Guide to implementation of phytosanitary standards in forestry

Version 6.3 (27 April 2010)
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Foreword

(To be updated for final draft)

New threats to forest health from insects, pathogens and other invasive species are emerging due to growing global trade and an increase in new trade patterns. These threats are largely the result of increased international pest movements associated with the trade of plants, plant products and other articles such as containers, soil, industrial equipment, and personal baggage. Management of pests and preventing their spread plays a key role in ensuring forest health and meeting sustainable forestry objectives.

The International Plant Protection Convention (IPPC) and the National Plant Protection Organisations (NPPOs) of member countries have historically dealt most often with agricultural crops. In recent years, however, forest pests have become a more prominent concern, suggesting the need to develop better communication with the forest sector. All sectors in forestry - including those involved in growing, harvesting, processing, storing, remanufacturing and finishing forest products - need to understand what the IPPC is, and how NPPOs work, if they are to be of assistance to signatories implementing International Standards for Phytosanitary Measures (ISPMs).

Understanding the formal ISPM texts is not always easy. Differences in the use of terminology and the perception of roles and responsibilities impede broader implementation of these phytosanitary principles internationally.

The FAO Forestry Department has therefore initiated a multistakeholder activity to prepare this Guide to provide the forestry sector with clear and concise guidance on forest health practices, including plain language descriptions of the international standards and suggestions for improved national implementation. The Guide has been prepared through a consultative process involving an international group of scientists, phytosanitary authorities and forest sector representatives and is supported by the IPPC Secretariat at FAO.

Understanding and implementing the ISPMs is vital in maintaining forest health and vitality, particularly with global trade increasing the risk of new pest introductions and local climatic change increasing the possibility of establishment into new areas. This Guide will help increase this understanding and assist policy makers, planners and managers to improve communication between agencies at a national level and apply these standards in the forestry sector.

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Acronyms

CBD Convention on Biological Diversity
CPM Commission on Phytosanitary Measures
CITES Convention on International Trade in Endangered Species
FAO Food and Agriculture Organization of the United Nations
IFQRG International Forestry Quarantine Research Group
IPM Integrated pest management
IPPC International Plant Protection Convention
ISPMs International Standards for Phytosanitary Measures
IUFRO International Union of Forest Research Organizations
NPPO National Plant Protection Organization
PFA Pest free areas
PFPP Pest free place of production
PRA Pest risk analysis
RPPO Regional Plant Protection Organization
SPS Sanitary and Phytosanitary Measures
TPFQ Technical Panel on Forest Quarantine
WPM Wood packaging materials
WTO World Trade Organization
1 INTRODUCTION

Protecting the world’s forests from harm is vital. Forests are important global resources that provide a wide range of environmental, economic and social benefits. The global forest area is just over 4 billion hectares, which represents 31 percent of the total land area. Outbreaks of forest insects alone damage some 35 million hectares of forests annually, primarily in the temperate and boreal zone (FAO, 2010).

Forests can play a significant role in addressing global climate change concerns. Forests absorb carbon from the atmosphere and store it in trees and forest products. Properly managed, woodfuel also provides a renewable alternative to fossil fuels. Forest conservation, management and use are important considerations for adaptation to climate change.

The health and vitality of the world’s forest ecosystems is impacted by a range of natural disturbance agents including pathogens, insect pests and fire. A wide range of indigenous pests can have negative impacts on forests and the forest sector. Sometimes even more damage is caused by non-indigenous pests, which have been introduced around the world through international trade and the movement of items such as fuelwood and smuggled plant materials. This Guide is intended to help reduce pest spread and impacts.

Since non-indigenous insect pests and diseases (collective referred to as “pests”) did not evolve with the forests they are affecting, they sometimes can be devastating (see Table 1). In such situations, introduced insect pests may not have natural control agents that normally keep populations in balance. The new host trees may have no resistance to introduced pathogens. Climate change also appears to be influencing pest establishment in new locations, as well as increasing the severity of impacts of both indigenous and non-indigenous pests. International cooperation is very important in limiting the spread of forest pests to new areas.

To successfully protect the world’s plants, including forest tree species, from pests requires coordinated international action. This coordination occurs through the International Plant Protection Convention (IPPC) which is an international agreement between countries to control pests and prevent their spread. The IPPC’s governing body is the Commission on Phytosanitary Measures (CPM), which adopts International Standards for Phytosanitary Measures (ISPMs) to prevent pest introduction and spread and facilitate trade. Currently, 172 countries are contracting parties to the convention. Under the guidance of the IPPC, most governments have established their own national plant protection organization (NPPOs) to protect natural resources including forests from pest introduction, entry and establishment. NPPOs frequently have to work together with neighbouring countries to prevent pest entry and spread. This collaboration may be done through Regional Plant Protection Organizations (RPPOs).

NPPOs are the national contact point to the IPPC, and work together to develop ISPMs. All member countries unanimously agree that ISPMs are effective in managing pest risks and allowing safer trade. NPPOs can use the ISPMs as the basis for their national phytosanitary regulations. These regulations will have an impact on trade, and it is important for everyone involved in the forest products trade to understand how regulations can affect them. ISPMs developed by the IPPC are recognized by the World Trade Organization (WTO), which provides a dispute resolution process for trade issues.

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1 For example, the NPPO of Kenya is Kenya Plant Health Inspectorate Service (KEPHIS); of China is the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ); of Chile is Servicio Agrícola y Ganadero (SAG), and of Canada is the Canadian Food Inspection Agency (CFIA). The full list of NPPOs and their official contact person can be found on the IPPC Web site: www.ippc.int.
Table 1  Examples of forest pests which have moved internationally and the resulting impacts

<table>
<thead>
<tr>
<th>Pest</th>
<th>Impacts and pathways</th>
<th>Main hosts</th>
<th>Native range</th>
<th>Introduced range</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Agrilus planipennis</em> Emerald ash borer</td>
<td>Caused death &amp; decline of millions of trees in Canada &amp; USA; predicted to ultimately kill most ash in forests, urban plantings &amp; shelterbelts. In Russian Federation, most ash trees within 100 km of Moscow are dead; infestation is spreading rapidly &amp; European forests are threatened. Pathways: international trade in plants, wood &amp; wood products containing bark; flight &amp; wind dispersal</td>
<td><em>Fraxinus</em> spp. (ash), <em>Ulmus</em> spp. (elm)</td>
<td>DPR Korea, Japan, PR China, Mongolia, Republic of Korea, Russian Federation</td>
<td>North America: Canada, USA</td>
</tr>
<tr>
<td><em>Cinara cupressivora</em> Cypress aphid</td>
<td>Serious damage to forests in Africa, Europe &amp; South America. Rapidly spread through Africa after accidental introduction into Malawi in 1986. By 1990, trees worth approx US$44 million were lost plus US$14.6 million/year through reduction in annual growth increment. In Kenya, estimated that it might kill as many as 50% of all cypress trees during the 30-year harvest cycle. Pathways: international transport of nursery stock; flight &amp; wind dispersal</td>
<td><em>Cupressus</em> spp. (cypress), <em>Juniperus</em> spp. (juniper)</td>
<td>Europe &amp; Near East; from eastern Greece to Iran</td>
<td>Africa: Burundi, DR Congo, Ethiopia, Kenya, Malawi, Mauritius, Morocco, Rwanda, South Africa, Uganda, Tanzania, Zambia, Zimbabwe Europe: France, Italy, Spain, UK Latin America &amp; Caribbean: Chile, Colombia Near East: Jordan, , Syrian Arab Republic, Turkey, Yemen</td>
</tr>
<tr>
<td><em>Cryphonectria parasitica</em> Chestnut blight</td>
<td>Now nearly extinct from chestnut blight, American chestnut was one of most abundant hardwoods in eastern USA; this decline shows how entire ecosystem can be fundamentally altered. Chestnut trees very important economically, producing durable wood (for furniture, construction) &amp; nuts (cash crop, staple food for wildlife). Blight impact on forest sector in Turkey contributes to migration of young workforce from rural to urban environments. Pathways: movement of nursery stock; poor harvesting techniques</td>
<td><em>Castanea</em> spp. (chestnut)</td>
<td>Asia</td>
<td>Africa: Tunisia Europe: Austria, Belgium, Bosnia and Herzegovina, Croatia, France, Germany, Greece, Hungary, Italy, FYR Macedonia, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Switzerland, Tunisia, Turkey, Ukraine North America: Canada, USA</td>
</tr>
</tbody>
</table>
Agrilus planipennis
Emerald ash borer
Larvae infest upper trunk & lower portions of main branches causing yellowing & thinning of foliage; dieback & death of trees within 3 years.

Cinara cupressivora
Cypress aphid
Sap sucking on terminal growth of young & old trees retards new growth & causes desiccation of stems. Progressive dieback on heavily infested trees.

Sirex noctilio
European woodwasp
Drills into wood to lay eggs; injects toxic mucus & a fungus *Amylostereum areolatum* which may kill tree foliage, wilt crowns & turn from green to yellow to reddish-brown. Larval tunnelling damages wood.

Cryphonectria parasitica
Chestnut blight
Infests above-ground parts of trees only, creating cankers that expand, girdle & eventually kill tree branches & trunks.
**Ophiostoma ulmi & O. novo-ulmi**  
Dutch elm disease (a vascular wilt)

Insect vectored: *Scolytus* spp. (bark beetles) carry fungus while feeding on branches; fungus spreads via tree sap throughout tree; can also spread via root grafts from tree to tree.

Wilting, yellowing & browning of leaves; branches may be individually infected; brownish streaks of discoloration in branches & stems; symptoms may progress throughout tree in a single season or take 2+ years.

**Phytophthora ramorum**  
Sudden oak death (SOD)

On oak/tanoak: stem bark lesions, bleeding basal cankers, branch cankers, crown dieback followed by death.

Other hosts: leaf lesions, small branch cankers, stem & branch dieback.

**Bursaphelenchus xylophilus**  
Pinewood nematode

Insect vectored: *Monochamus* spp. (longhorned beetles)

Nematode deposited when adult beetles feed/lay eggs in trees. Nematodes feed on bark & xylem causing wilt & mortality; also feed on fungal tissues in dead trees or wood products.
Impacts

Main

Native

Introduced range

Pest | Impacts and pathways | Main hosts | Native range | Introduced range |
--- | --- | --- | --- | --- |
*Ophiostoma ulmi* & *O. novo-ulmi* Dutch elm disease (a vascular wilt) | One of most severe diseases in the world. Hundreds of millions of healthy mature elms lost in Asia, Europe & North America. Major pandemic across Northern Hemisphere from 1920s to 1940s. First seen in the Netherlands then spread through continental Europe & the USA, decimating elm populations. Disease declined in Europe but re-emerged in more virulent form to affect UK & most of Europe. Insect vectored: *Scolytus* spp. (bark beetles) **Pathways:** originally through wooden crates made from infested elm & infected logs | *Ulmus* spp. (elm) | Asia | Worldwide Re-introduction of more virulent strain from North America to Europe (mid-1960s) |

*Phytophthora ramorum* Sudden oak death (SOD) | Attacks various nursery plants and forest trees where it has spread into forests. In California, USA millions of oak & tanoak trees have died. In Great Britain it has recently been found infecting Japanese larch, resulting in significant mortality. **Pathways:** movement of contaminated plant material, growing media, nursery stock & soil carried on vehicles, machinery, footwear, animals | *Quercus* spp. (oak), *Lithocarpus densiflorus* (tanoak), Larix kaempferi (Japanese larch) many other plant & tree species | Unknown | Europe: Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Poland, Slovenia, Spain, Switzerland, Sweden, UK North America: USA |

*Bursaphelenchus xylophilus* Pinewood nematode | Major threat to Asian & European pine forests; caused extensive tree mortality where it has been introduced; millions of trees killed annually in Japan alone. Insect-vectored: *Monochamus* spp. (longhorned beetles) **Pathways:** adult vector beetle flight; movement of vector-infested wood products and wood packing materials | *Pineus* spp. (pine) | North America | Africa: Nigeria Asia & Pacific: Japan, PR China (including Hong Kong, Taiwan), Republic of Korea Europe: Portugal |

About this Guide

A key role in preventing the spread of pests can be carried out by many people associated with the forest sector, including those involved in planting, managing, harvesting, manufacturing, selling and transporting forest products. Different parts of the forest sector have closer and more distant linkages to phytosanitary organizations that regulate forest product trade, but all affect the goal of reducing the spread of pests (see Figure 1).

This Guide provides information to explain:

- in Chapter 2 - how the ISPMs and NPPO regulations affect the import and export of forest commodities;
- in Chapter 3 - how people in the forest sector can reduce the risks of spreading pests through effective management approaches;
- in Chapter 4 - how each relevant ISPM can be used to prevent forest pest introduction and spread;
- in Chapter 5 - how the forest sector can work together with NPPOs to develop and implement practical and effective ISPMs and national phytosanitary regulations that reduce pest movement and are least restrictive to trade.

This Guide will be of vital interest to all sectors in forestry and will also benefit forestry policy-makers, planners and managers, particularly in developing countries.
Figure 1. Target audiences for this Guide and the relationship of the forest and agricultural sectors to regulatory agencies
2 TRADE IN FOREST COMMODITIES

2.1 Introduction

International trade in wood products increased 61 percent between 1992 and 2007 (Figure 2). Many countries want to promote international trade in forest commodities, but also recognize the need to protect their plants, including forests, from pests. National Plant Protection Organizations (NPPOs) may implement International Standards Phytosanitary Measures (ISPMs) as part of their national phytosanitary regulations for imported forest commodities. NPPOs also certify that export consignments meet the import requirements of other countries.

Figure 2. Change in global exports of wood products 1992-2007

![Bar chart showing change in global exports of wood products](chart)

(Source: FAO, 2009)

Import requirements for the same commodity may differ from country to country. Usually these differences are the result of variations in countries’ perception of the threat associated with the commodity. These variations can be due to differences in forest susceptibility or in the levels of pest risk which the countries accept (see Box 1). New ISPMs are currently being developed (see Chapter 5) to assist with the import and export of forest commodities, and to reduce pest spread.

