most of our abundant energy and minerals potential

Encouraging environmentally responsible development and efficient use of the country's diverse energy resources.

Building growth from more efficient land and resource use

Increasing sustainable resource use and improving sector productivity while creating a dynamic, responsive and effective system to manage our [illegible]

Government efforts to build economic growth through sustainable use of natural resources in seven areas:

Realising greater value from our marine and aquaculture resources

Making the most of the considerable opportunities for New Zealand to gain much greater value from its extensive marine and aquaculture resources.

Maintaining and advancing biodiversity

Healthy functioning ecosystems supplying and maintaining the natural capital we need to prosper.

Transitioning to a low-emissions economy

Incentivising New Zealand businesses and households to transition to a low-emissions [illegible] productivity.

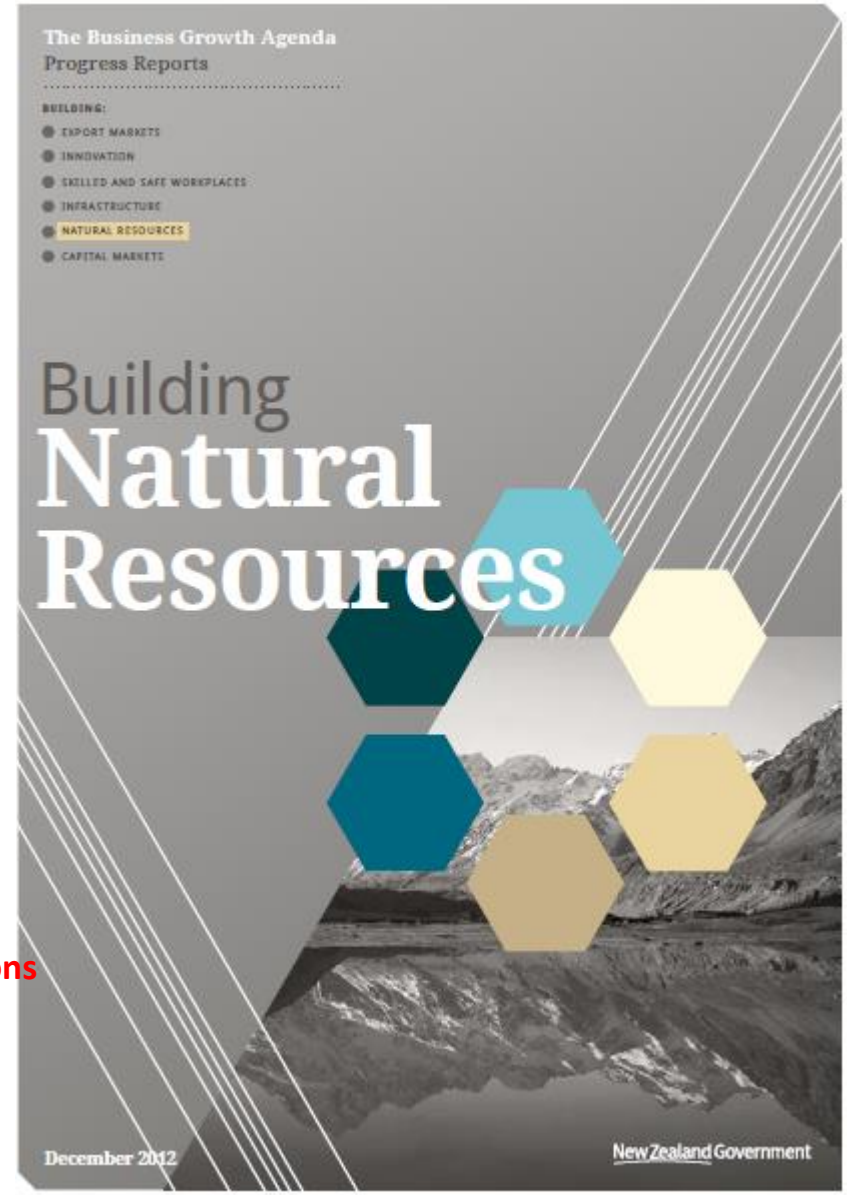
Harnessing Māori resources productive potential

Further developing the productive potential of Māori resource-based industries to help drive New Zealand's economic performance.

