

Freshwater - Fresh Thinking

Enhancing impact assessment in water management



Thur 28 & Fri 29 Nov 2013 Caccia-Birch House, Palmerston North

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Assessing freshwater impacts – what's economics got to do with it?

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Water, water everywhere...

- By world standards New Zealand is well-endowed with freshwater
- But not always in the right place and form, as pressure points are beginning to emerge
 - Insufficient quantity as water is costly to transport
 - Insufficient quality due to varied control of point source and non-point source discharges to freshwater
- Mix of social values cause conflicts over
 - Extractive uses versus in-stream uses
 - Commercial activity versus non-commercial outcomes
 - “Economic” gain versus environmental condition

Economics in the RMA

- Freshwater governed by RMA, for consenting use, abstraction and discharges
- RMA has economic complexion, in particular:
 - Section 5 refers to “enabling...economic well-being...”
 - Section 7(b) efficient resource use and development
 - Section 32 “Consideration of alternatives, benefits and costs” of plans and regulations
- Under RM Reform Act passed this year, s32(2) (a) benefits and costs include
 - Opportunities for economic growth and employment that are anticipated to be provided or reduced

Economics applied to RMA to date

- In RMA contexts to date, socio-economic assessments usually built on economic impact analysis, loosely linked to parallel social impact assessments (SIA) of varying content
 - Pivotal focus on GDP, employment quantity & quality
 - Jobs and incomes prompt changes in population, demands on infrastructure, social & family relations &c
 - Eclectic selection of social impact indicators
 - Rarely Quadruple bottom line & Multi-criteria analysis
- Economics has more to say about use or non-use of water than forecasting output and jobs

Usefulness of economic impact analysis

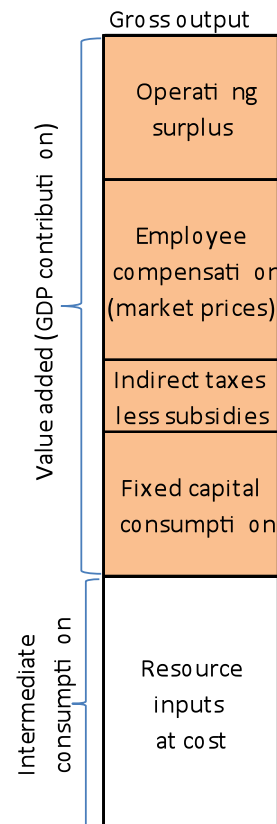
- Economic impact analysis (EIA)
 - Traces how an activity creates spending & jobs across all sectors in the economy (direct & indirect impacts)
 - Identifies effects of an activity on such aggregate measures as GDP, household incomes and employment
 - Individual projects insignificant on a national scale, but EIA for local/regional economy is feasible
 - Economic multipliers as conventionally done, do not reflect constrained resource costs and exaggerate positive impacts
 - General equilibrium analysis does reflect resource costs and reallocation across sectors, but
 - More complex analysis, most suited to major developments

Usefulness of cost benefit analysis

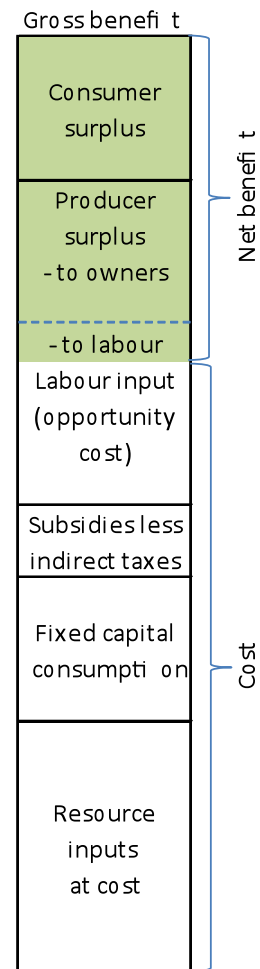
- Cost benefit analysis (CBA)
 - Weighs in monetary terms all costs and benefits arising from resource use options (like investment appraisal)
 - Estimates economic surpluses (net of costs) for producers and consumers, accounting for effects on third parties (externalities)
 - Draws on some of the same data as EIA, but treats it differently over a longer term analysis timeframe (forecasting necessary)
 - Enables an estimate of economic well-being (the sum of surpluses) and of resource use efficiency (benefit:cost ratio)
 - Most suited to a national analysis, clear of local transfer effects
 - Informed by other methods eg micro-simulation of behaviours
- Complemented by Multi-criteria analysis (MCA)
 - Weighs effects in terms of non-monetary scales

Same base, different perspective

Economic Impact Analysis



Cost Benefit Analysis



What's distinctive about CBA?

