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**HOUSE OF  
REPRESENTATIVES**

STANDING COMMITTEE ON CLIMATE CHANGE, WATER,  
ENVIRONMENT AND THE ARTS

**Reference: Climate change and environmental impacts on coastal communities**

THURSDAY, 26 FEBRUARY 2009

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**HOUSE OF REPRESENTATIVES STANDING COMMITTEE  
ON CLIMATE CHANGE, WATER, ENVIRONMENT AND THE ARTS**

**Thursday, 26 February 2009**

**Members:** Ms George (*Chair*), Dr Washer (*Deputy Chair*), Mr John Cobb, Mrs D’Ath, Mr Dreyfus, Mrs Irwin, Ms Livermore, Ms Marino, Mr Scott and Mr Zappia

**Members in attendance:** Mr Dreyfus, Ms George, Mrs Irwin, Ms Livermore, Ms Marino, Dr Washer and Mr Zappia

**Terms of reference for the inquiry:**

To inquire into and report on:

Climate change and environmental impacts on coastal communities. The committee will inquire into and report on issues related to climate change and environmental pressures experienced by Australian coastal areas, particularly in the context of coastal population growth. The inquiry will have particular regard to:

- existing policies and programs related to coastal zone management, taking in the catchment-coast-ocean continuum
- the environmental impacts of coastal population growth and mechanisms to promote sustainable use of coastal resources
- the impact of climate change on coastal areas and strategies to deal with climate change adaptation, particularly in response to projected sea level rise
- mechanisms to promote sustainable coastal communities
- governance and institutional arrangements for the coastal zone.

**WITNESSES**

**SHORT, Professor Andrew Damien, Coastal Studies Unit, University of Sydney..... 1**



**Committee met at 11.11 am****SHORT, Professor Andrew Damien, Coastal Studies Unit, University of Sydney**

**CHAIR (Ms George)**—I declare opening this public hearing of the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts. The committee is inquiring into climate change and environmental impacts on coastal communities. The Minister for the Environment, Heritage and the Arts and the Minister for Climate Change and Water have asked our committee to examine the environmental impacts of coastal population growth as well as the impact of climate change on coastal areas and strategies to deal with climate change adaptation, particularly in response to projected sea-level rise. The committee will also look at existing policies and programs related to coastal zone management, mechanisms to promote sustainable coastal communities, and governance arrangements for the coastal zone.

I would like to welcome Professor Andrew Short from the University of Sydney to this public hearing. Although the committee does not require you to give evidence under oath, I should advise you that the hearings are legal proceedings of the parliament and warrant the same respect as proceedings of the House itself. In that regard the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. The committee has received your submission and, as you would be aware, it has been authorised for publication, along with the others that have come to the committee. Do you have any comments to make on the capacity in which you appear before the committee?

**Prof. Short**—I am actually an honorary professor at the University of Sydney, having retired from there in 2007.

**CHAIR**—Thank you. We would now like to invite you to make a brief opening statement, if you so wish, before we proceed to questions and discussion on the matters raised in your submission.

**Prof. Short**—Thank you very much for the invitation to attend your committee. I do have a statement which I would like to read to you. It is more of a background to where I can perhaps provide expert evidence on the Australian coast. I am a marine scientist who specialises in the dynamics of the coastal zone, our beaches and our dune systems around the entire Australian coast. Whilst I did retire from the University of Sydney in 2007, I was director of its Coastal Studies Unit for 25 years. I am also an adjunct professor at the Griffith University Centre for Coastal Management in Queensland. I have also been a scientific adviser to Surf Life Saving Australia since 1986.

During the 1990s I inspected every single beach system on the Australian coast and developed the Australian Beach Safety and Management Program in collaboration with Surf Life Saving Australia. This database includes every one of our 12,000-plus mainland beaches and beaches on 30 major islands, our 2,600 coastal dune systems and 2,400 drainage systems—our creeks, rivers and so on. We are in the process of providing the entire database to Geoscience Australia and it is also being utilised by the Department of Climate Change in their coastal vulnerability assessment, which I know you have already heard about. The results of this work are published in a series of seven books, one for each state and the territory. I have just finishing a more

popular book called *The Coast of Australia*, which will be out this year, which of course includes a chapter on the impact of climate change on our coast.