Efficient land use

Maintain Natural Capital

Low emissions economy



RMA: Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

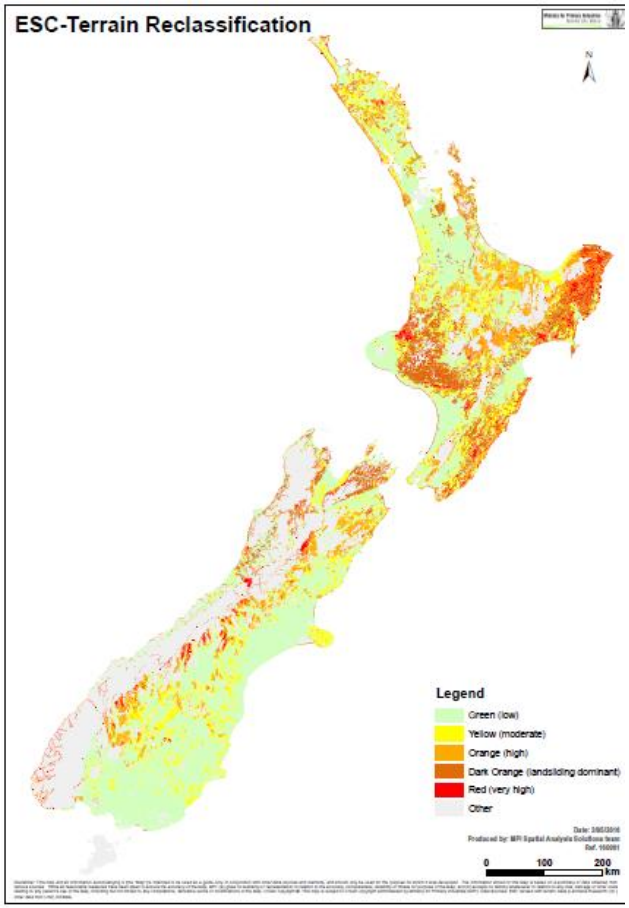
PURE ADVANTAGE *Our Forest Future*

NATIONAL POLICY STATEMENT for Freshwater Management 2014

National Environmental Standard

New Zealand Emissions Trading Scheme Review 2015/16: Discussion document and call for written submissions

