Environmental rent-seeking, choice modelling and Australian waste policy

Abstract: In seeking to gauge the extent of benefits that may be realised through increased recycling, governments have typically been influenced by vocal community groups. In more recent years, governments have explored the use of survey based techniques such as choice modelling, to directly elicit the community's willingness to pay for increased recycling. This paper canvasses shortcomings inherent in both approaches, and calls for care in the use of recent recycling benefit valuations in public policy development.

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1. Introduction

In most OECD countries, the key waste management consideration for government historically was overseeing waste disposal. Governments primarily provided waste collection and disposal services, with costs met through broader revenue collections. In addition, landfills often had poor environmental controls that resulted in a range of harmful impacts. The combination of budgetary pressures and harmful impacts at landfills led to a policy focus on reducing volumes disposed to landfill (BDA Group and EconSearch 2004).

Reforms of landfill regulation, technology and management practices have significantly reduced harmful impacts associated with landfilling. These improvements, along with the use of larger and more remote locations (such as old mine and quarry sites) have also seen a dramatic reduction in the number of landfills and populations exposed to amenity impacts as well as increasing the available capacity in some instances. For instance, the Woodlawn landfill, an abandoned mining pit in rural NSW opened in 2005 with total capacity for some 25 m tonnes, compared to the current level of putrescible waste disposal in all of NSW of some 3 m tonnes per year.

While these reforms have lessened the urgency of reining back waste disposal volumes, communities have continued to express their desire for increased waste recycling. Communities are embracing broader sustainability practices, and recycling is seen as a material way this can be done with opportunities for everyone to contribute. This has prompted governments to broaden the rationale behind waste policy goals to include 'upstream' life-cycle impacts associated with recycling.

Most waste policy objectives now include goals such as conserving resources and reducing the environmental impacts arising from the use of virgin materials. To this end, recent policy reforms such as higher landfill levies and product stewardship schemes have been used to increase recycling rates. More draconian policies can also be found, such as the regulatory impost on the Woodlawn landfill which limits this cost-effective waste management facility to receiving only half a million tonnes of putrescible waste annually so as *'not to discourage recycling initiatives'*.

Impacts arising from waste generation, management and disposal have commonly been categorised according to where they occur in product supply chains. The two categories are:

- *Downstream impacts*: These are impacts related to the post-consumer disposal of waste - for example, air and water emissions associated with the landfilling or incineration of waste, or health, biological and amenity impacts from littering and illegal dumping; and,
- *Upstream impacts*: These are impacts higher in supply chains that result from the production and consumption of materials - for example, the depletion of non-renewable resources or emissions of greenhouse gases from the transport of materials to users.

This paper considers community advocacy for increased recycling, the nature of recycling benefits, how they are being estimated and implications for policy development.

2. Community advocacy for recycling

A number of surveys have been conducted in Australia on community attitudes to the environment, waste and recycling. For example, the WA Department of Environment and Conservation (2007) found 87% of respondents believed that recycling would make a real difference to the environment, while the NSW Department of Environment, Climate Change and Water (2010) found that 14% of respondents cited waste as one of the top two environmental issues of concern. From a national perspective, the Australian Bureau of Statistics indicates that 90% of households recycle through their council's kerbside collections and almost every Australian reports doing some sort of recycling or reuse of waste.

It is not surprising therefore that advocacy for recycling and improved waste management practices generally has been widespread in Australia. In turn, Australian Governments have held numerous inquiries into waste management practices, and in 2009 a National Waste Policy - *Less Waste More Resources* - was released by the the Council of Australian Governments. While the policy does away with the ambitious waste recycling targets embodied in earlier national strategies, its primary focus remains on minimising the creation of waste in the first instance and in maximising the reuse and recycling of materials in preference to waste disposed.

In developing this broad policy position, and in considering ongoing programs, governments have had to weigh-up the importance of recycling to the community. One way governments do this is through gauging the extent to which the community engages on an issue and the importance they appear to place on it.

Demonstrations, protests, public awareness campaigns, and direct lobbying have been cornerstones of community expressions of the importance, and hence value, of various environmental goods. Indeed Handy and Gleason (2007) suggest that expenditures on these activities may serve as a useful way of measuring the implicit value of changes in environmental quality sought by the community. That is, the resources spent will reflect the lower bound of the value placed on the environmental quality that these residents want to preserve, and hence is an important signal to decision makers.