I have been involved in assessing the coastal impacts of climate change since 1986. In Sydney I maintain Australia's longest all-beach shoreline monitoring system, which was established in 1976 and which continues to this day, monitoring the state of the beach on a monthly basis. I presently work part time for CoastalCOMS, which maintains 140 video cameras around the Australian coast which continually monitor our shoreline and our waves as well as people on the beach. On a more pragmatic level, I was a citizen member of the Warringah Coastal Management Committee on Sydney's northern beaches when it was formed in 1995 until last year. This gave me a very hands-on approach to local government dealing with beaches, particularly Narrabeen beach, which is the second-most at-risk beach on the Australian coast in terms of property value. I have also worked professionally, and do at the present time, on the Gold Coast and have worked quite a lot on the Adelaide coast—the other two most at-risk sections of the Australian coast in terms of property value. So I have a very good insight not only into the entire coast but also into those regions which are considered most at risk at present—without even taking climate change on board. I can therefore provide a very hands-on, pragmatic opinion of the present state of the entire coast as well as the likely impacts of climate change and some of the strategies required to identify and predict these changes.

Finally, besides the issues raised in my written submission, there are three issues related to my own field which I would like to stress. I call them the three Ms, the first of which is mapping. As this committee has already been told, there is a need for high-resolution LIDAR mapping of our coast. Without the high resolution we do not know the state of our coast and the degree of vulnerability. This seems to be overlain on the first cut being done by the Department of Climate Change. Secondly, we need modelling of our coast so that we can predict the changes that will take place as sea levels, waves, tides, sediment budgets and so on change. Finally, we need monitoring of these changes. We cannot quantify what is happening unless we are monitoring our coastline. We should employ a range of different techniques. The mapping will provide accurate coastal vulnerability; the modelling will permit predictions of coastal impacts; and the monitoring can be used to both calibrate the models and track the actual changes, both physical and ecological. Just as we cannot quantify climate change unless we monitor our atmosphere, tides and sea level, we cannot quantify the changes it will bring unless we monitor our coast and waves. Thank you.

**CHAIR**—Thank you very much. Before we proceed to discussion, can you tell me whether you were involved in some of the mapping that was done by the New South Wales coastal councils for some of the areas around Narrabeen and Manly?

**Prof. Short**—Not directly. I was aware of it but I was not directly involved.

**CHAIR**—We have been told by the department that they will soon release their first-pass assessment. Could you make some comments about the step beyond that? I take it that will indicate some of the general areas of vulnerability and some of the hotspots. What needs to be done beyond that first-pass assessment?

**Prof. Short**—I guess what it is going to show are two areas of vulnerability. One is on the open coast, which will be on the open beaches. In some cases some of the headlands will

become more unstable. The biggest area of impact, as I said in my written submission, is going to be in the estuaries, in the low-lying areas. Take Narrabeen beach, for instance. The beach itself has about 40 properties at risk. The floodplains at Narrabeen Lagoon have 600 properties at risk, an order of magnitude of more property at threat to inundation. The next step would be to ask: what do we do about this? Already in the Narrabeen floodplain, they are making the new property be elevated above the flood levels. Infrastructure is going to have to be elevated. Either there will have to be a rolling process of accommodating the changes that are forecast in all low-lying areas—we keep up with it by elevating our houses, our structures and so on, as we will no doubt do on our ports—or we draw the line somewhere and say, ‘We will stop here and retreat.’ Basically, we can accommodate it, we can put in sea walls to stop it or we can retreat from it. Each community is going to have to make a decision along those lines. Obviously high-value areas will either accommodate it or stop it by sea walls and other structures. In perhaps low-value areas, they will retreat from that. So it will be up to each community. As you just said, firstly, we need to know what is at risk and the time frame for that approaching risk; and, secondly, the community, working with local government and government at other levels, needs to decide how we are going to respond to this. The community must accept it or it will be very difficult to implement.

