Overview of the management of invasive alien species from the environmental perspective

Clare Shine
IUCN Commission on Environmental Law
IUCN Invasive Species Specialist Group

with the help of many contributors to the
Global Invasive Species Programme (GISP)

Points to be covered

1. Why are IAS an international environmental issue?
2. What instruments and tools have been developed?
3. What are the main gaps and constraints?
4. How should we move forward – at the national, regional and global level?

1. Why have IAS become an international environmental issue?

Only a subset of alien species go on to be problematic…

But those that do can have multiple impacts affecting different sectors and native biodiversity

Economic, environmental and public health implications for all countries

Consequences - Environmental

IAS are among the top drivers of environmental change globally (Sala et al. 2000).

IAS are the second greatest threat to Threatened and Endangered species in the U.S. (Wilcove et al. 1988).

Consequences - Economic

Introduced from Latin America as a high protein food source, the golden apple snail caused losses to Philippine rice crops during the 1980's of @ $1 billion (Naylor 1996).

Losses to agriculture globally: $55-248 billion/year.

Costs to U.S. estimated to be at least $100 billion/year (Pimentel et al. 2000).

Consequences - Economic

Eradication and Control - Direct Costs

European gypsy moth. Introduced into North Carolina in 1993. Took 4 years to eradicate it and cost @ US$19 million.

Sea Lamprey. The US Department of State spends more than US$10 million annually to control in the Great Lakes of US/Canada.

Brown tree snake. Control-related efforts have cost the US military @ US$2 million annually since 1993.

Consequences - Human Health

Giant African Snail (*Achatina fulica*)

- **"Hitchhiker"**
- **Potential Food Source**
- **Pets**

Intermediate host for "rat lungworm" (*Angiostrongylus cantonensis)* which can infect the human brain, causing headache, fever, paralysis, coma, and even death (Roberts and Janovy 1996).

Consequences - Political

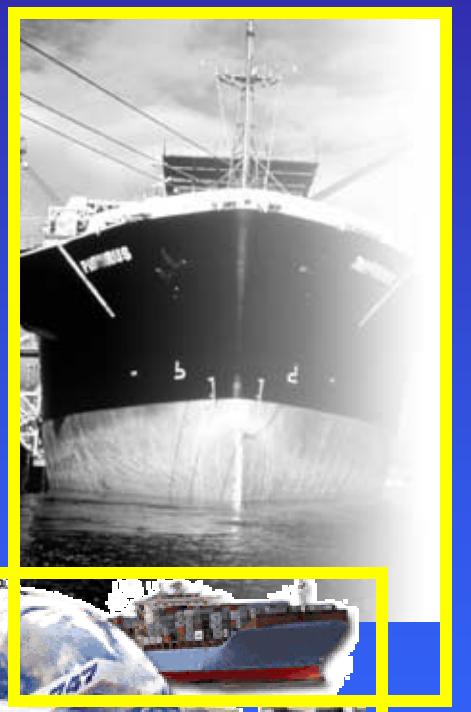
Barriers to Sustainable Development

- **Food Security**
- **Water Security**
- **Human Health**
- **Poverty**
- **Regional Conflict**
- **Migration**

Consequences - Political

Invasive alien species could prevent governments and industries from:

- **Selling some types of food products**
- **Selling "living" commodities**
- **Using certain kinds of containers**



