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# A new biosecurity investment decision framework to promote more efficient biosecurity policy

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**Abstract:**

Australian governments spend millions of dollars each year on pre border, border and post border biosecurity programs. While the resourcing of some of these programs is determined by existing deeds of agreement, others, particularly in relation to environmental and social pests and diseases, fall outside of existing decision frameworks. This paper presents a new biosecurity investment decision framework based on economic principles that aims to produce more objectively determined decisions. It determines whether a role for government exists in relation to a specific problem through the application of market failure tests and then guides the user to the most efficient cost recovery mechanism. The framework is presently under active consideration for use by Industry & Investment NSW and would be suitable for wider application.

The aim of this paper is to disseminate the draft framework among economists and open the concept to peer review.

## *Introduction*

The Beale report describes the aim of Australia's biosecurity regime as seeking, "through careful management, to minimise the risk of the entry, establishment or spread of exotic pests and diseases that have the potential to cause significant harm to people, animals, plants and other aspects of Australia's unique environment". (Beale, 2008, XIII)

While Beale et al choose to put a socio-enviromental angle on their definition , it is apparent that Australia's biosecurity regime has historically focussed on protecting primary industries, particularly agriculture, from the introduction of pests and diseases that might increase the cost of production or affect market access. Until the introduction of the national animal and plant cost sharing deeds of agreement signed by various industry bodies as well as all Australian state, territory and Commonwealth governments, the taxpayer paid the lion's share of the cost of the biosecurity regime, including eradication campaigns.

It is difficult to discover the reasoning behind many of the biosecurity decisions made in the past and, indeed, the industry-government cost sharing ratios incorporated into the present plant and animal cost sharing agreements, while an improvement on the previous ad hoc arrangements, are also far from ideal in terms of allocative efficiency. For instance, neither agreement has a 100% "industry pays" category, despite the listing of a number of pests and diseases that do not pose obvious social costs (including equine influenza in the animal deed). "Category Four" plant pests under the Emergency Plant Pest Response Deed, for instance, are to be cost shared 80% industry-20% government, despite the fact that they

"primarily affect commercial cropping industries, with minor or no economic, trade or environmental impacts". Similarly, the Emergency Animal Disease Response Agreement states with regard to Category Four animal diseases (p45):

> *These are diseases that could be classified as being mainly production loss diseases. While there may be international trade losses and local market disruptions, these would not be of a magnitude that would be expected to significantly affect the national economy. The main beneficiaries of a successful emergency response to an outbreak of such a disease would be the affected livestock industry(s).*

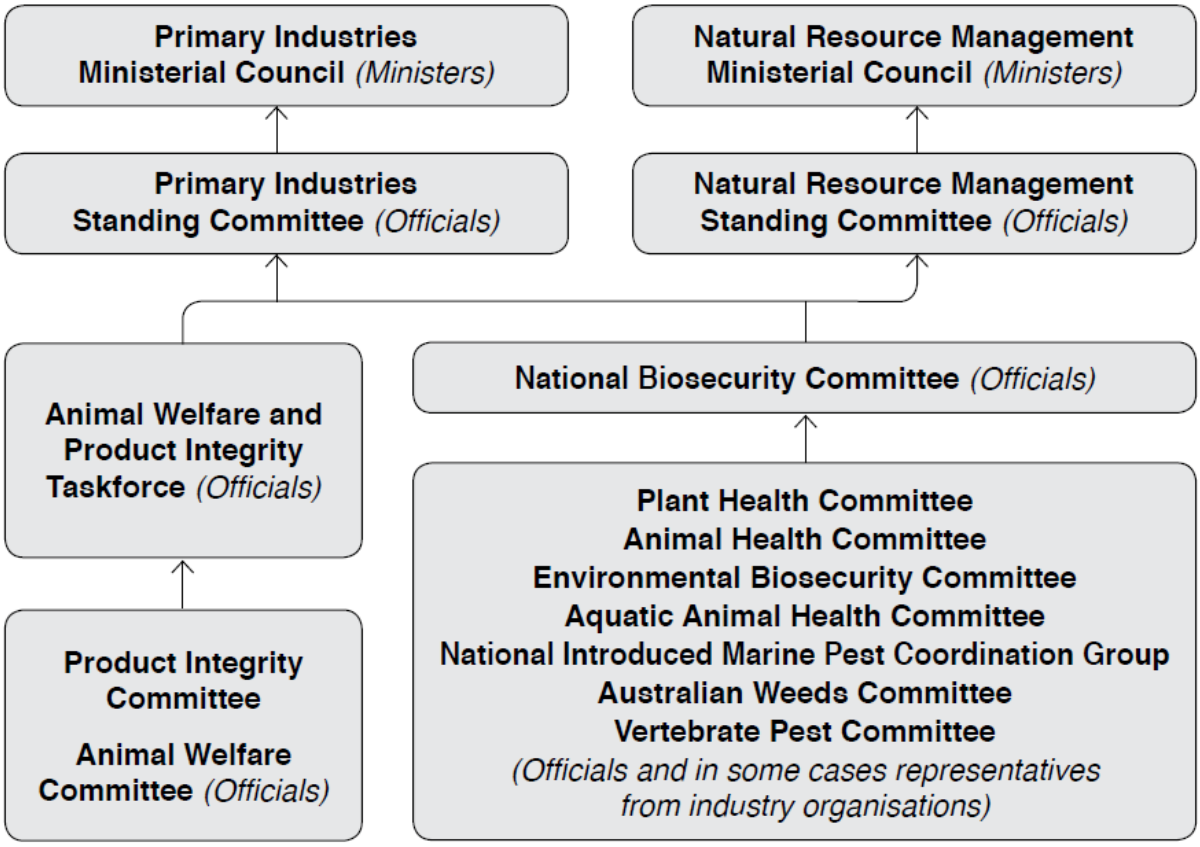
The last decade has witnessed significant change in relation to biosecurity priorities, decision making processes and funding, with greater attention paid to social and environmental threats, such as red imported fire ant (RIFA), which has been the subject of a near-$100 million eradication program over the last nine years. However, a number of recent events, particularly the equine influenza outbreak and subsequent findings of the Callinan inquiry, led to the Beale findings that Australia's biosecurity system has a number of systemic deficiencies and requires a funding increase of around $260 million per annum, with half of this increase dedicated to post-border activities (primarily surveillance for priority pests and diseases)(Beale et al 2008, 207-08). The Beale report concluded that "the current grouping of functions and governance arrangements are sub-optimal. They do not support a clear role for the Australian Government or the Parliament. They encourage the perception of political influence in what should be science-based analysis and decision making". (Beale, 2008, XVIII)

The decision framework described in this paper aims to make economic principles relating to the role of government and efficient cost recovery accessible to biosecurity decision makers, many of which are from non-economic professional backgrounds, with the ultimate goal improving the objectivity and allocative efficiency of biosecurity decisions.