This chapter of the Guide explains some aspects of how the ISPMs and NPPO regulations affect the import and export of forest commodities. Since import and export are closely linked, it is recommended that Sections 2.3 and 2.4 are read together.
Box 1. Logs: an example of the relation between pest risk and phytosanitary import requirements

While wood may contain many kinds of organisms, not all logs pose a risk of movement, establishment and spread of forest pests. Countries vary in their perception of risk associated with the imports of logs depending on the area of origin, the tree species, shape and size, or the presence or absence of bark. Some countries do not have any import requirements for logs; some require phytosanitary certification only based upon visual inspection for pests, while others may require or accept a particular treatment. These import requirements are established based upon the assessed risk of pests moving on the logs.

For example, wood moving from tropical countries to Canada, a temperate country, might contain pests, but these will be geographically constrained, i.e. restricted to tropical climates and trees. Because Canada has no tropical forests, it also has few phytosanitary import requirements for tropical species. However, if these same logs contained pests which could establish and cause damage to important plants of the urban environment of the importing country, the NPPO may prescribe specific phytosanitary measures prior to export to mitigate this risk.

2.2 Forest commodities

Forest commodities are defined as wood and non-wood products produced from plants and trees grown in forests or other wooded lands. Because of the wide range of forest commodities, the risk of pest infestation and the measures that can be used to manage that risk vary with different commodity types. Some examples are given in Table 2 which also defines various terms for different forest products. Further details on opportunities to reduce pest risk in forest commodities are given in Chapter 3.

Table 2. Forest commodities, their pest risks and risk management options

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Pest risks and management options to reduce risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants for planting (including bonsai &amp; rooted Christmas trees) excluding seeds</td>
<td>Plants for planting are increasingly recognized as carriers of pests, which could be associated with stem (wood and/or bark), branches, foliage, fruits/cones, roots &amp; sometimes soil or growing media. Bonsai plants, potted Christmas trees &amp; large trees for planting present higher risks as they have most of these plant parts. A variety of pests may move with them including aphids, scale insects, adelgids, bark beetles, weevils, moths, &amp; foliar, root-rot &amp; canker fungi. Importing countries generally develop a pest risk analysis (see Section 4.2) that identifies pests of concern &amp; aids in the development of specific import requirements. Requirements can include surveillance, pest-specific surveys, identification of pest-free areas, treatments, pre-shipment inspections, &amp; post-entry quarantine. Additional opportunities for inspection for pests could occur during handling plants for planting (including pruning, harvest &amp; packaging) by appropriately trained personnel.</td>
</tr>
<tr>
<td>IPPC definition: plants intended to remain planted, to be planted or replanted</td>
<td></td>
</tr>
<tr>
<td>Cut branches (including Christmas trees without roots)</td>
<td>Cut branches could carry many of the same pests as plants for planting but the risk of pest transmission to living host trees is less because they are most often used indoors, &amp; this limits their pest risk to natural environments. Christmas trees are a widely used commodity &amp; are often grown as a monoculture which increases the potential for pest outbreaks &amp; spread. Import requirements may include pest surveys, harvesting from pest-free areas, treatments, pre-shipment inspections, use in isolation from living plants &amp; safeguarded disposal after use.</td>
</tr>
<tr>
<td>Commodity</td>
<td>Pest risks and management options to reduce risk</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Roundwood/logs</strong></td>
<td>Roundwood with bark is more risky than roundwood that is debarked or bark-free. Both can carry pests; however debarked wood will not have as many pests as wood with bark. To manage insect pests living in or just under the bark of logs, bark removal, heat treatment or fumigation is generally used. For deep wood-boring insects, heat treatment or fumigation are the primary management measures. Irradiation could also be used where applicable. For fungal pathogens, fumigation, heat treatment &amp; end-use processing can reduce pest risk. Visual inspection during post-harvest grading is used to selectively remove infected logs, although in some cases it is not sufficient to identify early stages of decay.</td>
</tr>
<tr>
<td>IPPC definition: wood not sawn longitudinally, carrying its natural rounded surface, with or without bark Related names: poles, posts, timber, pilings</td>
<td></td>
</tr>
<tr>
<td><strong>Sawnwood</strong></td>
<td>Sawnwood has less risk than roundwood because sawing removes most of the bark &amp; removes most wood pests living in or just under the bark. The measures proposed for roundwood are equally effective for sawnwood. The risk of blue-stain fungi &amp; some wilt organisms can also be reduced by moisture reduction, e.g., kiln drying.</td>
</tr>
<tr>
<td>IPPC definition: wood sawn longitudinally, with or without its natural rounded surface, with or without bark Related names: boards, lumber, timber, or squared wood</td>
<td></td>
</tr>
<tr>
<td><strong>Wood chips</strong></td>
<td>The risk from wood chips depends on their size &amp; especially on how the chips will be used. Wood chips used as landscape materials could spread small insects, nematodes or fungi. Where wood chips are used for pulp production or energy generation, the processing will kill the pests. But poor conditions during transport, storage &amp; handling prior to use may still present a risk. The smaller the wood chips, the lower the risk of most insect pests. Pest risk can be managed by heat treatment, moisture reduction of the chips, fumigation, &amp; safeguarding during transport &amp; storage of chips.</td>
</tr>
<tr>
<td>Intended for pulp production, as an energy source, or as landscape materials</td>
<td></td>
</tr>
<tr>
<td><strong>Fuelwood</strong></td>
<td>Fuelwood is often infested with various pests (i.e., bark beetles, deep wood boring insects or fungal organisms). Consequently, the transportation of fuelwood both domestically &amp; internationally often spreads pests. Heat treatment or fumigation can manage pest risks. Proper safeguarding during transport &amp; storage could reduce pest risk.</td>
</tr>
<tr>
<td>Any wood material (including roundwood, sawnwood, particle &amp; waste wood) intended for heat &amp; cooking</td>
<td></td>
</tr>
<tr>
<td><strong>Wood packaging materials</strong></td>
<td>Wood packaging is often made from low quality boards &amp; these have been internationally recognized as high risk. Therefore the packaging materials must be made from debarked wood, heat treated or fumigated, &amp; marked with a specific internationally accepted mark (see Section 4.3).</td>
</tr>
<tr>
<td>IPPC definition: wood or wood product (excluding paper products) used in supporting, protecting or carrying a commodity (e.g. dunnage, crates, boxes, loading boards, drums &amp; pallets)</td>
<td></td>
</tr>
<tr>
<td><strong>Processed wood products</strong></td>
<td>Processed wood products that are assembled with the use of heat, pressure &amp; glue are generally free of primary wood pests. However, termites or dry wood borers can infest any wood products after manufacture. Inspection can be used to detect infestations.</td>
</tr>
<tr>
<td>(e.g. plywood, oriented strand board or wood particle board, medium density fibre board)</td>
<td></td>
</tr>
<tr>
<td><strong>Manufactured wood products</strong></td>
<td>Manufactured wood products are varied &amp; their risk is dependent on the origin of the wood, the species of wood, the degree of processing &amp; the intended use. If manufactured wood is not properly processed it may require appropriate treatment such as heat treatment, fumigation or irradiation.</td>
</tr>
<tr>
<td>(e.g. handicrafts &amp; furniture)</td>
<td></td>
</tr>
<tr>
<td><strong>Forest seeds</strong></td>
<td>Seeds can carry pests either on the surface or internally. The degree of pest risk depends on the seed pest type, detection reliability &amp; storage conditions in the place of the end use. Some of the measures to manage pest risk are: monitoring at the place of origin, recognition of pest-free areas &amp; seed testing for pest detection. If infestation of seeds is detected, appropriate treatment, such as heat, chemicals or irradiation, is needed.</td>
</tr>
<tr>
<td><strong>Bark</strong></td>
<td>Bark can carry a number of pests (e.g. insects, fungi, nematodes). Bark may be use for fuel, as landscape mulch, as a growing medium, or to produce processed wood products. Pest risk depends much on the intended use. Infested bark used as mulch or growing medium presents the highest risk. Some of the measures to manage pest risk are: heat treatment, irradiation, moisture reduction, fumigation, composting, &amp; safeguarding during transport &amp; storage.</td>
</tr>
<tr>
<td>IPPC definition: the layer of woody trunk, branch or root outside the cambium</td>
<td></td>
</tr>
</tbody>
</table>
ISPMs and national regulations apply to any item that may be infested or contaminated by pests. These regulations also apply to any organism that can serve as a vector, or could be a potential pest itself. These things are called regulated articles, and may include plant and forest commodities and any equipment used to process or transport goods. Examples are equipment such as logging trucks, wood handling equipment, shipping containers, barges, ships, railway cars, wood packaging materials, and other storage units that are necessary to move forest commodities.

2.3 Import of forest commodities

Contracting parties - countries who are members of the IPPC - reserve the sovereign authority to make regulations to protect their resources, including forests, from the introduction and establishment of pests. Each country’s NPPO is responsible for establishing the regulations that specify their phytosanitary import requirements for commodities that can move pests of concern. The forest sector can play an important role in assisting the NPPO to determine pest status by sharing pest information; by supporting survey activities for pests, and by providing information about new pests.

Importing NPPOs establish phytosanitary import requirements based on an evaluation process that carefully considers all aspects of a pest’s risk, including:

- its association with the commodity;
- its potential to enter, establish and spread in the importing country;
- its potential to cause economic or environmental harm if it becomes established.

This evaluation process is called pest risk analysis (PRA) (see Section 4.3). This requires considerable scientific evidence, so the process to complete a PRA may take several years. If there is preliminary evidence that a pest could be associated with a commodity, a country may impose restrictions on imports until a full PRA is completed. These restrictions are referred to as an emergency action.

Once the PRA is complete, the importing country may establish regulations and appropriate import requirements to manage the risk. Import requirements are decided by the importing country’s NPPO, but can often be negotiated bilaterally between the NPPOs of importing and exporting countries. Import requirements may include activities to be carried out in the exporting country, in transit, or upon entry to the importing country (Table 3). Industry must comply with import/export requirements, so importers wishing to import forest commodities should initially contact the nearest office of their NPPO.

Table 3. Examples of phytosanitary measures which may be applied to forest commodities

<table>
<thead>
<tr>
<th>When applied</th>
<th>Examples of phytosanitary measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to export</td>
<td>• commodity originates from an area free of pests</td>
</tr>
<tr>
<td></td>
<td>• commodity produced based on specific requirements (e.g. debarking)</td>
</tr>
<tr>
<td></td>
<td>• growing season and pre-shipment inspections</td>
</tr>
<tr>
<td></td>
<td>• appropriate treatment or post-harvest handling</td>
</tr>
<tr>
<td>During transport</td>
<td>• phytosanitary treatments (e.g. onboard fumigations, insecticidal sprays)</td>
</tr>
<tr>
<td></td>
<td>• safeguarding (covering or enclosing the commodity in containment)</td>
</tr>
<tr>
<td></td>
<td>• transport within a specified period</td>
</tr>
<tr>
<td></td>
<td>• restrictions on transport through pest-free areas</td>
</tr>
<tr>
<td>After arrival in the</td>
<td>• inspection</td>
</tr>
<tr>
<td>importing country</td>
<td>• processing in a particular way</td>
</tr>
<tr>
<td></td>
<td>• entry and use within a specified period or season</td>
</tr>
<tr>
<td></td>
<td>• post-entry treatment</td>
</tr>
<tr>
<td></td>
<td>• post-entry quarantine</td>
</tr>
</tbody>
</table>
Imported shipments of forest commodities, especially those considered risky (e.g. untreated roundwood with bark, or Christmas trees) are often required to be accompanied by a phytosanitary certificate (a document certifying the health of the plants, plant products or commodities) which is issued by the NPPO of the exporting country (see Section 4.11). This is a written statement that the shipment is compliant with the importing country’s requirements. It certifies that any measures that are required to be taken prior to export have been satisfactorily completed. Figure 3 shows the steps that should be followed to import forest commodities.

Commodities that fail to meet the import requirements may be treated at the entry port, rejected from entry to the importing country, destroyed, or redirected to another country that will accept them. When shipments are rejected because they fail to meet the import requirements, NPPOs are encouraged to notify the exporting country so that actions may be taken to avoid repeat failures (see Section 4.12). Rejected shipments may have significant costs to both the importer and the exporter.

Most countries make special arrangements to permit the entry of normally prohibited articles for the purposes of academic or industrial testing, certain limited industrial applications, or for small quantities of imports. These arrangements are usually developed on a case by case basis and are determined by the NPPO of the importing country. Usually the NPPO of the importing country provides a special written permit or letter to authorize this type of limited import.
Figure 3. Steps in the import process

1. Importer selects product & source

2. Importer consults their NPPO for requirements of product from source

3. Import requirements already established?
   - No: Importing NPPO assesses product pest risk & establishes import requirements
   - Yes: Exporting NPPO verifies requirements are met; issues phytosanitary certificate, if required

4. Exporting NPPO verifies requirements are met; issues phytosanitary certificate, if required

5. Product shipped with required documentation

6. Importing NPPO inspects product and documentation

7. Importer receives product
2.4 Export of forest commodities

To export forest commodities, the exporter should first contact their NPPO. NPPOs have cooperative relationships with the NPPOs of countries with whom they trade. Ideally, the exporting country’s NPPO would have information about the import requirements of different countries and the steps that need to be followed in order to export the goods. The exporter may also obtain details about requirements directly from the importing country’s NPPO, or through the importer, who can obtain the requirements from their NPPO. Exporters should be aware that different countries may have different requirements for a commodity, even if those different countries appear to be geographically related.

All those involved with the production of forest commodities, at all stages from the growth of seedlings to the milling of wood, should apply good forest health practices to help ensure the commodity moves pest-free (see Chapter 3), so that forest health can be protected. For this reason, as well as for business reasons, it is in the best interest of exporters to ensure that commodities comply with requirements prior to export.

If the importing country has not developed specific phytosanitary import requirements for a particular commodity there may be a need to initiate a PRA, as shown in Figure 4. For that PRA, the NPPO of the importing country may request information and technical data on potential pests associated with the commodity from the NPPO of the exporting country and may even request the identification of potential measures that could be applied to manage pest movement.

Often the NPPO of the exporting country has more information about the forest pest issues associated with the commodity, and can cooperate with the importing country’s NPPO. This cooperative process between NPPOs may aid in the possible development of bilateral arrangements that can establish specific import requirements for a commodity from a specific region. These arrangements may also provide a mechanism for deciding whether to permit normally prohibited or restricted items to enter for educational or industrial testing, with an alternative phytosanitary approach or measure.