**CHAIR**—In your written submission, you make the point that in your view these low-lying areas, often located kilometres inland, will bear the brunt of sea-level rise and will require more attention than the open coast systems. A lot of the effort and concentration has been on the coastal zone as such. Will this first-pass assessment give us a better appreciation of the areas that you suggest are going to be the most vulnerable? Will we get enough data from that first-pass assessment to help us make those judgments?

**Prof. Short**—The data, particularly in the low-lying areas, will be as good as the mapping. Most maps we have at the moment are fairly crude in their resolution in that first few metres above sea level. I know that in the Narrabeen region, having it mapped down to one metre, that even one metre is still fairly crude when you are talking about perhaps a slow creep of centimetres per year. This is why I would say again that the degree to which we can assess the impact will depend on how good the mapping is. I believe it will identify larger areas of low-lying inland—estuarine, flood plains, swamps and so on—that are connected to the sea as being those most at risk.

At the moment, I think the media tends to like the high-profile more vulnerable open coast to publicise—often on a front page—rather than some sort of mangrove or swamp back upriver. As I said in my submission, I think that there is a bit of a bias in the media towards these more high-profile or sensational views of potential climate change rather than what is really at major threat.

**CHAIR**—And because of your interface between academia and a more hands-on approach, what are the practical things that you think we should be recommending to government to assist the people at the local level that have to put in place these mitigation strategies at whatever level they choose to exercise?

**Prof. Short**—From my firsthand experience with Warringah Shire, they came up against a stumbling block with the state. They have been trying for more than a decade to investigate offshore sand nourishment to pump sand onto the beaches. There really needs to be a policy at the national level that gives clear guidelines to the state and local government about what is and

is not allowable to protect our coast. Sand nourishment has been a no-no at the state level in New South Wales to date. It is accepted in Queensland on the Gold Coast and they do it in Adelaide, but not in New South Wales, for whatever reasons, and I think that there need to be clear guidelines about what is and is not acceptable in different areas. This can range from stopping at all costs, with seawalls, barrages and so on; to mitigating it through things like sand nourishment and dune planting; to accommodating it by raising the level of houses, for instance; or to retreating. All of those are possible ways of dealing with encroaching sea inundation. But there need to be clear guidelines on what is acceptable and in what areas, and I think that the coastal vulnerability atlas should go some way towards identifying those areas and what might at the first pass be the most appropriate mechanism to deal with the changes in those areas. Then someone of course has to fund it, and our local government cannot afford it normally.

**Mrs IRWIN**—Don't they usually pass the buck and say that it is the state government's problem? It is similar to what is happening in New South Wales with Brisbane Waters at the moment with the dredging.

**Prof. Short**—Yes. I think that it is a national problem and I think that is why the federal government must be involved.

**Mrs IRWIN**—Yes, I agree.

**Prof. Short**—There must be national solutions, not a series of ad hoc things going on just at the state level, let alone local government level. Local government and state government do need the best level of advice possible in both identifying the changes and identifying mechanisms to mitigate those changes whatever they are.

**CHAIR**—Do you think that it is the role of the federal government to go beyond providing the research and the toolkits and helping people understand the dimension of the problem? Do you think we should be doing more than that?

**Prof. Short**—I think it is going to have to go to the federal level, because the funding required to truly mitigate or accommodate those changes will certainly be beyond the realm of local government and I think even state government.

**CHAIR**—The other thing that we get from a lot of the local government authorities is the call for a nationally consistent approach, and of course the more we delve into it, it is obvious that there is not one policy that is going to cover all situations around the coastline. It depends on whether it is sandy or a rock face, for instance. What do you think of the idea that the Commonwealth might recommend that by the end of the century all planning authorities need to take into account the fact that the projections from the International Panel on Climate Change are X and that they should bring their regimes into line with that? Do you think we can go that far?

**Prof. Short**—I think we can. The coast is being monitored at a national level by the national tidal facility. The wave climates vary from state to state but I think there should be a national approach, a national guideline with some regional variation depending on the different oceans involved. I agree that a national approach is needed. There should be uniformity because climate change does not change at the border—though at the moment potential impacts change at

different borders. So I would be very much in favour of Commonwealth involvement and a unified Commonwealth scenario for climate change for Australia.