Barriers to international trade and economic growth

Effects of invasive plants

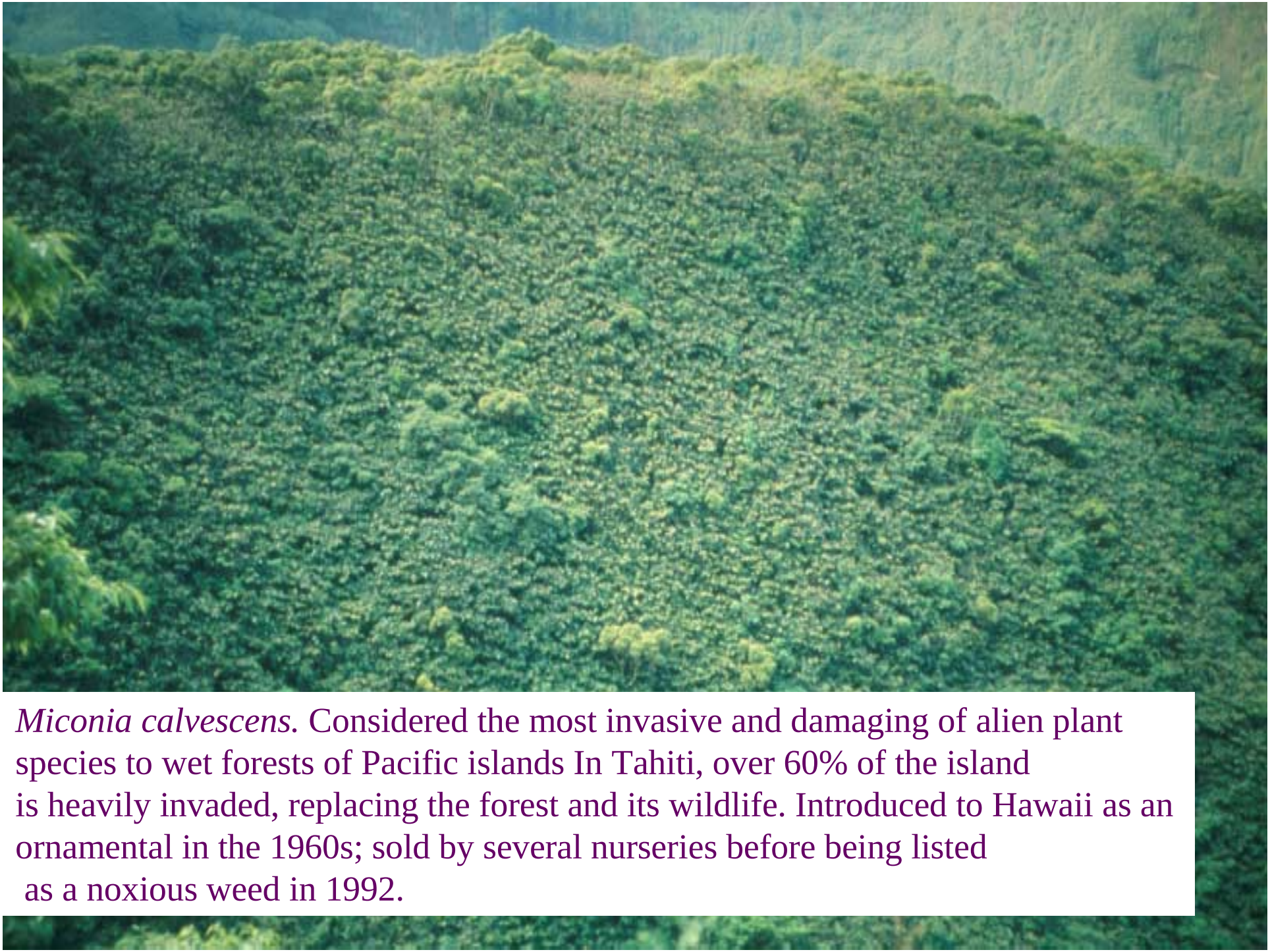
- Competition with native taxa of flora
- Hybridization with genetically close species
- Changes of the physical and chemical characteristics of the soil
- Modification of natural and seminatural habitats
- Propagation of pests and diseases

Statistics from the Working for Water programme (South Africa) http://www-dwaf.pwv.gov.za/wfw

- Invading alien plants (IAPs) the single biggest threat to plant and animal biodiversity.
- Established in over 10 million hectares of land in South Africa.
- Cost of controlling IAPs in South Africa estimated at R600 million a year over 20 years and will double within 15 years.
- IAPs waste 7% of our water resources; reduce our ability to farm; intensify flooding and fires; cause erosion, destruction of rivers, siltation of dams and estuaries, and poor water quality and can cause a mass extinction of indigenous plants and animals.

