Preserving Biodiversity, Promoting Biosecurity and Biosafety: Australian Perspectives

Lois Ransom

Paper prepared for presentation at the "Biodiversity And World Food Security: Nourishing The Planet And Its People" conference conducted by the Crawford Fund for International Agricultural Research, Parliament House, Canberra, Australia, 30 August – 1 September, 2010

Preserving Biodiversity, Promoting Biosecurity and Biosafety: Australian Perspectives

LOIS RANSOM

Email: lois.ransom@daff.gov.au

Biosecurity is the management of risks to the economy, the environment and the community of pests and diseases entering, emerging, establishing or spreading. In Australia, biosecurity services are delivered by government and industry in partnership with farmers and the wider community as a shared responsibility. This is described in a biosecurity continuum to convey that biosecurity outcomes cannot be delivered if any element of the continuum is missing or ineffective. Biodiversity is both an outcome of and a contributor to biosecurity actions, for example as a source of biological control agents and genetic diversity for host resistance breeding. Biotechnology is a tool that can help deliver biosecurity outcomes, although it may also generate biosecurity concerns unless appropriately managed. Our environment and the activities it supports can be viewed as a large and complex ecosystem. Meshing the biosecurity continuum approach with an ecosystem concept can help government, industry and communities to identify priority actions to deliver trade, food safety and security and biodiversity outcomes through risk-based analysis and delivery of biosecurity actions. Valuing the outcomes of biosecurity actions, particularly in the natural or built environment where dollar values are not as clear as they are in commercial production systems, is difficult and generally a product of societal values and individual impacts.

LOIS RANSOM is the Chief Plant Protection Officer (CPPO) in the Australian Government Department of Agriculture, Fisheries and Forestry. She is a plant pathologist by training and practice and has worked in most areas of plant health spanning pesticide efficacy testing; research, development and extension for better disease management in Tasmania's vegetable and medicinal crops; and quarantine and export policy and operations with the Australian Government. She was Australia's Agriculture Counsellor in Tokyo from 2000 to 2003. As the CPPO she is a focal point for national and international plant health with a significant leadership role in the ongoing development of Australia's plant biosecurity system.

Introduction

It is a challenge to address the topic of this talk in the allotted time because each of the 'bio' elements is worthy of far more intensive discussion in their own right. I will start on definitions because these give a sense of how things fit together, and use examples from my experience in the biosecurity system in Australia that may be of some value in considering the issues that have been raised by previous speakers.

The ongoing evolution of Australia's biosecurity system has focused to date on the reform of a national framework to achieve clarity of purpose and to define roles and responsibilities, as well as to set priorities for ongoing development of biosecurity capacity and capability that will enable the delivery of the biosecurity outcomes expected by the Australian community. National planning and action to protect Australia's biodiversity may learn from the recent actions to ensure our biosecurity system is dynamic, responsive and flexible.

The foundation for achieving better biosecurity outcomes is the national framework that actively enables and supports effective local delivery of biosecurity. This can also set local action in the context of national priorities and outcomes where numerous small actions contribute to larger outcomes. It is inevitable that the biosecurity system, and those working within it, is judged on actual outcomes. No matter what else we do, if biosecurity outcomes for this country are poor and our

place within the global community is poor, we will be judged poorly.

Definitions

The relationships between biodiversity, biosecurity and biosafety are as complex as the ecosystems they create or protect. At its most basic, biodiversity is safeguarded by Australia's biosecurity system, which can be assisted by the safe application of biotechnology.

The Convention on Biological Diversity (CBD 1992) defines 'biological diversity' as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. Biodiversity is both an outcome of and a contributor to biosecurity actions, for example as a source of biological control agents and of genetic diversity for host resistance breeding.

Biosecurity is the management of risks to the economy, the environment and the community of pests and diseases entering, emerging, establishing or spreading. Hence the biological diversity of an area, whether a small ecosystem or the whole of Australia, is protected from the impacts of pests that are absent from that area by effective application of biosecurity services.

