FOREST PESTS AND DISEASES

AN INTRODUCTION

Box 18.1 Forest, other woodland, and other land with tree cover: definitions of terms

Forest	Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.
Other wooded land	Land not classified as forest, spanning more than 0.5 hectares; with trees higher than 5 m and a canopy cover of 5–10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land with tree cover	All land that is **not** classified as forest or other wooded land is called '*other land*'. Of this, '*other land with tree cover*' is defined as land spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 m at maturity.

Table 18.1 Extent of forest and wooded land, 2005

Country/area	Forest	Other wooded land	Other land with tree cover	Total forest and wooded land area
	1000 ha	1000 ha	1000 ha	1000 ha
Total Eastern and Southern Africa	226,534	167,023	10,345	403,902
Total Northern Africa	131,048	94,609	10,207	235,864
Total Western and Central Africa	277,829	144,468	788	423,085
Total Africa	**635,412**	**406,100**	**21,339**	**1,062,851**
Total East Asia	244,862	90,003	0	334,865
Total South and Southeast Asia	283,127	29,842	10,806	323,775
Total Western and Central Asia	43,588	71,446	1,145	116,179
Total Asia	**571,577**	**191,291**	**11,951**	**774,819**
Total Europe	**1,001,394**	**100,925**	**8,044**	**1,110,363**
Total Caribbean	5,974	1,310	339	7,623
Total Central America	22,411	5,018	449	27,878
Total North America	677,464	111,866	32,899	822,229
Total North and Central America	**705,849**	**118,194**	**33,687**	**857,730**
Total Oceania	**206,254**	**429,908**	**145**	**636,307**
Total South America	**831,540**	**129,410**	**613**	**961,563**
WORLD	3,952,025	1,375,829	75,779	5,403,633

1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)

Source: Global Forest Resources Assessment 2005.

Table 18.2 Forest cover by subregion 2005 and distribution

Table 18.2

Forest cover by subregion 2005 and distribution

Region/subregion	Land area (*1 000 ha*)	Forest area, 2005 (*1 000 ha*)	Forest area as % of region's land area	Forest area as % of global forest area
Eastern and Southern Africa	814581	226 534	27.8	5.73
Northern Africa	1517682	131 048	8.6	3.32
Western and Central Africa	630393	277 829	44.1	7.03
Total Africa	**2962656**	**635 412**	**21.4**	**16.08**
East Asia	1147756	244 862	21.3	6.2
South and Southeast Asia	848952	283 127	33.4	7.16
Western and Central Asia	1101205	43 588	4	1.1
Total Asia	**3097913**	**571 577**	**18.5**	**14.46**
Total Europe	**2260180**	**1 001 394**	**44.3**	**25.34**
Caribbean	22907	5 974	26.1	0.15
Central America	51073	22 411	43.9	0.57
North America	2069930	677 464	32.7	17.14
Total North and Central America	**2143910**	**705 849**	**32.9**	**17.86**
Total Oceania	**849116**	**206 254**	**24.3**	**5.22**
Total South America	**1753646**	**831 540**	**47.7**	**21.04**
WORLD	**13067421**	**3 952 025**	**30.3**	**100**

1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)
Source: Global Forest Resources Assessment 2005.

FRA 2005: Composition of total forest area by forest type.

2005 Total forest area	3 952 025 000 ha
of which:	(%)
Primary forest	36.4
Modified natural forest	52.7
Semi-natural forest	7.1
Productive forest plantation	3
Protective forest plantation	0.8

Table 18.3 Forest cover by subregion: 1990, 20000 and 2005 and annual rates of change