Developing the proposed National Policy Statement on Indigenous Biodiversity



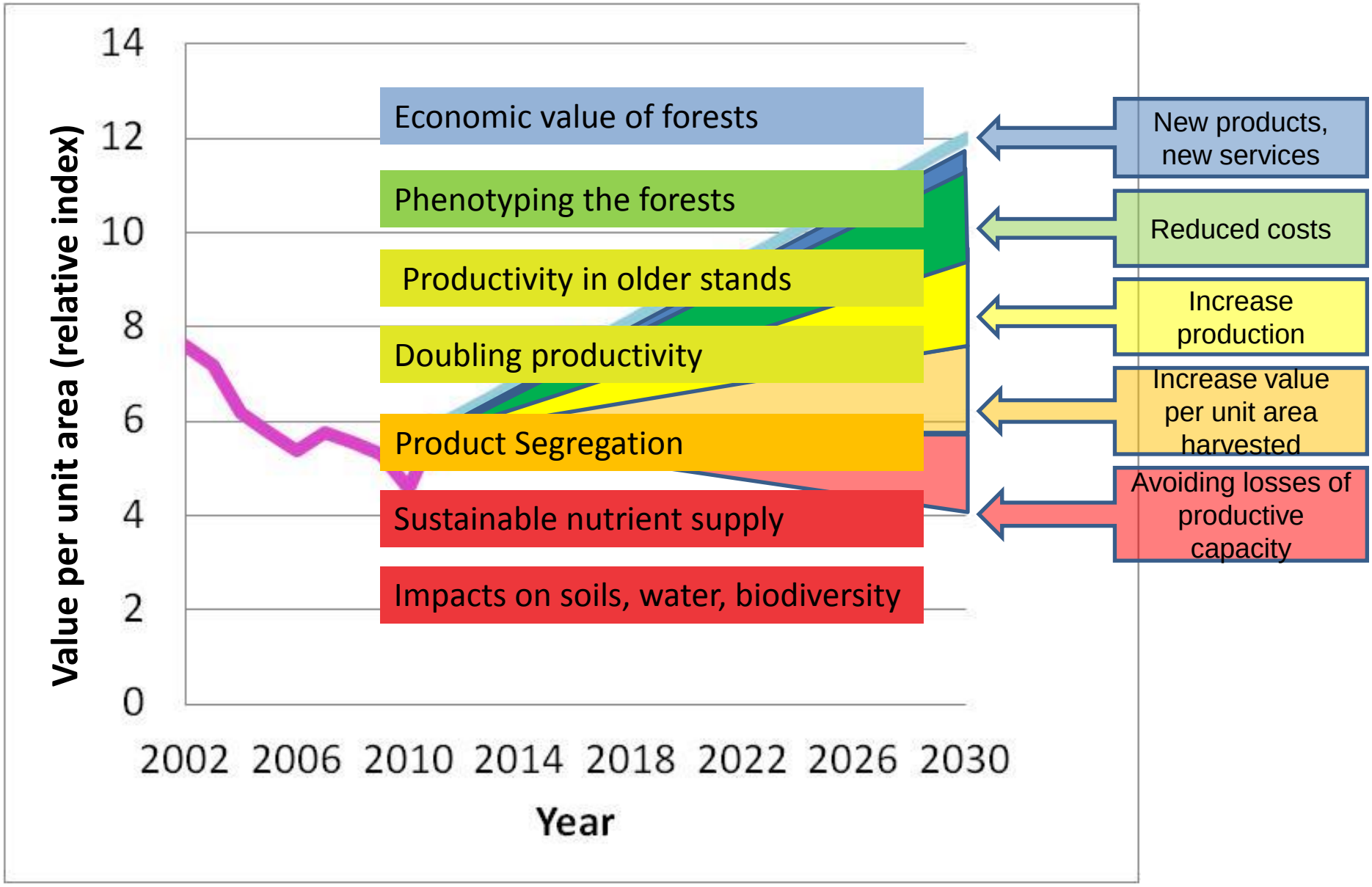
FOREST INDUSTRY SAFETY COUNCIL
TOGETHER TOWARDS ZERO

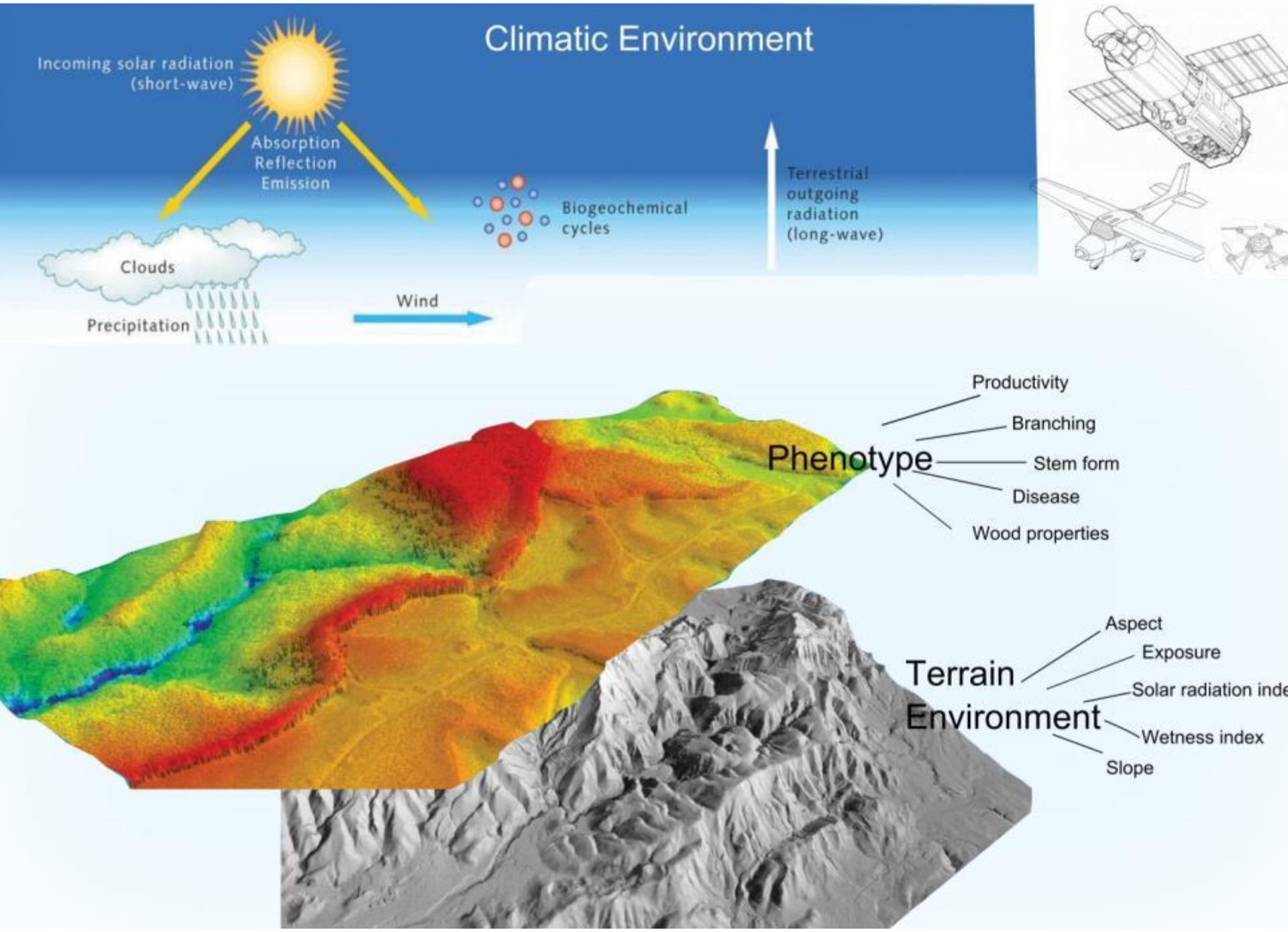
HSNO Act: GM organisms