For most imported forest commodities, a phytosanitary certificate is required, which must be issued by the NPPO of the exporting country. The NPPO of the exporting country makes arrangements with the exporter to verify that the import requirements (i.e. treatments, production practices) have been met and that any required inspections have been completed. Some activities required in support of phytosanitary certificates, such as periodic inspections during the production cycle and integrated pest management activities, may be more effectively carried out by foresters during the handling and processing of harvested wood (see Chapter 3).

The exporting NPPO may conduct inspections or may delegate them to an approved organization under the NPPO’s control and responsibility. In some cases, where commodities move from one country to a second country and then to a third country, a re-export phytosanitary certificate may be issued in the second country to meet the requirements of the final destination country (see Section 4.11).

Other certificates, such as treatment certificates, are sometimes used as an alternative, or in addition to, the phytosanitary certificate. These certificates are often arranged through bilateral agreements and often contain only a portion of the information required on a phytosanitary certificate, such as when, where and how a specific treatment was applied.

NPPOs of some countries require an import permit which specifies their phytosanitary import requirements and authorizes the entry of the commodity. Usually, the importer is responsible for obtaining an import permit and providing the details to the NPPO of the exporting country through the exporter.
Certain processed forest commodities (e.g. plywood, fibreboards) are recognized to pose less pest risk, and so may be exempted from certain requirements. The NPPO may require certification of the kind of processing completed for the product that qualifies for these exemptions. Some general guidance to NPPOs is available on
the types of forestry commodities that may not require a phytosanitary certificate as a result of processing and the intended use\(^2\).

In addition to the phytosanitary regulations of an importing country, there may be other requirements including those arising from the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Biological Diversity (CBD) and other international agreements. In some cases, these separate requirements may be administered by an authority other than the NPPO.

In addition to forest products themselves, equipment used to harvest or transport forest commodities may pose a risk for the movement of forest pests. Increasingly NPPOs are establishing import requirements for the entry of such equipment. Shipping containers and other storage units could also be contaminated with forest pests, soil or waste of forestry commodities (i.e. branches, leaves, plant debris). These should be cleaned after use and the contaminant materials disposed of in a manner that effectively manages risks.

\(^2\) Annex 1 of ISPM No. 32 \textit{Categorization of Commodities} provides guidance on the risks associated with certain processed commodities.
3  GOOD PRACTICES FOR FOREST HEALTH PROTECTION

3.1  Introduction

If the forest is healthy, then products from that forest will be less likely to contain pests that could start new problems elsewhere when forest products are moved internationally. Keeping the forest healthy requires careful planning throughout all of the resource management phases from regeneration to harvest. Harvest planning should include careful consideration of what will likely grow back, and how the next generation of forest will be managed. This chapter provides basic information on pest management practices for all of the phases of forest resource management, including:

- forest operations: planning, harvest and log transportation;
- forest nurseries;
- planted forests;
- naturally regenerated forests;
- post-harvest treatments and manufacturing centres;
- product transportation and distribution.

3.2  Integrated pest management for forestry

The most effective way to deal with forest pests is integrated pest management (IPM). IPM relies on understanding the crop and pest biology as well as the biology of natural control agents that can help keep pests under control. An IPM programme starts with prevention, particularly through crop and site selection, natural regeneration, and planting and thinning practices that reduce pests. Careful monitoring of pest populations determines when control activities are needed. Because IPM relies on a combination of measures, it is a kind of “systems approach” to pest prevention (see Sections 3.9 and 4.6). For IPM to be effective, field staff must be trained to recognize pests and their biological control agents.

3.3  Forest operations

Forest workers can minimize pest movement through careful operational planning, harvesting, wood storage and transport (see also Section 3.9). The movement of pests from the harvest location to the processing site can be prevented during timber marking and harvesting, particularly when wood volume and quality are evaluated. Personnel should be trained to recognize and report unusual pests, and to carry out practices that reduce the risk of pest populations moving to other locations.

Minimizing pests during harvest and processing will reduce the incidence of pests in the product prior to export and make transport easier and safer. Minimizing pests is particularly important if the harvested wood is to be moved internationally. In addition, potential quarantine impacts on trade can be reduced by identifying and reporting uncommon pests to the NPPO, particularly if the pest is detected early and eradicated (see Section 4.7). Box 2 offers more specific guidance on operational practices that reduce the incidence of pests.

Phytosanitary considerations need to be balanced against other important forest resource decisions such as biodiversity goals, recreation, fire suppression, local regulations, and other management objectives.
Box 2. Forest planning and operational practices that minimize pest prevalence

- Identify major pest outbreaks during the field planning phases and report these to a pest professional or the NPPO or other regulatory authority.
- Consider harvesting those stands with a high incidence of dead and dying trees, so the pests do not spread.
- Consider layout of harvest boundaries to reduce the chance that trees remaining after the harvest might blow down and provide food for pest buildup.
- Prevent erosion and subsequent weakening of trees which can make them more susceptible to pests, through harvesting practices appropriate to the landscape.
- Avoid damage to standing trees during forest operations as this can impact vigour, enable infection with wood-degrading fungi, and increase susceptibility to other pests.
- Remove felled trees from the forest quickly to avoid a buildup or an outbreak of pests.
- Transport logs during dormancy period of known pests and apply appropriate control measures on the receiving end before the pests emerge.
- When moving or storing wood originating from natural disturbances such as wind storms and fire, ensure operations do not allow the spread of pests.
- Where appropriate, store wood under cover, sprinkler systems or ponds, and install pheromone or light traps to reduce further infestation or outbreaks spreading to surrounding areas.
- Dispose of or manage harvest, thinning and pruning debris properly to ensure that associated pests are not spread to other areas.
- Sanitize equipment and transport containers to avoid transfer of pests.
- Limit locations where cut branches (including Christmas trees or tree parts) are harvested to areas not infested with pests.

3.4 Forest nurseries

Since each forest nursery can supply plants for planting to many geographic areas, keeping pests out of nurseries is especially important. Careful monitoring of seedling health is an important practice. Forest nurseries use intensive management practices which, if not properly done, may promote pest buildup. The artificial environment of the nursery, such as planting density, species/clone choice, and monoculture, can be favourable to pest development.

Application of several independent phytosanitary measures and pest management activities in a systems approach can improve protection (see Box 3, and Sections 3.9 and 4.6).

To minimize damage, identifying and treating pests before they spread is essential. Operational procedures should require that anyone who sees symptoms of a pest or disease that is unknown in the nursery must report it to their manager. Nursery managers should notify the NPPO or other appropriate officials if an unknown pest is found.

If forest nursery plants are intended for international trade, it is necessary to follow the importing country’s requirements. A phytosanitary certificate may be required to certify to the importing NPPO that the shipment has been inspected and found free of pests and that it fulfils the phytosanitary import requirements (see Section 4.11).
Box 3. Good nursery management practices that minimize pest prevalence

- Provide the best possible growth conditions (nutrients, water, light, appropriate spacing and weed control) to raise healthy, vigorous and resistant plants.
- Collect/obtain seed from good quality, genetically superior trees; use multiple sources of planting material to increase genetic diversity; use certified seed if possible, and store seed in conditions that limit pest attack; test seed prior to planting to ensure good germination and seed health; apply seed treatments, if needed.
- Keep appropriate records that permit identification of sources of production material, and where it is grown and outplanted, to allow tracing infestations.
- Use soil or growing medium free from insects, pathogens and weed seeds.
- Treat soil if necessary to kill pests before planting.
- Establish monitoring systems to permit the early detection of common pests.
- Take immediate action if pests are detected.
- Use appropriate preventative silvicultural, chemical or biological control methods.
- Ensure irrigation water is free of pathogens and other contaminants such as pesticides, particularly if the water source is a pond where water accumulates from infected or treated fields. Simple filtration systems can be installed to sanitize infested water.
- Avoid watering late in the day, if appropriate, as keeping leaves wet can allow pathogens to infect plants. Trickle irrigation rather than sprinklers can help keep leaves dry.
- Install screens or nets in plant production facilities to prevent pest entry or spread.
- Inspect materials prior to transport to ensure plants are free of pests.
- Nursery managers should notify the NPPO or other appropriate officials if an unknown pest is found.
- Rotate crops to avoid recurring pest problems; make sure the alternative crop is not susceptible.
- Dispose of infested soil or growing media carefully so as not to contaminate new plants or soil.
- In infested areas, limit the entry of visitors (humans, animals, birds) to reduce the risk of pests and pathogens moving on their bodies, clothing and footwear.
- Clean and, if necessary, disinfect all tools, footwear and equipment before leaving the nursery area, especially if a pathogen is present.
- Destroy or sanitize infested plant waste by burning, composting or treating with heat to kill the pest.
- Use deep burial (2 m) to dispose of plant waste that cannot be made safe.

3.5 Planted forests

Some of the nursery IPM practices are also useful in managing planted forests. Forest health problems can be prevented by starting with the appropriate seed that meets provenance (seed origin) and species requirements, or the appropriate size and type of seedlings or cuttings. Choosing the most suitable species and stock type for the site’s soil and climatic conditions reduces plant stress, and thus susceptibility to infestation by certain kinds of pests. Understanding local pest status can also help avoid placing susceptible species into conditions that favour the pest.

Field surveys, including evaluation of forest health conditions, will help early detection of any new pest introductions, and ensure prompt action. Surveys are also needed to make sure that seedlings will be free of competition from weeds. Control of weeds may be beneficial to promote tree growth and provide physical
access for silvicultural activities; however, the negative effects (e.g. biodiversity, soil erosion) of weed removal should be considered. Further guidance on planting practices is provided in Box 4.

<table>
<thead>
<tr>
<th>Box 4. Good planting practices that minimize pest prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Be aware that monocultures and clonal plantations can be more susceptible to pests.</td>
</tr>
<tr>
<td>• Choose the correct provenances and tree species appropriate to the site and climate to ensure strong and healthy plants.</td>
</tr>
<tr>
<td>• Select appropriate growing sites to ensure healthy plants and avoid future pest problems.</td>
</tr>
<tr>
<td>• Consider invasive potential when selecting non-indigenous tree species for planting.</td>
</tr>
<tr>
<td>• Be cautious when moving plants with soil to reduce pest spread. If possible, use bare root plants.</td>
</tr>
<tr>
<td>• Move bare root plants when dormant and less likely to spread forest pests. This also reduces plant stress.</td>
</tr>
<tr>
<td>• Provide healthy growing conditions, with sufficient water, sunlight and nutrients to avoid stress.</td>
</tr>
<tr>
<td>• Provide adequate spacing between field-planted seedlings to reduce susceptibility to pests.</td>
</tr>
<tr>
<td>• Clean and treat footwear and equipment (e.g. tools, vehicles) before going off-site to help reduce the spread of diseases such as root rot.</td>
</tr>
<tr>
<td>• Survey after planting to ensure stocking goals are met and to ensure pests are not prevalent.</td>
</tr>
<tr>
<td>• Control weeds to ensure that crop plants are able to grow well.</td>
</tr>
<tr>
<td>• Where silvicultural wastes from pruning, spacing and thinning can be a breeding substrate for pests, dispose of them properly.</td>
</tr>
</tbody>
</table>

Diseases, insect pests and weeds can be spread from one location to another during the movement of site preparation equipment and the practice of routine silvicultural activities, such as pruning and thinning. Proper cleaning and sanitizing of equipment is therefore important. Equipment, tools, footwear and vehicle tyres should be cleaned with a disinfectant, such as bleach or alcohol, when working in areas infested with diseases of quarantine significance. Flame sterilization can be used for some kinds of tools. If none of these are available, vigorous washing with steam or soap, if available, will reduce risk.

As the young plantations mature into forests for the future, activities such as spacing, pruning, thinning and fertilization may be practiced depending upon available resources and management objectives. Forest managers must be ever vigilant to preserve and enhance forest health during these management activities.

### 3.6 Naturally regenerated forests

Forests can be regenerated by the sprouting of roots or stumps from the previous harvest, or natural seeding. In some forested areas, understory plants that are present prior to harvesting may be potentially available to help fill-in the natural seeding process. These existing plants are called “advance regeneration”. In some cases natural regeneration is more resilient to environmental stresses, because the species are well-adapted for the site, and they can be more vigorous.

Even when using natural regeneration, the reforestation of any site requires planning and follow-through. In some cases, specific management and harvest practices can be selected to promote natural regeneration and minimize the impacts on the ecosystem. Surveys of the advance regeneration will be needed to ensure that these plants are undamaged and healthy enough to compete with weeds and become part of the new forest.
It is important that natural seeding be adequate to meet the future needs of the site ecosystem, based on tree species and stocking requirements. To ensure that a good tree crop is established, monitoring and pest surveys in the appropriate follow-up time frame are necessary.

Later, monitoring and pest surveys will be necessary to determine whether or not the natural regeneration is sufficiently free from weeds or brush competition. Competition may also come from root-suckering of some deciduous species or overstocking by natural seeding of certain conifers.

Naturally regenerated forests may also be subject to appropriate silvicultural activities of spacing, pruning, thinning and fertilization. It is imperative to ensure that these activities and the associated equipment and tools do not intensify or move pests and diseases (see Box 5).

### Box 5. Good practices for naturally regenerated forests that minimize pest prevalence

- Conduct plant and disease surveys to determine probability of success of the natural regeneration approach to grow a sustainable forest.
- Choose the most appropriate silvicultural and harvest practices to reduce pest populations in the future forest.
- Conduct follow-up surveys to verify that regeneration is successful and to check for pests.
- Ensure appropriate spacing between naturally regenerated plants to avoid susceptibility to pests of concern and promote growth of trees.
- Control weeds when and where appropriate.
- Where silvicultural wastes from pruning, spacing and thinning can be a breeding substrate for pests, dispose of them properly.
- Carry out activities, such as pruning, thinning and harvesting of non-wood forest products (i.e. chestnuts, resin, sap and branches), during periods of low risk so that wounds do not serve as disease entry points.
- Clean and treat footwear and equipment (e.g. tools, trucks) before leaving infested sites, to help reduce the spread of diseases such as root rot.

### 3.7 Manufacturing centres and post-harvest treatments

Following harvest and transportation of the forest products to the manufacturing centre, it is important to process the products carefully so as to reduce existing pest populations and minimize opportunities for pests to attack. The range of post-harvest treatments is wide and varied.

