



Valuing investments in Environmental Research, Science and Technology

Lake Taupo Water Clarity/Quality
Biological Management of Possums

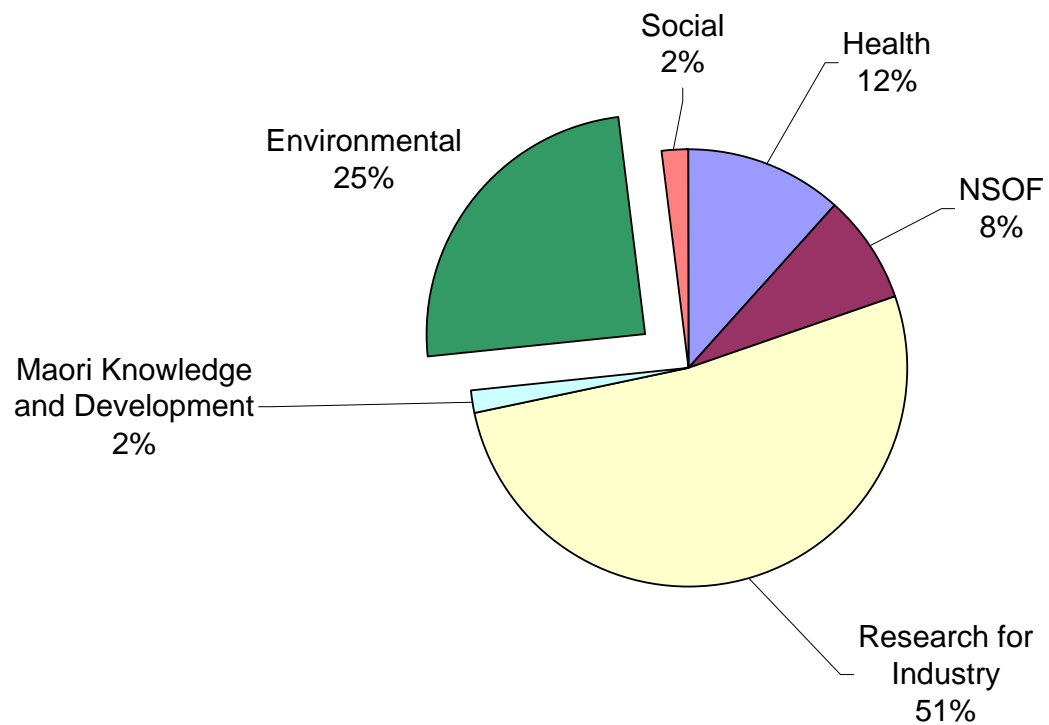
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Purpose of the study

- ◆ MoRST is performing an evaluation of the funds invested in Environmental Research.
- ◆ Two case studies discussed here contribute to ongoing decision making about this investment.

Government Funding on Public Good Science (\$356 million in 2003/04)





Background to evaluating R&D

- ◆ Two approaches to estimating returns to R&D investments: econometric analysis and case studies:
 1. Econometric analysis uses statistical techniques to examine the relationship between research expenditure and production processes in individual firms, industries or national economies.
 2. Case study research traces the investments made in a selected research programme and the flow of benefits deriving from the research.