However not all people who would place a positive value on increased recycling will participate in these activities, in part because environmental goods typically have 'public good' characteristics - resulting in the benefits of their provision being realised by others who have not contributed to the cost of their supply[1]. Therefore some in the community will simply 'free ride' the benefits that come from the environmental activism of others.

Accordingly, decision makers (across the bureaucracy and political spheres) will typically infer that the silent majority in the community also hold positive values for increased recycling. However this consideration must also be moderated by the likelihood that some lobbying for recycling will constitute rent seeking behaviour.

That is, those seeking community-wide action (such as an increase in material recovery and recycling) may merely be seeking to accrue a private benefit from actions that others in the community would bear the cost of. This may be readily apparent for industries that use recyclate or materials recovered from recyclate, as community time and expense in recovering, reprocessing and making these resources available may lead to lower cost inputs to those industries.

Clearly there are vocal industry groups across many areas of policy encouraging governments to sponsor or regulate the community so as to further their private financial interests. Government is of course careful in letting such rent-seeking behaviours influence the development of welfare maximising policies.

However individuals and organisations can look to generate both market (financial) and non-market private benefits through rent-seeking activities. This may be particularly relevant in the area of waste policy.

A non-market benefit may be where individuals value the community acting in particular ways, despite there being negligible private financial implications to them. So for example, people may desire and lobby for a major sporting event to be held in Australia, despite not intending to attend and in the knowledge that the event is likely to place a net cost on the taxpayer. But perhaps the pride of having the event in their home country outweighs any private cost to them.

In the case of waste policy, many people in the community may have deeply held beliefs, such as '*the creation of waste is wasteful'*, that influences their attitudes and values. This may prompt them to lobby for policies to drive down the volume of wastes going to landfill, as the non-market benefit to them may exceed the small cost impost they may incur.

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1 From an economic perspective, the pertinent property right characteristics of public goods are that there is non-rivalry and non-excludability in their consumption.

However consider the situation where a broad base of individuals accrues a (non-financial) satisfaction from the community minimising waste disposal. Further, lets suppose that the aggregate value across these people of achieving zero waste is valued at $10m.

From an economic perspective, we would want policy interventions that enabled these preferences to be expressed in market transactions so that levels of landfill disposal and recycling were achieved that balanced these benefits with all other benefits and costs involved. This would deliver an optimal rate of resource use, recycling and landfill disposal.

However in the absence of such price-correcting policy interventions, and in response to some in the community calling for greater waste minimisation, a government may pursue a zero waste policy through a range of initiatives at a cost, net of all other costs and benefits except for the non-financial satisfaction of these people, of say $100m.

If the broader community is poorly informed of overall waste management costs and hence do not object politically, the pursuit of zero waste in response to the rent seeking behaviour of some in the community will have resulted in a net social cost of $90m.

The purpose of this example is to show that rent seeking is an equally valid concept applied to groups seeking public good benefit (which of course they enjoy as individuals because no one can be excluded even if they don't pay) as it is to companies, unions, individuals and so on seeking access to government controlled resources for private gain.

Surprisingly there has been little investigation of rent-seeking and environmental lobbying in the economics literature. Nevertheless, a useful review of the available literature is provided by Beard (2007), while Migue and Marceau (1993) and Damania (1999) investigate the impact of political lobbying on the choice of environmental policy instruments.

Handy and Gleason (2007) conclude that in the history of the environmental movement, they find overwhelmingly that many policies are adopted, at least partially, as a result of rent-seeking activity by local and environmental non-profit organisations.

Some evidence of the scope for environmental rent-seeking can be gleaned from comparisons of surveys conducted in Australia on community attitudes and purchasing behaviour. As noted above, attitudinal surveys have consistently identified interest in the environment, waste and recycling. However other surveys have found that peoples' aspirations and self-image regarding environmental responsibility are not always matched by their actions (see box 1).

Typically, point-of-sale surveys identify only some 5% of purchasing decisions are actually being influenced by environmental issues, indicating a divergence may exist between behaviours individuals are willing to make themselves compared to behaviours they would like others in the community to exhibit.

Accordingly, some seeking community-wide action for increased recycling may merely be exhibiting rent-seeking behaviour, and governments need to be careful in allowing these positions to overly guide policy development. Rather governments should seek to develop their own objective assessment of the net benefits of increased recycling, which may include both downstream and upstream costs and benefits.