Melaleuca quinquenervia invading

(Photo courtsey of The Nature Conservancy)



Miconia calvescens. Considered the most invasive and damaging of alien plant species to wet forests of Pacific islands In Tahiti, over 60% of the island is heavily invaded, replacing the forest and its wildlife. Introduced to Hawaii as an ornamental in the 1960s; sold by several nurseries before being listed as a noxious weed in 1992.

Water hyacinth in East Africa

Red imported fire ants impact…

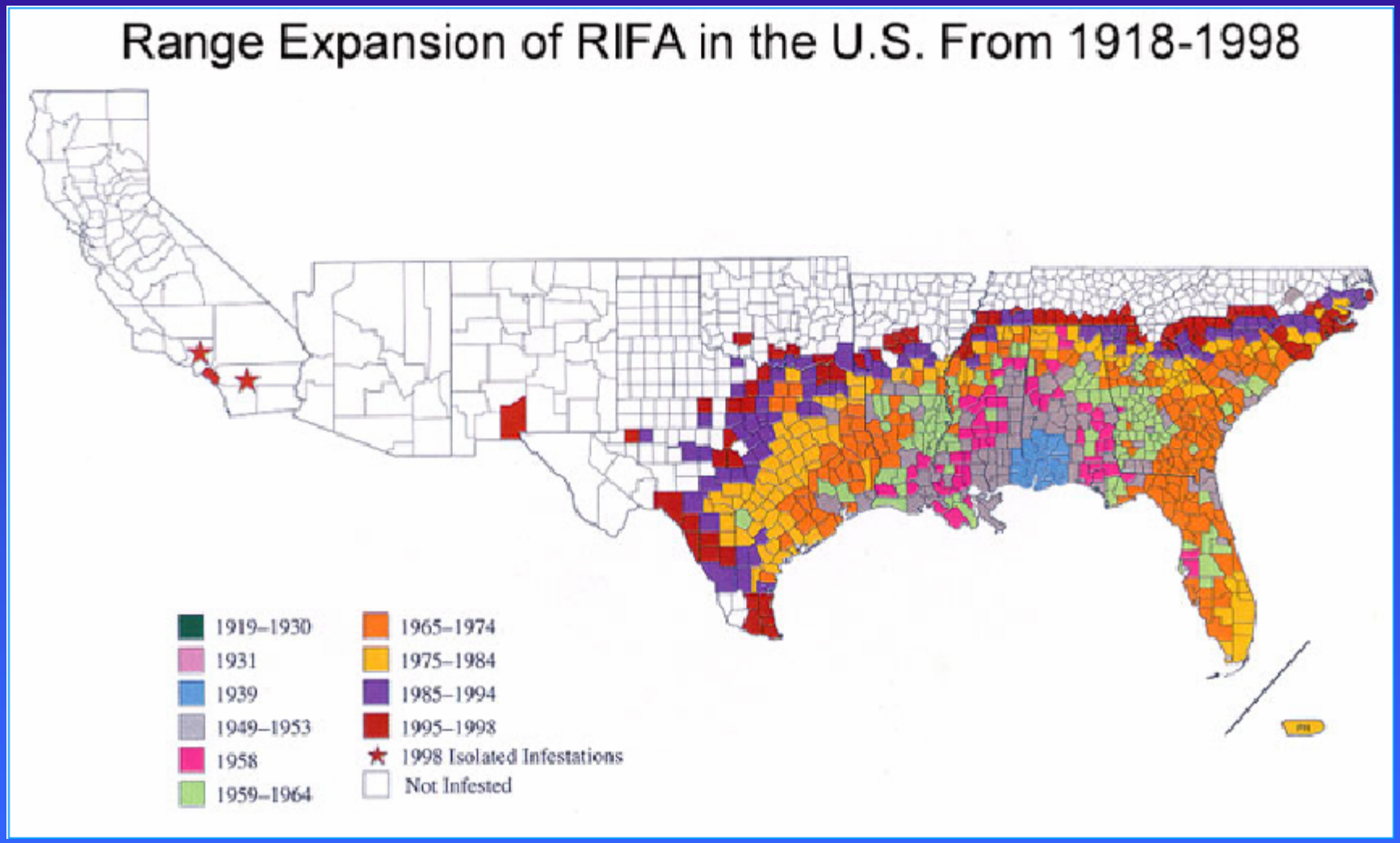
Public health

Biodiversity

Agriculture and livestock production

Electrical systems

Range Expansion of RIFA in the U.S. From 1918-1998



Source: California Dept of Food and Ag.

adapted from Davis et al. 2001

Most vulnerable ecosystems?

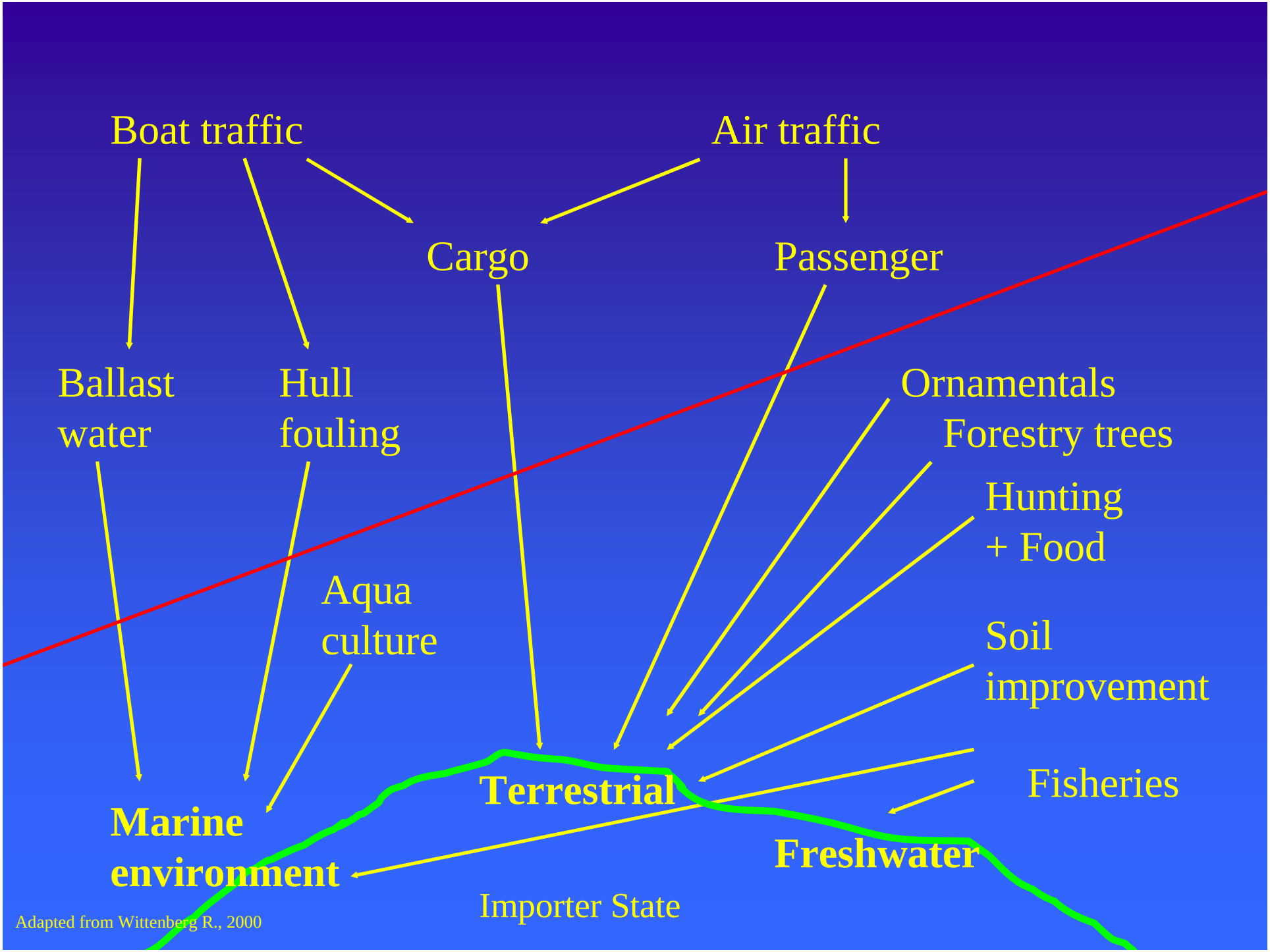
- Geographically/evolutionarily isolated ecosystems (islands, mountain ranges, lakes etc.)
- Unique flora and fauna and biological communities