Research areas in 'Growing confidence in forestry's future' research programme

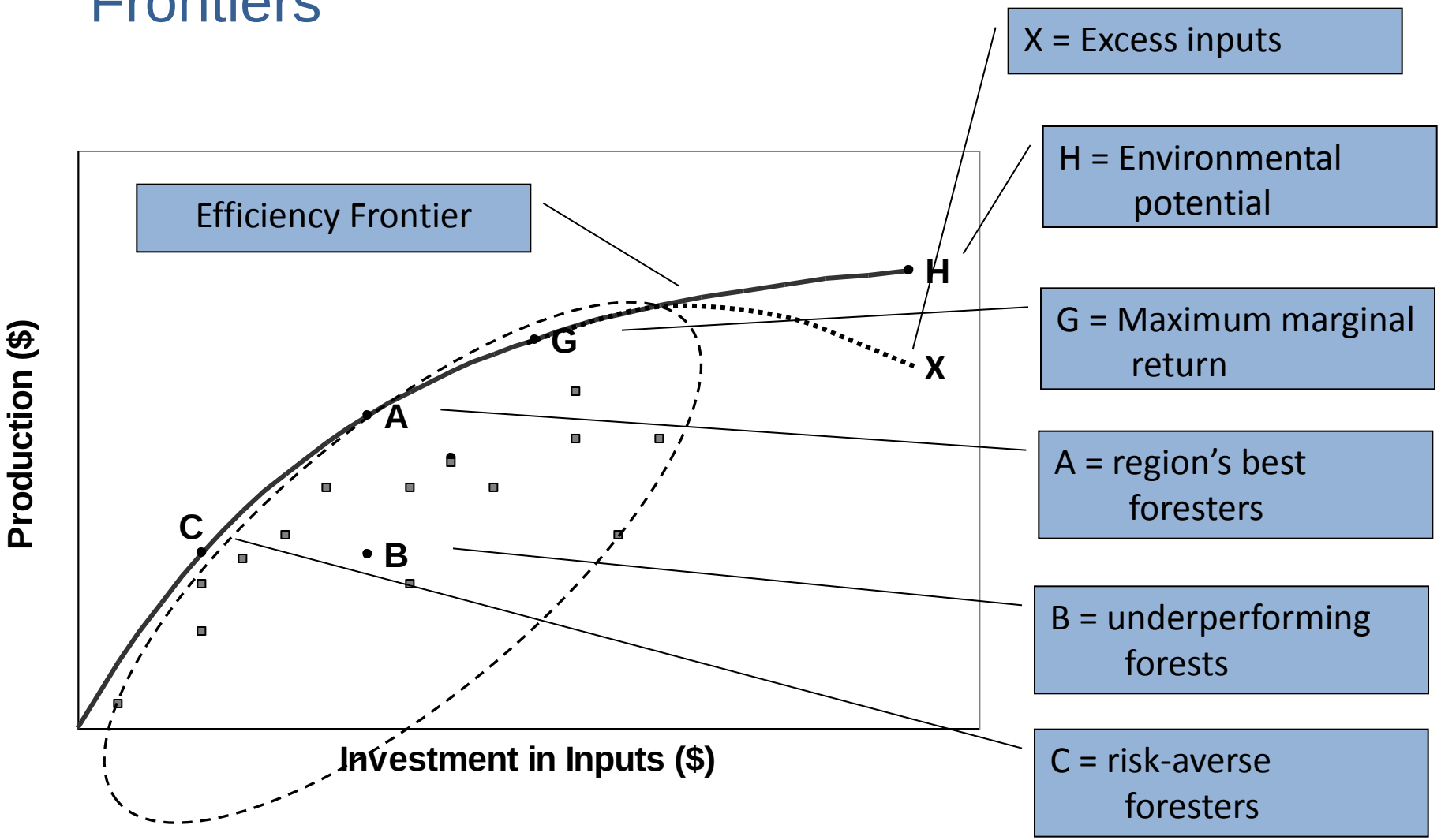
1.1 Segregation of the current resource
1.2 Enhancing productivity of older stands
2.1 Phenotyping the forest
2.2 Doubling radiata pine productivity
2.3 Enhanced activity of the soil microbial community
3.1 Sustainability of soil, water and biodiversity
3.2 Sustainability over multiple rotations
3.3 Spatial economic modelling for sustainable forestry