- Values all inputs at their opportunity cost (value forgone in alternative uses) – constraints count
- Aims to distinguish **real** resource gains or losses from transfer effects within the community
 - Has implications for how much secondary market effects (e.g. price changes) count as additional to primary resource outcome
 - Eg: Pollution raising treatment of water for other uses is a real resource cost; but increases in price of inputs used for water treatment are transfers from input buyers to input sellers
- Can use non-market valuation for environmental effects – but not yet used much in NZ

Ecosystem services as source of value

- Natural resources provide a stream of services which confer value, as would be costly to replace

Provisioning services

Products obtained from ecosystems
eg: fish, water quantity & water quality, navigability, biodiversity (basic)

Regulating services

Benefits obtained from regulation of ecosystem processes
eg: moderation of variability in water flows and quality

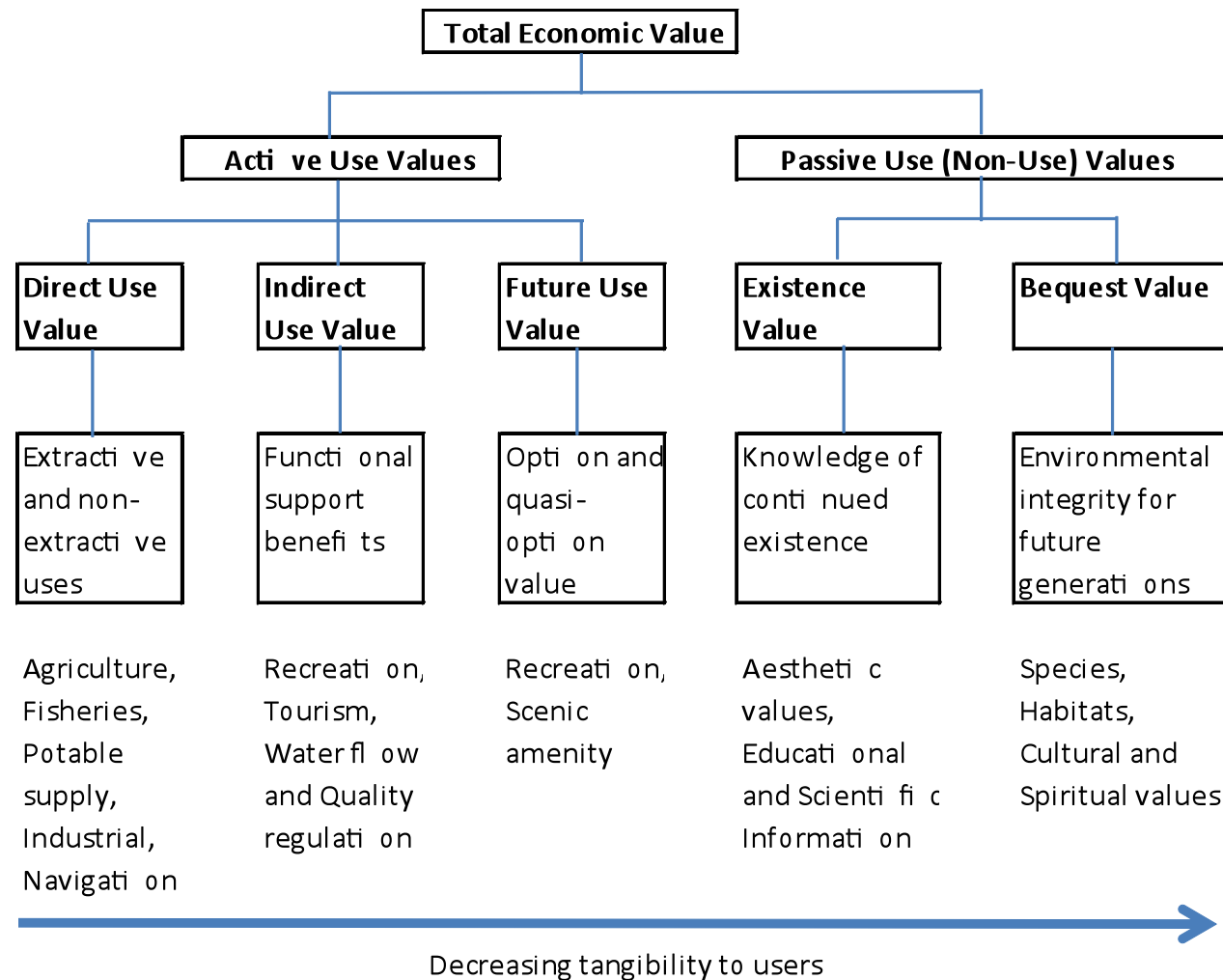
Cultural services

Non-material benefit obtained from ecosystems eg: recreation settings, landscape, amenity, biodiversity (choice)