**Dr WASHER**—Professor, you have mentioned the LIDAR and the accuracy of that and the necessity. How much LIDAR work has already been done?

**Prof. Short**—I cannot comment on the amount. I know that each state has done some of their coast, mainly in the highly populated areas. I am doing some work on the Coorong at the moment in South Australia and have done LIDAR right along the Coorong which is our longest beach and barrier system in Australia. But I do not think that anyone can answer that because it is not coordinated. I think that we should have a coordinated LIDAR mapping, not necessarily the whole coast, but of those coastal parts that are vulnerable.

**Dr WASHER**—But as sea level rise increases—and as you say, it moves into the lowland areas—what effect does tide have then? Now we have changed the bathymetry of this whole region by a new plain you would expect tidal factors to now play a much greater role in these areas than perhaps previously thought.

**Prof. Short**—It will depend on the nature of the estuary. Tides will be modified because tidal prism is the area of the estuary, say, times the height of the tide. If the estuaries get deeper they may have a larger area so the tide may actually be modified or reduced. But particularly in northern Australia, tides resonate within some of the estuaries and we get very large tides like up in King Sound, and that is due to resonance. As the shape of the estuary varies that resonance may change and the tides may increase, or they could decrease.

You need modelling of a potential change so you can be prepared for not only changes in sea level, which everyone talks about, but changes in tide regime because of the changing sea level and shape of our coast and also changes in the wave climate. As our wave climate changes, it causes major rotation and oscillation of our beaches. If it changes permanently, all those beaches will reorientate themselves, which could lead to massive erosion at one end and accretion at the other end. So there is a range of things we need to be looking at and, insofar as they can be predicted by the climate model, we can then model their potential impacts on the coast.

**Dr WASHER**—From that point of view that you just last gave, what are effective barriers? I think, for example, that in the Netherlands they are banning all these barriers. They are giving up the dykes and just walking. Do you think that barriers are effective mechanisms to face all those problems?

**Prof. Short**—The barriers are very effective in the Netherlands because most of their country is below sea level and they do have natural barriers plus the artificial ones. The only comparable parts of Australia which have this very low-lying shoreline—though it is not below sea level—are normally up around the Gulf of Carpentaria, parts of northern Australia. Fortuitously, I guess, they are uninhabited.

I do not see us incorporating barriers, as such, as they call their barrages or dykes, unless there was a possible scenario whereby if you wanted to keep sea level out of Port Phillip or out of Sydney Harbour, you could build a barrage across the entrance. I would not like to see it happen but it would be a very effective way of stopping any sea level rise inside Port Phillip or inside

Sydney Harbour. It would be very unsightly but it is certainly feasible. But I do not see us building barriers as the Dutch have done because we have a different type of coast. We have a high-relief coast and our low-lying areas are normally undeveloped.

**Mr ZAPPIA**—Professor, thank you for your submission. You made the comments earlier about how local communities have to respond to their individual circumstances. It seems to me that that is really where the decisions are going to have to be made. What do you see as the specific role of the federal government in getting those local communities to make the appropriate decisions?

**Prof. Short**—First of all, local communities have to be informed of what the problem is and what the options are for them. I think they need good information and mapping. If we can use the Narrabeen example again: we have the beach, which is eroding slowly; we have a much greater estuarine areas in Pittwater and Narrabeen or Sydney Harbour; and there are a range of options as to what you can do. I think the community needs to know what the problem is, what they are faced with, and what the options are and the cost of those options. They need information. At the moment, they get most information through the media, which—as I alluded to earlier—tends to be sensational. I think they need good, accurate information. A well-informed Australian community at a community level will be far more supportive, particularly of any mitigation that has to be done which may seem unpopular at first, such as retreating from beaches, building seawalls or whatever has to be done.

**Mr ZAPPIA**—But my question is: what do you see as the role for the federal government in that process?

**Prof. Short**—I guess I see it co-funding the research that has to be done—a bit like, for example, a Coastcare program which involved the federal, state and local governments coming together to address issues to deal with maintaining of a coast on a fairly low scale. I would see that on a much higher level: the federal government and state governments working together to fund the mapping, research and modelling and then providing the information outlets for the community and then providing the community forums to respond to that information.