The receiving and storage of raw products delivered from the forest is one of the first opportunities that the manufacturing centre needs to consider. Ideally, those who provide logs should alert the manufacturing centre of any potential pest problems. Nevertheless, all wood products should be visually examined on arrival at the centre for signs of pest and disease. These should be investigated and reported to the NPPO or other appropriate authority, if the pest is not known.

Even though it may have been intended to move the harvested trees during the pests’ dormant period, seasonal weather patterns may change the timing of when pests emerge. This may necessitate some action such as placement of pest traps, or cover sprays. Some manufacturing centres sprinkle water on log piles, or submerge logs in ponds, to reduce bark beetle attack until the wood can be processed. Local technical experts can advise manufacturing centres if there are practical solutions for the types of pests likely to be present locally.
Ensuring that vehicles and other equipment used to transport wood from the forest to the manufacturing centre are cleaned of bark and plant debris immediately after unloading is good practice and will substantially reduce the risk of accidental spread of pests.

Bark and other residual products should be gathered and stored for further utilization or safe disposal. It is quite common for pests to be present in residual or waste materials and these materials need to be managed to prevent pest infestations near the manufacturing centre.

Processed wood or forest products should be monitored and graded to remove those products that show presence of advanced disease or pest indicators such as signs of fungi, insect exit holes and frass (digested plant materials). This quality grading step provides further assurance that the products being delivered or shipped are less likely to create pest or disease outbreaks. Those products that have been removed because of the presence of a disease or pest risk should be safeguarded and processed, or disposed of where it is safe to do so. Treatment to kill the pest, such as pasteurization by heat treatment, irradiation or fumigation, may be an option. Box 6 lists general good practices for manufacturing centres.

**Box 6. Good practices for manufacturing centres and post-harvesting treatments**

- Examine harvested logs prior to entering the manufacturing centre to determine if forest pests are present and might spread to surrounding products or areas.
- Logs with advanced decay should be set aside so that decayed sections can be removed and used or disposed of in a way that safeguards the remainder. This reduces the amount of visual inspection in the manufacturing process.
- If new pests are discovered or if there appears to be a potential pest outbreak in the harvesting, manufacturing or storage areas, contact your NPPO or other regulatory authorities.
- Store log piles under cover, under water sprinkling systems, or in ponds to reduce existing or potential infestations. Pheromone or light traps may be a part of the solution to reduce and control infestations.
- Clean vehicles that transport logs, removing bark and debris immediately after unloading.
- Continually gather up storage yard bark and debris for further utilization or disposal in a safe manner to prevent pest buildup and spread.
- Monitor all products during the manufacturing process for the presence of advanced disease or insect pest indicators. Separate infested products for safe utilization or disposal to prevent the movement, spread or introduction of pests elsewhere.
- Store infested products away from disease and pest-free product to prevent contamination or potential spread while products are in storage awaiting shipping or disposal.
- Post-harvesting treatments such as heat treatment, irradiation or fumigation may manage the risk of pests. Contact your NPPO for further information on what is suitable for your products and the pests or disease associated with them.

### 3.8 Product transportation and distribution centres

Import and export of forest commodities rely heavily on seaports, interim handling facilities, airports, and train depots for the unloading and loading of containers and ships. Due to the large number of forest commodities in movement and storage, these areas are critical in helping prevent the spread of forest pests.

In ports, storage yards could easily become a habitat for bark beetles, borers and contaminant pests. To minimize pest contamination, storage areas should be built on a hard or permanent surface and be free of vegetation, dead or dying trees, refuse and soil. It is important that the surrounding areas where export wood is stockpiled are kept free of forest insects and pathogens.
To avoid cross-contamination, imported wood and wood for export should be stored separately with a suitably sized buffer between them. Similarly, treated and untreated wood should be separated. If there are places assigned in the port for fumigation of wood, construct physical barriers with insect-proof materials or covers to avoid recontamination of treated wood.

Potential pest infestation sources such as rejected logs, dunnage, broken wood pieces, or forest waste should be removed promptly and safely disposed of to avoid potential pest buildup.

Containers should be inspected prior to loading, to ensure that pests or other dirt and debris do not pose a pest risk. Container cleaning programmes of pressure washing or sanitation treatment may be necessary. Written procedures are needed to ensure worker safety and that phytosanitary goals are achieved.

Immediately prior to vessel loading, it is also advisable to inspect forest products to ensure that there have not been any infestations while in storage. This can also serve as a monitoring record if pests are detected upon shipment arrival and inspection at the destination port or location.

Where product entry and exit facilities are located near forests it is useful to conduct monitoring programmes to detect establishment of new forest pests (see Section 4.7). In some cases, forests located near product entry and exit facilities may serve as sentinel points for monitoring and detection of the entry of any forest pests into the country. Monitoring methods such as pheromone or light traps, and regular survey sites are recommended.

There may be a need to protect cargo from insects on vessels in those areas where insects, such as Lymantria dispar (gypsy moth) and Anoplophora chinensis (burnt pine longhorn beetle), are attracted to light. It is helpful to minimize the intensive lighting at ports and vessels during periods of high risk and conduct loading operations and arrange departure times at periods of low insect activity. Pre-departure inspections of the commodity or conveyance may also be necessary.

By working with local and national plant protection organizations and scientists, practical working solutions can be developed to improve the facilities engaged in the movement and distribution of forest products and thus protect forest health (see Box 7).

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**Box 7. Good practices for product transportation and distribution centres to reduce pest spread**

- Build forest product storage areas on hard surfaces free of potential pest infestation sources to ensure phytosanitary cleanliness for products.
- Recycle off-loaded dunnage and wood packaging materials in consultation with the NPPO.
- Dispose of potential pest infestation sources such as shipping waste and broken products in accordance with the NPPO recommendations.
- Implement container cleanliness standards and procedures to ensure pests are not moved during the transportation process.
- Inspect products and remove infested wood, prior to loading.
- Prevent cross-contamination between imported and exported products, and between treated and non-treated products.
- Keep treated (ISPM 15) wood packaging materials separate from untreated wood packaging. Do not load treated wood on untreated wood packaging materials.
- Implement monitoring programmes including trapping, in those areas where entry and exit facilities are adjacent to forested areas, in collaboration with the NPPO.
- Promote awareness of localized pest infestations near seaports and develop systems approaches to ensure ships and cargo are clean of hitchhiking pests and egg masses.
- Work with the NPPO to develop practical solutions for managing the risk of pest movement for facilities where the import and export of forest products are concentrated.
### 3.9 Using a systems approach to reduce pests in forests

A systems approach in the regulatory world is the use of two or more independent measures to reduce pests. In the forest sector, this is a familiar idea. Foresters often adopt many practices to reduce pest problems throughout the entire production process, from planting and managing forests to harvest operations. Table 4 gives examples of pest management measures that foresters can use to reduce pests before products are sold and shipped, and before associated pests pose a risk to forests abroad, or impact profits at home.

**Table 4. Examples of forest pest risk management measures that may be included in a systems approach**

<table>
<thead>
<tr>
<th>When applied</th>
<th>Pest risk management measures</th>
</tr>
</thead>
</table>
| **Before trees are planted** | • Register seed and plant producers and provide training in proper handling methods  
• Select healthy planting material  
• Select resistant or less susceptible species or varieties if needed  
• Identify pest free areas, places or sites of production  
• Select appropriate genetic material  
• Consider ecological characteristics such as soils, vegetation, biodiversity and other resource values in planning and site selection and preparation |
| **During growing seasons** | • Perform inspections to detect pest presence  
• Perform testing for diseases e.g. root rot or Phytophthora  
• Reduce pest populations using practices such as pest mating disruption, preharvest treatments, biocontrol, and pheromone trapping  
• Reduce pest populations using appropriate silvicultural practices, such as sanitation and weed control, thinning, pruning and tree salvage  
• Maintain surveys needed to certify low pest prevalence |
| **At harvest** | • Harvest trees at a specific stage of development or time of year to prevent the increase of pest populations  
• Inspect and remove infested trees and logs  
• Use sanitation practices, such as removing any waste that could be potential breeding substrate for pests  
• Use harvesting or handling techniques that minimize damage to trees and soil  
• Remove felled wood quickly to avoid pest buildup  
• Remove stumps or treat surfaces where necessary to reduce root rot or other pest problems |
| **Post-harvest treatment and handling** | • Treat logs or other wood products to kill, sterilize or remove pests using heat, fumigation, irradiation, chemical treatment, washing, brushing or debarking  
• Store logs or wood products in ways that reduce pest buildup, such as under water or in cold storage  
• Inspect and grade logs and other wood products  
• Use sanitation measures including removal of parts of the host plant  
• Sample and test forest products for pests  
• Install insect screening in storage areas |
| **In association with export and import** | • Treat or process forest commodities to kill pests  
• Apply phytosanitary restrictions on end use, distribution and ports of entry  
• Apply restrictions on the season of import to avoid pest introduction  
• Select appropriate method of packing, such as closed or covered containers, to prevent infestation during transport  
• Require post-entry quarantine of plants or products  
• Inspect and/or test forest commodities to verify the lack of pests  
• Use good sanitation practices for conveyances such as ships, containers and trucks |
3.10 Special challenges in preventing pest spread through fuelwood

The international fuelwood market is rather new, but appears to be growing as countries seek renewable energy sources to replace fossil fuels (Table 5). Fuelwood is a broad category that includes roundwood, wood residues, wood pellets and charcoal. The more processed products present lower pest risks.

Table 5. International trade in fuelwood (average 2001 and 2002)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Volume shipped internationally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charcoal</td>
<td>1 255 288 metric tonnes</td>
</tr>
<tr>
<td>Wood chips and particles</td>
<td>26 742 650 cubic meters</td>
</tr>
<tr>
<td>Fuelwood</td>
<td>1 926 946 cubic meters</td>
</tr>
<tr>
<td>Wood residues</td>
<td>6 282 628 cubic meters</td>
</tr>
</tbody>
</table>

(Source: Hillring and Trossero, 2006)

Trees damaged by pests are frequently cut for fuelwood. Many of the pests that caused the tree to get sick or die can survive in the wood for several years and be transported to new areas. Wood-boring beetles are the most frequent users of this pathway, such as *Agrilus planipennis* (emerald ash borer) and *Anoplophora glabripennis* (Asian longhorned beetle), but *Sirex noctilio* (European woodwasp) and fungal pathogens can also be transported on cut logs or branches.

It is becoming increasingly evident that even domestic movement of these commodities can cause undesirable spread of pests and national regulations may be needed to prohibit movement from infested areas to clean zones such as in China for the Asian longhorned beetle.

Some countries have import regulations on fuelwood to reduce pest risk by requiring heat treatment or fumigation. These requirements are easier to monitor and enforce in large commercial concerns, but small operations and individuals often lack this capacity. Regulation of individuals moving fuelwood is next to impossible. Public education may be the best approach to reducing the spread of pests through fuelwood.

For international transport, regulations for roundwood often govern fuelwood – unless the latter is chipped. Treatments such as debarking can greatly reduce the survival of bark beetles, but heat treatment or fumigation provide better protection from pests that live deeper inside the wood.
4 PHytosanitary concepts simplified

4.1 Introduction

This chapter describes the International Plant Protection Convention (IPPC), and how the International Standards for Phytosanitary Measures (ISPMs)\(^3\) are developed and adopted. Subsequent sections describe the guidance contained in that are particularly relevant to forestry, in support of healthy forestry operations and pest free trade, both in forest commodities and in other commodities shipped with wood packaging materials. For clarity, the descriptions assume ideal implementation of the standards. In some cases, contracting parties to the IPPC – the countries or regions who are members – implement the standards differently. They may also establish stricter phytosanitary requirements, but have to provide technical justification. The WTO and the IPPC provide a dispute resolution process when countries file claims of unjustified trade restrictions.

4.2 The International Plant Protection Convention and International phytosanitary standards

The IPPC Secretariat, hosted by the Food and Agriculture Organization of the United Nations (FAO), provides for close collaboration with related international organizations and conventions. The IPPC’s governing body is the Commission on Phytosanitary Measures (CPM), which adopts ISPMs to prevent pest introduction and spread and facilitate trade. ISPMs are developed and approved through an international consultative process, and are recognized under the World Trade Organization (WTO) through its Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement).

The process of developing a new or revised ISPM is managed by the Standards Committee of the IPPC. ISPMs are based upon scientific principles and research, and therefore drafts are developed by technical panels or expert working groups. The Technical Panel on Forest Quarantine (TPFQ) addresses forestry-related issues. Scientific support for the TPFQ is provided by the International Forestry Quarantine Research Group (IFQRG) - an independent body of research scientists and representatives of national regulatory agencies and the forest sector. The Standards Committee reviews draft standards and prepares them for “country consultation”. Contracting parties (countries who are members of the IPPC) may comment and suggest revisions of the draft standard, often after national consultation with affected industries. The revisions are negotiated until a draft is developed that is unanimously approved by all contracting parties. The process of developing a new ISPM can take several years.

Contracting parties to the IPPC are required to:

- set up a National Plant Protection Organization (NPPO)\(^4\);
- designate an official IPPC contact point;
- prescribe and adopt phytosanitary measures;
- certify exports;
- regulate imports;
- cooperate internationally;
- share information on pests and regulations;
- cooperate in the development of ISPMs or Regional Standards for Phytosanitary Measures (RSPMs).

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\(^3\) The titles of all existing ISPMs, and a short summary, are given in Annex 2.

\(^4\) A list of NPPOs and RPPOs and their contact points can be found on the IPPC Web site: [www.ippc.int](http://www.ippc.int).
NPPOs are the government agencies within the member countries that implement the phytosanitary standards by developing and enforcing national regulations. They undertake pest risk analyses for the establishment of phytosanitary measures; manage pest surveillance; report to other countries on pest status; coordinate the control of pests; establish and monitor pest free areas; issue phytosanitary certificates, when required, confirming that consignments have met an importing country’s requirements; ensure phytosanitary security of consignments from certification until export; conduct verification inspections and, if necessary, require disinestation of consignments.

Because pests do not recognize international borders, NPPOs frequently have to work together with neighbouring countries to prevent pest entry and spread. This collaboration may be done through Regional Plant Protection Organizations (RPPOs). RPPOs assist in coordinating regulations to deal with regional phytosanitary issues raised by NPPOs. RPPOs gather and disseminate information and may identify priorities for regional standards which may become the basis for new ISPMs. Usually it is an NPPO, or sometimes an RPPO, which requests that the IPPC develop a new ISPM, or revise an existing one, to deal with a particular phytosanitary issue.