Some statistics:

- 1% of all endemic plants are found in American Samoa
- Hawaii - 90% endemism for flowering plants, 99% for insects
- Hawaii's rate of invasion 500x the rate per unit area for mainland U.S. for insects and mites (R.C.McGregor 1973)

2. What instruments and tools have been developed to address pathways for transmission of IAS?

- Focus on the global level for the time being



Adapted from Wittenberg R., 2000

International regulatory framework

Protection of plant, animal and human health

Nature conservation & biodiversity

Risks associated with some transport and trade pathways

Instruments for the protection of plant, animal and human health

- IPPC/ICPM and Office International des Epizooties
  Long-established part of international framework; close links to national quarantine and border control services
- the interests they protect may be adversely affected by alien animals, plants and micro-organisms (viruses, bacteria and fungi) that become invasive
- focus is not explicitly environmental BUT some countries already use IPPC framework to support assessment of environmental risks

Protection of plant health

IPPC covers invasive alien species IF they meet definition of « pest ». Covers mandate of national plant protection organisations and measures for import control, risk analysis, surveillance, control of incursions, export certification etc.

Regional Plant Protection Organisations

Regional organisations within global IPPC framework. May develop regional standards consistent with regional needs and priorities

Plant protection (continued)

New international phytosanitary standards (ISPMs) provide guidance on the application of pest risk analysis to a specific set of risks related to the environment

ISPM for a known invasion pathway approved 2002 (*Guidelines for regulating wood packaging material in international trade*, aims to reduce the risk of introduction and/or spread of quarantine pests via this pathway (ISPM 15)).

Plant protection (developments in 2003)

Supplement on *Analysis of environmental risks* to ISPM No.11 (*PRA for quarantine pests*, 2001) approved 2003. Provides guidance for coverage of taxa that impact unmanaged as well as agricultural systems.

IPPC Supplement No. 2 on *Guidelines on the understanding of Potential Economic Importance' and related terms including reference to environmental considerations* (to ISPM No.5 (*Glossary of Phytosanitary Terms).* Potential harmful impact on plants may include damage to ecosystems, habitats or species or other specified values such as recreation, tourism or aesthetics).

Biodiversity-related instruments

- alien species referenced from 1980s, but often in limited ways (e.g. just protected areas/prevention).
- Convention on Biological Diversity 1992: the first global instrument to mandate comprehensive approach to « alien species that threaten ecosystems, habitats or species »

Biodiversity (developments in 2002)

CBD Decision VI/23 & Guiding Principles promote:

- hierarchical approach to prevention, eradication, containment/control
- research, monitoring, inter-State and regional cooperation, information exchange between trading partners, precautionary and ecosystem approaches, risk assessment of intentional introductions and pathways, capacity-building…

Several of these tools well-established under IPPC but not systematically applied to biodiversity considerations at national level

CBD prioritises application to specific ecosystems and biogeographic units. Progress to date on wetlands, islands, Global Strategy for Plant Conservation.

