



Department of
Agriculture and Food



ENVIRONMENTAL AND SOCIAL VALUES OF WA BIOSECURITY FRAMEWORK – A META ANALYSIS

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WA Biosecurity Framework and Senate Review

- Biosecurity Framework Consists of Department of Agriculture, Environment and Conservation, Forestry and Fishery:
- Senate Biosecurity Review (2006).
- Additional Investment Requirement of \$42M annually.
- Triple Bottomline Evaluation.



Results of the Study

Proposed Funding	\$42.92M	Benefit Cost Ratio
Economic Benefit	\$130M – \$168M	3.05 – 3.93
Environmental and Social Benefit	\$161M – 220 M	3.82 – 5.14

Objective: Monetise Environmental and Social Values

- Process:
 - Identify what those environmental and social benefits are.
 - Undertake a methodology review for quantification of qualitative benefits.
 - If possible, apply such methodology for quantification.
- Consideration:
 - Time Constraints
 - Resource Constraints



Identification of Benefits of Biosecurity Programs

- Should we identify the benefits for individual projects?
- A generic approach was more suitable
- Preservation of Endangered Species and Ecosystem
- Conservation, amenity, aesthetic and Bequest Values
- Ecotourism and Recreational Values
- Animal Biosecurity Program (contribute to Public Health via managing and controlling Zoonoses).



Methodology Review

- Quantifying Qualitative Data VS Monetary Estimates of Environmental Values.
- Market Price, Productivity and Hedonic Pricing Method – suitable only if some sort of market valuation exists for environmental goods
- Contingent Valuation Method—across the board application for ecosystem valuation via willingness to pay survey.
- Travel Cost Method—Estimates economic values associated with ecosystems of site that are used as recreation. E.g. how much individuals are willing to pay to travel to these sites.
- The Cost Method
- Contingent Choice Method (indirect willingness to pay through tradeoff questions)
- Benefit Transfer Method—Economic estimates by transferring existing benefit estimates from studies already published.



Benefit Transfer Method

- Advantages
 - Saves significant time and resources
 - Published values are already reviewed
 - Flexibility in adjusting values and opportunity for improvisation
 - Simulation and Meta analysis can be based on a cross section of published values
 - Fits the requirement in this case (WA biosecurity framework) which is a cross section of Forestry, Fishery, Agriculture and Environment.
- The weakness: Lack of published results, inadequacy for policy response and the values matching public perception.



Benefit Transfer Method and Meta Analysis

- Published results are collected from the following application
 - Contingent Valuation
 - Travel Cost
 - Hedonic Pricing
 - Replacement Cost
 - Partial and General Equilibrium Model



Biosecurity Benefits of Species Preservation (Willingness to Pay (WTP) Survey)

- Species Preservation values: restoration of Atlantic salmon \$14-\$21/hh (Jackson and Dragun 1996b)
- Multiple species survey (Preservation of all endangered species in Victoria, \$118/hh (Dragun 1996b)
- Conservation of fisheries in Montana rivers \$2- \$17
- Conservation program for coastal nongame wildlife-\$15
- Can we derive a reasonable proxy value for the biosecurity framework from similar examples?



Natural Habitat, Tourism and Recreational Valuation Studies

- Protection of the Kakadu Conservation Zone and National Park Australia, (\$US 52, WTP by Carson et al (1997))
- Protection of Nadgee Nature Reserve, Australia (\$US 27, Bennet 1984)
- Protecting Habitat of Uncommon Species, ACT (\$A 24. CIE (2001)
- West Australian Recreational Anglers WTP is \$5.5 Per Additional Salmon Caught (Van bueren et al (1993).



Discussion

- Willing to Pay Survey – Is it backed by the ability to pay?
- Willingness to Pay Survey– will we get the same answers or the same values if they were obliged to pay?
- The range is large, Single species WTP and Multiple species WTP provide quite different results.
- Surveys usually provide a large range of values—which may not be appropriate for policy decision making.