4.3 Evaluating pest risk

The process of analysing pest risk is addressed by several ISPMs: Framework for pest risk analysis [ISPM No. 02 (2007)]; Guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms [ISPM No. 03 (2005)]; Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms [ISPM No. 11 (2004)]; Pest risk analysis for regulated non-quarantine pests [ISPM No. 21 (2004)]

Pest risks involve a wide range of organisms potentially associated with forest commodities including bacteria, fungi, insects, mites, molluscs, nematodes and viruses. The pest risk associated with the trade in forest commodities is evaluated by individual countries. Countries must ensure that import requirements are based on science, are proportional to the pest risks and have minimal impacts on trade.

The evaluation of pest risk for a proposed import commodity has several steps. First, a clear description of the commodity and its level of processing is needed. Then a draft list of pests potentially associated with that commodity is prepared from scientific literature and historical records of pests detected on the commodity.

Next, each potential pest is assessed as to:

- whether it is present in the exporting country and importing country;
- whether it is associated with the commodity;
- whether the pest can enter, find suitable habitats, establish and spread in the importing country.

This requires an understanding of the ecology and behaviour of each organism, including the range of suitable hosts, its life stages, method and rate of reproduction, length of its life cycle and climatic requirements.

Furthermore, the potential impacts of the pest on industry, the environment and international trade are evaluated.

The result of this process is an assessment of the pest risk for each organism. When the risks for all of the pests associated with a particular commodity from a particular country of origin are considered as a group, this is called a pathway risk analysis.

This assessment of pest risk is one of the inputs to the completed pest risk analysis (PRA). The pest risk will determine the need for phytosanitary measures. The PRA also includes consideration of various phytosanitary measures to manage the pest risk.
A lack of information is sometimes a major constraint on assessing the pest risk of forest commodities. There may be a lack of information on the organisms associated with a commodity, their entry, establishment and spread. Other information gathering problems may arise; language barriers in publications; limited or no access to databases; inability to predict the economic or environmental impacts; or a lack of effective treatments or measures to reduce risk. A lack of information results in high uncertainty of pest risk and may lead to a precautionary approach in setting import requirements.

4.4 Wood packaging material

Regulation of wood packaging material in international trade [ISPM No. 15 (2009)]

Wood packaging material (WPM) is often used to support, protect or carry goods during transport. WPM includes pallets, boxes or dunnage used in a container or ship’s hold to secure a variety of trade goods. WPM is often made from low quality wood. Untreated WPM can provide a pathway for a number of significant forest pests, such as Anoplophora glabripennis (Asian longhorned beetle) and Bursaphelenchus xylophilus (pinewood nematode). The pests may occur at the surface of the wood (bark beetles, moths and other surface insects and fungi) or deep inside the wood (boring beetles, nematodes and fungi).

In recognition of this high risk pathway, ISPM No. 15 was developed. ISPM-15 requires that wood packaging be treated to kill pests existing in or on the wood, prior to moving in international trade. The standard recognizes two treatments: heat treatment, in which the wood is heated to a minimum of 56 °C throughout the profile of the wood for a minimum of 30 minutes; and methyl bromide fumigation at specific concentrations, timings and procedures.

The standard requires that wood be debarked. Where fumigation is used, the debarking process must occur prior to fumigation. Small pieces of bark are allowed to remain after the debarking process if these pieces are no wider than 3 cm (regardless of the length). If bark pieces are wider than 3 cm, no individual piece may be larger than 50 square cm.

For many countries methyl bromide is the only available treatment to manage pest risks of WPM, and as such it is recognized in ISPM No. 15. The IPPC recognizes that methyl bromide is an ozone-depleting substance and its use should be limited as much as possible. The urgency of finding alternatives to methyl bromide continues to remain a key priority in the work programme of the IPPC. Private companies and governments are working to identify additional treatments for use in rendering wood packaging free of pests.

The standard also states that wood must be treated and marked according to the ISPM-15 requirements. The mark consists of a box containing:

- an IPPC symbol;
- a country code;
- an producer/treatment provider code;
- a treatment code (HT for heat treatment or MB for methyl bromide).

The mark must appear on two opposite sides of the wood packaging unit. WPM that meets all these requirements is said to be “compliant”. For more details about the mark, see ISPM-15.

WPM producers authorized to use the specific identification mark are inspected and certified by the NPPO in the country of manufacture, to ensure that they are actually treating the wood to meet ISPM-15 standards. The mark provides the basis for entry into countries.
Only one treatment is required for the life of the unit, as long as it remains intact. However, when a unit of wood packaging is repaired (repair means that less than 1/3 of the unit is replaced), this repaired portion of the unit should be made with treated wood and marked. When a unit is remanufactured – that is, when more than 1/3 of the unit is replaced- the entire unit should re-treated, old marks removed and a new mark applied.

Note that not all wooden articles that carry trade goods need regulation. Wood packaging made from manufactured wood – such as plywood, fibreboard or oriented strandboard – should not be regulated as the processes used in the creation of these types of wood (heat, pressure and glue) make them pest free. Similarly barrels where heat is used in the creation of the staves (whisky barrels for example) should not be regulated. Very thin WPM (less than 6 mm thick) is not regulated under ISPM-15.

The wood packaging standard is a good example of how forest industries and NPPOs have successfully worked together to develop and implement phytosanitary measures.

4.5 Pest management

Guidelines for pest eradication programmes [ISPM No. 09 (1998)]

The NPPO or other appropriate regulatory authority should be informed when a new pest has been introduced to an area. The NPPO may arrange official diagnostic confirmation in order to decide whether a pest management programme is needed. Where local diagnostic expertise is limited, the NPPO may contact other NPPOs for specimens to be officially identified there. Such collaboration can save time. The NPPO is obliged to report new pests to the IPPC (see Section 4.8).

Once a new pest has been confirmed, the risk may be evaluated through a PRA (see Section 4.3). The PRA may show that the pest is already present and may not warrant regulation or action. If, however, the pest is new and considered to present a serious risk, the response must be immediate and effective if eradication is to be successful.

Having a plan in advance of finding a pest (called a contingency plan), previously agreed with all stakeholders, will help save time in the planning stages. The plan should deal with matters such as what to do, how it is going to be done, who is going to do it, and how the work is to be paid for. In many cases, to carry out the plan the NPPO, other government departments, local government authorities, industry sectors and other commercial bodies will all need to coordinate activities. Contingency plans should be regularly reviewed to reflect new data or to take into account new experiences in dealing with a relevant pest or one with similar characteristics, both locally and in other countries.

If there is no pest-specific plan available, then a generic all-purpose one may still prove valuable. Obviously some elements of a pest-specific plan cannot be specified in a generic plan. However, a generic contingency plan may at least provide an immediate framework for developing an effective action plan quickly if a new or unforeseen pest is detected.

The essential elements of a contingency plan include:

- understanding the biology and possible impacts of the pest;
- defining the objectives of the plan;
- establishing response actions to be taken (e.g. surveillance, sampling, safeguarding potentially infested sites, regulatory actions and destruction of infested articles);
- testing the plan by conducting a trial run;
- defining the authorities and resource limitations of involved agencies;
- developing a communication plan (for stakeholders, partners, other NPPOs, the public and media);
- determining when to end an eradication programme (either due to success or failure).
To make sure eradication measures have the best chance of success, three important questions must be answered.

- What is the pest distribution?
- What are the pathways for entry to the area?
- How does the pest spread?

To determine the pest distribution, delimiting surveys must be conducted (see Section 4.7). It may not be possible to carry out an effective survey until signs or symptoms are most likely to be evident, depending on pest biology.

Good record-keeping of actions undertaken during eradication efforts is essential and will help when considering which elements worked best, which did not (and why not), and therefore what might be done differently in the event of a recurrence in the future.

A way of determining when eradication is a success needs to be developed. For example, eradication might be declared a success if surveys fail to detect signs of the pest at any stage of its existence over a specified period of time. It is suggested that this time period should be at least twice as long as the development phase of the pest to adulthood.

The efficacy of the measures will need to be monitored on a continuous basis and stakeholders will need to be kept informed, especially if changes in strategy are under consideration. The criteria for determining when changes are appropriate will also need to be agreed on and communicated to stakeholders, trading partners and neighbouring NPPOs in advance. Ideally, stakeholders should be part of the review process as they may have a better understanding of the impacts on their operations than the NPPO, and may be able to suggest alternative approaches.

Sometimes it may not be possible to eradicate the pest. In this case, a method to decide when to stop trying to eradicate the pest needs to be considered. It may be necessary to change the strategy to a policy of containment and management of the risk. An example of the evolution of a response strategy is given in Box 8.

The appearance of a new pest, and the measures taken to control it, will inevitably have an impact on a wide range of stakeholders. It is important to ensure that key stakeholders understand the potential impact the pest might have, both in general and on their businesses. It is therefore recommended that key stakeholders are identified and given the opportunity to comment on the pest management options.

It is also important for stakeholders and others to understand the economic and other impacts of eradication measures, including the costs and benefits of all potential solutions – from doing nothing to the most aggressive approaches to eradication. For example, impacts may include destruction of plants, lost business revenues, loss of export markets, or the cost of applying pre-export treatment to regulated commodities. An economic impact assessment will often help to determine when the cost of action becomes more expensive than the losses incurred. If the risks of both the pest and the pest eradication programme are fully understood, then stakeholder support for the measures taken is more likely to be given.
Box 8. Emergency response and exit strategy for the introduction of *Dendroctonus micans* in Great Britain

*Dendroctonus micans* (great spruce bark beetle) is regarded as a major pest of spruce (*Picea* spp.) from eastern Siberia to the west of Europe. It lives and breeds under the bark, destroying the cambium which weakens and, in extreme cases, kills the tree. This beetle was first discovered in Great Britain in 1982. Following confirmation of the introduction of the insect, an outbreak management team was established consisting of the NPPO and industry personnel to develop a strategy for pest eradication. The strategy initially focussed on surveillance, control of wood movement and sanitation felling of potentially infested trees.

Initial surveillance showed that only parts of Great Britain were infested. The area was brought under regulation so that movement of wood out of the area was only permitted if the wood was bark-free or originated from specifically identified pest free areas. All trees found to be infested were felled, spot peeled of bark to remove obvious infestation and the wood taken to an approved mill for processing. For all logs with bark, movement was only permitted within the regulated area to an approved mill. To be approved, a mill had to install effective debarking equipment and have facilities available for managing bark debris.

Communication tools regarding the risks and established phytosanitary controls were developed. These included publicity leaflets and vehicle windshield stickers.

An inspector was designated to provide advice and guidance to the industry, to oversee surveillance and to monitor compliance at mills and other places. Penalties were imposed on offenders.

In the late 1980s, a fourth element was added to the management strategy. A biological control agent, the predator *Rhizophagus grandis* was introduced and released.

In 2005 eradication efforts were abandoned. *D. micans* was so widespread that it no longer qualified as a quarantine pest. Any new outbreaks elsewhere in the country are now routinely treated by the release of the predator and nature is allowed to take its course. The emergency response slowed the spread of the pest while scientists developed this long-term solution. Today, tree mortality has been reduced to less than one percent of infested trees, compared with 10 percent or more prior to the introduction of the biological control agent.

### 4.6 Systems approaches

**The use of integrated measures in a systems approach for pest risk management [ISPM No. 14 (2002)]**

A systems approach uses two or more independent phytosanitary measures to reduce pest risk in order for the commodity to meet the requirements of the importing country. Systems approaches provide the opportunity to consider both pre- and post-harvest procedures that can help reduce risk. Systems approaches can provide equivalent alternatives to a single more expensive or limiting procedure such as disinfestation treatments or movement prohibition. For more detail about equivalency of phytosanitary measures, see ISPM No. 24. Systems approaches can be even better than a single measure if that single measure is uncertain or unreliable. A systems approach should be technically justified. An example of a systems approach is provided in Box 9.

A systems approach in forestry manages the risk of pests in wood and wood products by using a combination of independent measures, from site preparation activities to post-harvest treatment and handling to transportation and distribution. Many of the practices suggested in Chapter 3 could be used in a systems approach (see Table 4 in Section 3.9). A systems approach may integrate silvicultural practices such as pruning, thinning and tree salvage as well as field treatment, post-harvest disinfestation, inspection and culling. It might also include risk management measures designed to prevent contamination or re-infestation, such as maintaining the integrity of lots, requiring pest-proof packaging, or screening of areas where the commodity is assembled or stored. Likewise, procedures such as pest surveillance, trapping and sampling can also be incorporated.
Box 9. Application of a systems approach for the export of untreated logs

Trading untreated logs internationally is often considered a significant pest risk. However, in this particular example, two countries developed a bilateral agreement to allow trade in logs under very closely controlled conditions. The importers wanted logs with bark because bark is used as fuel in running the processing mill. Leaving the bark on logs prevents drying and splitting of wood during transport. Also, the fumigation treatment could be done more efficiently in the importing country. Therefore, a bilateral agreement was developed to allow trade.

The bilateral arrangement used a systems approach to reduce the pest risk. The consignments must be:

- inspected and found free of signs of quarantine fungi;
- practically free on the outside of the log of specific pests of concern to the importing country;
- accompanied by a phytosanitary certificate stating it meets the requirements;
- transported only during a specific low risk window of time;
- unloaded and stored in a special zone that does not have hosts of the pests that might come in on the imported logs;
- fumigated within a few days of entry and then processed.

A systems approach can also include safeguarding measures that do not kill pests or reduce their prevalence but do reduce their potential for entry or establishment. Such safeguarding measures may include designated harvest or shipping periods, restrictions on certain conditions of the commodity, the use of resistant hosts, and limited distribution or restricted use at the destination.

Systems approaches range in complexity and rigour. The simplest type could be simply a combination of two independent measures known to be effective. A more complex systems approach would involve a careful analysis of the most effective opportunities to reduce pest risk, followed by selection of critical control points that are monitored to ensure that pests remain within acceptable tolerances.

4.7 Surveillance

Guidelines for surveillance [ISPM No. 06 (1997)]

The terms “surveillance” and “survey” are often confused. Survey is only one component of surveillance. According to ISPM No. 6, surveillance is an official process which collects and records data on pest presence or absence by survey, monitoring and other procedures such as literature reviews.