Non-binding codes for transport and other pathways

At sea

Ballast water have been addressed but not hull-fouling)

In the air

International Civil Aviation Organisation survey under way. Nothing to address military aviation as a pathway

Other

Codes of conduct for aquaculture (FAO, producers); some national codes on pets, aquatic trade, ornamentals…

Status of national prevention measures within the multilateral trade framework

- WTO Agreement on the Application of Sanitary and Phytosanitary Measures (1995) provides for use of international standards to promote harmonisation and avoid disguised barriers to trade
- recognises IPPC and OIE as competent to set standards
- adoption predates international focus on IAS – but Members may develop national measures to protect people, animals and plants, and the environment against pests, diseases, disease-carrying organisms and disease-causing organisms
- probably broad enough to allow importing countries to address IAS if national resources for RA, effective agencies and legislation ….

3. What are the main gaps and constraints?

Lack of standards for managing environmental pests and animals that themselves could be invasive

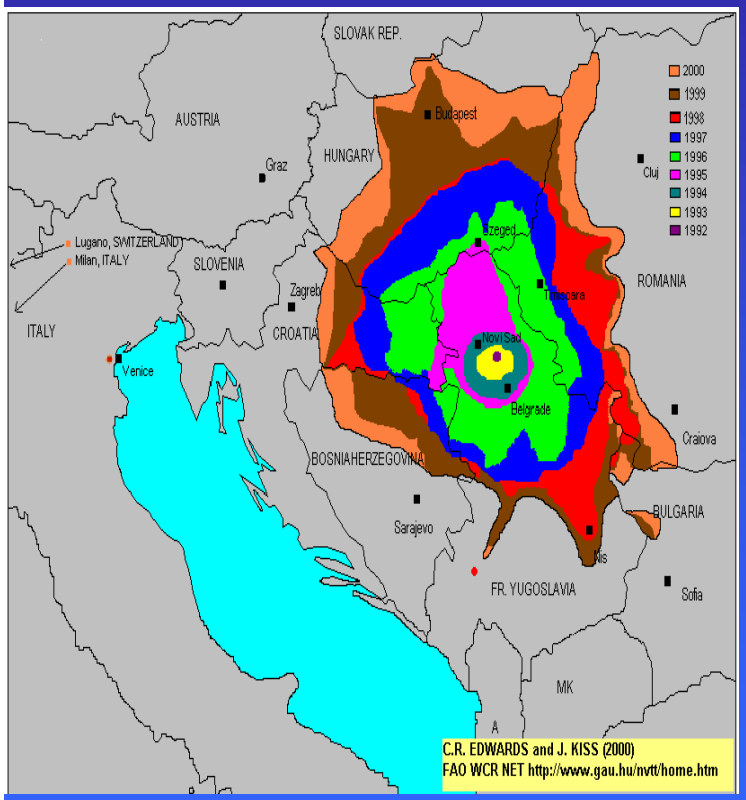
- IPPC and OIE do not cover organisms that are not animal diseases or plant pests (“environmental pests”)

- So IPPC does not cover e.g. termites, poisonous spiders, alien nematodes that are "orphans" or hitchhiker/contaminants but not plant pests (eg. spiders in table grapes, ants in taro)

- New ISPMs do not extend scope of IPPC in this respect

- Countries can do this e.g. New Zealand Import Health Standards extend IPPC “pest” definition to include all those new organisms that may affect the economy, human health or the environment

Other key pathway gaps



- no binding measures on aquaculture and other deliberate introductions into aquatic ecosystems
- lack of binding controls on shipping (ballast water, hull fouling)
- NB growing Internet-based trade in ‘exotic’ seeds, bulbs and plants
- no measures or guidance to reduce pathway risks for natural disaster relief & assistance. foods, seeds…

Constraints at the regional level

- Lack of measures to address transboundary issues (e.g. in continental land masses where a country's decisions can pose immediate risks to neighbours)
- In free trade areas, removal or liberalisation of border controls may facilitate the movement of potentially invasive alien species between different countries and ecosystems
- under-development of regional risk assessment support and capacity-building (some regions)

