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Climate change and our coastal and urban resources

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I have just returned from a visit to Iceland. That country has a history, and potentially a future, with many elements in common with Australia.

Iceland was settled around 900AD by Vikings. They encountered a part wooded, part grassy landscape which they thought they could farm following practices common at that time in Western Europe. They soon ravaged a fragile landscape setting in motion centuries of soil loss.

Up until recently Icelanders have fought a desperate struggle against the forces of nature. They have learnt to adjust, creating a society which is not only restoring its degraded lands, but also capturing its natural forces in a sustainable way. Geothermal and hydro energy provide them with a foundation to innovate and become a society with minimum use of fossil fuels. Hydrogen-powered cars and boats are now being developed; 98% of buildings are heated by geothermal energy; tourism is booming, and large scale alumina smelting is fuelled from renewable sources. All this is producing jobs and increased wealth and affluence.

Parallels with the larger Australian continent are intriguing. The growing population hugs the coast, sheep grazing is important and soil degradation is part of its history; however, most important, both nations are potentially well endowed in sources of renewable energy. A big difference of course is that we have more accessible and relatively cheaper sources of coal, oil and gas which we continue to use to our economic advantage.

I dwell on these parallels for one simple reason. Innovation has provided that small nation with a capacity to exploit its renewable energy sources. Have we? The answer is surely no. I know of scientists and engineers in solar energy who have emigrated to USA and UK. Many R&D interests seek support for renewable energy endeavours, yet our governments continue to favour funding ways to “clean up” fossil fuel products. For how long can such an approach remain? Following the recommendations of Professor Garnaut, there must be an equally strong commitment to the development of a range of renewable energy sources especially to those where the Australian environment gives our nation comparative advantages.

Of great interest to a coastal scientist like me is the relative lack of assistance to those struggling to innovate and develop technologies that utilise our vast wave energy resources of

the southern flanks of Australia. The incessant beat of the Southern Ocean swell is there to be captured. There are estimates of around 500 GW of recoverable wave energy. This is 10 times or so the current power generation capacity of our country. What we need is more investment in innovation, to become leaders in this area of energy (and associated desalination) technology building upon the initial efforts of those at Port Kembla and Western Australia. Perhaps there is also the potential of tapping the energy of ocean currents as they swing along the continental shelves. Taiwan, another small country, is examining the capture of energy from the strong Kuroshio Current. The resource is there, it is renewable; let's invest in ways to use it and make our oceans be our "friend".

But the sea is also a "menace" to Australian communities, perhaps not in catastrophic ways as earthquakes and volcanoes are in Iceland, but in ways that continue to adversely impact on public infrastructure and private property.

Oceans are intimately linked to the atmosphere and hence to climatic conditions globally and regionally. As a continent "girt by sea", and located in middle to low latitudes, we are damned by influence of El Niño, Pacific Decadal Oscillation and Indian Ocean Dipole, all of which interact to bring "droughts and flooding rains". We must continue to expect year to year, decade to decade, fluctuations in weather patterns as part of natural variability of the climatic system.

Yet ocean temperatures are rising. They will continue to rise for centuries to come. Warmer oceans lead to rising sea levels, not evenly because of current patterns, but it could be one metre (plus or minus 0.3m) by 2100. Higher sea and air temperatures will induce more intense cyclones, and along with higher sea levels there will be increased shoreline erosion. But more insidiously, the sea will creep into low-lying lands more and more frequently on higher and higher tides. I call this the "Venice effect". Over the next 50 years or so, as the rate of sea-level rise accelerates, more and more critical infrastructure and low-lying properties will be flooded on high spring tides.

There are levels of uncertainty attached to various climate change projections; however, the trends look clear enough to warrant strong adaptation action by governments in land use planning, provision of public infrastructure and environmental management.

The insurance industry estimates around 700,000 coastal properties are likely to be affected given current projections of sea level rise. Most are in Queensland but there is an increasing number in NSW and WA. The impact will be severe for ports, jetties, electric and sewerage works, roads, railways and public amenities. Examples of major infrastructure at risk include the third runway at Sydney Airport.

We hear a lot about potential environmental impacts to reefs and wetlands of sea level rise and the effects of warmer and more acidic seas. However, near our great cities beaches will erode thus driving demands for sand nourishment to protect amenity and property. But which beach and what property will receive periodic additions of sand and from what source? Priority decisions by governments will have to be made with unpleasant consequences in some places. In other words, what are the "tipping points" that will lead to decisions for properties and infrastructure being abandoned, relocated or protected? At one extreme, when will Sydney Harbour, Port Philip, Moreton Bay or the Swan estuary require tidal barrages like those protecting London?

Many countries are facing those decisions now. We have already done something like this in investing millions per year in nourishing Gold Coast beaches. But in the USA, Netherlands and now the UK, coastal protective works or coastal retreat decisions are impacting severely on local communities and economies. For instance, the Environment Agency in England is taking powers away from local councils and allowing the destruction of century old dykes and sea walls to permit rising tides to invade agricultural lands while putting millions of pounds into protecting selected towns and cities such as Hull from floods.