Countries may engage in pest surveillance to:

- detect new pests for rapid eradication or containment;
- facilitate trade by providing information about pests and their distribution within their region;
- justify the use of regulations to prevent the entry of a pest which does not occur in the importing country.

There are two major kinds of surveillance: general surveillance; and specific surveys.

General surveillance gathers information on the distribution of pests of concern over an entire area. Specific surveys gather information on pests at a specific site (e.g. a harvest location, the area around exporting saw mills, ports and airports) over a defined period of time.

The NPPO is responsible for gathering and maintaining information for general surveillance. A variety of sources are used, including FAO, forestry agencies, research institutions, universities, scientific societies (including amateur specialists), land managers, consultants, museums, the general public, scientific and trade journals, and unpublished material.
To keep these data sources up to date, the forestry community can help by monitoring pest situations and reporting to their NPPO or other pest professionals when unusual pests or changes in pest distribution are detected. Monitoring for new pests can also be undertaken by botanical gardens, arboreta, and other locations that routinely plant exotic plant materials. A well-organized diagnostic and reporting system is needed to support this effort.

Specific surveys are carried out to detect a specific pest, to identify the edges of the distribution of a pest, to monitor for the presence of a pest in an area or site, or to document the absence of specific pests in order to support the designation of pest free areas (see Section 4.9). These are official surveys that follow a plan that is approved by the NPPO.

A survey for pests which are only likely to be present as a result of a recent introduction might focus on possible entry points and pathways of spread (e.g. a specific type of imported nursery plant, a type of sawnwood, or a handicraft such as a wooden birdhouse) and sites where imported commodities are stored, marketed or used as planting material.

The survey methodology used must be scientifically based. The selection of survey procedures may be determined by the type of sign or symptom by which the pest can be recognized. Surveys are normally designed to maximize the probability of finding pests.

Personnel involved in surveys should be well-equipped and trained in sampling methods, preservation and transportation of samples for identification, and record keeping. Diagnostic expertise is necessary for verifying the identity of pests. International experts are often available to assist with diagnosis. Samples of pest specimens should be kept in safe storage conditions. These are called “voucher specimens” and are useful in resolving disputes. To help to diagnose specimens, identified specimens can be kept in “reference collections”.

For both general surveillance and specific surveys, data quality is important. The records kept should be appropriate for the intended purpose; for example to support specific pest risk analyses, the establishment of pest free areas, or the preparation of pest lists.

Reporting of new pests should be encouraged through public education and awareness programmes. Making data and information on the distribution, biology and description of pests publicly available may facilitate the reporting of new pest finds because foresters, land managers and the public are able to identify ordinary pests and report those which are new or unusual to appropriate authorities. A clear structure for reporting new pest finds should be established.

4.8 Pest reporting

Pest reporting [ISPM No. 17 (2002)], Determination of pest status in an area [ISPM No. 8 (1998)]

Contracting parties to the IPPC have an obligation to report pests to the IPPC and RPPOs, as well as to the NPPOs of their trading partners. Pest reports are required for:

Occurrence: When a new pest is found, its occurrence should be reported.

Outbreak: A sudden increase in an established or new pest population should be reported even when the pest is not expected to establish.

Spread: An established pest that expands its geographical distribution, resulting in a significant increase in risk to the reporting country, neighbouring countries or trading partners should be reported.

Eradication: Successful eradication of pests may be reported when an established or transient pest is eliminated from an area and the absence of that pest is verified.
Any other new or unexpected pest situation: A report should also be made on any unexpected situation associated with an established pest which increases the phytosanitary risk to the reporting country, neighbouring countries or trading partners, such as a rapid increase in pest populations, changes in host range or the development of a new, more vigorous strain or biotype. The detection of a new pathway should also be reported.

The rapid expansion of the global economy, and the shortage of taxonomic experts, makes it difficult to maintain accurate pest lists for all forest commodities. Better international collaboration is needed to overcome these obstacles. For that purpose, the RPPOs of North America and Europe maintain Web-based reporting systems (Box 10).

Box 10. Examples of pest reporting in Europe and North America

Two regional plant protection organizations publish their pest reports on the Internet. Anyone may sign up to receive pest alerts regularly by e-mail at these Web sites.


Pest reporting allows countries to adjust as necessary their phytosanitary requirements and actions to take into account any changes in risk. It provides useful current and historical information for the operation of phytosanitary systems. Accurate information on pest status helps provide the technical justification of phytosanitary measures and helps to minimize unjustified interference with trade.

Pest information that might affect planting and marketing choices can also benefit foresters and aid the forest sector in working with NPPOs in planning management measures.

4.9 Pest free areas and places of production, and areas of low pest prevalence

Requirements for the establishment of Pest Free Areas [ISPM No. 04 (1995)]; Requirements for the establishment of pest free places of production and pest free production sites [ISPM No. 10 (1999)]; Recognition of pest free areas and areas of low pest prevalence [ISPM No. 29 (2007)]

Exporting countries may be able to establish official pest free areas or areas of low pest prevalence. This may enable them to negotiate agreements with importing countries so that regulated commodities are permitted to be exported from those areas. This may enable countries to gain, maintain or improve market access.

A pest free area (PFA) is defined simply as an area in which a specific pest does not occur. PFAs allow for the export of plants, plant products and other regulated articles without the need for the application of additional phytosanitary measures. The official establishment of a PFA must be based on specific survey data. The PFA status must be periodically reviewed by intensive surveys or inspections during the growing season. Documentation should be made available for other regulatory authorities when requested. An example of the use of PFAs is given in Box 11.

Box 11. Using pest free areas (PFAs) to support the movement of regulated commodities to areas free of Lymantria dispar

*Lymantria dispar* (gypsy moth) is a serious pest of deciduous trees in eastern North America. It is not present in western North America or Mexico, nor does it occur in portions of states or provinces in eastern Canada and the United States. NPPOs in North America conduct specific annual surveys to identify the exact distribution of the pest, using a very effective pheromone insect trap. The resulting pest information is used to define PFAs in eastern North America that permit exporters to move regulated articles (Christmas trees, logs, etc.) to non-infested areas.
A pest free place of production (PFPP) is a place of production where a specific pest does not occur, even though the pest may be present in the area. This must be demonstrated by intensive specific survey, which must be periodically reviewed by inspections during the growing season. Trading partners will expect to see documentation supporting the PFPP declaration.

It should be recognized that the concepts of PFAs and PFPPs are easier to define in planted forests and more difficult to define in naturally regenerated forests. This is because naturally regenerated forests have a wider distribution and larger variety of plants and potential pests than planted forests. Therefore, identifying a specific PFA in a naturally regenerated forest would involve surveillance activities that are often too expensive to be practical. In planted forests, the challenge of undertaking surveillance is much more manageable where the plantations of hosts are planted in blocks contained within a non-host environment.

4.10 Inspection

Guidelines for inspection [ISPM No. 23 (2005)]; Methodologies for sampling of consignments [ISPM No. 31 (2008)]

NPPOs or their authorized officials perform inspections at import or prior to export.

Import inspection is used to decide whether to accept, detain or reject the imported commodity. Inspection is based on visual examination and other tools or tests that detect pests and regulated articles. It verifies the identity and integrity of the commodity. It also verifies the effectiveness of phytosanitary measures that have been applied, such as treatments or systems approaches.

An export inspection is performed by the exporting country to ensure that a consignment meets specified phytosanitary requirements of the importing country at the time of inspection. If requirements are met, the inspection may result in the issuance of a phytosanitary certificate by the exporting country’s NPPO for the consignment in question.

In cases of repeated non-compliance (see Section 4.12), the intensity and frequency of inspections for certain consignments may be increased, or import of the commodity may be stopped. The NPPO of the importing country should also contact the NPPO of the exporting country so that they can identify the source of problems and suggest improvements.

4.11 Phytosanitary certification

Export certification system [ISPM No. 07 (1997)]; Guidelines for phytosanitary certificates [ISPM No. 12 (2001)]; Consignments in transit [ISPM No. 25 (2006)]; Categorization of commodities according to their pest risk [ISPM No. 32 (2009)]

NPPOs of exporting countries issue phytosanitary certificates to certify that consignments of plants, plant products or other regulated articles meet the specified phytosanitary import requirements of trading partners. Phytosanitary certificates should not be required by importing countries for wood products that have been processed in such a way that they have no potential for introducing regulated pests. ISPM 32 provides guidance on which commodities need or don’t need phytosanitary certification. See also Section 2.3 and 2.4 of this Guide for more information on import and export processes.

The basic elements of the phytosanitary certification process include:

- determining the relevant phytosanitary requirements of the importing country;
- verifying that the consignment conforms to those requirements at the time of certification;
- issuing a phytosanitary certificate.
The importing country NPPO should make available official and current information concerning its import requirements. The current import requirements for the country of destination may also be obtained by the exporter, and supplied to the exporting country’s NPPO 5.

The NPPO may authorize officials to perform some certification functions, such as commodity inspections or verification of treatment, but not to issue phytosanitary certificates.

Importing countries frequently specify requirements for phytosanitary certificates, such as: the use of a specific language; completion by typing or in handwritten, legible, capital letters; the use of specified units; or a limited period of validity following inspection or treatment for dispatch of the consignment from the country of origin.

A phytosanitary certificate may be rejected or additional information may be requested by the importing country if the phytosanitary certificate:

- is illegible, incomplete or is a non-certified copy;
- includes unauthorized alterations or erasures, conflicting or inconsistent information, or wording that is inconsistent with the instructions or model certificates;
- is fraudulent;
- the period of validity has expired or has not been complied with;
- certifies prohibited products.

Fraudulent certificates (modified, or not issued by the NPPO) can result in rejection of the consignment.

In some cases, international trade may involve the movement of consignments of regulated articles which pass through a country without being formally imported. This kind of consignment is said to be ‘in transit’. Such movements may present a phytosanitary risk to the country of transit. Countries may apply technically justified measures to consignments in transit through their territories.

4.12 Non-compliance notification

*Guidelines for the notification of non-compliance and emergency action [ISPM No. 13 (2001)]*

When consignments do not meet import requirements they are considered to be non-compliant. The importing country notifies the exporting country NPPO about the non-compliance. The exporting country’s NPPO should then follow up with the exporter to ensure that future shipments are not rejected.

Non-compliance notifications are provided when there is:

- failure to comply with phytosanitary requirements;
- detection of regulated pests;
- failure to comply with documentary requirements (e.g. phytosanitary certificates);
- prohibited consignments or prohibited articles in consignments such as soil;
- evidence of failure of specified treatments;
- repeated instances of prohibited articles in small, non-commercial quantities carried by passengers or sent by mail.

4.13 Phytosanitary import regulatory systems

*Guidelines for a phytosanitary import regulatory system [ISPM No. 20 (2004)]*

An import regulatory system should consist of two components:

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5 NPPO contact details may be found on the IPPC Web site: [www.ippc.int](http://www.ippc.int).
• a regulatory framework of phytosanitary legislation, regulations and procedures;
• an official service, the NPPO, responsible for operation or oversight of the system.

NPPOs have the sovereign right to regulate imports to achieve their appropriate level of protection, taking into account their international obligations, in particular the IPPC (1997) and the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). When a contracting party implements phytosanitary procedures and regulations, it should try to use measures that reduce risk to an acceptable level with the least negative impacts on trade. In general, NPPOs can only regulate to control quarantine pests in products intended for consumption or processing. However, because of the special risks associated with plants for planting, both quarantine pests and regulated non-quarantine pests can be regulated if associated with plants for planting. Forest plants (including seeds), lumber and wood packaging materials (including dunnage) are examples of forest articles that are regulated in many countries.
5 CONCLUSIONS

Forest pests and diseases are a global problem and consequently it is necessary to look beyond national borders to develop effective solutions. Despite many improvements in phytosanitary protection, introductions of new forest pests continue because of the increase in international trade. Climate change also appears to be increasing the frequency of new pest establishment. Foresters, scientists and national plant protection organizations (NPPOs) must work together to take the actions necessary to prevent pest establishment and spread.

Fortunately, information sharing between people working in forestry and plant health regulators is already helping prevent, detect and eradicate new pest outbreaks. Continued expansion of this networking, and the use of technologies such as the Internet can assist in addressing the challenge of global pest control.

Good forest management practices, such as those described in this Guide, can help reduce pest outbreaks and prevent pests from moving around the globe via forest commodities. Integrated pest management begins with planning what to grow and where to grow it. Careful surveillance; the management of forest stands throughout the growing cycle, and good practices during harvest operations can bring quality, low pest-risk products to the international marketplace. Understanding and meeting the phytosanitary requirements of importing countries can enhance the safe movement of forest commodities, reduce costs and increase international trade.

A number of important international standards for phytosanitary measures (ISPMs) provide guidance that is helpful in reducing forest pest movement in international trade. New ISPMs related to the trade of forest commodities continue to be developed in response to international needs. Currently, standards on wood commodities and forest tree seed are being drafted by the International Plant Protection Convention (IPPC) Technical Panel on Forest Quarantine (TPFQ).

As new ISPMs are developed, people working in forestry can provide valuable input with their special knowledge and expertise that will help build practical guidelines. In this way, by working together, the forest sector and NPPOs can promote trade opportunities and prevent the introduction and spread of forest pests.
References


Annex 1 - Glossary of terms

**Background:** These definitions were collected from publications and by utilizing the Internet. Definitions and terms in forestry and other fields are highly variable, and policy-makers spend a lot of time in international meetings debating points because of a lack of common understanding of terms. Many people and organizations have strived to reach some common understandings about definitions. In forestry, FAO in collaboration with the International Union of Forest Research Organizations (IUFRO) have collaborated for many years in this area (e.g. *Glossary on forest genetic resources*, Revised September 2003). It should be noted that the authors of this Guide do not intend to confuse readers by listing more than one definition for the same term. Our intention is mainly to have the readers become aware that, even within a particular sector, a different meaning of the same term may exist.

**Area:** An officially defined country, part of a country or all or parts of several countries *(ISPM 5, 2009)*

**Bark:** The layer of a woody trunk, branch or root outside the cambium *(ISPM No. 5, 2009)*

   - The tissues of a tree outside the cambium composed of inner living bark and outer dead bark *(BC Ministry of Forests and Range, 2008)*
   - The outer part of woody stems and branches. Anatomically it includes all the plant tissues outside the cambium *(Terms of the Trade, Fourth edition, 2000, D. Evans)*.