GCFF Programme focus



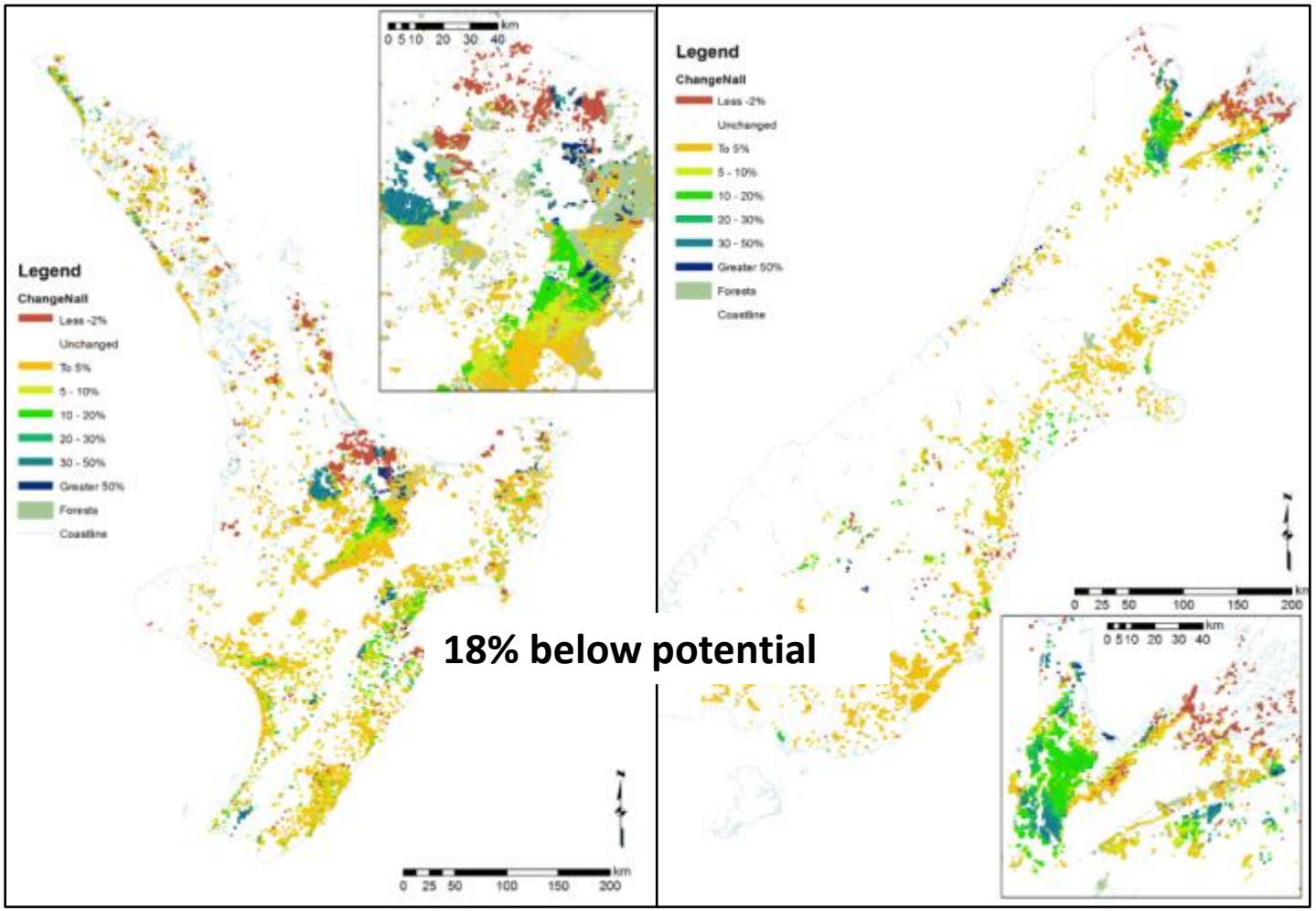

Climatic Environment
Incoming solar radiation (short-wave)
Absorption
Reflection
Emission
Biogeochemical cycles
Terrestrial outgoing radiation (long-wave)
Clouds
Precipitation
Wind
Productivity
Branching
Phenotype
Stem form
Disease
Wood properties
Aspect
Exposure
Terrain
Solar radiation inde
Environment
Wetness index
Slope