Supporting services

Services necessary for production of all other ecosystem services
eg: water cycling, nutrient cycling, pollination

Total Economic Value (TEV) of freshwater



Economic valuation of environmental effects

- Market and cost-based methods
 - Value of marketable outputs
 - Estimating statistical function of production gains
 - Natural service valued at cost of next best alternative
 - Natural asset valued at deprival / replacement cost
- Revealed preference non-market techniques
 - Valuing recreation demand from travel cost analysis
 - Valuing quality from “hedonic” house price analysis
- Stated preferences of surveyed respondents
 - Contingent valuation of specified outcome changes
 - Choice modelling of changes in mix of attributes

The state of non-market valuation in NZ

- Lincoln University database has over 100 studies
 - Driven by academic interest at Lincoln, Waikato, Massey & Auckland etc & some private consultants
 - Varied methods, subjects (water, recreation) & quality
 - Costly and time-consuming to implement
 - More often context-specific than generic
- “Benefit transfer” proposed to overcome funding and timing constraints
 - Use values obtained in one study for comparable cases elsewhere
 - But studies on similar cases can have different results

Experience with non-market valuation in NZ

- Very rarely influential in practical public policy
 - Clearest example of use is in setting the Value of Statistical Life in transport safety appraisals
 - With few exceptions Environment Court has not used or relied on such studies
 - Several Court decisions explicitly sceptical of reducing environmental balancing to some numerical assessment
 - Existing studies are *ad hoc* and often not well tailored to illuminating specific trade-offs at the margin
- Benefit transfer is often not done well
 - Provides a number but relation to context is crucial

Whither now, economics?

- Don't expect a magic bullet from non-market valuation
 - Values associated with water are too many, varied, & context-specific to expect full quantification/valuation
 - “Off-the-peg” values from Benefit Transfer rarely provide a good fit for the values applying elsewhere
 - Southland study: gains from irrigated dairying dwarf amenity value lost as estimated using benefit transfer
 - NMV estimates often look high compared to people's observed willingness to pay for similar things
- Information deficiencies in the environmental amenity/recreation space are challenging

But all is not lost...

- Economics is not just about sticking numbers on effects in the future
- Also illuminates trade-offs inevitable in choices
 - CBA, EIA are fundamental to RMA purpose of promoting sustainable management
 - Economic principles also add to assessment of effects
 - Scarcity confers value:
 - Fewer sites protected means greater probability of loss
 - Replacement cost is some guide to the potential loss
 - Substitution possibilities are also crucial to value
 - Specific sites may be more valuable locally than nationally (where substitution possibilities are greater)

A place for non-market valuation...

- NMV techniques can be informative of trade-offs and relative values in certain circumstances
 - Reveal relative preferences between options
 - Preference order is useful even if \$ values doubtful
 - Do NMV more often and better to articulate choices
 - Marginal choices need to be clearly defined and related to the study method used
 - Eg: Travel cost method estimates total value of existing environment at a point in time – NOT value gained or lost from marginal changes in environmental condition
 - Test results for consistency with observed behaviour
- Cost of primary study precludes use in all cases

Linking with other impact assessment

- Economic assessment often last to be commissioned after all others nearing completion
- Earlier engagement could enable better connections between assessments
 - Identify critical changes for marginal analysis
 - Establish full scope of environmental effects and potential economic consequences
 - Provide bottom-up information on social and cultural impacts to complement the more top-down derivation of much economic data
- Better links between “the economy” and people

Conclusion (interim)...

- Economic techniques are decision-aiding tools rather than deterministic decision rules
- Illuminating resource use trade-offs is (or should be) pertinent to broader weighing of effects
- Simpler, less academically rigorous methods like replacement cost or next best alternative could be used more widely than they are
- Need more *ex post* reviews of how activities change environment and community well-being
- Use in conjunction with broader assessment