> **Box 1: Environmental aspirations and actions**
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> A 2003 study by Taverner Research, jointly funded by the NSW Government and industry under the National Packaging Covenant, found a considerable divide between what consumers say and what they do. That is, despite a generally high level of involvement in recycling, there is virtually no connection between attitudes to recycling, waste or the environment, and purchasing behaviour. The study found that only 4% of 1,188 supermarket shoppers surveyed mentioned recyclable packaging, biodegradable, recycled materials, re-usable packaging or anything else in relation to packaging or the environment as a factor when choosing products.
>
> This hypothesis was supported by the Southern Waste Strategy Authority who in 2006 commissioned a perception and behaviour survey on 400 householders in the Greater Hobart Area. They found that 48% of people claimed to make a conscious effort to buy goods without lots of packaging, but noted that such claims directly contradict point-of-sale surveys, and noted that peoples' aspirations and self-image regarding environmental responsibility are not always matched by their actions.

3. Downstream recycling benefit estimations

Increased recycling will be associated with changes in patterns of waste disposal, both legal (such as landfilling) and illegal (such as littering and illegal dumping). The nature of these changes will depend upon the policy vehicle used to promote recycling. Without postulating the extent to which a policy vehicle may impact recycling rates and in turn legal and illegal waste disposal volumes, the benefits associated with marginal changes in landfilling and illegal disposal volumes are briefly canvassed below.

3.1 Landfill impacts

The cost of disposing waste to landfill includes both private costs incurred for landfill establishment, operation and end-of-life management as well as non-market costs or 'externalities'. Externalities, sometimes known as spillover effects, impose costs or benefits on the community which are not priced into market exchanges.

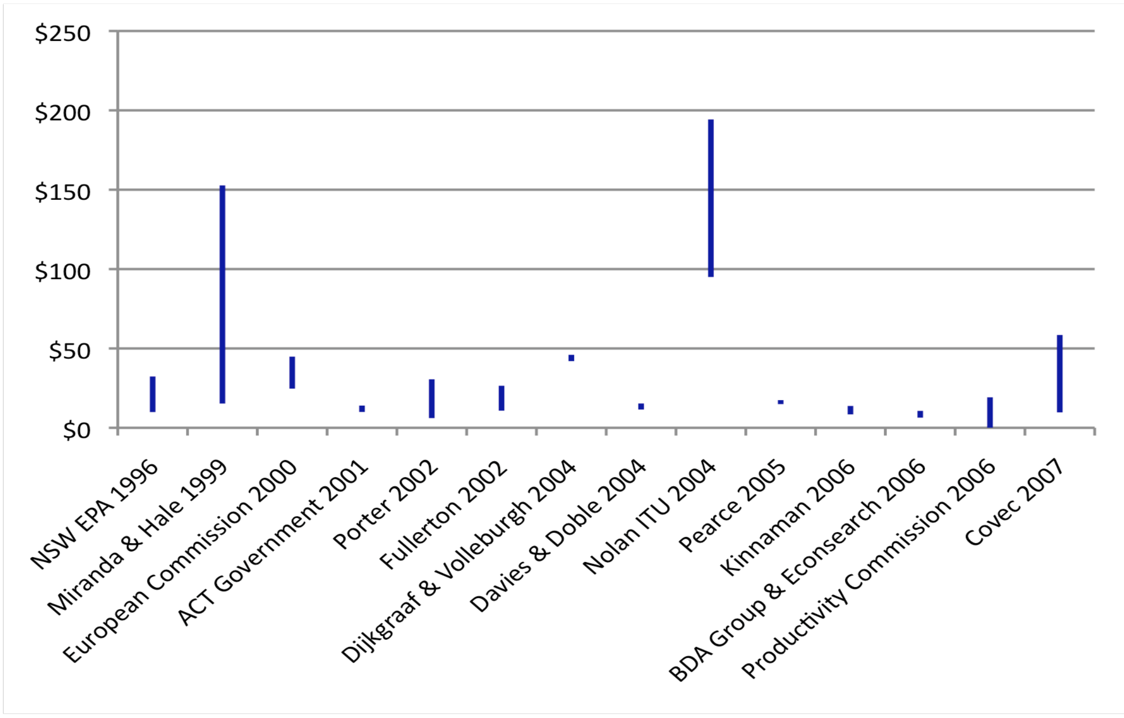
Landfill externalities can include the climate change impact of methane and greenhouse gases from the decomposition of organic wastes, as well as the potential for the leaching of toxic compounds into the surrounding soil structure, waterways or as air emissions. Other externalities include the impact of noise and odours on local amenity. Actual impacts will depend upon the type of wastes being disposed, the landfill management practices employed and demographics of nearby populations and ecosystems.

