



Environmental  
Protection Authority  
*Te Mana Rauhi Taiao*

# The radiata pine estate and the regulation of GM forestry trees in New Zealand

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# Plantation forests in New Zealand



90% *Pinus radiata*

New Zealand's plantation forestry estate: 1.7 M ha (2015)



50,000 ha harvested in 2015



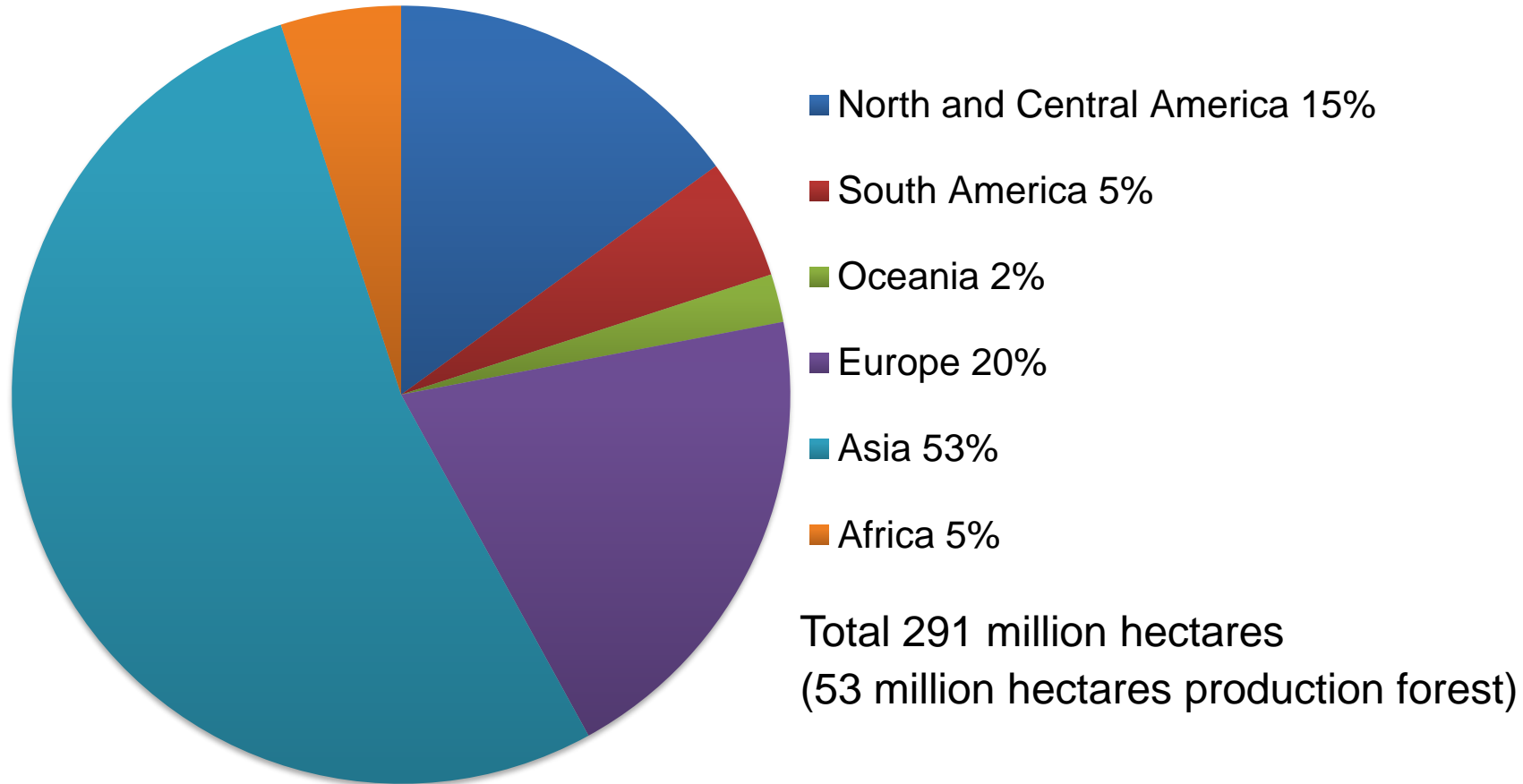
NZ\$5B in export revenue (2015)



# Contribution of NZ's main 65 plant species to its GDP

Plant	Total impact on GDP in 2012	Ranking #
Ryegrass	\$14,537,000,000	1
Pinus radiata	\$4,454,000,000	2
Clover	\$2,334,000,000	3
Kiwifruit	\$807,000,000	4
Douglas fir	\$200,000,000	12
Eucalyptus	\$41,000,000	23
Cypress	\$17,000,000	32