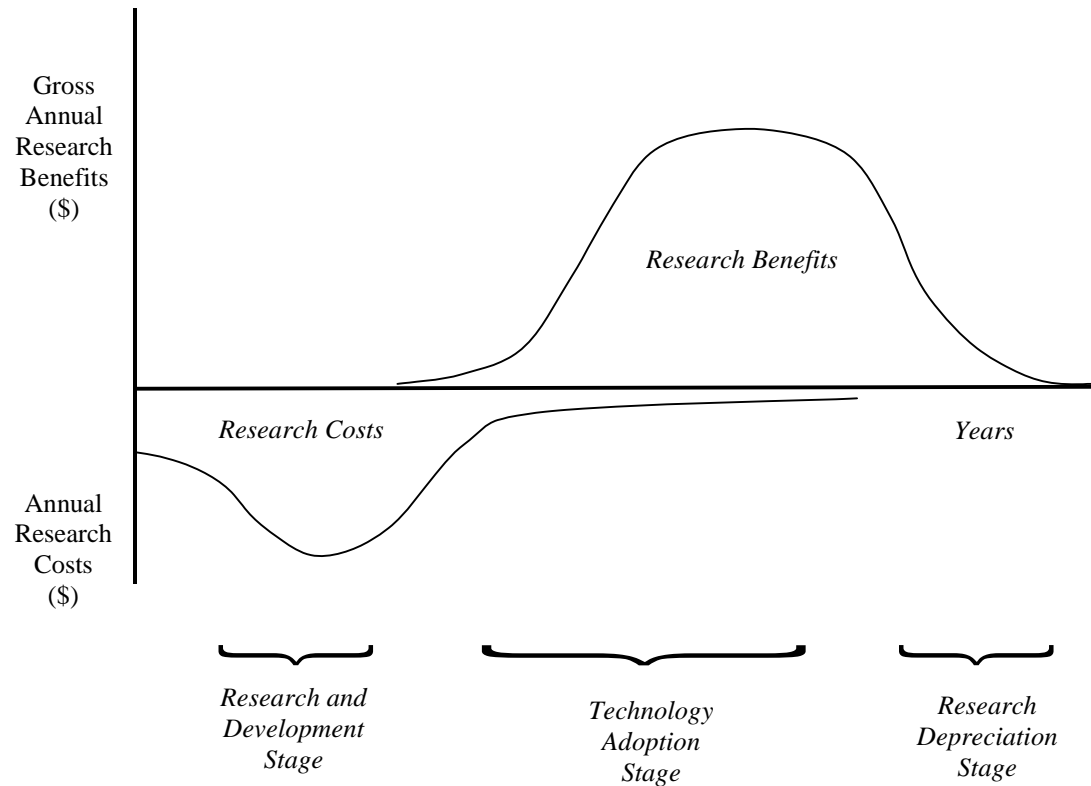
Workshop feedback

- ◆ A workshop held in Christchurch in 2004 considered how the returns to RS&T might be evaluated.
- ◆ Identified two broad areas of benefits from Environmental RS&T:
 1. Improvements in our understanding of the environment which lead ultimately to environmental improvements.
 2. Benefits to commercial sectors such as aquaculture, tourism or forestry.
 - RS&T leading directly to industry benefits
 - RS&T indirectly benefiting commercial industry

Two Research approaches

- ◆ Methodology One Identifies a research programme, then attempts to identify and quantify the benefits the research has created.
 - Biological Management of Possums
 - Water clarity/quality in Lake Taupo
- ◆ Methodology Two Identifies a particular sector or industry that has benefited from environmental research and attempts to trace the link back to the research that contributed to the benefit.
 - Marine Aquaculture
 - Irrigated Agriculture

A Note on Time lags in R&D





Water Clarity/Quality in Lake Taupo

- ◆ Main issues
 - Land-use changes and nutrient inflows
 - Eutrophication
- ◆ Main funding providers
 - FRST; EW; MfE; Dairy Industry; MWD; CRIs; Power Companies
- ◆ Total Research Funding: \$17 million



