



## FOREST HEALTH A GLOBAL OVERVIEW

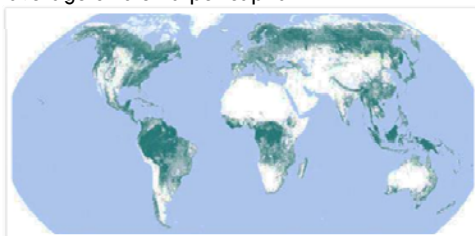
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### Global forest cover

- Forests cover 31% of total land area
- Total forest area is just over 4 billion hectares = average of 0.6 ha per capita



### Threats to forest health

- Insects (endemic & invasive)
- Diseases (endemic & invasive)
- Plants (woody invasive species)



## Threats to forest health

- Other biotic agents (e.g. physical damage, browsing, grazing, nematodes)
- Abiotic disturbances (e.g. storms, floods, drought, air pollution, earthquakes, landslides, tsunamis)
- Fire

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## Impacts

- Tree survival
- Yield & quality of forest products
- Socio-cultural & recreational values



## Impacts

- Wildlife habitat
- Species biodiversity
- Disrupt natural fire, nutrient & hydrological cycles
- Affect international trade in forest products



## Abiotic disturbances

### Examples from Asia and the Pacific

#### Tropical Cyclone Nargis - Myanmar - 2008

- Damaged 17 000 ha of natural forest, 21 000 ha of plantations



#### Tropical Cyclone Sidr – Bangladesh –2007

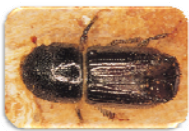
- Some 4.1 million trees were damaged
- Sunderban mangrove forests, a UNESCO World Heritage Site - 4-5% (20 000–25 000 ha) of forest area were severely damaged; nearly 15% (60 000 ha) partially damaged

## Forest fires

- Large wildfires - megafires - noted in all regions of the world



- Most costly, destructive and damaging of all wildfires
- Occurrence likely increases as droughts deepen, fuels accumulate & landscapes become more homogeneous



## Impacts of pests on forests

- Insect affected area:**

At least 35 million hectares per year

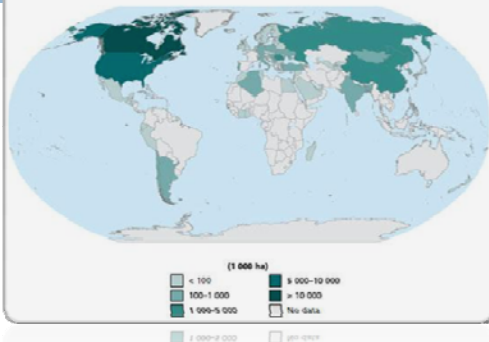
- Substantial environmental and socio-economic losses



University of Natural Resources Canada, Canadian Forest Service

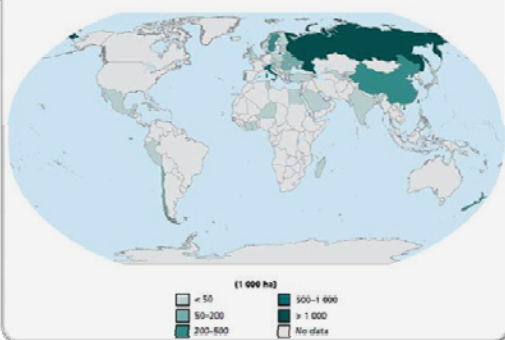
## Average forest area affected by insects

Average area of forest annually affected by insects by country, 2005



## Average forest area affected by diseases

Average area of forest annually affected by diseases by country, 2005

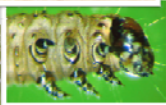


## Data underestimated

- Information availability on forest area significantly affected by forest pests continues to be poor & data collection methods are highly variable
- Methods need to be devised to obtain, analyse & report data on forest pests

## Top ten insect pests reported

- *Lymantria dispar*, gypsy moth
- *Ips typographus*, European spruce bark beetle
- *Tortrix viridana*, European oak leaf roller
- *Thaumetopoea pityocampa*, pine processionary caterpillar
- *Neodiprion sertifer*, European pine sawfly



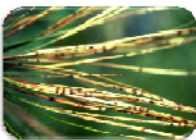
## Top ten insect pests reported

- *Panolis flammea*, pine beauty moth
- *Pityogenes chalcographus*, six-toothed spruce bark beetle
- *Bupalus piniarius*, pine looper moth
- *Dendrolimus pini*, pine lappet moth
- *Lymantria monacha*, nun moth



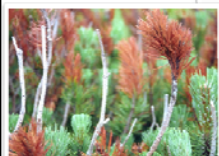
## Top diseases reported

- *Armillaria* spp., Armillaria root disease
- *Mycosphaerella pini*, red band needle blight
- *Cryphonectria parasitica*, chestnut blight
- *Melampsora larici-populina*, poplar rust



## Top diseases reported

- *Heterobasidion* spp., annosum root rot
- *Sphaeropsis sapinea*, diplodia tip blight
- *Chalara fraxinea*, ash dieback
- *Gremmeniella* sp.



