

# BEARING THE COST – SETTING PRICE SIGNALS AND COST SHARING TO ENSURE A SOFT LANDING

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## Abstract

Many residents in coastal areas that are at low risk in the absence of climate change will be adversely affected by changes that are beyond their control. There is a significant case that such residents have a claim on wider society for assistance should additional costs be imposed for protection, adaptation or withdrawal due to sea level rise and directly related effects.

Once an area has been identified as being subject to future developing risks and this information is made widely available to the community and officially recognised on planning or other documents with official status the situation is different. New residents buying into or building in such an area can realistically be expected to bear any costs associated with future adaptive responses. In fact it is essential that they factor these costs into their decision if sustainable patterns of development are to be established and maintained.

If future risks are identified early enough, say with a lead time of 25 years or more before an adaptive trigger is likely to be invoked, observation shows that existing residents should not suffer significant property value losses if they sell in the years shortly after the declaration of the area occurs. As the trigger conditions that require an adaptive response approaches, future buyers/developers will begin to factor in the cost of these approaches, starting to depress market prices by the level of anticipated costs. However, by this time a smaller portion of the original residents – those that have some claim on compensation or assistance – will remain in the area. Given average length of time of residence of the order of seven years, after twenty years, fewer than 5% of the original residents would remain in their original home.

The approach provides a smooth transition from current approaches which spreads costs and makes adaptation relatively smooth if adopted early.

## Key Words: climate change, coastal, adaptation, policy, planning, cost

### Introduction

The impacts of climate change are potentially very large if the wider community makes poor decisions about future investments in areas at risk. In parts of the community there is a view that government should bear a significant portion of defence and adjustment costs. This paper outlines an approach to bearing costs based on clear information, clarity about responsibilities for adjustment costs for new owners/developers and fair compensation for those affected where past decisions could not reasonably have been expected to take climate change risks into account.

The approach presented in this paper was developed in part as a result of a project

undertaken in the Clarence City Council area in Tasmania. It has not been adopted by that project at this time nor does it represent the policy of any level of government.

The analysis reflects the conditions prevailing in the situation where the project was undertaken, other situations cited in the literature and the experience of the authors in other coastal regions in Australia. While we consider the analysis to provide insights to many other coastal areas, we recognise that the range of circumstances arising from climate change in other locations will not be fully addressed.

We would like to acknowledge that funding for Clarence Coastal Climate Impacts study was provided by the Department of Climate

Change, the State Emergency Service (Tasmania) and Clarence Council.

### Objective – Management of expectations and ensuring responsible coastal investment

The ultimate cost of adjusting to changes in coastal conditions arising from climate change will depend on ensuring that investment decisions in coastal areas take into account future changes. However, achieving this may not require prescriptive rules limiting or controlling development.

If good information is available to those making investment choices, and if those making the decisions bear the cost of those decisions, a relatively smooth transition may be achieved from existing conditions to appropriate adaptations or, if necessary retreat from the affected area with costs borne fairly by all those benefiting from these areas.

### Existing development – a case for compensation

Many properties in coastal areas that are at low risk in the absence of climate change will be adversely affected by the impacts of climate change. Until recently, residents choosing to live in these areas and other property owners could not be expected to have known that climate change may transform what is currently a safe coastal setting into the front line of future storms and flood risk, even to the point – eventually – that their property may end up below sea level. Further, the causes of these future risks are well beyond their control, even though they may have contributed their small share to the global condition.

There is a significant case that such residents have a claim on wider society for assistance should additional costs be *imposed* for protection, adaptation or withdrawal due to sea level rise and directly related effects<sup>1</sup>.

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<sup>1</sup> In part the arguments of this paper include consideration that some form of protection or adaptation will be adopted once risks reach certain levels as described in *Establishing triggers*

There is even a significant case for compensation from loss of property value and amenity due to rising risks or eventual property loss, even if no costs are imposed directly through regulatory action<sup>2</sup>.

Compensation for property loss was not strongly supported in at least one survey of community attitudes to policies addressing climate change in coastal areas (Myriad Research 2006). The strongest argument in favour of compensation for property loss is that it will reduce the degree of pressure on government to protect property that is unrealistically expensive to protect, or resort to forms of protection by property owners that reduces public amenity or has other adverse effects<sup>3</sup>.

Providing assistance or compensation to existing property owners does not necessarily imply society will be faced with very high assistance or compensation costs. Most impacts of climate change will occur gradually over the next century and beyond.

For dwellings and other structures in low risk locations for normal coastal hazards (ie in the absence of climate change), significant

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*for adaptive response to climate change* Attwater, CR, et al. However, if this is not the case, the main arguments still hold.