Pushing the Production Boundaries – New Frontiers

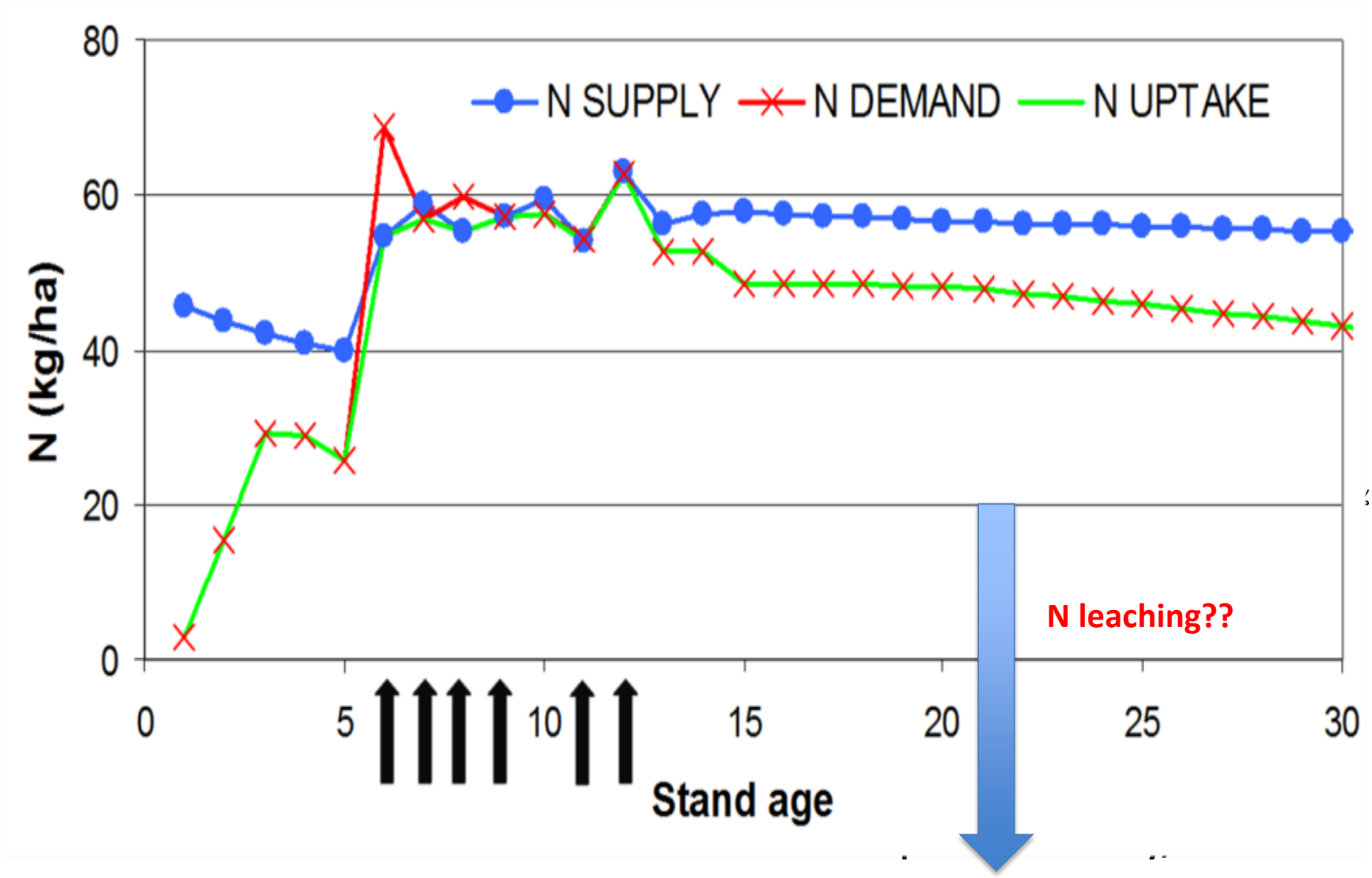


Adapted from: Dillon, 1977. An Analysis of Response in Crop and Livestock Production (2nd edition), Pergamon Press, Oxford

How much more production can we squeeze?