## Woody invasive species

- *Lantana camara*
- *Mikania micrantha*
- *Parthenium hysterophorus*
- *Mimosa diplotricha*



## Some other notable pests of concern to the Asia and Pacific region

- *Bursaphelenchus xylophilus*
- *Dendroctonus valens*
- *Dendrolimus sibiricus*
- *Dendrolimus spectabilis*
- *Hyphantria cunea*
- *Ips typographus*
- *Lymantria dispar*



## What is contributing to the global problems?

- Increased international trade & increased number of pathways
- Climatic changes

## Important pathways

### Pathways for pest movement in international trade

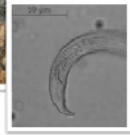
<b>Wood as a commodity</b>	Roundwood with/without bark Sawnwood with/without its natural rounded surface Processed wood, such as plywood, MDF, etc. Fuelwood
<b>Packaging wood</b>	Pallets, crates, drums, skids, boxes, wood containers, cases, dunnage
<b>Plants for planting</b>	Live plants ranging in size from rootless cuttings to large trees complete with root balls
<b>Cut plants</b>	Ornamental & other cut plant materials could harbour pests, e.g. floral displays, Christmas trees, etc.
<b>Germplasm</b>	Cones & seeds, tissue culture materials directly in trade & as contaminants in a very wide range of goods and substrates
<b>Hitchhikers</b>	Any organism could be carried inadvertently in containerized or human transport, i.e. cars, trucks, planes, trains, boats, etc.





## International trade and forest pest spread

- Numerous pest species have been spread around the globe through international trade
- Increased concern resulted in the development of ISPM No. 15
- Following slides show examples of major pests that have moved internationally & global consequences



## European woodwasp (*Sirex noctilio*)

- Major global threat to forests & forest sector causing considerable damage & costs for control
- Introduced from Europe/North Africa to South Africa, Oceania, Latin America & the Caribbean, North America



## Red turpentine beetle (*Dendroctonus valens*)

- Accidentally introduced into China in 1980s presumably on unprocessed logs imported from Western USA
- Infested over 4 000 km<sup>2</sup> of Chinese pine stands (*Pinus tabulaeformis*) in Shanxi, Hebei, Henan & Shaanxi Provinces with severe mortality
- Nearly 10 million trees killed
- Several consecutive years of drought have severely stressed host trees contributing greatly to the outbreak





## Emerald ash borer

(*Agrilus planipennis*)

- Killed millions of trees in Canada, US
- Russian Federation - most ash trees within 100 km of Moscow killed; infestation spreading rapidly threatening European forests
- Spread from Asia through movement of plants, wood packaging materials, forest products, in particular fuelwood



## Asian longhorned beetle

(*Anoplophora glabripennis*)

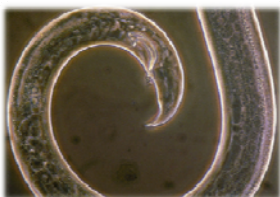
- Wood-boring beetle – major threat to broadleaved trees in both urban and forest environments
- Introduced into Europe & North America from China & Korea in wood packaging materials



## Pine wood nematode

(*Bursaphelenchus xylophilus*)

- Caused extensive tree mortality in some areas where it has been introduced
- Millions of trees killed annually in Japan



## The Guide

- To initiate a common understanding of phytosanitary concepts
- To make ISPMs more accessible to the forest sector
- Thus to reduce the movement of pests



## What next?

- **Complexity of interactions between forest pests & trees will make predictions about the impacts of climate change difficult**
  - **Global trade is continuing to increase**
    - **the world has become smaller**



## What needs to be done

- **Be proactive not reactive - stop it from happening!**
- **Increase monitoring for new pest threats before they arrive**
- **Identify new trade trends, especially of plants**
- **Adapt policies/legislation to rapidly respond to new challenges**

Thank you!