**Biological control:** The use of biotic agents such as insects, nematodes, fungi, and viruses for the control of weeds and other forest pests *(BC Ministry of Forests and Range, 2008)*

**Biological control agent:** A natural enemy, antagonist or competitor, or other organism, used for pest control *(ISPM No. 5, 2009)*

**Buffer zone:** An area surrounding or adjacent to an area officially delimited for phytosanitary purposes in order to minimize the probability of spread of the target pest into or out of the delimited area, and subject to phytosanitary or other control measures, if appropriate *(ISPM No. 5, 2009)*

   - A strip of land where disturbances are not allowed, or are closely monitored, to preserve aesthetic and other qualities adjacent to roads, trails, waterways, and recreation sites. *(BC Ministry of Forests and Range, 2008)*

**Certificate:** An official document which attests to the phytosanitary status of any consignment affected by phytosanitary regulations *(ISPM No. 5, 2009)*

**Commodity:** A type of plant, plant produce, or other article being moved for trade or other purpose *(ISPM No. 5, 2009)*

**Conifer:** A tree belonging to the order of Coniferales, usually evergreen, cone bearing and with needles, awl or scalelike leaves such as pine, spruces, firs, tamarack, often called “softwoods” *(University of Wisconsin Forestry Terms, publication No. G3018)*

   - Any tree that produces seeds in cones, with no fruit structure around the seed. Leaves are usually needles, scales, or narrow and linear in shape, and evergreen *(University of Florida. Forest Terminology for Multiple-Use Management, SS-FOR-11)*.

**Consignment:** A quantity of plants, plant products and/or other articles being moved from one country to another and covered, when required, by a single phytosanitary certificate *(a consignment may be composed of one or more commodities or lots)* *(ISPM No. 5, 2009)*

**Corrective action plan (in an area):** Documented plan of phytosanitary actions to be implemented in an area officially delimited for phytosanitary purposes if a pest is detected or a specified pest level is exceeded or in the case of faulty implementation of officially established procedures *(ISPM No. 5, 2009)*

**Delimiting survey:** Survey conducted to establish the boundaries of an area considered to be infested by or free from a pest *(ISPM No. 5, 2009)*
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**Dunnage:** Wood packaging material used to secure or support a commodity but which does not remain associated with the commodity (ISPM No. 5, 2009). An example of dunnage is logs used to wedge heavy objects in a container or ships hold to keep them from moving during shipment.

Low-grade lumber or panels used to separate and bind ship cargoes (*Terms of the Trade*, Fourth edition, 2000, D. Evans).

**Ecosystem:** A dynamic complex of plant, animal and micro-organism communities and their abiotic environment interacting as a functional unit (ISPM No. 5, 2009)

A functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow.

An ecosystem can be of any size - a log, pond, field, forest, or the earth’s biosphere - but it always functions as a whole unit.

Ecosystems are commonly described according to the major type of vegetation (i.e. forest, old-growth or range ecosystem) (BC Ministry of Forests and Range, 2008)

**Emergency action:** A prompt phytosanitary action undertaken in a new or unexpected phytosanitary situation (ISPM No. 5, 2009)

**Emergency measure:** A phytosanitary measure established as a matter of urgency in a new or unexpected phytosanitary situation. An emergency measure may or may not be a provisional measure (ISPM No. 5, 2009)

**Endemic species:** A species that is indigenous to a particular area; not introduced and often with a limited geographical range (Ministry of Forests and Range Glossary of Forestry Terms in British Columbia, 2008)

**Entry (of a pest):** Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (ISPM No. 5, 2009)

**Eradication:** Application of phytosanitary measures to eliminate a pest from an area (ISPM No. 5, 2009)

**Establishment:** Perpetuation, for the foreseeable future, of a pest within an area after entry (ISPM No. 5, 2009)

**Field:** A plot of land with defined boundaries within a place of production on which a commodity is grown (ISPM No. 5, 2009)

**Forest:** Land spanning more than 0.5 hectares with trees higher than 5 meters 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 (Global Forest Resources Assessment 2010, Specification of National Reporting Tables for FRA 2010-Working paper 135)

- A biological community of plants and animals which is dominated by trees and other woody plants (University of Florida. Forest Terminology for Multiple-Use Management, SS-FOR-11).

- A plant community with trees and other woody plants dominating (University of Wisconsin Forestry Terms, publication No. G3018)

**Naturally regenerated forest** Forest predominantly composed of trees established through natural regeneration (Global Forest Resources Assessment 2010, Specification of National Reporting Tables for FRA 2010-Working paper 135)

**Planted forest** Forest predominantly composed of trees established through planting and/or deliberate seeding (Global Forest Resources Assessment 2010, Specification of National Reporting Tables for FRA 2010-Working paper 135)

**Forest commodities:** Wood and non-wood products produced from plants and trees grown in forests or other wooded lands.

**Forest health pest:** A forest health factor that limits the ability to meet resource management objectives (BC Ministry of Forests and Range, 2008)

**Forest health treatments:** The application of techniques to influence pest or beneficial organism populations, reduce damage, or reduce the risk of future damage to forest stands. Treatments can be proactive (e.g. spacing...
trees to reduce risk of attack by bark beetles) or reactive (e.g. spraying insecticides to treat outbreaks of spruce budworm) (BC Ministry of Forests and Range, 2008)

Forestry: The science of establishing, cultivating, and managing forests and their attendant resources (Forest Terminology for Multiple-Use Management, University of Florida SS-FOR-11).

The science, art, and practice of managing and using trees, forests, and their associated resources for human benefit (University of North Carolina, Understanding Forestry Terms).

Habitat: Part of an ecosystem with conditions in which an organism naturally occurs or can establish (ISPM No. 5, 2009)

The environment in which a population or individual lives; includes not only the place where a species is found, but also the particular characteristics of the place (e.g. climate or the availability of suitable food and shelter) that make it especially well suited to meet the life cycle needs of that species (BC Ministry of Forests and Range, 2008)

Handicraft: Commodity class of articles derived or made of natural components of wood, twigs, and vines, and including bamboo poles and garden stakes. Handicrafts include the following products where wood is present: Carvings, baskets, boxes, bird houses, manufactured Christmas trees, garden and lawn/patio furniture (rustic), potpourri, silk trees (typically artificial Ficus trees), trellis towers, garden fencing and edging, and other items composed of wood (APHIS proposed rule on the Importation of Wooden Handicrafts from China. U.S. Federal Register/Vol. 74, No. 67/Thursday, April 9, 2009/Proposed Rules)

Hitch-hiker pest: A contaminating pest; a pest that is carried by a commodity, and in the case of plants and plant products, does not infest those plants or plant products (ISPM No. 5, 2009).

Host range: Species capable, under natural conditions, of sustaining a specific pest or other organism (ISPM No. 5, 2009)

Incidence (of a pest): Proportion or number of units in which a pest is present in a sample, consignment, field or other defined population (ISPM No. 5, 2009)

A measurement of the presence and magnitude of pests within a given area (BC Ministry of Forests and Range, 2008)

Incursion: An isolated population of a pest recently detected in an area, not known to be established, but expected to survive for the immediate future (ISPM No. 5, 2009)

Indigenous species: Species or genotypes which have evolved in the same area, region or biotope and are adapted to the specific predominant ecological conditions at the time of establishment (Compilation of Forestry Terms and Definitions, Internal Report No. 6, 2002).

Tree species which have evolved in the same area, region or biotope where the forest stand is growing and are adapted to the specific ecological conditions predominant at the time of the establishment of the stand (Compilation of Forestry Terms and Definitions, Internal Report No. 6, 2002).

Inspection: Official visual examination of plants, plant products or other regulated articles to determine if pests are present and/or to determine compliance with phytosanitary regulations (ISPM No. 5, 2009)

Introduced species: A species, subspecies or lower taxon occurring outside its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could occupy without direct or indirect introduction or care by humans). This definition refers to introduced forest species and not to pests (Global Forest Resources Assessment 2010, Specification of National Reporting Tables for FRA 2010-Working paper 135).

Introduction: The entry of a pest resulting in its establishment (ISPM No. 5, 2009)

Invasive alien species: An alien species whose establishment and spread threaten ecosystems, habitats or species with economic or environmental harm. These are addressed under Article 8(h) of the Convention on Biological Diversity (CBD).

Invasive species: Species that are non-native to a particular ecosystem and whose introduction and spread cause, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health (Global Forest Resources Assessment 2010, Specification of National Reporting Tables for FRA 2010-Working paper 135)
Log: A section of a woody stem bucked to a specific merchantable length for manufacturing into products. Sometimes used more narrowly for a given standard log length, usually of 16 feet, when estimating volume of standing timber (West Virginia Glossary of Forestry Terms Rev. 8/98).

A piece of the woody stem (trunk or limb) of a tree (University of Wisconsin Forestry Terms, publication No. G3018).

Section of the main stem of a harvested tree. Standard logs measure 16 feet long. Half logs are 8 feet long (University of Florida Forest Terminology for Multiple-Use Management, SS-FOR-11).

The bole of a tree; trimmed wood that has not been sawn further than to form cants (APHIS 7CFR 319.40).

Lot: A number of units of a single commodity, identifiable by its homogeneity of composition, origin etc., forming part of a consignment (ISPM No 5, 2009).

Lumber: Logs that have been sawn into boards, planks, or structural members such as beams (APHIS 7CFR 319.40).


Mitigation: Actions taken to lessen risk of movement of pests to an acceptable level.

Monoculture: In general, even-aged, single-species forest crops (BC Ministry of Forests and Range, 2008).

National Plant Protection Organization (NPPO): Official service established by a government to discharge the functions specified by the IPPC (ISPM No. 5, 2009)

Organism: Any biotic entity capable of reproduction or replication in its naturally occurring state (FAO, 2009)

Occurrence: The presence in an area of a pest officially recognized to be indigenous or introduced and not officially reported to have been eradicated (ISPM No. 5, 2009)

Oriented strand board (OSB): A structural panel made of narrow strands of fiber oriented lengthwise and crosswise in layers, with a resin binder (Terms of the Trade, Fourth edition, 2000, D. Evans).

Outbreak: A recently detected pest population, including an incursion, or a sudden significant increase of an established pest population in an area (ISPM No. 5, 2009)

Pathway: Any means that allows the entry or spread of a pest (ISPM No. 5, 2009)

Pest: Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products (ISPM No. 5, 2009)

Any organism that is out of place or causes stress to a desired organism (University of North Carolina, Understanding Forestry Terms).

(Forest health pest) A forest health factor that limits the ability to meet resource management objectives; an organism capable of causing material damage. Forest pests include insects, tree diseases, and noxious fungi (BC Ministry of Forests and Range, 2008)

(Quarantine pest) A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (ISPM No. 5, 2009)

(Regulated pest) A quarantine pest or a regulated non-quarantine pest (ISPM No. 5, 2009)

(Regulated non-quarantine pest) A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (ISPM No. 5, 2009)

Pest free area (PFA): An area in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained (ISPM No. 5, 2009)

Pest free place of production (PFPP): Place of production in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained for a defined period (ISPM No. 5, 2009)
**Pest free production site:** A defined portion of a place of production in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained for a defined period and that is managed as a separate unit in the same way as a pest free place of production (ISPM No. 5, 2009)

**Pest risk (for quarantine pests):** The probability of introduction and spread of a pest and the magnitude of the associated potential economic consequences (ISPM No. 5, 2009; see Glossary supplement No 2)

**Pest risk analysis (PRA):** The process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it (ISPM No. 5, 2009)

**Pest status** (in an area): Presence or absence, at the present time, of a pest in an area, including where appropriate its distribution, as officially determined using expert judgment on the basis of current and historical pest records and other information (ISPM No. 5, 2009)

**Phytosanitary certificate:** Certificate patterned after the model certificates of the IPPC (ISPM No. 5, 2009).

**Phytosanitary certification:** Use of phytosanitary procedures leading to the issue of a phytosanitary certificate (ISPM No. 5, 2009)

**Phytosanitary import requirements:** Specific phytosanitary measures established by an importing country concerning consignments moving into that country (ISPM No. 5, 2009)

**Phytosanitary measure:** Any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (ISPM No. 5, 2009)

**Phytosanitary security (of a consignment):** Maintenance of the integrity of a consignment and prevention of its infestation and contamination by regulated pests, through the application of appropriate phytosanitary measures (ISPM No. 5, 2009)

**Plant Products:** Unmanufactured material of plant origin (including grain) and those manufactured products that, by their nature or [by the nature of] their processing, may create a risk for the introduction and spread of pests (ISPM No. 5, 2009)

**Plants:** Living plants and parts thereof, including seeds and germplasm (ISPM No. 5, 2009)

**Plywood:** A flat panel made up of a number of thin sheets or veneers, of wood in which the grain direction of each ply or layer is at right angles to the one adjacent to it. The veneers sheets are united, under pressure, by a bonding agent (Terms of the Trade, Fourth edition, 2000, D. Evans).

Panel products manufactured by gluing together layers of veneer with the grain of alternate layers oriented at right angles to provide strength (University of Florida Forest Terminology for Multiple-Use Management, SS-FOR-11).

**Protected area(s):** Areas especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means (Global Forest Resources Assessment 2010, Specification of National Reporting Tables for FRA 2010-Working paper 135)

A regulated area that an NPPO has determined to be the minimum area necessary for the effective protection of an endangered area (ISPM No. 5, 2009)

General large areas set aside for a specific form of protection by government or First Nations under specific legislation or authority. They are generally established through strategic planning at regional or subregional scales (BC Ministry of Forests and Range, 2008)

**Pulp:** Commodity class of soft moist mass of wood fiber used in the manufacture of paper. Pulp is made up by reducing wood chips to fibers, either by grinding them up, or by chemical means, and then turning the fibers into slurry (Terms of the Trade, Fourth edition, 2000, D. Evans).
**Pulpwood:** Commodity class of wood used to produce pulp. Pulp wood is usually wood that is too small, of inferior quality, or the wrong species to be used in the manufacture of lumber or plywood (*Terms of the Trade*, Fourth edition, 2000, D. Evans).