## *Current Institutional Arrangements*

Despite the Australian Government's broad constitutional power, it has primarily focused on regulating border and pre-border activities, leaving most post-border concerns to the states, save for emergency situations (Beale, 2008, p8). Within this framework, agreements such as the Memorandum of Understanding on Animal and Plant Quarantine and the various emergency response arrangements have been developed to help clarify the respective responsibilities of the Commonwealth and state governments.

State and Commonwealth governments have also established institutional arrangements to accommodate joint discussion and decision making on biosecurity policy. These include the Natural Resource Management Ministerial Council, the Primary Industries Ministerial Council and various biosecurity subcommittees, as shown in the schematic below (Beale, 2008, p8).




(Beale, 2008, p10)

Private industry bodies, such as Animal Health Australia and Plant Health Australia, also work in partnership with industry, governments, researchers and others to provide national coordination to improve biosecurity policy and practice across Australia's livestock and plant industries. These bodies aim to strengthen Australia's national respective health systems and maximise confidence in the safety and quality of Australia's livestock and plant products in domestic and overseas markets and to build capacity to respond to pest and disease emergencies (Animal Health Australia 2010, Plant Health Australia 2010).

While these government and industry bodies negotiate and finalise policies relating to pests and diseases with a national dimension, much of the initial policy impetuous and formulation occurs within individual (often state) government agencies. For instance, the post-border responsibilities and presence on the ground of state and territory government lead agencies usually mean that it is those jurisdictions that first identify an exotic incursion and make a preliminary decision about what action, if any, will be taken.

The lead agency (for non human health biosecurity) within the Australian Government is the Department of Agriculture, Fisheries and Forestry (DAFF), which includes Biosecurity Australia, AQIS and Biosecurity Services Group components. Within the states, it is common for a lead agency to be nominated, such as Biosecurity Queensland and Biosecurity Victoria. This is not the case in NSW, but the Department of Industry and Investment (I&I NSW) and the Department of Environment, Climate Change and Water (DECCW) often take a leading position by the nature of their services provided.

The resourcing of some biosecurity programs is determined by existing deeds of agreement, such as the Emergency Plant Pest Response Deed and the Emergency Animal Disease Response Agreement. However, others, particularly in relation to environmental and social pests and diseases and policies relating to endemic agricultural pest and diseases, potentially can fall outside of existing decision frameworks.

## *The Biosecurity Decision Framework*

With so many levels of decision making and participants in policy formulation, it is essential that decisions are objective, defensible, consistent and rooted in economic efficiency if society is to obtain the greatest return from its investment. The authors have developed the biosecurity investment decision framework contained in Appendix 1 to promote these characteristics with regard to I&I NSW's biosecurity decision making.

Used correctly, the decision tree provides decision makers with four basic pieces of information:

i. whether market failure is at the root of the biosecurity problem in question;
ii. whether taxpayers or industry (via 'cost recovery') should pay for the intervention;
iii. the appropriate level of cost recovery for the intervention (program); and
iv. the appropriate cost recovery mechanism, if applicable – i.e. fee or levy.

The schematic can be used to identify these four issues quickly in a qualitative way, thereby providing a preliminary indication of whether a biosecurity proposal is appropriate without further analysis or as a basis for consultation regarding cost recovery with industry in cases of where industry is lobbying for government involvement.

In addition to the generic market failure test and cost recovery principles, the framework also requires the user to undertake three 'actions' that are more specific to the biosecurity problem at hand:

i. to accurately define the problem;
ii. to identify program/s or activity/ies options to address the problem, and;
iii. to conduct a benefit cost analysis before final project approval.

The decision tree schematic that is at the core of the framework is designed to assist policy makers to arrive at objective and consistent recommendations in relation to any kind of biosecurity-related activity. To ensure consistent application of the schematic, it is essential that users refer to the explanatory notes corresponding to each question as one individual's interpretation of a term or phrase may differ to that intended.

Each major subcomponent of the framework is described below.

**Market Failure Test**

The framework incorporates a simple market failure test for justification of government involvement in a biosecurity project, as well as cost recovery principles to ensure efficient resource allocation.

The 'market failure test' comprises a series of qualitative questions based on introductory-level microeconomic theory that can be found in any first year text (such as Gans et al 2005). This test is predicated on the view that governments intervene in the affairs of individuals for one of two reasons – distributional objectives ('welfare') or to address a market failure. While biosecurity activity could conceivably have a distributional dimension, such as the ability of the poor to fund medical treatment made necessary by the introduction of a pest or disease, such issues are better addressed directly through the existing health care 'safety net'. Consequently, the framework focuses on market failure justifications for government intervention.

While there are numerous forms of potential market failure, the three most prevalent forms of market failure in the biosecurity arena are those of externalities, industry goods and asymmetric information. The framework requires the presence of at least one of these market failures as a necessary, but not sufficient, reason for government intervention.

If no market failure is established, government action is not required and no biosecurity services should be provided, save for cases where industry specifically lobbies government to provide a centralised coordination/head of power role under a full cost recovery regime. It is probably unlikely that industry would do so in the absence of some form of market failure.

If the presence of market failure is established and if it is determined that government action may be justified, potential biosecurity program/s or activity/ies should then be designed to overcome the identified market failure. This is designated Action 2 in the framework.