There are significant differences between jurisdictions in the way that waste is classified and the commensurate classes of landfill. Despite the variety of classifications, the main classes of landfill are:

- putrescible - accepting solid wastes, excluding industrial hazardous wastes; or
- inert - accepting solid wastes, excluding industrial or domestic hazardous wastes, biodegradable wastes and electronic product wastes.

Landfill externalities arising from putrescible landfills are typically far greater than those originating from inert landfills, primarily due to the high organic content of the wastes which generate air and water emissions and associated odours. Landfill externalities are also typically higher when located near urban centres due to the greater population exposure to pollution and amenity impacts. BDA Group (2009) present a review of available estimates of the non-market (or external) costs of landfilling (Figure 1).

Figure 1: Estimates of the external costs of landfilling (2008 $A per tonne of waste sent to landfill)



Source: BDA Group (2009)

BDA Group (2009) also provide their own detailed estimates associated with putrescible landfills across Australia, taking into account environmental controls employed, climatic conditions, estimated water and air emissions, greenhouse gases and amenity impacts, and exposed populations. Across these conditions, the external costs of landfilling putrescible waste were estimated to range between $1 - $24 per tonne. This range relates to an average tonne of putrescible waste. The material composition and hence subsequent non-market benefits derived from diverting waste from landfill to increased recycling could vary significantly within and beyond this range.

3.2 Illegal disposal impacts

Littering and illegal dumping can impose costs on the community via danger to wildlife, loss of aesthetic value, the costs of litter clean-up and danger to human health.

The Keep Australia Beautiful visible litter count surveys provide the most comprehensive datasets on littering and provide longitudinal litter count data by state and territory. However, this data is intended only as an assessment of the presence of litter objects within surveyed regions. No corrections for population densities or other demographic factors are carried out. Accordingly, the dataset cannot be used to determine littering benefits attributable to changes in recycling practices.

Indeed there is a dearth of information on the extent of illegal waste disposal and how disposal patterns may change under alternative policies aimed at increasing recycling. For example, subsidies for the development of advanced waste treatment facilities may have little impact on illegal disposal patterns; increased landfill levies have been found to promote increased illegal dumping; while product stewardship programs (such as container deposit schemes) can lead to reductions in littering. However the nature of these relationships have largely not been quantified.

Once estimates of physical changes in illegal dumping are prepared, postulating the value of these changes to communities is also challenging. The few impact valuations available typically base benefit valuations on the cost of cleaning-up illegally dumped material (as a lower bound estimate). For example, MMA and BDA Group (2007) provide an empirical assessment of clean-up costs associated with illegal dumping in South Australia, based on a survey of 33 councils and parks organisations.

4. Upstream recycling benefit estimations

Increased recycling rates will lead to changes in waste industries, including those involved in waste collection, transport, and disposal, as well as broader industries associated with the reprocessing of recyclate material, and in turn, users of recycled materials. Economic modelling can be used to identify the range and extent of these production and consumption changes, as well as the extent of net 'market' benefits that may be realised[2].

As noted earlier, 'non-market' upstream benefits may also be realised through increased recycling, such as reduced industrial emissions and more sustainable resource use patterns. Estimating such benefits is at best problematic, and involves:

- identifying changes in consumer and producer behaviours in established markets (for example, changes in the use of recycled papers in new paper production) as well as outside of these markets (for example, changes in home composting practices);

2 Where competitive and efficient markets exist, the price that recyclers are willing to pay for recyclate will generally indicate the market benefits achievable from reprocessing recovered material.

- identifying the nature and extent of non-market attributes affected by changes in the consumer and producer behaviours (for example, pollution emissions from paper manufacturing and recycling premises);
- identifying the cause and effect (or dose-response) relationships between changes in the identified non-market attributes and communities or environments affected (for example, how health outcomes across different individuals are affected by changes in pollution exposures);
- identifying the demographics of populations subject to the changes in non-market attributes and prior levels of those attributes (for example, health status of populations exposed to pollution emissions from paper manufacturing and recycling premises);
- valuing per unit changes in the various non-market attributes (for example, the value of reducing morbidity and mortality associated with pollution exposures);
- summing across all non-market attributes and impacted communities and environments, taking into account any cross-pollutant effects, prevailing pollution and resource management policies, and so on.