<sup>2</sup> Areas subject to high risk from coastal hazard in the absence of climate change may be more problematic. In principle, if a development was approved and permitted under normal planning and development processes, there could be issues about why such development was permitted if risks are high. If the development was not permitted (ie was illegal), it is reasonable that the owner should be liable for any risks arising. While recognising the complex issues these instances raise, these cases are not the main focus of this paper.

<sup>3</sup> Evidence for this comes from Maine, where a policy of 'rolling easements' for eroding beaches has been resisted by landowners as there is no compensation for losses, reducing the scope and effectiveness of the policy (Surfrider Foundation, *State of the Beach Report*, 2008 <http://www.surfrider.org/stateofthebeach/05-sr/state.asp?zone=NE&state=me&cat=ss.>)

Deleted: optimal path

effects due to climate change are unlikely for the next decade or more. As discussed below, the cost to today's property owners will be a small part of the total cost of adjustment.

### **Development in areas at future risk**

While owners of development that occurred before the future risks of climate change were identified have a case for assistance when faced with imposed adjustment costs or loss of property, those purchasing or developing in areas identified as subject to future risk should not.

Once an area has been identified as being subject to future risks – even if the timing may be highly uncertain – and this information is made widely available to the community and officially recognised on planning or other documents with official status, then residents or investors purchasing existing property or developing new property *must accept liability* for future costs of protection and adjustment, or loss due to the need to retreat.

Indeed, it is *essential* that new buyers and developers in the area factor these costs into their decision if sustainable patterns of development are to be established and maintained. If not, there will be a strong temptation to purchase or build in these desirable coastal areas while imposing the costs of maintaining their desirability on wider society. Eventually, this could lead to costs that heavily burden society, *costs which easily could have been avoided*.

However, if potential purchasers know they will be responsible for the costs arising from climate risks, they can make their own judgement about whether the value of the money spent is worth the return in terms of residential amenity, income production (for business investment) or in the case of public sector authorities, public benefit.

If responsibility for cost is allocated in this way, then as risks and the costs of avoiding them become more imminent, underlying land values and the value of established structures will gradually fall, at least relative to other property not at risk. Property values

will be discounted by the present value of future costs or anticipated losses.

For areas with very high costs to protect or adapt, or potentially undefendable areas, this discount will be large. This should lead to a fall in investment or reinvestment in property making the cost of retreat much lower when it occurs<sup>4</sup>.

### **Property value effects in areas at future risk**

If future risks are identified early enough, say with a lead time of 25 years or more before an adaptive trigger is likely to be invoked, existing residents are likely to suffer modest property value losses if they sell in the years shortly after the declaration of the area occurs<sup>5</sup>.

As the trigger conditions that require an adaptive response approach, future buyers/developers will factor a larger amount to cover the cost of these approaches, eventually depressing market prices by the level of anticipated costs. However, by this time a smaller portion of the original residents – those that still have some claim on compensation or assistance – will remain in the area.

The question of compensating existing owners may be contested, even if the costs are low. A number of issues need to be addressed:

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<sup>4</sup> A similar approach was argued in the context of the United States by Titus as long ago as 1991 (Titus J G, *Greenhouse effect and coastal wetland policy: How Americans could abandon an area the size of Massachusetts at minimum cost* Journal of Environmental Management, Vol 15, No. 1 Jan 1991)

<sup>5</sup> There is little actual market evidence for buyer behaviour in such a situation. Calculations of present value suggest that a rational investor would discount the current value by 50% if the total value of the property would be written off in 25 years, the most extreme case. Generally the expected life would be longer than 25 years and the cost of adaptation or protection less than the total cost of the property.

- Given the variability of housing values with the housing cycle and the relatively small effects expected in the early years, assessing the loss due to climate change risk is likely to be contentious
- An opinion poll of residents in Clarence (Myriad Research, 2006) show very low support for compensation for coastal residents for loss of land value. Some took the view that coastal residents were, by and large, well off and that there was little need to compensate them for losses
- There generally is a view that property owners should neither be compensated for losses nor taxed on gains arising from changes to planning scheme provisions that affect property values<sup>6</sup>. If identifying areas at future risk is considered part of the planning scheme, it may be seen as a precedent going against this principle. This may be avoided if identifying areas at risk is done outside of the planning scheme framework as part of a climate change response program. Even so, there may be institutional resistance to this.

In spite of these objections, we propose that this approach is both equitable and avoids other issues that will arise if compensation is not provided, as discussed further below.