**Cost Recovery Principles**

The 'cost recovery principles' used in the framework are those embodied in the 2001 Productivity Commission report *Cost Recovery by Government Agencies*, which also formed the basis of the Australian Government's Cost Recovery Guidelines (2005). Some aspects of the Commission's recommended approach have been simplified - for instance, the number of cost recovery levels have been rationalised to reflect I&I NSW's accounting software limitations, and the Commission's six linked schematics are displayed as one.

In line with the Commission's approach, the cost recovery section of the framework is divided into two parts: the first is for analysing 'regulatory' activities, such as mandatory incursion management program enforcement (e.g. equine influenza); the second deals with 'non regulatory' (or information) activities, such as surveillance, research and extension (etc). This delineation is made as different costing regimes apply to differing regulatory and non regulatory activities.

The framework also incorporates the Commission's risk creator-beneficiary-taxpayer pays hierarchy, whereby the most economically efficient method of charging for government services is deemed to be as follows:

- Governments should first look to recover costs from the risk creators in proportion to the risk, or cost, imposed on others. This is often referred to as the 'polluter pays principle'. Recovering costs from the risk creators could be through either fees or levies and the Productivity Commission approach to cost recovery effectively uses this option as the default within the 'Regulatory' arm of the biosecurity decision schematic.
- If no risk creators can be identified, or if it is not efficient and effective to make them pay, only then should governments consider the 'beneficiary pays' principle. Under this principle, those that directly benefit from the provision of the service should pay according to the amount of benefits they receive. This is most often achieved through imposing a levy on the affected parties. The beneficiary pays principle is applied only within the 'Non Regulatory' arm of the biosecurity decision schematic.
- If no risk creators or direct beneficiaries can be identified, or if it is not efficient and effective to make them pay, only then should government consider paying for the provision out of consolidated revenue.

As mentioned previously, the framework's predetermined levels of cost recovery are a simplified version of the Commission's, applied as follows:

- Marginal Cost – applied when the provision of a program/activity involves the further dissemination of the 'basic product set' beyond any intended taxpayer funded provision of a 'basic product set'. To make calculation of marginal cost tractable within the I&I NSW accounting system, marginal cost includes salaries (with on-costs) and operating expenses.
- Avoidable Cost – applied to programs/activities that build on the basic product set by making further use of data already collected or involve additional collection, compilation, analysis and dissemination. This includes salaries and on-costs, operating expenses and some overheads.
- Fully Distributed Cost – applied to regulatory activities will be either fully taxpayer funded or the subject of fully distributed cost recovery via a fee and/or levy cost recovery arrangement. Such fully distributed cost should include all of the costs of providing the program/activity, including the administrative costs of regulation. As such, it includes salaries and on-costs, operating expenses and overheads and an appropriate return on assets.
- Commercial Cost – applied to programs/activities that compete (directly or potentially) with commercial providers. Such pricing includes salaries, operating costs, overheads, a return on assets and an appropriate profit margin in keeping with competitive neutrality principles.

The decision framework also requires the policy maker to determine if cost recovery would be both efficient and cost effective. In other words, is the amount of money to be collected from an industry (or target group), likely to significantly outweigh the administrative costs of doing so? Here, the principles relate to the mechanism to be used to recover costs, as distinct from the quantum of costs to be recovered. If a cost effective mechanism cannot be found, it may not be feasible for the activity to be provided at all, or alternatively, it may be appropriate for the activity to be publically funded.

Finally, the Commission's approach to cost recovery includes a preference for fees over levies on efficiency grounds (provides a better price signal to users of government products) unless fees would provide stakeholders with perverse incentives (such as non-reporting of diseases if a fee applied).

**Benefit Cost Analysis**

The underlying premise of the biosecurity decision framework is that a government activity or program should only proceed if it has been shown to provide positive returns on the initial investment. Therefore, Action 3 in the decision schematic is for the decision maker to conduct a benefit cost analysis for each proposed activity/program, with only those activities with benefit/cost ratios of greater than 1 to be considered, and if a choice is presented between multiple options, then the one that provides the greatest net gain to society should be chosen.

Action 3 – the benefit cost analysis (BCA) – appears in the schematic before the level of cost recovery is determined so that users are made aware of the basic need for the benefits of a project to be greater than the costs prior to a proposal being accepted. However, the authors realise that project proponents are likely to want to be appraised of who would be expected to pay for a project, and at what rate, well before a project is significantly advanced up the decision making hierarchy. Consequently, it is likely that proponents will qualitatively apply the entire framework to a proposal before considering conducting a quantitative BCA.

The heterogeneous component parts of each activity/program should be considered separately through the remaining pricing part of the decision framework (i.e. from Action 2 onwards) because it is quite likely that each government 'program' will actually be comprised of subcomponents that will require quite distinct and separate cost recovery regimes. For example, a monitoring program for a particular disease or pest might be cost recovered as a levy on industry (the beneficiaries), whereas the costs associated with regulatory breeches relating to that same disease might be recovered as fines on those that transgress the regulation (the risk creator). This requirement can lead to significant effort in both identifying appropriate project subcomponents and applying the framework to each subcomponent, but this is a critical step in ensuring meaningful information in relation to the justification and funding of the overall project.

## *Issues Encountered in Developing and Applying the Biosecurity Threat Decision Tree and Conclusions*

The authors have been working with non-economic I&I staff in applying market failure and cost recovery principles to project evaluation since 2004. The biosecurity-specific framework that is the subject of this paper has been in development for around one year and, although not official Departmental policy, has been applied to date to approximately one dozen biosecurity issues of interest to I&I NSW. This experience has enabled the following observations to be made.

In the process of drafting the biosecurity framework, many issues were encountered in both the development stage (what information to include and how to present it) and the implementation stage (decision maker's ability to use and understand the model). During the development stage, many versions of the decision tree were drafted in an attempt to identify the clearest way of representing the market failure concept and, particularly, cost recovery principles, that were counter-intuitive to members of other disciplines. While the present draft has been informed by numerous pilot applications of the framework in conjunction with non-economic I&I staff and is an obvious improvement on our first attempts, more work remains to be done on the actual schematic and accompanying notes.