Common constraints at the national level

Lack of public, political and media awareness

Capacity, resource and information constraints

Fragmented legal and institutional frameworks

- no strategic approach
- outdated/inconsistent laws to address agricultural-environment-marine-public health concerns
- poor coordination between agriculture, border protection, fisheries, environment, public health, tourism, other agencies

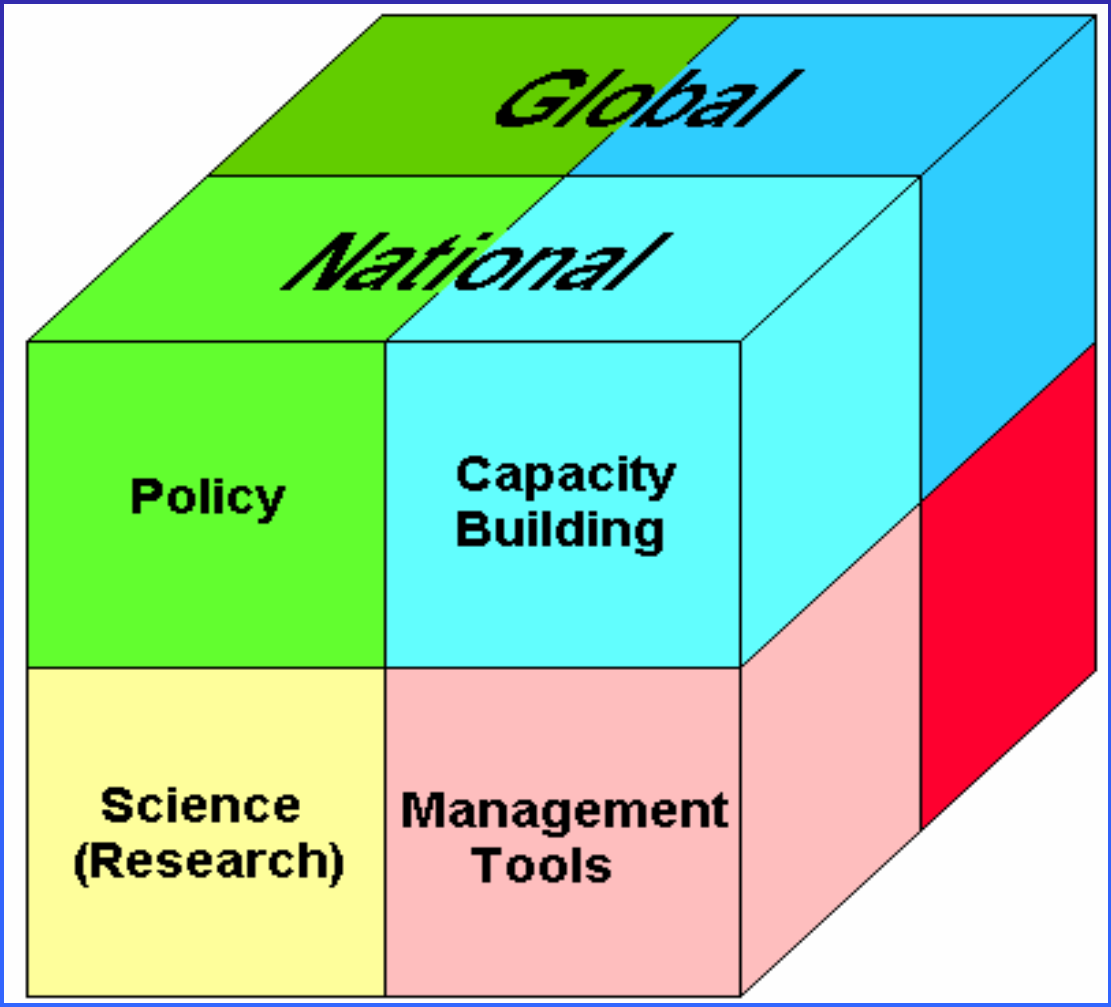
Gaps in coverage and terminology

Low levels of stakeholder engagement, compliance, enforcement

Specific constraints (national)