Environmental Impacts in existing forests

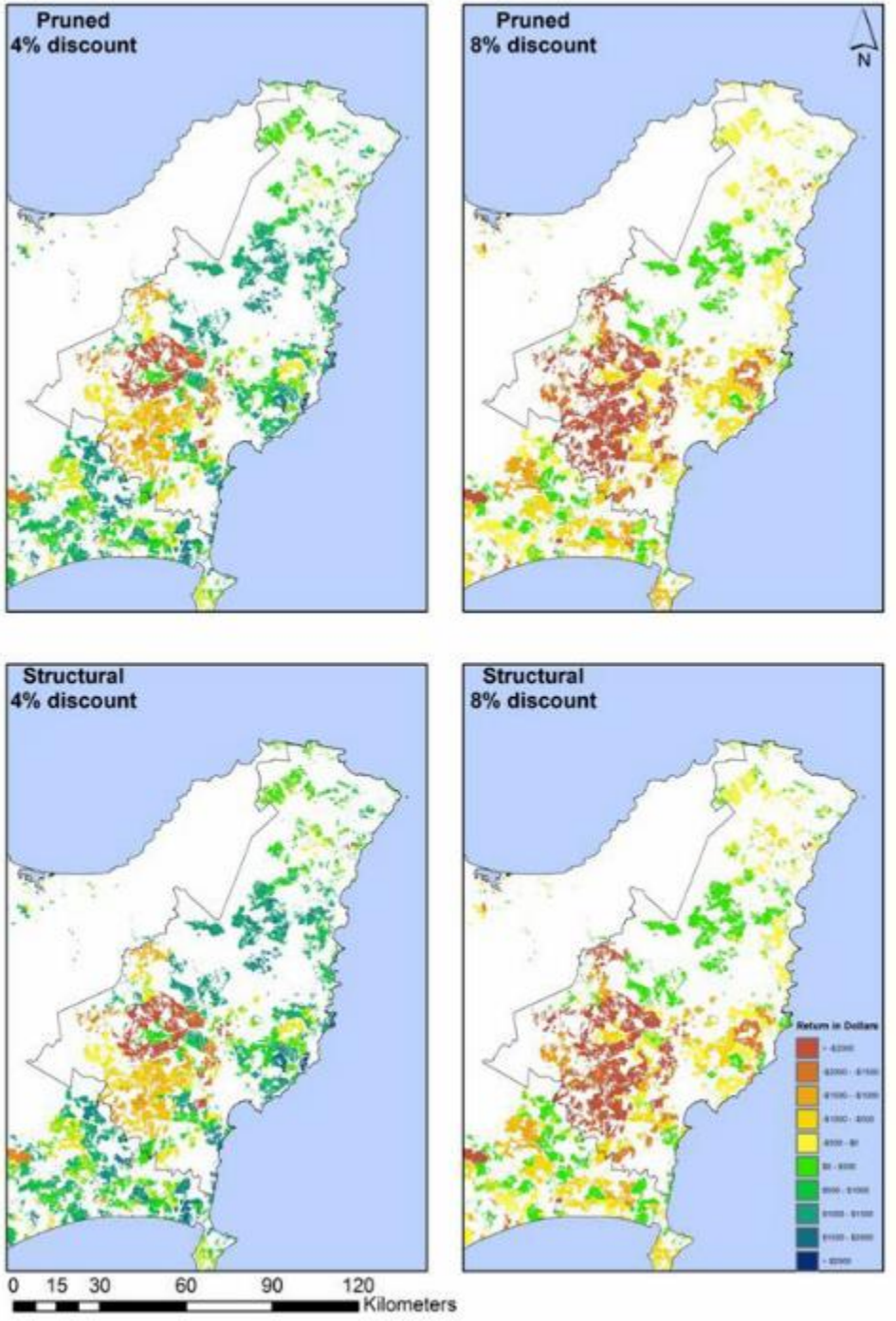


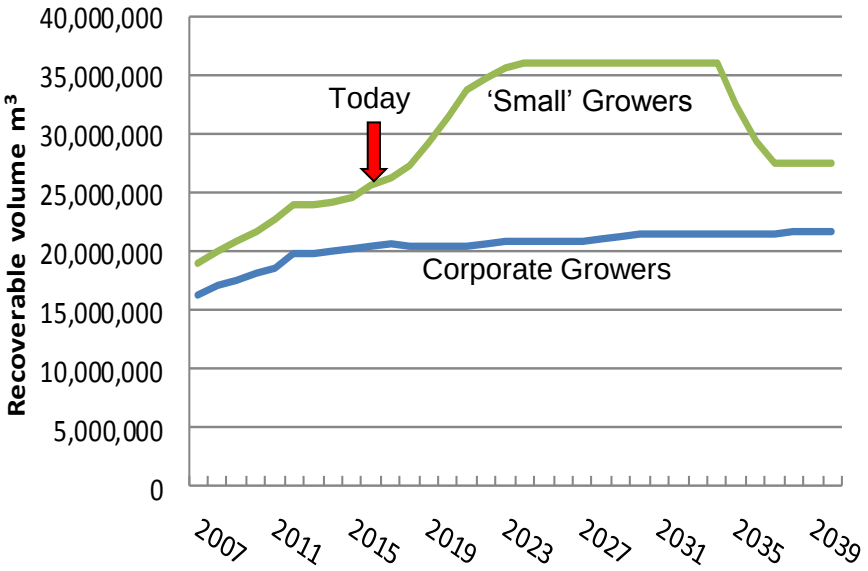
Regional Economic Forestry Scenarios

- Environmental data
- Forestry Costs
  - Variable regimes
- Valuation data
  - Land
  - Forest Products
  - Forest Ecosystem Services
- Transport networks
- Processing Locations

Full value and returns at any given location

Forest Investment Finder
http://prezi.com/vbuofvrbk7nb/fifindustry/





A Very Challenging Environment

65% of harvest in 2024 from steeplands

Ultimately the future will depend on society

Runanga Chair

Investor

Farmer

LEVEL OF SOCIAL LICENSE	SYMPTOMS/INDICATORS
WITHHELD / WITHDRAWN	Shutdowns, blockades, boycotts, violence / sabotage, legal challenges
ACCEPTANCE / TOLERANCE	Lingering/recurring issues & threats, presence of outside NGOs, watchful monitoring
APPROVAL / SUPPORT	Company seen as good neighbour, pride in collaborative achievements
PSYCHOLOGICAL IDENTIFICATION	Political support, co-management of projects, united front against critics

Forester

Urban dwellers

Rural Communities

Planner

In summary

- Global pressures on resources are increasing
- Planted Forests have a major role to play
- We will need to intensify
- We can and should do this in a holistic way
  - ***Thoughtfully, Cautiously, and Systematically***
  - ***With analysis of risk***
    - ***Especially of unintended consequences***
  - ***With dialogue***

$$sf(x) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos \frac{n\pi x}{L} + b_n \right.$$
s

Suggestions for the Task Force

- Develop a generally applicable systems approach to intensification to maximise opportunities and minimise consequences (intended and unintended)
  - O&C wheel may be a good framework
  - Make most of Task Force links across Divisions and to Society through New Generation Plantations
- Maximise Task Force benefits and opportunities
  - Session @IUFRO 125
  - 4th Planted Forests Congress, China 2018
  - New exchange programmes
  - Joint research programme proposal to GEF

Acknowledgements:

Planted forests paper colleagues: Jean-Michel Carnus, Peter Freer-Smith, Mark Kimberley, Walter Kollert, Shirong Liu, Christophe Orazio, Liuz Rodriguez, Luis Neves Silva, Michael Wingfield

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Future Earth: Mark Stafford-Smith

Growing confidence in forestry's future Research Programme

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