I arrived back in Australia earlier this month to a headline “Adapt or Perish”. The Garnaut report made strong reference to the national imperative to plan for the impacts of climate change. Water security is clearly high on this agenda. Drought can no longer be seen as an “indignant surprise”. Both our arable and urban lands will be increasingly exposed to water deficiencies adding to economic, social and environmental burdens in many regions, towns and cities. The need for a portfolio of demand and supply measures for different places becomes obvious, but our history tells us that planning and management of water resources is often throttled by a confusion of federal, state and local responsibilities.

The coast is no exception. Many federal and state parliamentary inquiries have highlighted the dysfunctional nature of governance and administration on matters related to coastal planning and management.

Let me quote from the 1991 House of Representative Inquiry, “The Injured Coastline”:

Existing ad hoc, hodge-podge pattern of development slowly nibbles away at a precious and beautiful resource, the natural coastline.

Existing coastal management arrangements are fragmented and poorly coordinated.

There has been a tendency in coastal management to focus on specific issues ... Such a perspective has been revealed to be too narrow.

And all these findings were made before we began to appreciate the likely consequences of climate change on the 80% of Australians who live in coastal areas!

Another House of Representatives inquiry is now underway to address again many of the issues that confronted previous inquiries, including population growth at rates of 2% or more outside cities, the so-called Seachange phenomenon. Except this time climate change impacts are being considered. A similar inquiry is being conducted by a committee of the Legislative Assembly in NSW.

What worries me now, given possible climate change scenarios, is the threat to coastal communities, economies and ecosystems posed by existing institutional arrangements. Nothing much has changed since 1991 when the House of Representatives Committee noted:

The fragmented nature of decision-making by public agencies operating within coastal management arrangements is reflected by the following organisational problems

- The multiplicity of public agencies
- Existence of arbitrary administrative boundaries, and the
- Failure to consider cumulative effects of decisions.

From my perspective, many things have got worse especially in the decline of staff levels and expertise in critical agencies across the country. There are also differences in legislation, regulations and administration of the coast between and within states allowing grossly inconsistent responses to the various challenges of coastal management and climate change.

To balance these negatives, there have been some intergovernmental agreements, coastal investments, and policy initiatives supported by new science. These have raised awareness of the need for action in assessing coastal vulnerability, on ecologic and geomorphic impacts of population growth and unconstrained development, and how best to improve governance.

What can you do as legislators?

First, is to be briefed on the science of climate change, potential impacts on your communities and what will be the local tipping points requiring government intervention as new information emerges. IPCC, CSIRO and other studies will help you understand future adaptation needs, both for areas of population growth and existing coastal settlements and urban areas.

Second, there is a need to question ministers and senior bureaucrats on how they are addressing complex, interagency issues of coastal management and planning. Agency silos can lead to bureaucratic inertia or conflicting decisions. Knowledge will help probe those responsible for planning new developments, or investing in or maintaining existing protective works, or in providing adequate staff resources to manage precious coastal assets. To what extent are future liabilities, such as compensation for property owners, or investment in “hard” or “soft” engineering works, being considered by the various agencies involved in coastal management? These are some of the questions that must be asked.

Third, there is a need to understand how state and federal agencies influence the third level of government – local councils. This level has progressively been under-resourced to meet the demands of growing coastal populations. Some councils continue to make ill-informed decisions which create potential liabilities, whilst others seek to protect themselves from future adverse climate change impacts incurring the wrath of property owners and end up defending themselves in courts. How well are state agencies guiding and supporting best practice by councils?

Finally, there are opportunities to examine existing legislation and tort law in relation to climate change. In NSW we amended the Coastal Protection Act (1979) to create a statute covering the common law doctrine of accretion. Only if a landowner can prove accretion will be “indefinitely sustained” will new land title be granted. This amendment is designed to prevent ad hoc construction of sea walls on beaches undergoing temporary accretion as sea levels rise. In 2002 many speakers in the Assembly rose to support the amendment. Here is a case where Parliaments can help sort out complex property rights issues that bedevil coastal management.

In conclusion, negative impacts of climate change on Australia will potentially create enormous divisions and tensions in our society. We must avoid a plethora of court cases and conflicting demands on the public purse that may arise from afflicted parties. One solution is to look at ways to improve institutional arrangements and legislation in order to create a better environment for coordinated decision making whilst also encouraging innovation in adapting

to new conditions. We need to stimulate the growth of employment in adaptive practices not in lawyers that will fight for the “rights” of those who cannot adjust to changing conditions.

I believe in strong federal leadership in cooperation with state and local governments that will stimulate and provide consistent national action and resources to address climate change adaptation. It will not be easy as there will be losers, but there should also be winners. Our intellectual resources must be harnessed and you should be aware of any impediments that prevent innovation from proceeding.

Priorities must be set. Planning can not wait. Transitional arrangements are needed now to address the emerging world of higher sea levels, less water, destructive storms, more bushfires, and stressed ecosystems, all at a time when Australia’s population on the coast will grow and grow! . Parliamentary committees must do their bit to question and find ways to make Australian communities more sustainable. Iceland is well on the way; so should Australia.