### Foreshadowing the transition

Risks in coastal areas due to flooding, storm surge, coastal erosion and rising water tables are described in statistical probability terms. Typically for domestic residences, risks are set to be such that a property should tolerate an event with a 1% annual exceedance probability (AEP) without significant damage<sup>7</sup>.

<sup>6</sup> There are some precedents of compensation provided where existing property development rights have been reduced by changes to planning schemes but this is different from what is proposed here.

<sup>7</sup> Flood and other risk standards as expressed in AEP events or average return interval (ARI) vary by jurisdiction, specific risk and type of structure. For discussion see, for example, *NSW Floodplain Development Manual* (NSW Government, 2005)

However, a low probability event could occur in any given year resulting in damage even where, statistically, risks are low. Should such an event occur (or indeed more than one), potential buyers or investors in the area may re-evaluate their perception of risk, with property values likely to be affected for a period of time shortly after the event, even though the statistically calculated risks may not have changed significantly.

Events that do not cause property damage but that demonstrate the kinds of risks faced may have a similar effect<sup>8</sup>. For example, after a heavy storm that erodes protective dunes or other coastal defences, natural or man-made, even if they are not breached, the perceived (and real<sup>9</sup>) risks of another similar storm may reduce the willingness of buyers or investors to choose potentially threatened areas.

The next sections focus on how property values are likely to be affected as risks rise. Property value encapsulates the aggregate assessment of the market about the value and risks associated with a location, effectively a private cost-benefit for individual families or businesses. While there are other, non-market costs and benefits, this measure reflects a large part of the transition in value as coastal conditions change.

### Property values without adaptation

There are many potential responses to increased risk from climate change. Options will depend on the specific risks to the area, the local geo-morphology and the pattern of existing development.

<sup>8</sup> For example, observations of property values immediately after a bushfire in Tasmania showed declines of up to 40% in one area immediately after the fire, even though there was minimal property damage in the area. With 18 months, property values had returned to pre-fire levels.

<sup>9</sup> In this case the real risks may have changed in a stepwise manner. For further discussion of the development of coastal risks due to climate change see Carley, J (2008) et al.

The following discussion presents a scenario that may be indicative of property value changes as one or more rounds of adaptation take place in a coastal area subject to rising sea levels. It is meant as indicative only.

Local circumstances will create a wide range of situations, some quite different from that described. However, the intention is to provide a way of framing the analysis that can be applied in these varied circumstances.

Figure 1 shows the typical trend of property values, highly smoothed out to eliminate cycles and short term fluctuations. Median property values on average typically increase at about 3%-5% per year in real terms (Abelson et al 2004). This would include a combination of real land value increases and maintenance and reinvestment (improvements). The figure is based on an increase of 3%.

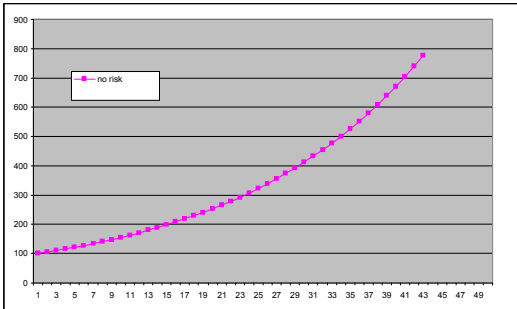


Figure 1 Typical trends in property values, no risk

For coastal properties where a future increase in, say, flood risk has been identified, there is likely to be little immediate effect if significant *increase* in risk is more than 25 years in the future.

As the level of risk increases, people are likely to become more cautious about purchasing or building in the area. Levels of reinvestment may also decline if confidence in the long term future is reduced. This may be so whether or not the area is subject to trigger conditions that will require an adaptation plan to be developed at the

expense of property owners<sup>10</sup> if the cost is likely to be high.

Even if there is no such requirement, as risks rise, any storm events, minor flooding or 'close calls' from very high tides will raise awareness of the risks and tend to reduce property values, at least for a short time after the event. These are shown as downward spikes on the graph in Figure 2.

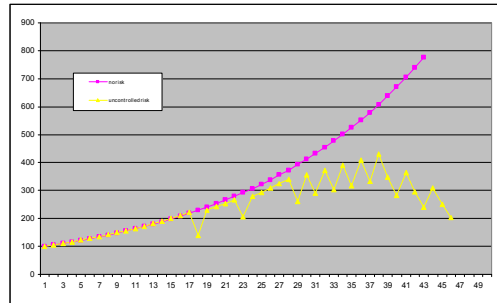


Figure 2 Expected trends in property values, increasing risk and flood events

If no adaptation takes place (the do nothing scenario) property values will fall as flood events become more common and severe and property owners are increasingly unwilling to reinvest. Note that in addition to loss of property capital value, property owners will also be subject to costs for repairs and clean up after flood events. There may be other costs to the wider community for emergency services, etc. The rate of decline of property values will reflect the actual and expected severity and frequency of these events.