# Global plantation forest areas

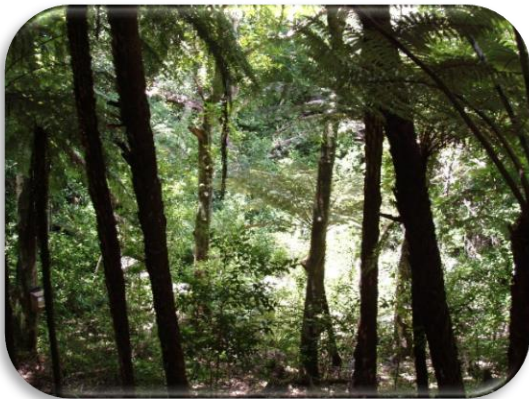
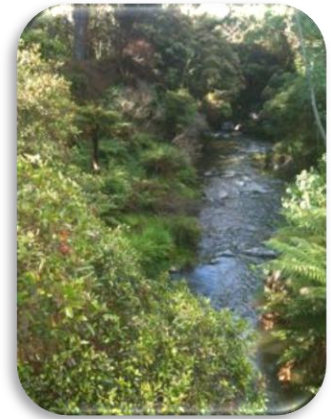


# Plantation vs “natural forest” harvest

29,000,000 m<sup>3</sup> plantation vs 29,000 m<sup>3</sup> natural harvested in 2015



[Sid Mosdell](#)



99.72% of harvest was plantation!



# Radiata pine – NZ's all-purpose forestry species



Improved genetic resource  
Entire estate is improved stock  
25 year rotation  
1,700 tonnes/ha (improving ~2% pa)

## Current uses

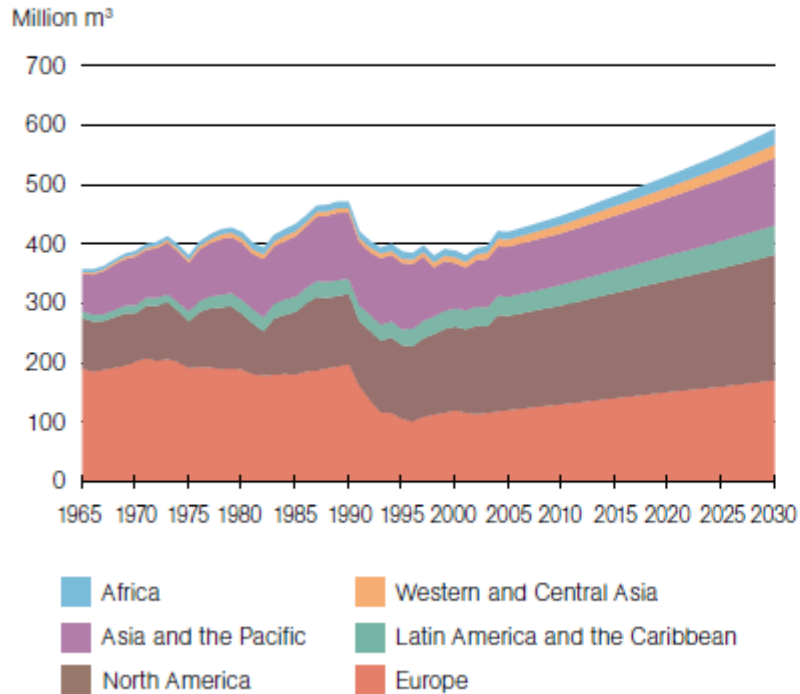
- **Structural Timber**
- **Appearance grade veneers**
- **Moulding**
- **Pulp & paper**