Region/subregion	Forest Land Area			Annual change rate			
	1990	2000	2005	1990-2000		2000-2005	
	1000 ha	1000 ha	1000 ha	1000 ha/yr	%	1000 ha/yr	%
Eastern and Southern Africa	252,354	235,047	226,534	-1,731	-0.7	-1,702	-0.7
Northern Africa	146,093	135,958	131,048	-1,013	-0.7	-982	-0.7
Western and Central Africa	300,914	284,608	277,829	-1,631	-0.6	-1,356	-0.5
Total Africa	**699,361**	**655,613**	**635,412**	**-4,375**	**-0.64**	**-4,040**	**-0.62**
East Asia	208,155	225,663	244,862	1,751	0.8	3,840	1.6
South and Southeast Asia	323,156	297,380	283,127	-2,578	-0.8	-2,851	-1.0
Western and Central Asia	43,176	43,519	43,588	34	0.1	14	n.s.
Total Asia	**574,487**	**566,562**	**571,577**	**-792**	**-0.14**	**1,003**	**0.18**
Total Europe	**989,320**	**998,091**	**1,001,394**	**877**	**0.09**	**661**	**0.07**
Caribbean	5,350	5,706	5,974	36	0.6	54	0.9
Central America	27,639	23,837	22,411	-380	-1.5	-285	-1.2
North America	677,801	677,971	677,464	17	n.s.	-101	n.s.
Total North and Central America	**710,790**	**707,514**	**705,849**	**-328**	**-0.05**	**-333**	**-0.05**
Total Oceania	**212,514**	**208,034**	**206,254**	**-448**	**-0.21**	**-356**	**-0.17**
Total South America	**890,818**	**852,796**	**831,540**	**-3,802**	**-0.44**	**-4,251**	**-0.50**
WORLD	**4,077,291**	**3,988,610**	**3,952,025**	**-8,868**	**-0.22**	**-7,317**	**-0.18**

1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)
Source: Global Forest Resources Assessment 2005.

Summary: major changes affecting the world's forests in the period from 1990 until 2005

1. **A large loss in tropical forest** cover with a much smaller gain in non-tropical forest area.
2. **A large loss in natural forest area** with a much smaller gain in forest plantation area.
3. For the broad aggregates considered here, **a loss in total forest area in all regions** except Asia and Europe.
4. **Deforestation continues** at an alarmingly high rate, but the net loss of forest area is slowing down thanks to forest planting, landscape restoration and natural expansion of forests on abandoned land.

The economic losses from forest diseases and insects were brought into focus.

Reports from almost every major part of the world described losses from pests and pestilences either **in killing forest trees and nursery seedlings, reducing growth, destroying wood in the living tree or in reducing the quality of wood or the quality of growing stock**.

Plantation risks

In plantations, preferred species are raised usually as:

- a pure crop in even-aged stands
- intensively managed toward increased productivity by reducing genetic variation eliminating competing vegetation
- maintaining optimum stand density and practicing other cultural operations.

All these operations may change the ecosystem drastically and expose plantations to the risk of diseases and insect pests.

The pathogens and insect pests in the tropical forests consist of a richer complex of species which exhibit a more prolonged period of activity as compared with those occurring in forests of temperate climatic regions.

The quantity and quality of available food in plantations may lead to epidemic insect outbreaks such as, for example, teak defoliators, *semul* shoot borer and *ailanthus* defoliator, gall rust diseases

Similarly, as a pure crop on a reforested site suffers from serious mortality owing to *Ganoderma lucidum* root disease, which is normally endemic in the natural forest.