Water Clarity/Quality in Lake Taupo

◆ Research Output

Improvement in our understanding of eutrophication of freshwaters

◆ Research Benefits

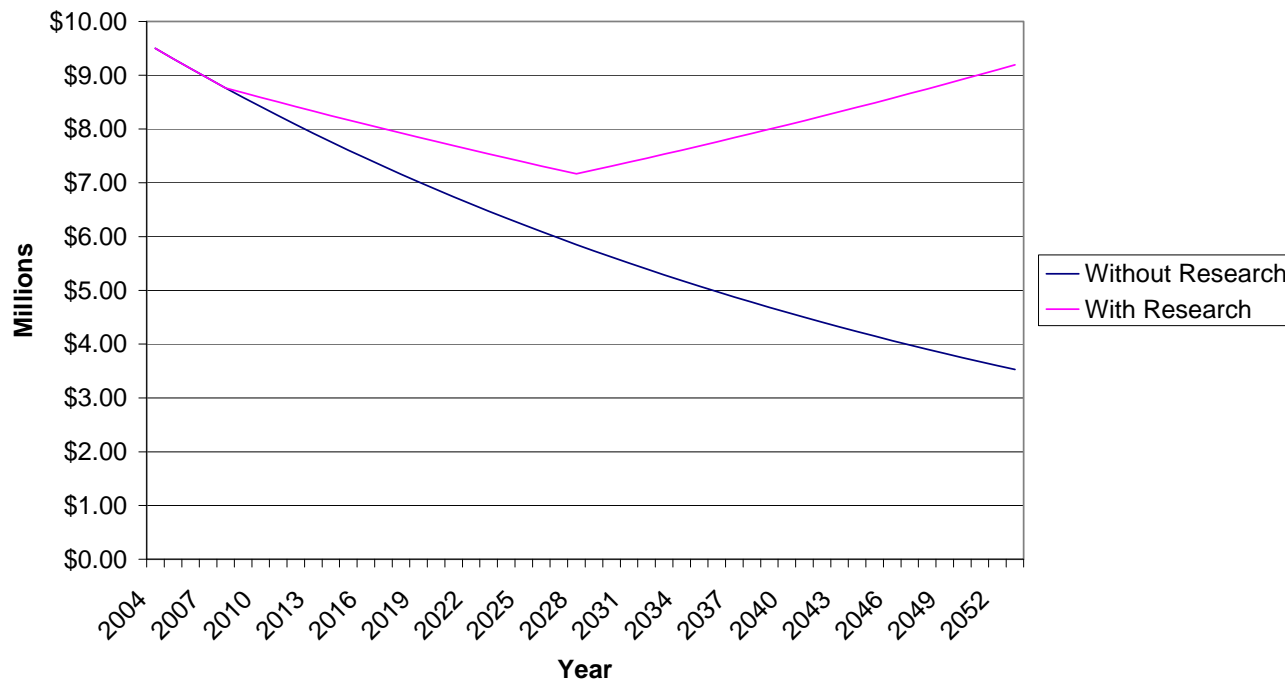
- Desired outcome: improvement in water clarity/quality
 - Tourism worth \$121 million/yr to Taupo catchment
 - Lower clean-up costs to power companies
 - Heritage, ecological and cultural values

Water Clarity/Quality in Lake Taupo

- Problems
 - Relationship between research output and subsequent policy decisions is unclear
 - Relationship between policy actions and subsequent water quality is unclear
- Experiment: *How large do the annual benefits associated with the Lake have to be so that the research costs are justified?*
 - Consensus of opinion is that the clarity/quality of Lake Taupo is degrading
 - Assume that application of the research results means a turn-around in the degradation of water clarity/quality
 - Assume further that economic value is directly related to water quality

Water Clarity/Quality in Lake Taupo

Annual Benefit Flow from Lake





Biological Management of Possums

- ◆ Main issues
 - Conventional control is expensive, and relies on frequent application of toxicants
 - Looking for an alternative management option
- ◆ Main funding providers
 - FRST, MAF, AHB, DOC
- ◆ Research Funding
 - \$30 million to date, anticipate a total expenditure in excess of \$100 million.



Biological Management of Possums

- ◆ Two main methods of biocontrol under investigation
 - GM pathogenic organisms
 - Physiological impairment – reducing fertility
- ◆ Another key issue is the delivery mechanism for the control agent
 - Method of dissemination

Biological Management of Possums

- ◆ Research Benefits
 - Depend on how the biocontrol agent is delivered.
 1. Self disseminating
 - ◆ Potential cost savings (current control costs \$89 million/yr)
 - ◆ Less reliance on conventional toxins
 - Non-target species
 2. Non disseminating
 - ◆ No cost savings



Biological Management of Possums

◆ Results

- A cost savings of 20% would justify research expenditure
- No quantitative information on environmental risk associated with conventional toxins
- Placing a monetary value on risk reduction
 - Survey methods
 - Revealed preferences