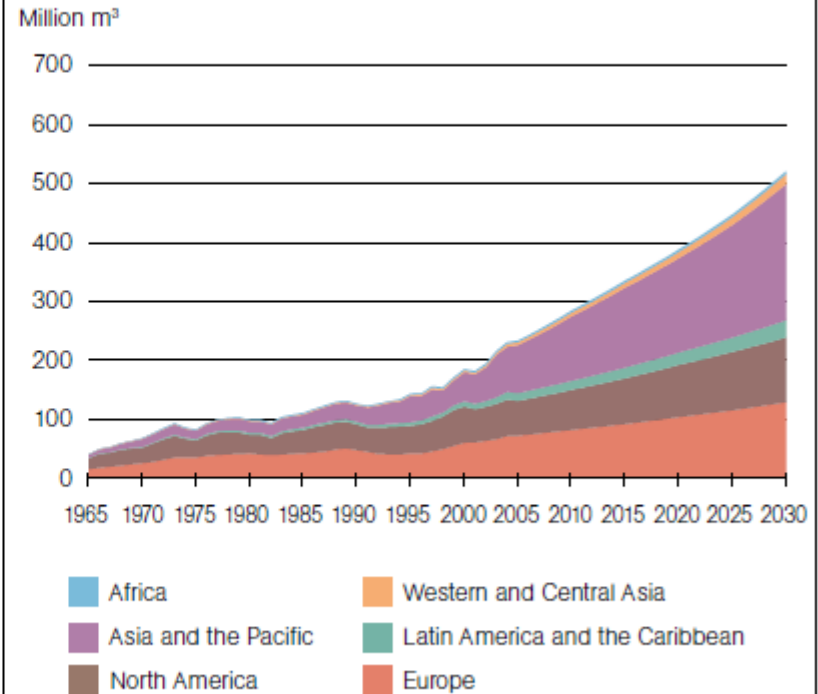
***Direct link to biofuels***

# Global demand for wood products

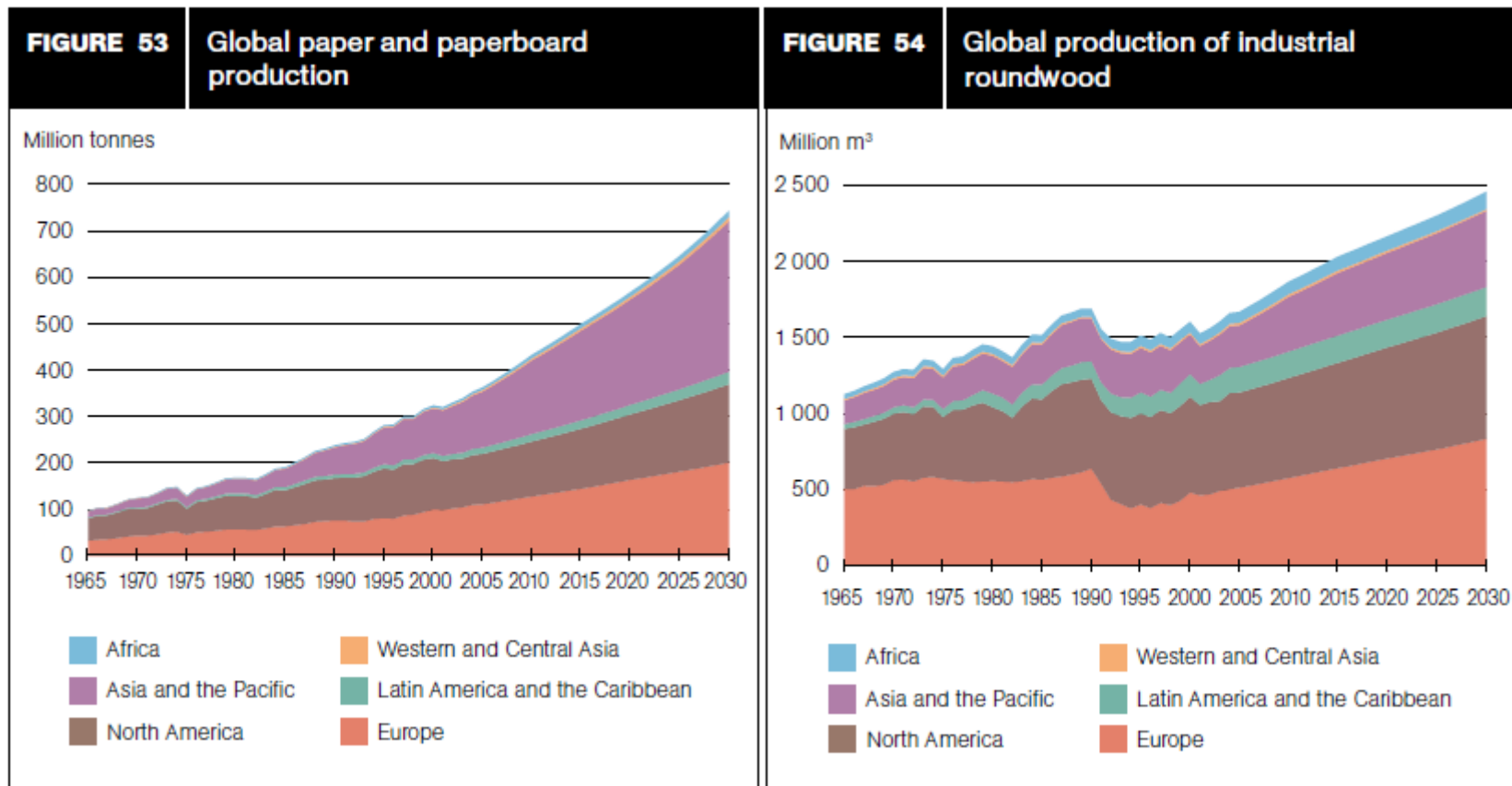
**FIGURE 51** Sawnwood production



**FIGURE 52** Global wood-based panel production



# Global demand for wood products



Drivers for more wood on less land



# New Organisms

## The Hazardous Substances and New Organisms Act, 1996

- Created the Environmental Risk Management Authority (now the Environmental Protection Authority)
- Established that all organisms that were not present in New Zealand on or immediately before 29 July 1998 are new organisms
- All GMOs are also considered to be new organisms, irrespective of time
  - All new organisms must be approved by the EPA for release before they can be introduced into the environment