During the implementation stage, the biggest obstacles faced were related to the apparent inability of users to disregard preconceived ideas and their inability to understand and accept certain economic concepts (though the latter issue is probably related to the former). With regard to preconceived ideas, the most common were:

- The use of risk analysis as a stand alone decision making tool.
- Government involvement in the past as justification for continued government involvement.
- Government should have some overriding paternal protection motive for specific industries which would warrant government intervention funded from consolidated revenue.
- Administrative arrangements, such as 'co-regulation between industry and government' have been suggested as solutions in themselves rather than the actual steps that could be taken to ameliorate the problem.
- A very narrow view of regulatory intervention involving only arrangements applying to the stock and plant diseases acts.

It was also discovered that many decision makers (particularly those not trained in economics) had considerable difficulty understanding and accepting some of even the most rudimentary economic concepts, such as:

- The concept of market failure seems particularly foreign to some decision makers and this has caused quite a bit of confusion. For example, externalities were explained in the traditional way as a spillover of an economic transaction to a third party. However, some decision makers were unsure what constituted an 'economic transaction', with specific reference to a situation where a livestock could transmit pests or disease to adjacent properties without an economic transaction being undertaken. They were also unfamiliar with the concept of a third party to a transaction.
- Decision makers often seem predisposed to misunderstand that cost recovery principles contains a logical progression from risk creators then to beneficiaries and only under extenuating circumstances should government be required to pay for the proposed activity/program. Decision makers appear to think that choosing the parties from whom costs are to be recovered is an arbitrary choice devoid of economic efficiency considerations.

While further work on the framework documentation may go some way towards ameliorating these issues, it seems likely that significant ongoing technical support from trained economists is going to remain necessary in ensuring the correct application of the economic principles embodied in the framework.

Despite the numerous difficulties encountered in developing and applying the framework, it is now apparent that there has been for some time a strong latent demand for such an investment decision rule, which has now manifested itself in very high demand for the framework and associated technical support. This appears to be due to a combination of budgetary pressure and dissatisfaction with previous subjective decision making models that are now financially unsustainable.

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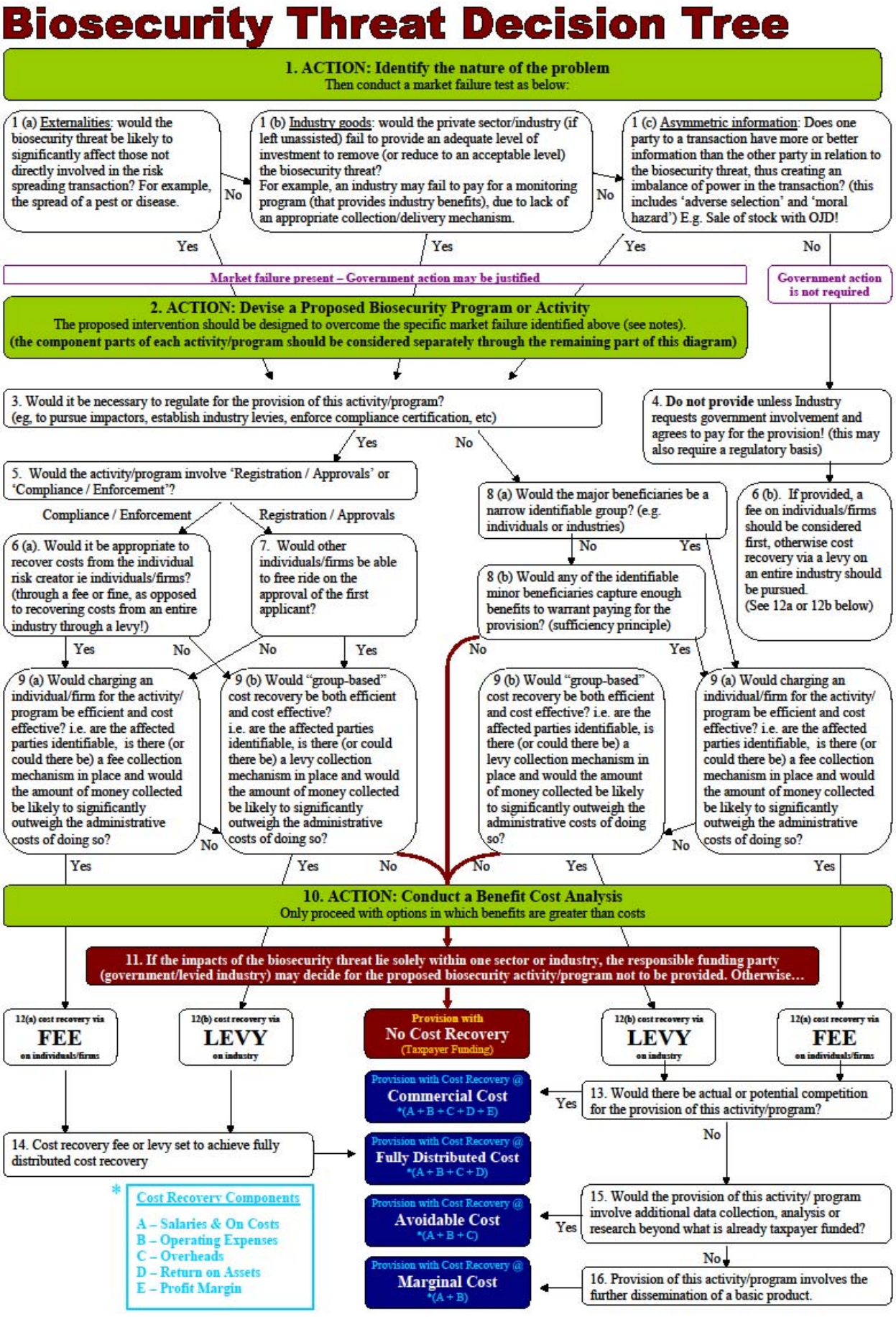
Appendix 1