Biosafety is a modern concept arising from the 2000 Cartagena Protocol on Biosafety, which encompasses the protection of human health and biodiversity by controlling the importation, release and use of genetically modified crops. Of itself, genetic modification is a tool that can help provide protection of plants from pests. However, modifications and their application in production ecosystems may have unintended consequences that must also be managed to mitigate damage to these and adjacent ecosystems. Biotechnology has been applied in Australia for integrated pest management and to reduce the use of pesticides. There have been observed increases in the biodiversity of insect fauna in genetically modified cotton crops.

Risk analysis is applied to the regulation of modified organisms to safeguard the environment and economy from adverse effects of their introduction in much the same way as biosecurity threats are assessed and managed through biosecurity import risk analysis processes.

The biosecurity system

In Australia, the biosecurity system is complex and operates at many different levels. Operations at the international border are obvious to importers of goods and to travellers returning through air and sea ports. Its operations off-shore to address pest risks on goods before they are exported and on-shore to limit their spread within Australia are not always as obvious. Off-shore activities include site visits to confirm biosecurity risks, the collection and analysis of international intelligence to identify new and emerging threats and measures to address them, and capacity-building, particularly in the Asia and Pacific regions, to improve pest management and reduce the risks that pests will move into Australia with goods, people or by natural spread.

States and territories operate a quarantine system to prevent the movement of established pests to new areas within the country. This is supported by animal and plant health legislation in each jurisdiction. Quarantine measures are applied to protect defined areas or habitats and ecosystems to support market access by maintaining these areas free of quarantine pests, or to safeguard them from diseases that severely affect their economic or ecological value. Biosecurity is also practised at a property level, to protect farms from diseases that may be carried by new livestock or stock feed.

This 'continuum' approach to biosecurity acknowledges the connectivity of off-shore, border and on-shore actions and the roles and shared responsibilities of governments, industry and the Australian community in protecting our farms, forests, cities and bushland from damaging pests and diseases (Fig. 1). It is reflected in the national biosecurity framework. The concept was first acknowledged in the 1996 Nairn review of quarantine and more recently in the 2008 Beale review of quarantine and biosecurity. These concepts reflect the value that we, as a nation, place on the ability we have to provide safe, wholesome food to our population, generate wealth from animal and plant exports and safeguard Australia's unique and diverse fauna and flora.

Biosecurity agencies are working hard to create a holistic focus that integrates all biosecurity activities within a national framework—ensuring that roles and responsibilities are clear, and that adequate resources and infrastructure are available to identify priority biosecurity risks effectively. The

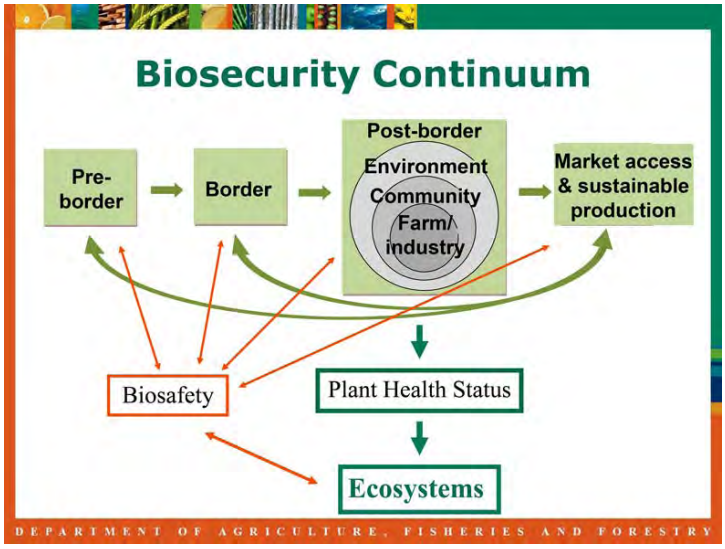

Figure 1. The biosecurity continuum

system, of necessity, must be risk based, as we simply do not have the resources to do everything, and if we are to import food and other goods, and support tourism, then there will be risks. Our ongoing focus is on the things that matter most.

What are we protecting?

Australia is one of the most biologically diverse countries in the world with 6.7% of the world's vascular plant species, 7.0% of the world's mammal species, 15% of ant species, 8.4% of the world's bird species, 3.8% of the world's amphibian species and 17.0% of the world's marine and freshwater fish species (National Biodiversity Strategy Review Task Group 2009). About 84% of plant species, 83% of mammal species and 45% of bird species are found only in Australia (DEWHA 2008). The gross value of farm production in Australia is in excess of $45 billion per annum (ABARE 2009). This includes the production and processing of animals and their products, which are also plant based.