Wood used in the manufacture of paper, fiberboard, or other wood fiber products. Pulpwood-sized trees are usually a minimum of 4 inches in diameter (University of North Carolina, Understanding Forestry Terms).

Trees and wood suitable for manufacturing paper, purified cellulose products (i.e. absorbents, filters, rayon and acetate), and oleresin products (such as pine oils, fragrances, cosmetics, and thinners) (University of Florida Forest Terminology for Multiple-Use Management, SS-FOR-11).

**Quarantine pest:** A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (ISPM No. 5, 2009)

**Regional Plant Protection Organization (RPPO):** An intergovernmental organization with the functions laid down by Article IX of the IPPC (ISPM No. 5, 2009)

**Regulated area:** An area into which, within which, and/or from which plants, plant products or other regulated articles are subjected to phytosanitary regulations or procedures in order to prevent the introductions and/or spread of quarantine pests or to limit the economic impact of regulated non-quarantine pests (ISPM No. 5, 2009)

**Regulated article:** Any plant, plant product, storage place, packaging, conveyance, container, soil and any other organism, object or material capable of harbouring or spreading pests, deemed to require phytosanitary measures, particularly where international transportation is involved (ISPM No. 5, 2009)

**Regulated non-quarantine pest:** A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (ISPM No. 5, 2009)

**Regulated pest:** A quarantine pest or a regulated non-quarantine pest (ISPM No. 5, 2009)

**Sanitation treatment:** The removal of dead, damaged, or susceptible trees, essentially to prevent the spread of pests or pathogens and so promote forest hygiene (BC Ministry of Forests and Range, 2008)

**Sawnwood:** Wood sawn longitudinally, with or without its natural rounded surface with or without bark (ISPM No 5, 2009).

**Silviculture:** The art, science, and practice of establishing, tending, and reproducing forest stands of desired characteristics. It is based on knowledge of species characteristics and environmental requirements (University of North Carolina, Understanding Forestry Terms).

**Spread:** Expansion of the geographical distribution of a pest within an area (ISPM No. 5, 2009)

**Systems approach(es):** The integration of different risk management measures, at least two of which act independently, and which cumulatively achieve the appropriate level of protection against regulated pests (ISPM No. 5, 2009).

**Technically justified:** Justified on the basis of conclusions reached by using an appropriate pest risk analysis or, where applicable, another comparable examination and evaluation of available scientific information (ISPM No. 5, 2009)

**Treatment:** Official procedure for the killing, inactivation or removal of pests, or for rendering pests infertile or for devitalization (ISPM No. 5, 2009)

*(Forest health treatments)* The application of techniques to influence pest or beneficial organism populations, reduce damage, or reduce the risk of future damage to forest stands. Treatments can be proactive (i.e., spacing trees to reduce risk of attack by bark beetles) or reactive (i.e., spraying insecticides to treat outbreaks of spruce budworm) (BC Ministry of Forests and Range, 2008)

*(Sanitation treatment)* The removal of dead, damaged, or susceptible trees, to prevent the spread of pests or pathogens and so promote forest hygiene (BC Ministry of Forests and Range, 2008)

**Wood:** A commodity class for round wood, sawn wood, wood chips or dunnage, with or without bark (ISPM No. 5, 2009)
**Wood chips**: Wood fragments broken or shredded from any wood (APHIS 7CFR319.40).

**Wood mulch**: Bark chips, wood chips, wood shavings, or sawdust intended for use as a protective or decorative ground cover (APHIS 7CFR319.40).
Annex 2 - International Standards for Phytosanitary Measures (ISPMs)∗

**ISPM No. 01 (2006) Phytosanitary principles for the protection of plants and the application of phytosanitary measures in international trade**
This standard describes basic phytosanitary principles related to plant protection including those related to the application of phytosanitary measures to the international movement of people, commodities and conveyances, as well as those related to the objectives of the IPPC.

**ISPM No. 02 (2007) Framework for pest risk analysis**
This standard describes the pest risk analysis (PRA) process within the scope of the IPPC and introduces the three stages of pest risk analysis – initiation, pest risk assessment and pest risk management. The standard focuses on the initiation stage. Generic issues of information gathering, documentation, risk communication, uncertainty and consistency are addressed.

**ISPM No. 03 (2005) Guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms**
This standard provides guidelines for risk management related to the export, shipment, import and release of beneficial organisms. It describes the related responsibilities of contracting parties to the IPPC, NPPOs or other responsible authorities, importers and exporters. The standard addresses biological control agents capable of self-replication (including parasitoids, predators, parasites, nematodes, phytophagous organisms, and pathogens such as fungi, bacteria and viruses), as well as sterile insects and other beneficial organisms (such as mycorrhizae and pollinators), and includes those packaged or formulated as commercial products. Provisions are also included for import for research in quarantine facilities of non-indigenous biological control agents and other beneficial organisms. This standard does not include living modified organisms, issues related to the registration of biopesticides, or microbial agents intended for vertebrate pest control.

**ISPM No. 04 (1995) Requirements for the establishment of Pest Free Areas**
This standard describes the requirements for the establishment and use of pest free areas (PFAs) as a risk management option for phytosanitary certification of plants, plant products and other regulated articles exported from the PFA or to support the scientific justification for phytosanitary measures taken by an importing country for protection of an endangered PFA.

**ISPM No. 05 (2009) Glossary of phytosanitary terms**
This reference standard is a list of terms and definitions with specific meaning for phytosanitary systems worldwide. It has been developed to provide a harmonized internationally agreed vocabulary associated with the implementation of the IPPC and ISPMs and is being regularly revised.

**ISPM No. 06 (1997) Guidelines for surveillance**
This standard describes general surveillance and specific surveys, and specifies the components of survey and monitoring systems for the purpose of pest detection and the supply of information for use in pest risk analyses, the establishment of pest free areas and, where appropriate, the preparation of pest lists.

**ISPM No. 07 (1997) Export certification system**
This standard describes the components of a national system of procedures leading to the issuance of phytosanitary certificates.

**ISPM No. 08 (1998) Determination of pest status in an area**
This standard describes the content of a pest record, and the use of pest records and other information in the determination of pest status in an area. Descriptions of pest status categories are provided as well as recommendations for good reporting practices.

∗ This list is current as of April 2010.
ISPM No. 09 (1998) Guidelines for pest eradication programmes
This standard describes the components of a pest eradication programme which can lead to the establishment or reestablishment of pest absence in an area.

ISPM No. 10 (1999) Requirements for the establishment of pest free places of production and pest free production sites
This standard describes the requirements for the establishment and use of pest free places of production and pest free production sites as pest risk management options for meeting phytosanitary requirements for the import of plants, plant products and other regulated articles.

ISPM No. 11 (2004) Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms
This standard provides details for the use of pest risk analysis (PRA) to determine if pests qualify as quarantine pests and describes the processes to be used for risk assessment and selection of pest risk management options. It also includes details regarding the analysis of risks of plant pests to the environment and biological diversity, including those risks affecting uncultivated and unmanaged plants, wild flora, habitats and ecosystems contained in the PRA area. It also includes guidance on evaluating the potential phytosanitary risks to plants and plant products posed by living modified organisms (LMOs).

ISPM No. 12 (2001) Guidelines for phytosanitary certificates
This standard describes principles and guidelines for the preparation and issue of phytosanitary certificates and phytosanitary certificates for re-export.

ISPM No. 13 (2001) Guidelines for the notification of non-compliance and emergency action
This standard describes the actions to be taken by countries regarding the notification of:
- a significant instance of failure of an imported consignment to comply with specified phytosanitary requirements, including the detection of specified regulated pests;
- a significant instance of failure of an imported consignment to comply with documentary requirements for phytosanitary certification;
- an emergency action taken when there is a detection in an imported consignment of a regulated pest not listed as being associated with the commodity from the exporting country;
- an emergency action taken when there is a detection in an imported consignment of organisms posing a potential phytosanitary threat.

This standard provides guidelines for the development and evaluation of integrated measures in a systems approach as an option for pest risk management.

ISPM No. 15 (2009) Regulation of wood packaging material in international trade
This standard describes phytosanitary measures that reduce the risk of introduction and spread of quarantine pests associated with the movement in international trade of wood packaging material made from raw wood. Wood packaging material covered by this standard includes dunnage, but excludes wood packaging made from wood which does not exceed 6mm thickness or processed in such a way that it is free from pests (i.e. plywood).

ISPM No. 16 (2002) Regulated non-quarantine pests: concept and application
This standard describes the concept of regulated non-quarantine pests associated with plants for planting and identifies their characteristics. The standard describes the application and the relevant elements for regulatory systems.

ISPM No. 17 (2002) Pest reporting
This standard describes the responsibilities of and requirements for contracting parties to the IPPC in reporting the occurrence, outbreak or spread of pests in areas for which they are responsible. It also provides guidance on reporting successful eradication of pests and establishment of pest free areas.

ISPM No. 18 (2003) Guidelines for the use of irradiation as a phytosanitary measure
This standard provides technical guidance on the specific procedures for the application of ionizing radiation as a phytosanitary treatment for regulated pests or articles. This does not include treatments used for: the
production of sterile organisms for pest control; sanitary treatments (food safety and animal health); the preservation or improvement of commodity quality (i.e., shelf life extension); or inducing mutagenesis.

This standard describes the procedures to develop, maintain and make available national lists of regulated pests.

ISPM No. 20 (2004) Guidelines for a phytosanitary import regulatory system
This standard describes the structure and operation of a phytosanitary import regulatory system and the rights, obligations and responsibilities which should be considered in establishing, operating and revising such a system.

ISPM No. 21 (2004) Pest risk analysis for regulated non quarantine pests
This standard provides guidelines for conducting pest risk analysis for regulated non-quarantine pests (RNQPs). It describes the integrated processes to be used for risk assessment and the selection of risk management options to achieve a specified pest tolerance level.

ISPM No. 22 (2005) Requirements for the establishment of areas of low pest prevalence
This standard describes the requirements and procedures for the establishment of Areas of Low Pest Prevalence (ALPP) for regulated pests in an area, and to facilitate export, for pests regulated by an importing country. This includes the identification, verification, maintenance and use of ALPPs.

ISPM No. 23 (2005) Guidelines for inspection
This standard describes procedures for the inspection of consignments of plants, plant products and other regulated articles at import and export. It is focused on the determination of compliance with phytosanitary requirements, based on visual examination, documentary checks, and identity and integrity checks.

ISPM No. 24 (2005) Guidelines for the determination and recognition of equivalence of phytosanitary measures
This standard describes the principles and requirements related to the determination and recognition of equivalence of phytosanitary measures. It also describes a procedure for equivalence determinations in international trade.

ISPM No. 25 (2006) Consignments in transit
This standard describes procedures to identify, assess and manage phytosanitary risks associated with consignments of regulated articles which pass through a country without being imported, in such a manner that any phytosanitary measures applied in the country of transit are technically justified and necessary to prevent the introduction into and/or spread of pests within that country.

ISPM No. 26 (2006) Establishment of pest free areas for fruit flies (Tephritidae)
This standard provides guidelines for the establishment of pest free areas for fruit flies of economic importance, and for the maintenance of their pest free status.

ISPM No. 27 (2006) Diagnostic protocols for regulated pests
This standard provides guidance on the structure and content of the IPPC diagnostic protocols for regulated pests. The protocols describe procedures and methods for the official diagnosis of regulated pests that are relevant for international trade. They provide at least the minimum requirements for reliable diagnosis of regulated pests.

ISPM No. 28 (2009) Phytosanitary treatments for regulated pests
This standard presents phytosanitary treatments for the control of regulated pests on regulated articles, primarily those moving in international trade that have been evaluated and adopted by the CPM. The adopted treatments provide the minimum requirements necessary to control a regulated pest at a stated efficacy. It also describes the requirements for submission and evaluation of the efficacy data and other relevant information on a phytosanitary treatment that can be used as a phytosanitary measure. This standard contains annexes that list phytosanitary treatments that have been evaluated and adopted by the Commission on Phytosanitary Measures (CPM).
ISPM No. 29 (2007) Recognition of pest free areas and areas of low pest prevalence
This standard provides guidance and describes a procedure for the bilateral recognition of pest free areas and areas of low pest prevalence. It also provides some considerations regarding pest free places of production and pest free production sites.

ISPM No. 30 (2008) Establishment of areas of low pest prevalence for fruit flies (Tephritidae)
This standard provides guidelines for the establishment and maintenance of areas of low pest prevalence for fruit flies by an NPPO. These areas may be utilized as official pest risk management measures alone, or as part of a systems approach.

ISPM No. 31 (2008) Methodologies for sampling of consignments
This standard provides guidance to NPPOs in selecting appropriate sampling methodologies (based and not based on statistics) for inspection or testing of consignments to verify compliance with phytosanitary requirements. It also provides guidance on the definition of an appropriate sample size. This standard does not give guidance on field sampling (for example, as required for surveys).

ISPM No. 32 (2009) Categorization of commodities according to their pest risk
This standard provides criteria for NPPOs of importing countries on how to categorize commodities according to their pest risk when considering import requirements. This categorization should help in identifying whether further pest risk analysis is required and if phytosanitary certification is needed.

The first stage of categorization is based on whether the commodity has been processed and, if so, the method and degree of processing to which the commodity has been subjected before export. The second stage of categorization of commodities is based on their intended use after import. Contaminating pests or storage pests that may become associated with the commodity after processing are not considered in this standard.
Annex 3 - Where to go for more information

Web sites

FAO:
FAO Forest Health: www.fao.org/forestry/pests/en
FAO Invasive Species: www.fao.org/forestry/aliens/en
Biosecurity in forestry: www.fao.org/forestry/site/biotec
FAO Priority Area for Inter-disciplinary Action - Biosecurity for agriculture and food production: www.fao.org/biosecurity
FAO/WHO Codex Alimentarius Commission: www.codexalimentarius.net

Other international organizations, conventions and information portals:

Convention on Biological Diversity (CBD): www.cbd.int
Global Invasive Species Programme (GISP): www.gisp.org
Global Invasive Species Database: www.issg.org/database
International Plant Protection Convention (IPPC): www.ippc.int
International Portal on Food Safety, Animal and Plant Health (IPFSAPH): www.ipfsaph.org
International Union of Forest Research Organizations (IUFRO) Unit 7.03.12 - Alien invasive species and international trade: www.iufro.org/science/divisions/division-7
World Trade Organization (WTO): www.wto.org