Consequently, over a period of 25 years or more a divergence in the rate of value increase can be expected, with coastal properties that face increasing risk growing more slowly in value than other property. If there is no response to increased risk, values will eventually decline as the area becomes uninhabitable.

<sup>10</sup> The concept of trigger points for action is developed in more detail in the companion paper *Establishing triggers for adaptive response to climate change*, Attwater et al.

Allowing risks to property to rise over time may be appropriate in some situations where the value of improvements is limited or near the end of its useful life, as long as there are adequate emergency response preparations and the results of flooding do not threaten other's safety or amenity. Property owners would still be liable for any clean up costs arising from their properties.

### Property values with retreat

If there is a response to increased risk, either at the initiative of property owners or because local planning requires a response, action taken could in some cases to reduce risks to 'normal' levels again.

The most draconian form of risk reduction is retreat. In this case property values essentially drop to zero immediately, a substantial loss of value even compared to the future of declining value and property damage faced under a future of no action. (Figure 3)

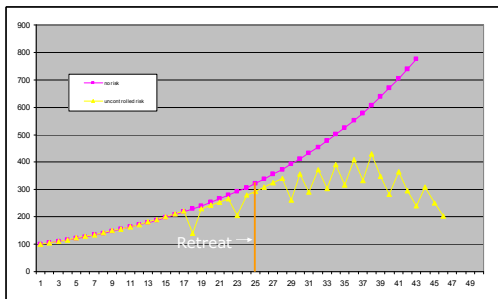


Figure 3 Property values if retreat adopted

Retreat may be justified if:

- the only protection options are costly compared to the property value protected, or
- if there are substantial public safety, amenity or environmental gains from removing at-risk development from the area.

In the latter instance, there may be a case for the community to acquire the land vacated for public use. In this instance the value of the

land would not drop to zero but to a much lesser value than that of developable land.

### Property values with adaptation

Where there is significant investment in property improvements and these are in good condition, it is likely that some action to extend the safe occupancy of the site will be preferred. This may involve some investment in shore protection, changes to properties to reduce risks from flooding, storms surges or erosion (eg. raising buildings, strengthening foundations, flood proofing services), or other action. The money spent will extend the period for which properties can be occupied at acceptable levels of risk.

If costs are modest and the time extension significant, say 20 years or more, there may be only a limited effect on property values, which will then continue appreciating much as for other low risk properties. This is illustrated in Figure 4.

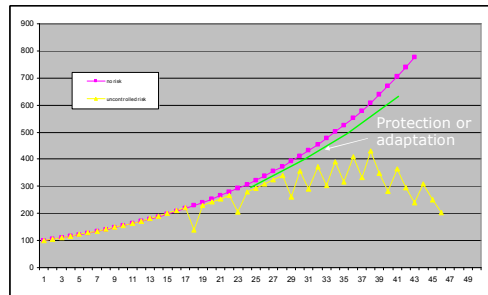


Figure 4 Property values with low cost protection or adaptation

In this case the investment is clearly justified as property values are sustained well above the do nothing case.

However, if costs are high (relative to the value of property protected) then property values would not rise in line with general property prices. If for example the costs of adaptation were paid by a levy over the period of time reflecting the lifetime of the adaptation works, the property value would be discounted by an amount equivalent to the capitalised value of the annual cost of the levy. This might look something like Figure 5. The dotted line shows the effect on price

even before actual adaptation expenditure if the market anticipates the expected cost.

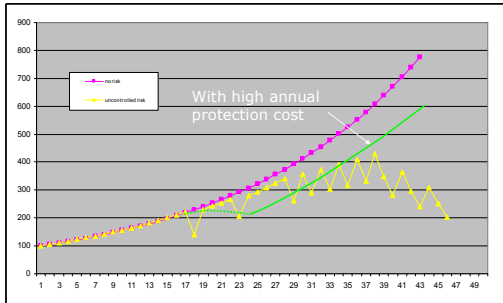


Figure 5 Property values with high for cost protection or adaptation

In this case, the cost of protection results in net property values lower or not much better than in the do nothing case for the first few years. It does however reduce the risk and cost of actual damage, risk to safety of occupants, and extend the ultimate length of occupancy of the area. However, there will be some level of expenditure where the option of protection or adaptation is not cost effective compared to the do nothing scenario.