- In many – NOT ALL – countries, quarantine has mainly agricultural focus. No equivalent expertise or mandate for environment agency
- Not enough intentional introductions and pathways are subject to RA.
- Prevention measures are focused on national borders – GAP as regards movements within individual countries, notably:
  - island-to-island
  - mainland-to-island e.g. in Hawaii, federal law does not allow for searching and retaining passengers that carry risk goods
  - between different ecological units (river basin, mountain range)
- Few deterrents or positive alternatives to continued trade in/use of known risk species (e.g. some aquatic plants in horticulture, landscaping with exotic species and seed mixes in natural areas etc.)

4. How should we move forward – at national, regional and global level?



Source: The Nature Conservancy Invasive Species Initiative (Ann Bartuska)

Indicators for all levels

- make best use of existing regulatory framework (IPPC, CBD etc.)
- continue to build cooperation between key organisations
- apply existing tools (e.g. RA, EIA) more systematically to biodiversity impacts
- develop new tools that help people to do what needs to be done – RA guidance, interoperable databases, enforceable policies

National: promote broad objectives

- protection of human, plant and animal health/life
- protection of species, sub-species and races against contamination, hybridisation, extinction or extirpation
- protection of native biodiversity (including ecosystem function) against impacts resulting from IAS
- protect against biosecurity threats generally (IUCN 2000)

National: need legal basis, capacity and resources to support prevention, early detection and rapid response/eradication

- recognize multiple roles of border control, customs and quarantine systems in trade facilitation, food security, human health and environmental protection
- invest in capacity: boosting national quarantine capacity may indirectly help to prevent IAS even if this is not a specific focus of quarantine agencies
- review legal frameworks and strengthen policies and laws as necessary

Mainstream IAS issues - engage agricultural and trade communities as well as environmental communities

- Stronger in-country information-sharing
- Inter-agency cooperation to implement and apply new ISPMs that address PRA for specific risks related to the environment
- Coordinated contribution to international policy-making to facilitate development of more environmentally-focused standards
- Stronger vertical coordination between national focal points, regional institutions and relevant conventions and programmes.

Moving forward at regional and subregional level

- Strategic cooperation on common threats e.g. South Pacific Regional Invasive Species Strategy
- Joint approaches to shared resources e.g. Southern African Development Community (SADC) project to manage aquatic weeds in shared watercourses
- Proactive approach to tackle emerging issues and find possible solutions (e.g. Red Imported Fire Ant in the Pacific Basin)
- Closer links with counterparts across borders, throughout region and with trading partners
- Regional information exchange and learning networks

Which regional players should be involved?

- Regional plant protection organisations; regional animal health representations
- Regional environment organisations
- Regional trade and development cooperation organisations
- Regional economic integration/free trade bodies (European Uni North American Free Trade Association etc.
- Regional information resources, including but not limited to RPPO systems

Global options

- Enhanced research and prediction capacity is urgently needed
- Consider the need for a new international body to monitor trends, identify species or species types which are/may prove to be invasive and provide information to quarantine services for use in risk assessment as a basis for national measures

International assistance programmes

- Screen rigorously screened for IAS risks at the design stage
- make full use of new information tools (e.g. the new FAO databases on invasive trees and forest pests for forestry and agroforestry programmes)
- cooperate with national overseas aid and defence departments

Global options (continued)

- Need to develop standards and guidance for plants and animals that are invasive in their own right
- Either:
  - through the OIE and IPPC, if Members support
  - or by creating a new body to handle “environmental pests” with similar links to national quarantine agencies.
- Both options would probably require countries to expand the scope of their national legislation and/or quarantine agencies

Global financing for capacity-building

- September 2002, World Bank and WTO established a Standards and Trade Development Facility with FAO, OIE and WHO

- Purpose is to help developing countries meet their export obligations under the SPS Agreement, participate in the development of relevant international standards and maximise their benefits from the Agreement