# What is a GMO under HSNO?

**Genetically modified organism** means, unless expressly provided otherwise by regulations, any organism in which any of the genes or other genetic material –

- (a) have been modified by *in vitro* techniques; or
- (b) are inherited or otherwise derived, through any number of replications, from any genes or other genetic material which has been modified by *in vitro* techniques



# Relevant Approval Pathways for GM Trees

## Importation into containment

- for GMOs that won't be further modified

## Development in containment

- For creating new GMOs

## Field trial in containment

- Nothing potentially heritable (ie, seed, pollen) is allowed to escape

## Release approvals

- Without controls (sections 34, 34A)
- With controls (section 38A)



# ERMA 200479 Field trial approval

Previous field trials were primarily to test environmental effects

- ERMA200479 is for production traits
  - growth/biomass acquisition
  - reproductive development
  - herbicide tolerance
  - utilisable biomass
  - wood density
  - dimensional stability
- Environmental effects a secondary goal



# The definition of field trial (in NZ)

The definition of a field trial in New Zealand is one of 'outdoor containment'.

- Same standards apply as they would to indoor containment
- Nothing heritable may escape the field trial
- Workable for large animals (ie, cows, sheep, goats), but not for plants
- Key GM plant production traits cannot be tested outdoors in New Zealand



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# What is exempted in Regulation?

## Hazardous Substances and New Organisms (Organisms Not Genetically Modified) Regulations 1998

(a) organisms that result solely from selection or natural regeneration, hand pollination, or other managed, controlled pollination:

(b) organisms that are regenerated from organs, tissues or cell culture, including those produced through selection and propagation of somaclonal variants, embryo rescue, and cell fusion (including protoplast fusion):

(ba) organisms that result from mutagenesis that uses chemical or radiation treatments that were in use on or before 29 July 1998

(c) organisms that result solely from artificial insemination superovulation, embryo transfer, or embryo splitting:

(d) organisms modified solely by-

(i) the movement of nucleic acids using physiological processes, including conjugation, transduction and transformation; and

(ii) plasmid loss or spontaneous deletion

(e) organisms resulting from spontaneous deletions, rearrangements, and amplifications within a single genome, including its extrachromosomal elements



# Points that must be considered

## Section 36 Minimum Standards

The Authority shall decline the application, if the new organism is likely to-

- (a) cause any significant displacement of any native species within its natural habitat; or
- (b) cause any significant deterioration of natural habitats; or
- (c) cause any significant adverse effects on human health and safety; or
- (d) cause any significant adverse effect to New Zealand's inherent genetic diversity; or
- (e) cause disease, be parasitic, or become a vector for human, animal, or plant disease, unless the purpose of that importation or release is to import or release an organism to cause disease, be a parasite or a vector for disease.





# Points that must be considered

Section 37 Additional Matters to be considered

The Authority, when making a decision under section 38, shall have regard

to—

- (a) the ability of the organism to establish an undesirable self-sustaining population; and
- (b) the ease with which the organism could be eradicated if it established an undesirable self-sustaining population.



# Public Notification and Hearings

## Section 53 Applications required to be publicly notified

(1) The following applications shall be publicly notified by the Authority:

(a) *[Repealed]*

(ab) an application under section 38A for a conditional release approval for a new organism

(b) an application, under section 34, to import for release any new organism

(c) an application, under section 34, to release any new organism from containment,

if the application has not been approved under section 38I:

(d) an application, under section 40, to field test a genetically modified organism:

(e) an application under section 47 to import, release, or use a hazardous substance or a new organism in an emergency:

(f) *[Repealed]*

If any submitter wishes to be heard, then a public hearing is held



# Approval for release

For any new organism to be released (including GM trees) the EPA will

- Take into account all the information presented to it, including all public submissions and statements/testimony at hearings
- Evaluate the benefits of the release against the risks. The benefits must outweigh the risks for approval to proceed
- The decision maker must be satisfied that the organism meets the requirements of the Minimum Standards and the additional matters to be considered, as part of its risk assessment



# Conclusion

Barriers to full-scale testing and release of GM pine in New Zealand are high

- Currently a “Catch-22” situation as regards plant testing
- Engineered sterility may hold the key to meeting the requirements of sections 36 and 37 of the HSNO Act



A photograph of a dense forest with many trees and a path. The text "Thank you for listening" is overlaid in the center.

**Thank you for listening**