Biosecurity Threat Decision Tree
1. ACTION: Identify the nature of the problem
Then conduct a market failure test as below:
1 (a) Externalities: would the biosecurity threat be likely to significantly affect those not directly involved in the risk spreading transaction? For example, the spread of a pest or disease.
No
1 (b) Industry goods: would the private sector/industry (if left unassisted) fail to provide an adequate level of investment to remove (or reduce to an acceptable level) the biosecurity threat?
For example, an industry may fail to pay for a monitoring program (that provides industry benefits), due to lack of an appropriate collection/delivery mechanism.
No
1 (c) Asymmetric information: Does one party to a transaction have more or better information than the other party in relation to the biosecurity threat, thus creating an imbalance of power in the transaction? (this includes 'adverse selection' and 'moral hazard') E.g. Sale of stock with OJD!
Yes
Yes
Yes
No
Market failure present – Government action may be justified
Government action is not required
2. ACTION: Devise a Proposed Biosecurity Program or Activity
The proposed intervention should be designed to overcome the specific market failure identified above (see notes).
(the component parts of each activity/program should be considered separately through the remaining part of this diagram)
3. Would it be necessary to regulate for the provision of this activity/program?
(eg, to pursue impactors, establish industry levies, enforce compliance certification, etc)
4. Do not provide unless Industry requests government involvement and agrees to pay for the provision! (this may also require a regulatory basis)
Yes
No
5. Would the activity/program involve 'Registration / Approvals' or 'Compliance / Enforcement'?
Compliance / Enforcement
Registration / Approvals
8 (a) Would the major beneficiaries be a narrow identifiable group? (e.g. individuals or industries)
6 (b). If provided, a fee on individuals/firms should be considered first, otherwise cost recovery via a levy on an entire industry should be pursued.
(See 12a or 12b below)
6 (a). Would it be appropriate to recover costs from the individual risk creator ie individuals/firms? (through a fee or fine, as opposed to recovering costs from an entire industry through a levy!)
7. Would other individuals/firms be able to free ride on the approval of the first applicant?
No
Yes
8 (b) Would any of the identifiable minor beneficiaries capture enough benefits to warrant paying for the provision? (sufficiency principle)
Yes
No
No
Yes
No
Yes
9 (a) Would charging an individual/firm for the activity/ program be efficient and cost effective? i.e. are the affected parties identifiable, is there (or could there be) a fee collection mechanism in place and would the amount of money collected be likely to significantly outweigh the administrative costs of doing so?
9 (b) Would "group-based" cost recovery be both efficient and cost effective?
i.e. are the affected parties identifiable, is there (or could there be) a levy collection mechanism in place and would the amount of money collected be likely to significantly outweigh the administrative costs of doing so?
9 (b) Would "group-based" cost recovery be both efficient and cost effective? i.e. are the affected parties identifiable, is there (or could there be) a levy collection mechanism in place and would the amount of money collected be likely to significantly outweigh the administrative costs of doing so?
9 (a) Would charging an individual/firm for the activity/ program be efficient and cost effective? i.e. are the affected parties identifiable, is there (or could there be) a fee collection mechanism in place and would the amount of money collected be likely to significantly outweigh the administrative costs of doing so?
No
Yes
Yes
No
No
Yes
No
Yes
Yes
10. ACTION: Conduct a Benefit Cost Analysis
Only proceed with options in which benefits are greater than costs
11. If the impacts of the biosecurity threat lie solely within one sector or industry, the responsible funding party (government/levied industry) may decide for the proposed biosecurity activity/program not to be provided. Otherwise…
12(a) cost recovery via FEE on individuals/firms
12(b) cost recovery via LEVY on industry
Provision with No Cost Recovery (Taxpayer Funding)
12(b) cost recovery via LEVY on industry
12(a) cost recovery via FEE on individuals/firms
Provision with Cost Recovery @ Commercial Cost *(A + B + C + D + E)
Yes
13. Would there be actual or potential competition for the provision of this activity/program?
14. Cost recovery fee or levy set to achieve fully distributed cost recovery
Provision with Cost Recovery @ Fully Distributed Cost *(A + B + C + D)
No
Provision with Cost Recovery @ Avoidable Cost *(A + B + C)
Yes
15. Would the provision of this activity/ program involve additional data collection, analysis or research beyond what is already taxpayer funded?
Provision with Cost Recovery @ Marginal Cost *(A + B)
No
16. Provision of this activity/program involves the further dissemination of a basic product.
* Cost Recovery Components
A – Salaries & On Costs
B – Operating Expenses
C – Overheads
D – Return on Assets
E – Profit Margin

**Biosecurity Threat Decision Tree Explanatory Notes**

It is expected that before consulting the Biosecurity Threat Decision Tree, a risk analysis would be undertaken to determine which of the many current biosecurity issues require further attention and which can be potentially disregarded. Risk analysis involves developing an understanding of risk, which is an important step in the risk management process, and provides the foundation upon which informed decisions on mitigation/management may be based. However, risk analysis should not be used to formulate a basis for investment decisions alone without also considering the appropriate economic principles such as are addressed in the Biosecurity Threat Decision Tree. On its own, risk analysis fails to consider the appropriate response obligations and potential cost sourcing arrangements.

***1. ACTION: Identify the nature of the problem***

Undertaking a risk analysis will determine which potential biosecurity threats are deserving of further scrutiny. The first step in applying the Biosecurity Threat Decision Tree is to accurately describe the specific nature of each of these identified problems.

Each of these potential biosecurity threats should be assessed to determine which groups in society are likely to be impacted by the threat (eg, specific individuals, firms, industry sectors, industries, the general public or the environment, etc). The magnitude of the potential biosecurity threats should also be considered, be it financial, social or environmental. And together with this, where ever possible, the risk creators should be identified along with an identification of the likely beneficiaries of any remediation action.

Problem definition is one of the most important processes in applying the decision framework because without an accurate appraisal of the actual biosecurity risk, any subsequent investment decision will be flawed

***1 (a,b,c) The Market Failure Test***

Competitive markets can be shown to result in the optimal allocation of resources. However, markets are often not perfectly competitive – that is, many markets have characteristics that result in sub-optimal resource allocations. Such markets are said to exhibit a degree of 'market failure'.

The presence of market failure is a necessary, but not sufficient, justification for government market intervention. For intervention to be justified, market failure must be present, the benefits of the intervention must exceed the costs and an appropriate cost recovery regime must be in place.