As a large land mass, the climatic variation from north to south allows a wide range of habitats for both native and introduced species, including plants that are produced for food. These habitats are under ongoing threat from invasive species including vertebrates, invertebrates, diseases and weeds that are new to Australia, or that may be established or native species that are not widespread. Of necessity, Australia imports goods to support industries and households, and many millions of people cross our international border as tourists or residents returning home. The biosecurity system is in place to reduce the risk of entry of pest threats.

Not all threats are exotic. The Queensland fruit fly (*Bactrocera tryoni*) is a good example of a native species that has extended its natural range over time and which has become a significant cost to producers and exporters as they must meet interstate and international conditions to prevent its further spread in exported fruit. Pests also affect the natural environment to shape ecosystems. The impact of the soil-borne fungus *Phytophthora cinnamomi* on native forests in Western Australia has been significant and is probably irreversible.

The spectrum of plant pests in Australia defines our plant health status. It is this status that underpins quarantine actions at the international border and the conditions under which we can export plants and products to the rest of the world.

Protecting biodiversity

Our environment and the activities it supports can be viewed as a large and complex ecosystem. It includes native habitats, farms and cities. Meshing the biosecurity continuum approach with an ecosystem concept can help government, industry and communities to identify priority actions to deliver trade, food safety and security and biodiversity outcomes through risk-based analysis and delivery of biosecurity actions. A key challenge is identifying the outcomes sought and achieving a balance of interests and investment in a matrix of stakeholders, outcomes and resources, as well as local and national interests and imperatives.

There are some very clear parallels around decision making, priority setting and community values and expectations in relation to protecting biodiversity to which biosecurity is no stranger. I have framed this as a series of questions that will need to be considered in order to begin to set priorities and outcomes for preserving biodiversity in Australia, in balance with demands for land use to support our economy and our communities.

These include:

- Which ecosystems do we want to protect and why?
- What do you protect them from?

- Who makes this decision?
- What actions are needed, etc?

On face value these may be simple questions but they can be extremely difficult to answer due to a lack of information and knowledge of an ecosystem and the efficacy of measures that may be taken to protect it. However, setting a solid and consistent foundation to identifying ecosystems and or species at risk allows for more efficient and robust planning and delivery and, if integrated into a national framework, supports greater transparency and confidence in decision making. This framework can also support the application of risk analysis and benefit:cost analysis to define social values, ecosystem services, endangered species, identify and allocate roles and responsibilities and establish baseline capacity to deliver.

Balancing priorities in a way that accommodates the breadth of stakeholder views and values is also fraught with difficulty. Every member of our community will assign their own value on a place or a thing. Agreeing values that do not have a simple and unequivocal dollar value for example, the return made on a crop of wheat or apples, requires the determination of a range of values and their comparative weighting. This is an area where Dr Possingham's group [page 14] will be working to provide guidance to government. Some areas such as world heritage listed areas already have a set of values assigned to them by virtue of the listing process. This may be a useful starting point for determining non-dollar values affected by a pest, and has been considered in analysing the potential impact of the electric ant (*Wasmannia auropunctata*) outbreak near Cairns, Queensland, should it enter the nearby world heritage area.

We have used these fundamental questions in our planning to protect species of myrtaceae in Australia. This family of plants is dominant in the Australian environment and is widely used by the nursery and forestry industries. We know there are a number of very damaging pests affecting the health of these plants overseas that would have a significant impact on Australian species if they were to arrive. These include guava rust (*Puccinia psidii*) and the Asian gypsy moth (*Lymantria dispar*).

In 2006, a national workshop was convened as part of our preparedness for an incursion of guava rust using scenarios to test options for a response. Representatives from affected industries, primary production, emergency response organisations and environment agencies took part. The same questions as those posed above provided a useful guide to establishing roles and responsibilities in policy and response, the assumptions underpinning whether to continue with a response given the biology of rust diseases and our ability to contain them, and when to stop an eradication response. We also explored the ecosystems that should be protected, noting that primary production industries are best placed to develop their own disease management strategies. This forward planning has been applied to the recent detection and ongoing management of the closely related myrtle rust, which was first confirmed in Australia in April 2010 (Fig. 2). Identifying the location of threatened species in areas where myrtle rust is present has focussed planning and action on protecting these plants and the ecosystems they live in.