This example demonstrates some of the tensions that will arise in making these decisions. If action is taken too early, it will impose definite costs now to save possible costs from damage in the future – costs that some may be prepared to take a chance on. If action is taken too late, significant damage may be incurred that otherwise could have been avoided.

Because all risks are statistical in nature and the timing and exact impact of events can never be known in advance, this tension will apply to all such decisions. However, by delaying action to the time when changes have already occurred that foreshadow these increased risks, the degree of uncertainty is substantially reduced. (DEFRA UK 2006).

The example discussed shows a single adaptation response that provides a further 20 years of low or normal risk. The same situation will likely be faced again in the future, with similar dynamics about costs and choices of options. This is discussed in more detail in a companion paper, *Choosing from adaptation options – more than a short term cost benefit approach*, (Attwater et al 2008).

### Cost to government of the proposed approach

The approach described above would result in most costs associated with response to climate change being borne by the owners of property that bought into or invested in the area after the risks had been identified. Only those people that owned property before the climate change risk was identified would be assisted to meet adjustment costs by the wider community. In most cases this would be their contribution to adaptation measures, a small fraction of the value of the property, and partial loss of property value upon sale. It would not apply to any new investments by these property owners made after the risk was identified.

This approach is expected to lead to more appropriate private decisions about investment and development of areas at risk. Should the cost of adaptation cease to be justifiable for the value of properties affected the process should lead to gradual disinvestment as risks rise, enabling a gentler, lower cost transition to retreat.

A possible disadvantage of such a scenario is the emergence of disadvantaged communities where households with limited economic resources stay behind or are even attracted to such areas while those better off depart<sup>11</sup>.

The sooner locations at risk are identified and publicised to the community, the lower the cost to government. It should be possible to identify most locations at risk 25 years or more before adaptive action is required.

For locations where the future risk is expected to be more than 25 years hence, the impact on property values in the short term would be small. However, property values would be significantly affected in the decade before adaptive responses are required, the effect accelerating as the time of the response draws near, but even the, most significant if response costs are high.

<sup>11</sup> This issue is canvassed more extensively in a companion paper *Climate Change Driving A New Social Divide* Witte et al 2008.

The average length of time of residence in a dwelling is of the order of seven years. After the first 10-15 years, the majority of properties would have been sold to new owners who would bear any adjustment costs. After twenty years, when adaptive action is required but elevated risks remain about 5 years into the future, fewer than 5% of the original residents are likely to remain in their original home.

For areas identified more than 25 years before risks are expected to be significant, the cost to the community for assisting existing property owners would be smaller, and for areas identified 50 years or more in advance, costs for assistance would be negligible.

### Other approaches

The proposed approach is not the only possible response to funding adaptation to climate change. However, it overcomes some of the expected issues arising if this approach is not taken.

If existing owners have no claim for compensation, but see their properties at risk due to no fault or action on their part, they are likely to seek to defend their properties to maintain the property's integrity and value, even if this is not the best outcome for the wider area and community. They are unlikely to be cooperative with initiatives that require retreat.

If existing owners who stay receive assistance for protection of their property but no compensation if they sell to others at a depressed market price, they may be effectively trapped into staying. This is a significant argument for providing compensation for declining property values as well as protection costs.

If government sets precedents of defending property without making clear that future purchasers in an at-risk area will be obliged to contribute, they will create an expectation that they will respond similarly in the future, encouraging further investment in these risk areas.

If future buyers or developers in an area believe that the government will be likely or may be obliged to protect property, they will tend to overinvest in locations at risk, raising the potential risks and losses and adding to the pressure to provide protection in locations where this is very expensive for the rest of the community.

### Requirements for success

The proposed approach is relatively simple, understandable, and would give the lowest overall cost of adjustment shared most equitably across those making decisions on spending in areas at risk and wider society. Further, there are relatively few key requirements to ensure the successful implementation of this approach. These are:

1. Very early identification of areas at risk with very clear and accessible information<sup>12</sup> about:
  - the areas at risk,
  - the expected timeframes over which these risks will develop
  - the possible responses to those risks and
  - the potential future costs.
2. Firmness and consistency in the application of the policy.
3. Adoption across sufficiently wide jurisdictions – ideally nationally but at least at state level. This is unlikely to be workable if done at the local government level.
4. Financial support from senior levels of government for compensation for existing residents.

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<sup>12</sup> The important features of an effective communication strategy are discussed in more detail in the companion paper *Communications – Critical To Achieving Public Support For Adaptation* Witte et al 2008



## Conclusion

The proposed approach provides a smooth transition from current approaches which spreads costs equitably and makes adaptation relatively smooth if adopted early.

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