**Mrs IRWIN**—I want to follow on from, I think, the first question that the chair asked you and from what Mr Zappia has just asked you. You mentioned Narrabeen and Collaroy Beach and you talked about seawalls, levies or retreat. What would be your option? Would it be more retreat than the seawalls and levies?

**Prof. Short**—In a place like Narrabeen, I would say retreat. That is happening to a limited degree because they initiated the buyback policy about 10 years ago.

**Mrs IRWIN**—The council itself?

**Prof. Short**—Yes, the council. But it is very expensive. You are talking about \$2 million to \$3 million per block, and it is increasing all the time. That buyback enables the buildings to be demolished, so they can retreat without having to build a seawall around the houses. They did propose a seawall there, and the community came out in their thousands and opposed it. So that was put aside some years ago. But you cannot always retreat. I am thinking of the Gold Coast. It is going to be very difficult to retreat on the Gold Coast. That is the most developed, longest

beach system in Australia, where not only the beach but also the backing estuary has been turned into all those canal estates. If they retreat, they are going to end up in the canals. An area like the Gold Coast is going to be a major, major problem. As I said, in some areas you will be able to retreat—go up the hills or whatever if land is available—but, in other areas, like the Gold Coast and some of the Sydney beaches, there will be no room to retreat too. In that case you need buyback, but buyback is exceedingly expensive when it comes to beachfront property.

**CHAIR**—Where are they at at Narrabeen—just to follow Julia’s question?

**Prof. Short**—Every now and then they scrape together enough money to buy another property. In the last 10 years they have bought back maybe 10 properties. There are another 40 at risk, and that is not counting the high-rises. I will point out that about 10 years ago the council tried to put a moratorium on redevelopment of freehold land on the beach, and that was thrown out by the Land and Environment Court. So, whilst they said, ‘We’d like to stop development on our foreshore,’ development is still taking place this very day—they are building new houses and redeveloping houses in that hazard zone of Narrabeen Beach and, I am sure, other beaches up and down the coast. So the local government tries to do the right thing with, say, a moratorium on development, but it goes to the local state court and it is thrown out and the development goes ahead. That is where I think we need this federal-state overview to say what is not acceptable in a certain zone along the coast—no new development or whatever—what is acceptable and what we have to do to mitigate those hazards.

**Mrs IRWIN**—You mentioned the Gold Coast. As we all know, a lot of tourists like to visit the Gold Coast—and, Deputy Chair, Western Australia as well. In your submission—which was very good and covered a lot of the questions that I wanted to ask you today—you note the need to better manage tourism and its impact on the coastal environment. Do you have any specific suggestions regarding tourism?

**Prof. Short**—I think tourists will go where they are sent. Apart from our iconic sites, which they all want to go to—Uluru, the Reef et cetera—I think they can be directed. They do not tend to go to out of the way, unknown locations. Tourism is very beneficial to Australia, and I would like to see more of it, but I would like to see it managed and directed so we maximise the value but minimise the impact. The Gold Coast is a great example, as it absorbs most of the tourists who want that sort of experience in Australia. Rather than seeing the whole coast littered with tourist resorts and having them spread all around the coast, I would like to see them more nodalised into the Waikikis and Las Vegases of Australia. I say that because it is more economical to manage, it reduces the footprint of tourism and it still potentially leaves large sections of the Australian coast in a natural state, and that is the way I would like to see our coast evolve over the next century or so. Most of it would stay natural. I said in my submission that there is a lot of opportunity to put more in national parks or state reserves.

**Mrs IRWIN**—That is correct.

**Prof. Short**—New South Wales is leading the way in that area, but the other states still have plenty of potential coastline that could be turned into national parks. It can still be used for tourism but it reduces the potential impact of encroaching development.