The challenge for protecting Australia's biodiversity, as I see it, is in establishing the national framework that integrates the processes to identify and then goes on to protect priority biodiversity targets in a way that is cost effective, reflective of community values, is flexible and adaptable and appropriately resourced. We have seen over the last 20 years the local impacts that community-based Landcare groups have made. Mobilising the 20+ million potential volunteers who have a strong vested interest in Australia's environment and ecosystems is a big task, but without commu-

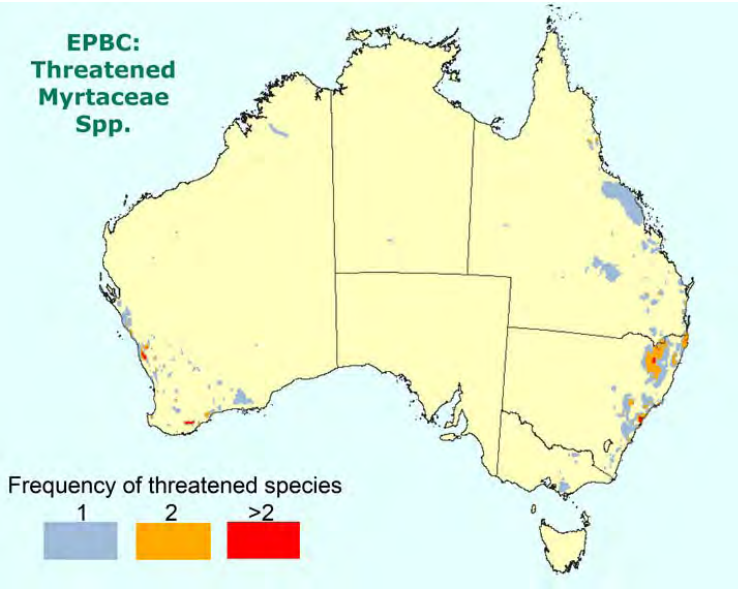

Figure 2. The distribution of myrtaceous species threatened by myrtle rust

nity ownership and a shared responsibility in protection of our environment these efforts will remain disjointed. Mechanisms that incorporate shared decision-making and stewardship will be critical to success and should underpin a road map that uses a national framework to enable local action.

Acknowledgements

I am grateful to Dr Ian Naumann (entomology, technical assistance and capacity building), Dr Mike Cole (forest health, invasive spp.) and Dr Jacek Plazinski (plant pest diagnostics, biotechnology) from the Office of the Chief Plant Protection Officer, Biosecurity Services Group, DAFF, for their valuable input into this paper.

References

ABARE 2009. *Australian Commodity Statistics 2009*. ABARE, Canberra. www.abare.gov.au/publications_html/acs/acs_09/acs_09.pdf

Beale, R. *et al.* 2008. *One Biosecurity: A Working Partnership.* The independent review of Australia's quarantine and biosecurity arrangements report to the Australian Government. Department of Agriculture, Fisheries and Forestry, Canberra ACT, 244 pp.

CBD (Convention on Biological Diversity) 1992. http://www.cbd.int/convention/articles.shtml?a=cbd-02 (accessed August 2010).

DEWHA (Department of the Environment, Water, Heritage and the Arts) 2008. *Threatened Species and Ecological Communities*. Australian Government, Canberra. www.environment.gov.au/biodiversity/threatened (Accessed August 2010).

Nairn, M.E. *et al.* 1996. *Australian Quarantine : A Shared Responsibility*. Department of Primary Industries and Energy, Canberra ACT, 284 pp.

National Biodiversity Strategy Review Task Group 2009. *Australia's Biodiversity Conservation Strategy 2010–2020.* Consultation draft, Australian Government, Department of the Environment, Water, Heritage and the Arts, Canberra, ACT. http://www.environment.gov.au/biodiversity/strategy/draft-strategy.html (accessed August 2010).