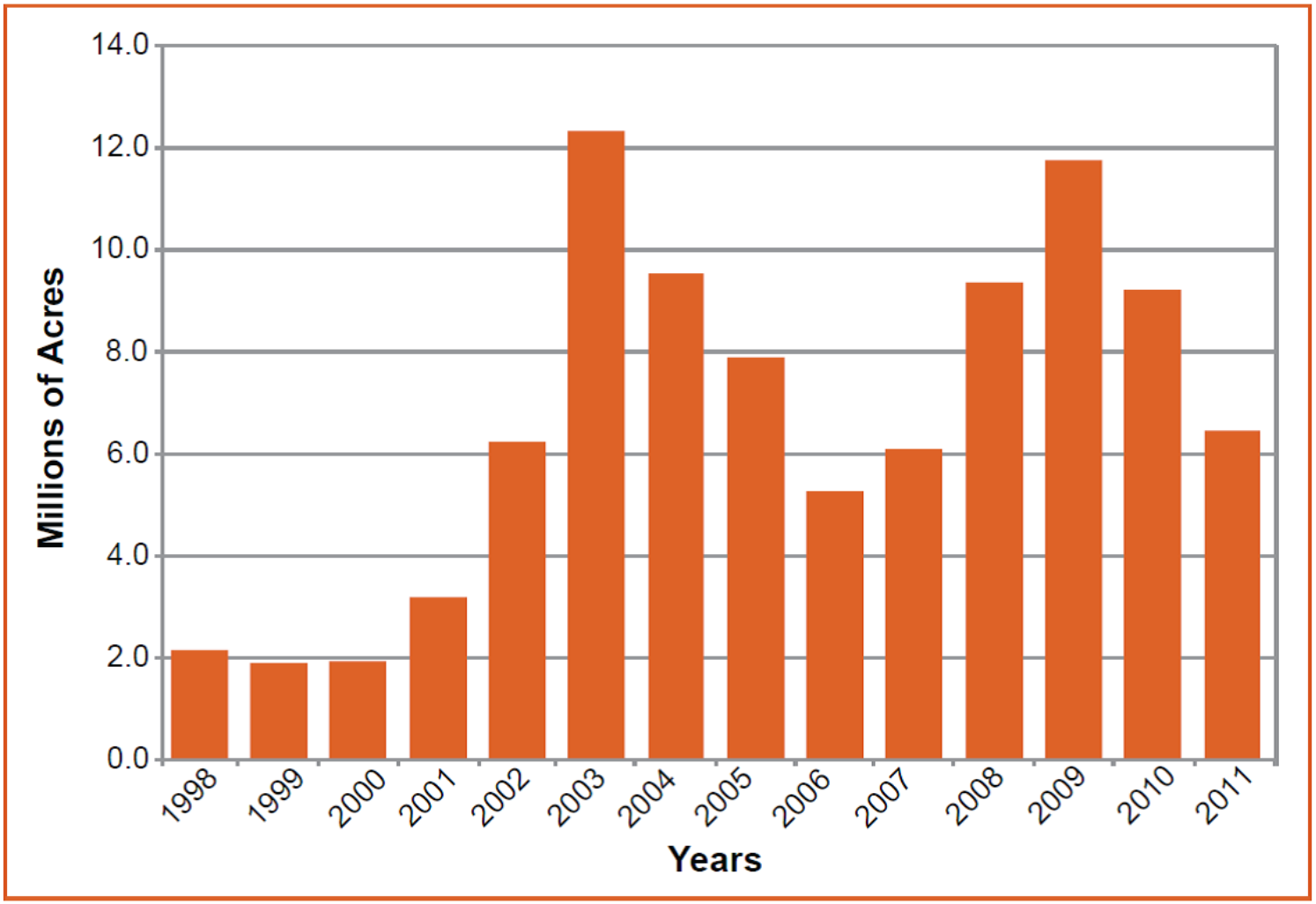
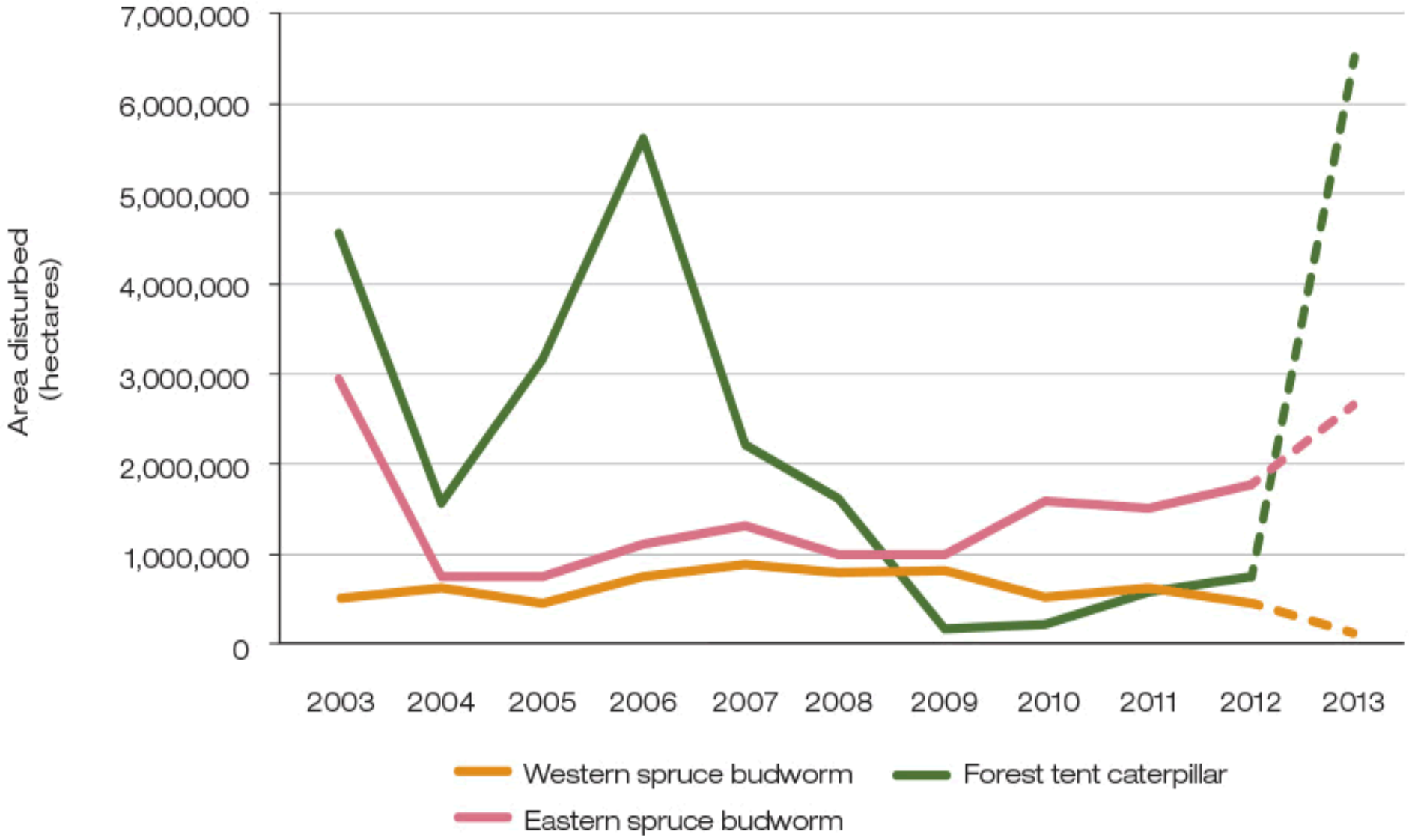