**Ms LIVERMORE**—When we think about the impact of sea level rise and what it means, particularly for local governments, we immediately think of houses and tourism developments being subject to erosion on the beaches. I just talked to one of my local councils about these sorts of projections of sea level rise, and the first thing that they started thinking about was what it meant for their underground infrastructure—their water treatment, water supply and sewerage. Is that something that councils have a grasp on, in your experience? What is the scale of that problem for councils?

**Prof. Short**—In low-lying areas, those services are the lowest of the lot, because they are underground. There are three forms of sea level. When the sea level rises you get the actual inundation and you get the saline intrusion—salt water intruding so that what was previously a freshwater aquifer will become salt water. Salt water itself could have very adverse effects on infrastructure. Also, a lot of those sewerage systems depend on gravity for flow. If the sea level is rising, the hydraulic head is getting less and less. So, to answer your question, yes, it will be a major concern. There is going to have to be some consideration and long-term planning to take that on board and review our services in low-lying areas, particularly the underground services, in light of the rising sea level.

**Ms LIVERMORE**—Is the mapping that is being done of our coastline at the moment going to provide the right information for councils to make those assessments as well?

**Prof. Short**—Ideally, you would do the high-resolution mapping which would give us the elevations and then overlay that with the existing land uses—infrastructure, services and so on—in a geographical information system approach. Then, based on that, as they are doing already at the Department of Climate Change, you can map out different levels of vulnerability, whether you are talking about vulnerability to underground water intrusion, actual inundation, waves or whatever. So there will be different types of impact and levels of vulnerability being exposed, whether it is an underground service or a house exposed to flooding. Plus, on top of all that, when you have a higher sea level in these estuarine and riverine areas each flood level that comes down will be higher than the previous one. That will exacerbate your flooding as well, which will then have flow-on effects for the property exposed to floods.

**CHAIR**—To follow up on Kirsten's comment, from what you know of the first-pass assessment, will the information be readily accessible to local government authorities and easily understood by the town planners?

**Prof. Short**—As I said, I supply data to them and I am not directly involved at the front end of that. You need to talk to Chris Sharples. I know he has spoken to this committee already—

**CHAIR**—Yes, in Tassie.

**Prof. Short**—about how that will be disseminated, but I assume it will be disseminated to the local governments. But, again, it is only a first pass. It does not have this high resolution. It is the first approximation what is at risk, which is good because it tells us where to focus our energy and funds at the next level.

**CHAIR**—Mr Sharples was making the comment that ideally you would have three levels of assessment, but at least it is a start, isn't it? It will be the first time that we have the first pass for the whole of the Australian coastline.

**Prof. Short**—Yes, and the next level and the third will be where you get down to the real nitty-gritty.

**Ms MARINO**—Thank you very much for coming. I appreciate that. I am from WA, so I have WA specific questions. Regarding the WA coastline, you mentioned a balance of reserve and development. Local government comes across the significant challenge of managing those who seek to develop and the opportunities within the region. I would be really interested to know what you are aware of in Mandurah, where there has been significant erosion of the coastline, and Busselton as well, where there are some challenges.

**Prof. Short**—I know it very well, yes.

**Ms MARINO**—I ask whether you have been directly involved with any of the local governments to this stage in WA.

**Prof. Short**—I have not been involved directly. I did attend the 2005 West Australian coastal management conference at Busselton and I am also well aware of Port Geographe, Port Bouvard and Mandurah—

**Ms MARINO**—The Groyne?

**Prof. Short**—Yes. In the case of Port Geographe they interrupted a natural onshore transport like what happened on the New South Wales-Queensland border, which has only been redressed 20 years on. That exacerbated the erosion to the north of the entrance there. At Port Bouvard they installed a pumping system at the beginning and they do not have the same problem. So you can have developments like that so long as you plan for the interruptions you are going to induce. In the case of Port Geographe they did not plan for that interruption, at Port Bouvard they did plan for it—two totally different outcomes.

Some of the big issues at Mandurah are those canal estates, and at Port Geographe, which are not only very low-lying but also cutting into acid sulphate soils and with all sorts of other issues. As you may be aware, they were banned in New South Wales back in 1970 but all other states are still going ahead and building canal estates. Those estates are very low-lying and not only are they alienating wetlands but some are exposing acid sulphate soils, so they are a major issue. Because they are low-lying, they will be very prone to sea level rise.