Clearly such undertakings require large amounts of information and analytical capabilities, and are subject to significant uncertainties and information gaps. For example, the use of life-cycle analyses to estimate just the physical changes in key pollutants generated and resources consumed has been the subject of considerable criticism, as have attempts to value intangibles such as the 'conservation' benefit of changing rates of resource extraction (see for example, Productivity Commission 2006).

In short, the derivation of potential upstream benefits from recycling is complex, and represents a major analytical undertaking even for those 'expert' in doing so. The methodological issues and scope for estimation errors is for example canvassed by BDA Group and Wright Corporate Strategy (2010) in relation to estimating the upstream benefits from increased recycling of packaging material.

5. Use of choice modelling to value recycling benefits

Due to the difficulties identified above in estimating the benefits from increased recycling, particularly benefits from changes in illegal disposal activities and upstream benefits, Australian governments are exploring the use of survey based techniques. The most prominent amongst these has been choice modelling, with recent applications examining the benefits from increased e-waste recycling, packaging material recycling and kerbside recycling.

These applications are briefly canvassed below ahead of reviewing the significant shortcomings embodied in how they have been applied.

5.1 Recent use of CM

Choice Modelling (CM) has its origins in the psychology and marketing literatures. Its relatively recent application in environmental valuation has come about largely as a response to the perceived inadequacies of alternative techniques. Respondents to a CM questionnaire are asked to select their preferred option from an array of alternatives known as a choice set. The alternatives are described using a common set of attributes. The alternatives are differentiated by the attributes taking on different levels. Respondents are asked to make a sequence of such choices. Given that one of the attributes used is measured in money terms and that one of the alternatives in each choice set is set to be the 'business as usual' option, it is possible to analyse the choice data provided by respondents to estimate:

- the per unit value of each of the non-market attributes; and
- the total economic value of a change away from the 'business as usual' policy (Bennett and Blamey 2001).

The Environment Protection and Heritage Council has commissioned two choice modelling studies to support recycling policy development. The first was a 2009 study by consultants URS, which examined the willingness of the community to pay for increased e-waste (TVs and computers) recycling. Respondents were asked to choose between alternative collection methods and percent of e-waste to be recycled. The study reported estimated willingness to pay per percentage increase in e-waste recycling over the current situation, as well as the premium they were willing to pay to have kerbside versus drop-off collection.

A 'choice set' example from their questionnaire and the background information provided to respondents on recycling benefits are shown in Figure 2.

The CM results were drawn on in a subsequent Decision Regulatory Impact Statement (RIS) prepared by PricewaterhouseCoopers (2009), and the decision by Australian governments to implement a product stewardship scheme for televisions and computers *'was based on analysis presented in the Decision RIS for televisions and computers'* (Australian Government 2011). Notably, it was identified in the Decision RIS that:

> *'A national recycling scheme for televisions and computers cannot be justified solely on resource recovery grounds, with the cost of recycling televisions and computers outweighing the value of the resources recovered.*
>
> *' ... the necessity or otherwise of a recycling scheme rests upon an assessment of other factors that either offset the net resource cost, or suggest that people are willing to bear the net resource cost.*
>
> *'The approach ... has been to draw on a 'choice modelling' survey ... which valued environmental and health risks and the intrinsic value of television and computer recycling.*
>
> *'When the URS estimate of $21 to $30 per item is used to measure willingness to pay, ... all the recycling options considered ... are beneficial to society with a net benefit'*

Figure 2: Choice set example from the URS (2009) questionnaire

Please select the recycling scheme you prefer.

Percentage of waste avoided and material recovered	Collection method	Additional cost on each new TV / computer purchased
50%	Kerbside	$40 per item
90%	Drop-off	$60 per item
1%	Current collection method	$0 per item

Some of the reasons why you may want to recycle worn out TVs and computers are:

Reduced use of landfill space - if 75% of the TV sets and computers disposed of annually were recycled, up to 320,000 m3 of landfill space could be saved; and

Recovery of materials - Recycling materials from Cathode Ray Tube screens allows the recovery of up to 10-20kg glass, 5kg of plastic, 1 kg of copper and similar quantities of lead and other metals per screen. Recycling flat panel screens gives less glass and lead but more plastic and other metals. For example, a desktop hard drive contains a high proportion (around 80%) of recyclable aluminium.