Figure 1 FHP surveyed acres of tree mortality due to insects and diseases 1998-2011.

Source: USDA Forest Service, Forest Health Protection. 2012. Major Forest Insect and Disease Conditions in the United States: 2011. United States Department of Agriculture Forest Service FS-1000. Washington D.C.


7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Area disturbed (hectares)
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Western spruce budworm
Forest tent caterpillar
Eastern spruce budworm

Global trade, climate change and international movement of forest pests and diseases

- **Opportunity** – climate change offers extended suitability for a wider range of pest and pathogen species, but not all will benefit
- **Opportunity** – global movement along pathways
- **Opportunity** – a range of exotic tree species as potential hosts after arrival

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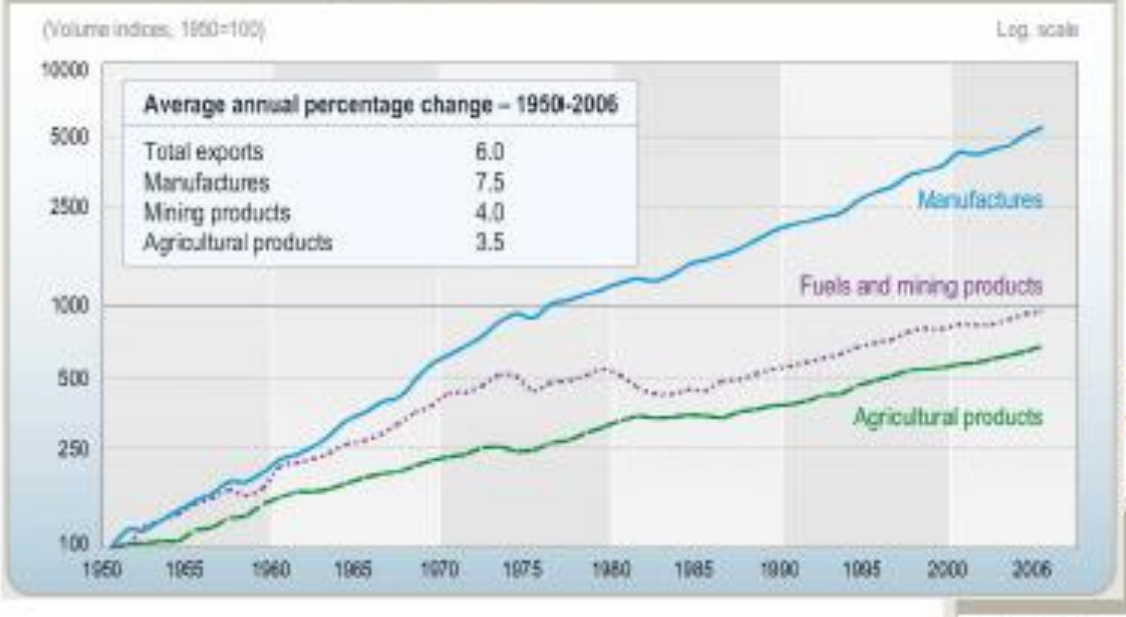
Increasing global trade: opportunities for pests to move internationally