The three most prevalent forms of market failure in the biosecuriy arena are; the presence of 'externalities' (sometimes called spillovers) associated with an action or transaction, cases where 'asymmetric information' is available to the parties to a transaction, and where

certain activities exhibit 'public/industry good' characteristics that result in under-investment in those activities by industry.

In the Biosecurity Threat Decision Tree, the three most likely forms of market failure have been listed (but others may be applicable). These potential forms of market failure are not necessarily related to each other and a specific biosecurity risk might involve one or two or all of the market failures listed. The aim of this section of the decision tree is not to determine which market failures apply to which biosecurity threat, rather, the description of the potential market failures have been worded and positioned thus in the decision tree so as to determine if there is at least one market failure to which government intervention may be required.

***1 (a) Externalities***

An externality (or spillover) associated with an economic transaction (or action of an individual) is an impact on a third party that is not directly involved in the initial transaction. Externalities can be either positive, such as pollination of crops by a beekeeper's bees, or negative, such as carbon pollution associated with electricity generation. In such a case, product prices do not reflect the full social cost of production or consumption of the product. Biosecurity externalities are often manifested as a heightened risk of negative outcomes rather than the actual occurrence of a particular outcome.

An example of a biosecurity externality is the importation of a livestock product that subsequently introduces an exotic disease to the domestic livestock industry. This means that industry participants that had nothing to do with the importation are negatively affected by the disease through increased production costs (ie disease control). Such an occurrence may not be sufficient justification for government intervention in its own right as there are often mechanisms in place that allow for coordinated industry action (see 1(b)).

However, externalities in the biosecurity arena may also negatively impact on non-industry third parties by affecting human health or welfare and/or the environment. It is the presence of such impacts that may warrant government intervention. For instance, there will likely be insufficient incentive for a livestock industry to make the "socially optimal" level of investment into control of an animal disease that affects the environment or human health as the industry cannot capture all of the benefits associated with the investment. This is because the optimal level of any investment is that level up to where the marginal (last) dollar invested returns a dollar of benefit - that is, there is no further net benefit to be gained by increasing the level of investment further. Hence, if half of the benefit accrues to wider society rather than the industry, the industry, being only interested in, or aware of, the returns to itself, will cease investing well before the societal optimum is reached.

In the case of an 'all or nothing' disease eradication campaign requiring a minimum level of investment to proceed, it may not be in the industry's interests to make the investment at

all if the benefit accruing to industry is less than the cost of the investment. Consequently, the presence of a market failure, such as externalities, is a necessary, but not sufficient, condition for government intervention. To be justified, intervention must also deliver net benefits to society and be funded through an appropriate mechanism.

### *1 (b) Industry Goods*

There may be cases where an industry as a whole would find it profitable to make a biosecurity investment but a combination of characteristics associated with the investment act as a barrier to taking coordinated action, resulting in under-investment.

The specific characteristics that form this barrier are: (i) 'non-rivalry in consumption', whereby one persons' use of a product does not diminish the product's availability to others; and (ii) 'non-exclusiveness of supply', whereby provision of the product to one person means that the product is effectively provided to all. Products (goods or services) that exhibit these characteristics are called "public goods", although in the case where the benefits of such a product accrue only to participants in a specific industry, the term "industry good" is more appropriate.

Biosecurity examples of public goods include research into the life cycle of a horticultural plant pest to enable better pest control and surveillance for an exotic animal disease, both of which are likely to more properly be described as 'industry goods'.

Given that everyone (ie all industry participants or citizens, as the case may be) benefits from the provision of an industry/ public good regardless of who provides it, little incentive exists for any one individual (or business) to provide the optimal level of investment in the industry/public good because they cannot capture all of the benefits. In such cases, the investment will only be made if the expected benefits accruing to the individual investor exceed their costs, with under-investment being the result. In cases where the minimum practical investment is high, there is the risk that no investment will be made at all, either because the expected return to the individual investor is less than the costs or because potential investors attempt to "free ride" on the investment of others (as they will receive the benefits for nothing if someone else makes the investment).

Consequently, where an opportunity exists to either improve societal welfare or industry profitability through the provision of a public or industry good, respectively, there is a strong case for government intervention to promote coordinated action. However, the presence of a market failure, such as industry under-investment, is a necessary, but not sufficient, condition for government intervention. To be justified, intervention must also deliver net benefits to society and be funded through an appropriate mechanism.

In the case of industry goods, such intervention may simply take the form of establishing an appropriate compulsory industry levy collection mechanism.

### *1 (c) Asymmetric Information*

Where one party to a transaction has more or better information than the other in relation to the transaction, the resulting imbalance of power in the transaction can sometimes lead to a socially sub-optimal market outcome. This type of market failure is called “asymmetric information”.

An example of asymmetric information is the sale of livestock that is sub-clinically infected with a disease at the time of sale but can have future serious production effects, such as ovine Johnes’ disease. Under such a scenario, the seller is able to pass on the higher cost of biosecurity management to the buyer, without the buyer initially being aware of these additional hidden costs – knowledge that may have lead the buyer to abort the sale or to have bid a lower price.

Asymmetric information not only has wealth effects, it can also lead to economic inefficiency, as the uncertainty associated with stock sales, for instance, might lead buyers to lower their ‘willingness to pay’ for all stock to account for the perceived risks, which in turn will lower market prices. Lower prices will, in turn, affect the relative profitability of farm enterprises, possibly leading to resource allocations (farmers’ enterprise mix choices) that do not maximise societal welfare.

Two special case of information asymmetry are ‘moral hazard’ and ‘adverse selection’. Moral hazard occurs when a party insulated from risk may behave differently than it would behave if it were fully exposed to the risk. For example, if the government adopted a policy of compensating livestock producers for the full market value of all stock quarantined with a particular disease, the producer may behave less cautiously than who has to bear responsibility without compensation. Adverse selection refers to a market process in which "bad" results occur when buyers and sellers have asymmetric information. In this situation the "bad" products or customers are more likely to be selected. For example, a Livestock Health and Pest Authority that offers free veterinary services (funded through the general levy) runs the risk of being adversely selected against by irresponsible or unprofitable producers making numerous frivolous or vexatious demands on its services.