Recreation, Aesthetic, environmental and Eco-tourism values estimated by CIE under AUSBIOSEC Consultancy

Pest	Recreation (WTP)	Biodiversity	National Park (WTP)	Total Across Australia
Fire Ant	\$196M	\$60M	\$401M	\$658M
Didymo	\$27 M	\$21m	\$337M	\$386M
Eucalyptus Rust	NA	\$143m	\$235m	\$378M

Value of Ecosystem Services and Biosecurity

Ecosystem Service	Ecosystem Functions	Examples	(1994 US\$/HA)
Pollination	Movements of floral gametes	Provision for pollinators	\$US 25
Biological Control	Trophic-dynamic regulation of populations	Keystone predator control of prey species	\$US2-\$78
Refugia	Habitat for resident and transient popn	Nurseries, habitat for migratory species	US\$7 - \$439
Genetic Resources	Sources of unique biological products	Medicine, genes for resistance	US\$16-\$41
Recreation	Recreational Activities	Amenity, ecotourism	US\$2- \$3008
Cultural	Non commercial use	Providing opportunities	US\$1-\$1761



Benefit Transfer from Micro Perspective

- Single Species Estimation
- Use the WTP published result of each species (e.g. Possum Conservation, \$A29)
- Extrapolate across all endangered species In WA (3022, SOE (207))
- Multiply by the number of households (803,700)
- Results are unrealistic

Combined Estimation Process

- Multiple Species WTP
- Invasive Species WTP
- Ecosystem Function WTP
- CIE (2007) estimation
- Result = \$382M - \$394M yearly
- Modal Range \$300m - \$400m

Benefit Transfer from a Macro Economic Perspective

- Based on Constanza's estimate of 17 global eco-system service
- Dollar value range = \$16 - \$54 trillion; average \$33 trillion
- Global GNP = \$18 trillion
- Ecosystem Value Ratio (EVR) = Value of Ecosystem Services/GNP
- EVR range 0.89 - 3



Benefit Transfer from Global to WA

- GSP for Western Australia 2005/6 and 2006/7 is \$120 billion and \$141 billion respectively
- Application of the minimum value from EVR range provides the value \$107.2 (but this is based on all 17 ecosystem services).
- Out of the 17 ecosystem 3 are directly related to environment and biosecurity management; hence
- Biosecurity Adjustment Factor (WA), $3/17 = 0.176$
- Biosecurity Value Impact Parameters = 1% (range 0.5% -2%)



New Concepts for Environmental Estimation

- Biodiversity Value Impact Parameter (BVIP) = Based on known average rate of species lost (varying between 1.75% - 3.5%, SoE (2007)).
- Key assumption: Rate of species loss will be reduced/delayed due to the additional investment in Biosecurity
- Preliminary estimation indicates the benefits will be in the range of 0.5% - 2%, with Mid value range 1%-1.25%
- Result \$302M – \$406M

Discussion

- Proxy values encompassing the entire primary sector are difficult to find.
- Sanity check were applied whenever values or unrealistically low or high.
- Micro and Macro approach underpins the result.
- Public health benefits by mitigating the impact of zoonoses (animal biosecurity) was not included in the estimation process.



Conclusion

- Values of biosecurity management are similar to greenhouse and carbon values.
- Based on perception, the values will change and fluctuate
- Although of public good nature, not all segments are public good
- A number of recent projects are discontinued in WA based on user pay principle



Decision Making and Public Policy

- Alternative decision making apparatuses are
 - Triple bottomline criteria?
 - User Pay principle?
 - Public and Private Good?
 - Industry Development Plan?
 - Agency Objective?
 - How to sort out the contradictions?



New Concepts for Investment Decision Making

- Non Excludability and Non Rivalry (e.g. Border Protection and Quarantine to Prevent Animal Epizootics)
- In reality most public goods are “impure”
- Low rivalry and high excludability is termed as “club good” (e.g. animal genetic resources and biodiversity)
- Low excludability is termed as “common pool good” (collective action is diseases, standards and certification systems)
- Merit goods (e.g. livestock extension and vaccination against contagious diseases)