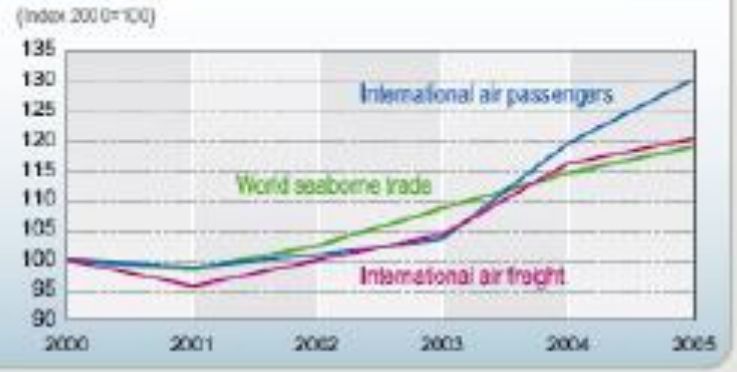
Chart I.3 World merchandise trade volume by major product group, 1950-2006



Source:
WTO International Trade Statistics, 2007

Volumes moving along pathways
World seaborne trade (total goods loaded) has increased significantly since 2000, reaching a record level of 7.1 billion tons in 2005.

World seaborne trade and international transportation traffic, 2000-2005



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Pests move – globally, despite Plant Health rules
They also cope with widely differing climates

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Changes in climate will have direct effects on invertebrate pests

Spring & summer temperatures - influence development rates; timing of bud burst *versus* egg hatch of defoliating moths; flight & dispersal

Winter temperatures - over-winter survival, dormancy

Rainfall & wind - mortality; dispersal & fecundity during insect flight periods

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- but climate change will also have direct effects on trees making them more or less suitable as host plants.

- and will influence populations of predators, parasites & other natural enemies.

… therefore, overall effect very difficult to predict!

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Pest and Disease Strategic Goals
Biosecurity

- To agree on and implement a programme that will facilitate the speedy **rehabilitation and restoration** of forestry areas that have had to be clearfelled and/or taken out of production as a result of attack by pests and disease.
- To raise **awareness** and develop **knowledge and understanding** of current and potential pest and disease threats and their management amongst all relevant stakeholders, decision makers and the public.
- Through **research**, to provide appropriate knowledge to ensure effective and sustainable tree health management




Forest insects and diseases in Indonesia are typically classified into three broad categories:

Native: Indigenous species that have existed in Indonesia for thousands of years. Outbreaks occur periodically. Examples are gall rust disease, bag worm, root rot fungus

Alien: Species introduced into Indonesia's forests within recent history. They are also referred to as "exotic," "non-native" and "foreign." Examples. Cabuk lilin, Phytophtora etc. Invasive: Insects and diseases that spread beyond their known usual range.

Both terms, "alien" and "invasive," refer to shifts from one ecosystem to another, not to shifts across national borders. So, even organisms that move into new ecosystems within the same country can be considered alien and invasive if they extend beyond their usual geographic range.

THANK YOU

TUGAS KELOMPOK

1. Jelaskan resiko pengusahaan hutan tanaman khususnya dalam kaitannya dengan perkembangan hama dan penyakit.
2. Jelaskan, bagaimana perdagangan global, perubahan iklim global dan lalu lintas internasional dapat mendukung perkembangan hama dan penyakit hutan?
3. Bagaimana biosecurity dapat berperan dalam menekan perkembangan hama dan penyakit hutan?

KESEPAKATAN DAN KONTRAK KULIAH

1. Masuk jam 7.15
2. Koordinator Kelas :
3. Nilai: 50% Penyakit, 50% bagian Hama

   Nilai Quis : 15%, Keaktifan : 15%, Tugas Kelompok: 20%,

   UTS/UAS = 50%.