The presence of a market failure, such as asymmetric information, is a necessary, but not sufficient, condition for government intervention. To be justified, intervention must also deliver net benefits to society and be funded through an appropriate mechanism.

### *2. Action – Devise a Proposed Biosecurity Program or Activity.*

Once a market failure rationale for further investigation of the problem is established, a potential intervention should be designed to address the specific market failure identified above. This might involve one or more programs across the intervention spectrum, such as:

- Government Regulation – eg, legislated movement restrictions, compulsory vaccinations.
- Co-Regulations – eg, Government requirement to use industry developed health certifications or codes of conduct.
- Self Regulation – eg, voluntary codes of conduct.
- Information Dissemination – eg, extensive advisory program, provision of appropriate advisory material.

A government biosecurity program or activity will usually be comprised of many heterogeneous components. Each heterogeneous component of the proposed program should be considered separately through the remaining part of the biosecurity threat decision tree. Often it will be appropriate to group those with similar characteristics or objectives (these groups need to be small enough so the types of activities within a group have common characteristics and objectives, but large enough to make the review process manageable).

***3. Would it be necessary to regulate for the provision of this activity/program?***

(eg, to pursue impactors, establish industry levies, enforce compliance certification, etc)

The Australian Government Department of Finance and Administration Cost Recovery Guidelines 2005, notes the importance in distinguishing between:

- Regulatory activities – those activities involving the administration of regulations; and
- Non Regulatory activities (or Information activities) – those activities that involve collecting, collating and disseminating information, and any other activities of a non-regulatory nature.

This distinction is necessary as the degree to which an activity relies on the regulation of people / businesses versus voluntary use of government products has a bearing on the appropriate funding mechanism for the activity.

***4. Government action is not required***

If no market failure can be identified, government intervention in an industry or market is not justified. In such circumstances, the government should not provide a biosecurity activity or program unless industry requests government involvement and agrees to pay for the provision through a full cost recovery mechanism.

***5. Would the activity/program involve 'Registration / Approvals' or 'Compliance / Enforcement'?***

The Australian Government Department of Finance and Administration Cost Recovery Guidelines 2005 state:

> For regulatory activities, it is often useful to distinguish between different stages in the regulatory process. In particular, when looking at regulatory activities, it is important to separate pre-market and post-market regulation. Pre-market regulation activities (regulations with which firms or products must comply before a product can be offered for sale) involve registration and approvals, or issuing exclusive rights and privileges. Post-market activities (regulations with which firms or products must comply after a product is available for sale) involve monitoring compliance with regulations, investigation and enforcement.
>
> It may also be useful to break down the regulatory activities further according to the various industry sectors regulated by the agency. Regulatory activities affecting competing sectors should be treated as a group so the design of the charges does not affect competition between sectors.

Registration and approval activities include the issuing of permits, testing, licensing and registering of products. For example, biological testing and the issuing of permits are required when opening trade avenues with new international trading partners or with a new biological product. Compliance and enforcement activities include monitoring of compliance, investigation of breaches and enforcement. For example, the NSW government will monitor for compliance with the Ballast Water Management Arrangements so as to prevent the spread of exotic marine pests.

***6. Would it be appropriate to recover costs from the individual risk creator?***

6 (a). Would it be appropriate to recover costs from the individual risk creator, ie individuals/firms? (through a fee or fine, as opposed to recovering costs from an entire industry through a levy!)

In terms of cost recovery it is most desirable to employ the economic principle of 'risk creator pays' (or polluter pays). Essentially this means that those who create the biosecurity risk should be the ones required to pay for the services to ameliorate them. This principle will apply unless either those individuals can not be specifically identified, or if charging these individuals establish perverse incentives in their behaviour (such as charging individuals for reporting cases of agricultural disease outbreak).

While fees are preferable to levies, a fee will not be efficient and cost effective if:

- it is difficult to establish a fee that accurately links the costs of the activities to the regulated firms or individuals; or
- the fee is costly to collect because it is difficult to identify and bill each regulated firm or individual.

If the decision on whether a fee is cost effective is borderline then it may be appropriate to consider whether a fee is needed to discourage frivolous or vexatious demand.

If a fee is not cost effective then a levy could be considered.

6 (b). If provided, a fee on individuals/firms should be considered first, otherwise cost recovery via a levy on an entire industry should be pursued.

This option only applies if industry requests government involvement and agrees to pay for the provision through a full cost recovery mechanism. As such, it simply determines if cost recovery should be administered through a fee/fine arrangement on individuals or a levy arrangement on the whole industry.

As distinct from 6(a), there is no possibility for 6(b) to funded through consolidated revenue with 'no cost recovery' (as government involvement has been determined to be inappropriate).

***7. Will other individuals/firms be able to free ride on the approval of the first applicant?***

Charging for the pre-market assessment of new products can encourage firms to avoid approval costs by waiting for others to seek approval first (free riding). Such an outcome may serve to stifle innovation. For example, the initial introduction of agricultural trade with a new external party (another country or another state) or trade in a new biological product, may require an expensive testing/approval process to ensure that such trade will not adversely impact the biological status of NSW. Once these tests have been conducted the new trading venture may be approved and open to any entrepreneur.

If individuals/firms are not able to free ride on the approval of the first applicant it is most appropriate for the costs of the intervention to be pursued through those parties requesting the registration/approval. Otherwise, a levy on the industry may be appropriate.

***8. The beneficiaries of government biosecurity programs or activities***

The most economically appropriate method of charging for government services is in keeping with the following points

- Governments should first look to recover costs from the risk creators (polluter pays principle).
- If no risk creators can be identified or if it is not efficient and effective to make them pay, only then should governments consider the 'beneficiary pays' principle. Under this system, those that directly benefit from the provision of the service should pay according to the amount of benefits they receive.
- If no risk creators or direct beneficiaries can be identified or if it is not efficient and effective to make them pay, only then should government consider paying for the provision out of consolidated revenue.

Under this option, the beneficiary pays principle is being considered because, with respect to biosecurity activities or programs, the risk creators will mostly have been identified and dealt with under the regulatory side of the biosecurity threat decision tree. Question 8(a) therefore assumes that it is not appropriate to target the risk creators and thus defaults to the beneficiary pays model.