The CM results appear to have been instrumental in garnering support for the adoption of the national television and computer recycling scheme, notwithstanding the extremely limited information available to survey respondents with which to develop their willingness to pay valuations (discussed further in section 5.2)

In a second study commissioned by the Environment Protection and Heritage Council, PricewaterhouseCoopers (2010) estimate consumers' willingness to pay for increased used packaging recycling and a reduction in the incidence of packaging littering.

Willingness to pay estimates were generated in terms of how much each household would pay for every 1% increase in the weight of waste packaging recycled, above the current national average level of recycling; and for each 1% point reduction in litter.

A 'choice set' example from their questionnaire and background information provided on recycling benefits are shown in Figure 3.

Figure 3: Choice set example from the PricewaterhouseCoopers (2010) questionnaire

If these were your only options, which would you choose?

	No change option	Option A	Option B
Percentage of waste packaging recycled	55%	65%	75%
Reduction in litter	No reduction on current levels	20% reduction - significant improvement	10% reduction - noticeable improvement
Additional cost to your household	No additional cost, $0 per year	$50 per year (or about $2 per fortnight)	$300 per year (or about $12 per fortnight)

Reasons for recycling packaging. *You may or may not share these views:*

Less litter. Depending on how waste is collected, increased recycling could reduce the amount of litter in public places.

Environment. Less waste goes to landfill. Most waste in Australia goes to landfills that are designed and built to manage the long term legacy of such waste.

Conservation of resources. Recycling reduces the need to use raw materials. For example, recycled glass and aluminium can be used to make new bottles and cans. Waste paper can be recycled to cardboard. In some cases recycling may only result in small improvements in conservation because collection and recycling of material uses energy, water and other resources. Also, the volume of resources recovered may be big or small, depending on the materials and the technology available.

PricewaterhouseCoopers note concern as to whether the values estimated using the choice modelling questionnaire are pure 'non-market' values or whether there is a mix of market and non-market values. They indicate that it is not possible to be definitive about where people anchor their choices and values, but that the survey was designed to steer respondents' attention to the non-market elements of value through the *'careful provision of background information and clearly defining the attributes'*. As was the case with the e-waste CM study, the background information (shown in Figure 3) was extremely limited, and in this instance, only descriptive.

The results of this study are currently being considered in the development of a Consultation RIS being developed by the Environment Protection and Heritage Council for used packaging.

Lastly, Gillespie and Bennett (2011) in a study funded by the Australian Government under the Commonwealth Environment Research Facility, use CM to estimate the willingness of residents in Brisbane to pay for the existing kerbside recycling service as well as their willingness to pay to increase the frequency of this service to weekly.

A choice set example from the questionnaire and the background information provided on recycling benefits are shown in Figure 4.

Figure 4: Choice set example from the Gillespie and Bennett (2011) questionnaire

Carefully consider each of the following three options for managing kerbside waste. Suppose options 1, 2 and 3 in the table below are the ONLY ones available. Which one would you choose?

Option	Your annual waste levy payment	General waste bin collection	Recycling bin collection
Option 1 – recycling ceases (return to a single bin)	$210	Weekly	Nil
Option 2 - recycling continues	$280	Weekly	Weekly
Option 3 - recycling continues	$380	Twice a week	Every two weeks

Potential benefits of recycling are:

Reduced use of landfill space.

Recovery of glass, plastic, cardboard, paper and aluminium for use in creating other products.

Less wastage.

Again, the background information provided to respondents with which to formulate their valuations was descriptive and extremely limited.

Gillespie and Bennett note that households may value the provision of recycling services for a wide range of reasons including avoiding some of the perceived problems of landfills, concern for conservation of virgin materials or ethical considerations, but ultimately it was difficult to disaggregate the diverse value components of respondents (and this was not attempted). In their conclusions they postulate that a:

> *'potential concern with any study that examines the estimation of respondents' willingness to pay for kerbside recycling is the extent to which respondent willingness to pay is confounded by their underlying perceptions about the environmental and resource sustainability benefits of recycling'.*

5.2 Shortcomings of CM recycling benefit valuations

Boyd and Krupnick (2009) raise concerns about the interpretation, usefulness, and accuracy of survey based willingness to pay benefit estimates derived when subjects are asked to assign value to environmental commodities that are complex or ambiguous. Their review of the non-market literature reveals a lack of uniformity in the way commodities are chosen and presented.