***8 (a) Would the major beneficiaries be a narrow identifiable group? (e.g. individuals or industries)***

For many government biosecurity programs or activities, the main beneficiaries will be an easily identifiable group, such as individuals, a particular industry or a consumer group. Where the main beneficiary is a particular industry, the term 'public good' is replaced by 'industry good'. In many instances, it will be possible to recover the costs of industry goods through a levy on industry members or associations.

***8 (b) Would any of the identifiable minor beneficiaries capture enough benefits to warrant paying for the provision? (sufficiency principle)***

If the major beneficiaries are either not able to be accurately identified or represent non paying entities such as the environment or social welfare, it may still be appropriate for one (or some) of the minor beneficiaries to pay for the provision of the service, provided they capture enough benefits from the government provision to warrant them to do so. This would be on a case by case basis and would involve consultation with the affected parties.

***9. Efficiency and Cost Effectiveness of Cost Recovery Charges***

Would charging for the activity/program be both efficient and cost effective?

(i.e. Is the amount of money collected likely to significantly outweigh the administrative costs of doing so?)

The following pricing principles relate to the mechanism to be used to recover costs, as distinct from the value of costs to be recovered. If a cost effective mechanism cannot be found, it might be appropriate for the for the proposed biosecurity activity/program not to be provided or alternatively, under extenuating circumstances it may be appropriate for the activity to be publically funded.

9 (a) Would charging an individual/firm for the activity/program be efficient and cost effective? This involves charging a fee/fine on individuals/firms to efficiently and cost effectively recover the costs of the regulation.

9 (b) Would "group-based" cost recovery be both efficient and cost effective?

Group based cost recovery arrangements can include compulsory or voluntary levies which are employed to recover the costs of an "industry good".

An efficient levy must be based on accurate identification of both the firms creating the regulatory need and a cost base that reflects the cost of regulation (eg, products sold, licenses held etc).

Even if a levy is efficient, it may not be appropriate if it is very costly or complex to collect. For such a scenario it may be appropriate for the activity not to be provided.

Alternatively, if the amount of the costs to be recovered are deemed insignificant, it may be cost effective for the product to be publicly funded.

***10. ACTION: Conduct a Cost Benefit Analysis***

Only proceed with options in which benefits are greater than costs

Cost–benefit analysis is typically used by governments to evaluate the desirability of a given intervention. It is an analysis of the cost effectiveness of different alternatives in order to see whether the benefits outweigh the costs. The aim is to gauge the efficiency of the intervention relative to the status quo.

Where a choice is to be made between several possible government biosecurity programs or activities, (all other things being equal) the option with the highest benefit cost ratio should be undertaken.

***11. Do not provide the biosecurity program or activity***

If the impacts of the biosecurity threat lie solely within one sector or industry, the responsible funding party (government/levied industry) may decide for the proposed biosecurity activity/program not to be provided.

Often a biosecurity threat will impact solely or predominately on only one industry or sector. Thus, any appropriate government intervention will inevitably attempt to establish a cost recovery regime that sources funds from that industry or sector.

If the affected parties are not able to be accurately identified or an appropriate levy collection mechanism is not able to be established or if the administrative costs of collecting the money is prohibitively high, the government may choose for the activity/program not to be provided rather than pay for its provision out of consolidated revenue.

Alternatively, in certain cases where a levy collection mechanism is determined to be both efficient and cost effective, an industry or sector may still request that the government not provide the activity/program. For many biosecurity threats it may be ‘appropriate’ for the government to intervene but for such cases the government is unlikely to intervene without the full support of the industry in question.

***12. Cost recovery via a Fee or Levy is determined by the path taken through the decision tree.***

***13-16. Degree of Cost Recovery***

| **Regulatory Activities**<br><br>As regulation can only be implemented by government, the central cost recovery issue relating to governments regulatory activities is whether it is efficient and cost effective to charge those industries or individuals that generate the need for the regulation. | | **Non Regulatory Activities**<br><br>The cost recovery arrangements applied to non regulatory services should aim to optimise the provision of these products through the following pricing structure: |
|---|---|---|
| *No Cost Recovery* - Along with efficiency and cost effectiveness, if charging is inconsistent with policy goals there should be no cost recovery. E.g. If charging would create perverse incentives that would work against the intent of the regulation. |  | *No Cost Recovery* – These biosecurity programs are publicly funded, and defined on the basis of targeting externalities, industry under-investment or asymmetric information and having no efficient and cost effective mechanism for recovering costs from either identifiable risk creators or beneficiaries; |
| *Cost Recovery at Commercial Cost, Not applicable for regulatory activities* |  | *13. Cost Recovery at Commercial Cost* - Products that compete (directly or potentially) with commercially available products should be priced accordingly. Such pricing would include salaries, operating costs, overheads, a return on assets and an appropriate profit margin in keeping with competitive neutrality principles. |

| | | |
|---|---|---|
| *14. Cost Recovery at Fully Distributed Cost* - Regulatory activities will be either fully taxpayer funded or the subject of fully distributed cost recovery via a fee and/or levy cost recovery arrangement. Such fully distributed cost should include all of the costs of bringing them to market, including the administrative costs of regulation. Such pricing would include salaries, operating costs, overheads and an appropriate return on assets |  | *Fully distributed cost recovery is not applicable for non-regulatory product provision, as such provision is either of the "basic product set", additions to that product set (e.g. avoidable & marginal priced or commercially contestable product provision.* |
| *Cost Recovery at Avoidable Cost, Not applicable for regulatory activities* |  | 15. *Cost Recovery at Avoidable Cost* - Products that build on the basic product set by making further use of data already collected or involve additional collection, compilation, analysis and dissemination should be priced using the "avoidable cost" method. This includes salaries, operating and some overheads. |
| *Cost Recovery at Marginal Cost, Not applicable for regulatory activities* |  | 16. *Cost Recovery at Marginal Cost* - When the provision of a product involves the further dissemination of the "basic product set" beyond the intended taxpayer funded provision, "marginal cost' should be applied. Such pricing would include only salaries and operating costs |