Their assertion is simply that ecological endpoints vary in the extent to which they require understanding of complex scientific relationships in order to 'translate' them into outcomes understood by the general public (and presumably this assertion would be equally applicable in relation to human health outcomes or broader 'sustainability' values associated with resource exploitation rates).

They define ecological endpoints as meaningful biophysical commodities that do not require expert knowledge of biophysical relationships in order to determine their value to people. In contrast, biological inputs and processes only hold value to people after being transformed, via knowledge of biophysical relationships, to indicate their contribution to endpoints of direct importance (see box 2). And notably, the outputs of one biophysical process often become inputs to subsequent biophysical processes. This means that a given biophysical commodity can simultaneously be both an input and an endpoint!

Box 2: The distinction between ecological outputs and endpoints

To convey the distinction between ecological endpoints and biophysical commodities that are not endpoints, Boyd and Krupnick (2009) provide the following examples:

Biophysical inputs / outputs	Biophysical processes	Ecological endpoints
Surface water pH	Habitat and toxicity effects	Fish, bird abundance
Acres of habitat	Forage, reproduction, migration	Species abundance
Wetland acres	Hydrologic processes	Reductions in flood severity
Urban forest acres	Shading and sequestration	Air quality and temperature
Vegetated riparian border	Erosion processes	Sediment loadings to reservoirs

Consider a household asked to place a value on the commodities on the left-hand side of the table. Are lower surface water pH levels valuable to households? Yes, but not directly. Why is lower pH valuable? One reason is that it allows for habitats more suitable to fish and bird species. If a household directly values more fish and birds, they indirectly value lower pH levels. Note though that the value of lower pH must be inferred from two pieces of information:

- the value of the direct fish and bird inputs to households, and
- the production relationship between surface water pH and fish and bird abundance.

Because the value of pH can only be inferred via knowledge of the production relationship, we do not call it an endpoint. In contrast, the abundance of fish and birds requires no further biophysical transformation in order to make its contribution to household value clear. Thus, fish abundance is an endpoint.

Accordingly, Boyd and Krupnick (2009) argue that in the use of environmental valuation techniques, concepts like bundled ecological commodities and their disaggregation, respondent knowledge of biological systems, and the dual nature of many commodities will be important in eliciting meaningful valuations.

From the discussion of downstream and upstream benefits from recycling in sections 3 and 4, it is clear that the (non-market) values households may realise from recycling are also functions of complex biophysical, industrial and market processes. The average householder is poorly equipped to postulate the likely reductions in pollution and amenity impacts at the various landfills in Australia that may arise as waste is diverted to recycling premises, let alone the demographics of exposed populations and health implications of changes in emission profiles.

Similarly, changes in the incidence of littering and illegal dumping could only be guessed at, along with the benefits it may generate in terms of improved visual amenity, reduced risk of glass cutting injury, reduced hazards for native wildlife, and so on.

Households would also have a limited appreciation of the mix of recyclate material that may be recovered through increases in either kerbside recycling or packaging recycling, let alone of the extent to which recyclate is exported or directed to domestic reprocessing plants. Further, households would typically not be aware of the processes the recyclate would be subjected to, differentials in pollution emissions between those processes and others using virgin materials, or of the need to net out any differentials in emissions associated with recyclate and virgin material transport.

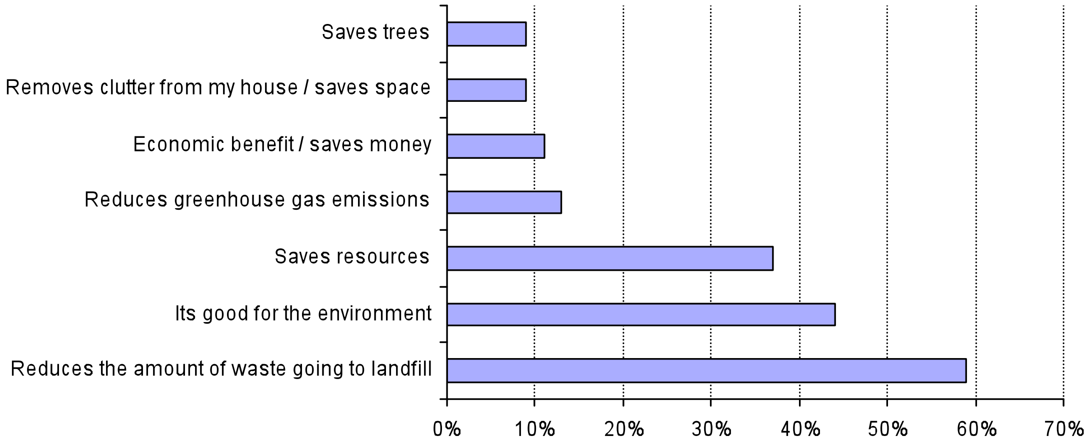
And would households be aware of potential price effects that increased recyclate supply may generate which would lead to increases in overall resource use, limiting potential reductions in resource exploitation? And would they understand how lower levels of resource use could deliver benefits to households? For example, do reductions in the growing of softwood plantations arising from increased wastepaper recycling offer the community 'sustainability' benefits? How would a householder postulate the extent of such benefits?

In short, recycling is a process rather than an endpoint which directly provides value to households. The general public is simply not in a position to understand the breadth and complexity of the related inputs, outputs and associated biophysical, environmental and health relationships, industrial and market processes, and population demographics and exposures that will collectively determine the extent of benefits that increased recycling may generate. Asking them to postulate such values is at best disingenuous. It is akin to arguing that the price an unwitting consumer is willing to pay for a fake 'premium' watch reflects fair value - it doesn't, it is a con.

The limitations of community knowledge in this regard would seem apparent, but some empirical support can be found in the study by the WA Department of Environment and Conservation cited earlier. While this study found that 87% of respondents believed that recycling would make a real difference to the environment, they found that '*knowledge gaps exist as to the actual tangible benefits of recycling with most respondents unable to cite the specific benefits likely to be achieved*'.

As shown in Figure 5, most commented that recycling would reduce the amount of waste going to landfill and / or that this would be 'good for the environment', but a relative small number of respondents had considered 'how' recycling may be good for the environment. Of those that had, the most common perceived benefit cited - a 'saving' in resources - remains vague in terms of potential environmental endpoints.

Figure 5: Perceived benefits of recycling held by the community



Source: WA DEC (2007)

6. Policy implications

Australian waste policy continues to place an emphasis on diverting waste from landfill to reuse and recycling, rather than focusing more directly on mitigating specific environmental or resource impacts at landfills, industrial premises, resource extraction facilities and so on. However as argued by the Productivity Commission (2006), the benefits of recycling have often merely been assumed, rather than rigorously estimated.

The few recycling benefit studies undertaken have provided insights on the nature and extent of potential benefits, but there has also been controversy. Some concerns relate to how life-cycle analyses have been used to derive estimates of physical changes in pollution and resource use, while others relate to how the value of these changes to the community are derived. Notably, resource conservation is being touted as a key rational for increased recycling, yet the 'sustainability' benefit this may generate is open to significant conjecture (see for example Bennett and Collins 2009).

Not persevering with such studies is also dangerous. As an alternative, governments have often merely cited the broad community support for recycling as sufficient to warrant new policy positions. However many in the community are likely to be merely reflecting the *'recycling is good, more is better'* message promulgated by governments who have themselves failed to garner the evidence to support such a simplistic proposition. Some more vocal members of the community will be rent-seeking, either for financial or non-market benefit, and as is common in other areas of public policy are likely to overstate the true value of benefits.

The recent interest in using survey based techniques such as choice modelling to elicit the community's willingness to pay for increased recycling has merit, in terms of governments wanting to develop evidence-based policy. However its application to date has been fundamentally flawed. As shown in section 5, extremely limited and often only descriptive information is provided to respondents in relation to the potential benefits that may be realised through increased recycling.

Survey participants themselves will have negligible information with which to formulate realistic value estimates, and garnered valuations at best may indicate the willingness of the community to support environmental sustainability in its broader sense. Using the choice modelling results as input to economic assessments is highly questionable, particularly where the postulated benefits are critical to a policy proposal yielding net benefits - as was the case with the evaluation of e-waste recycling and possibly with the forthcoming used packaging RIS.

Finally, the purpose of this paper was not to undermine the potential use of survey based techniques such as choice modelling to elicit community values. Rather such surveys need to be directed to investigating environmental endpoints that can meaningfully be valued by households, such as the conservation of specific species, risk of health conditions (that can be linked to pollution), and so on. Such valuations can then be drawn on in economic assessments of alternative waste policies, notwithstanding the complexity and controversy that may be involved. Or better, such values could be drawn on to assess industrial pollution or resource access polices, which would more directly target the underlying 'problems' that contemporary waste policy appears predicated on addressing.

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