**CHAIR**—If councils are aware of the impacts of climate change, why in your view are they continuing to approve inappropriate development knowing the consequences down the track?

**Prof. Short**—I think the pressure for development in their local government area and maybe direct pressure from developers as well. I would not like to go any more into that but obviously there is tremendous pressure to develop these areas.

**CHAIR**—So have states got a bigger responsibility? For example, I know that last week the New South Wales government finally released a draft sea level rise policy. As I understand it, it is not going to be translated into regulation or statute, so it is there as a guide to local government. Do they need to be doing more at the state level, being more prescriptive?

**Prof. Short**—They do. I know that in New South Wales the level of funding required is nowhere near what we need to even manage the coast as it is today, let alone a coast that may be facing climate change. There has generally been in New South Wales a retreat from the state government funding of coastal management and research issues that you need to address to properly manage the coast. I cannot speak for other states but I think it is a similar situation. So the states certainly need to do a lot more both to recognise the threat and to fund some of those three Ms I mentioned: the mapping, monitoring and modelling that needs to be done.

**Dr WASHER**—Just to follow up what the chair asked, you gave an illustration where one local government authority rejected an application and it went to a state court and the state court overturned it. That does not give you a lot of faith in the system, so to speak.

**CHAIR**—And the state governments calling up development proposals that might be in conflict with the local government policy in a particular area and the conflict that arises there.

**Prof. Short**—Yes. There are a number of examples in New South Wales and elsewhere where there has been very violent total opposition to development that has been pushed by the state government. I can think of several at the moment. It is like the state is trying to encourage development, but I would not like to go further into that; I would sort of get out of my area. But there is certainly not a uniform approach to how we should address those issues. Some areas are pushing development and others are trying to reject it or to mitigate it. As I was saying earlier, we need a federal down approach to what is acceptable. Are canal estates acceptable Australia wide or not if they can be enforced. The release of crown land in coastal dunes is still happening in New South Wales. Is that acceptable at a national level or should we be withdrawing from all these and should existing crown land be quarantined if it is close to the coast?

**Ms MARINO**—One of the key issues you have raised that is really important as some of the tools to assist councils without appearing to be directing in the initial stages, because it is quite difficult at a local level. I think the mapping, modelling and monitoring side is a very good way of funding the information that councils need to put on their tables at the local levels. I think that is part of the process that will be really important. The national tidal facility: you said there is monitoring.

**Prof. Short**—Yes, of sea level.

**Ms MARINO**—How much of their information goes to local government at this point?

**Prof. Short**—As you know, they have tidal stations around Australia and they regularly publish the change in sea level. It is noisy—it goes up and down—but there are trends. For instance, in Sydney Harbour, Jervis Bay or Batemans Bay, you can get the sea level changes since tide gauges were installed.

**Ms MARINO**—How many local governments are accessing and using that information in their current planning process?

**Prof. Short**—I think they rely on the state governments to give them their forecast sea level scenarios. Whether they are accepted or not, as you said, is another matter. As mentioned earlier different states adopt different scenarios, so there is no common approach Australia wide—

**CHAIR**—Do you think there should be one common approach?

**Prof. Short**—I believe there should be a common approach, but a regionalised one because what is happening in Northern Australia may differ from southern Australia.

**CHAIR**—To take into account the local and regional variations.

**Prof. Short**—In some areas the impacts of tides, as Dr Washer mentioned, may vary dramatically in Northern Australia where there is such a big amplification of tides.

**Ms LIVERMORE**—I want to go back to beach protection. If councils are looking at options to protect properties in their area, is there enough research around and good information in terms of the merits of sea walls versus dredging, the efficacy and the environmental impacts of those various approaches?

**Prof. Short**—There is data from overseas. In Australia we do not have a lot of experience of sea walls, we do not have many because we do not have the amount of property at risk as there is in parts of Europe, the United States and so on. There is a lot of work being done overseas and there are examples from overseas, so you can learn from their mistakes or otherwise. With massive sand nourishment again there has been tremendous amount of work done overseas particularly in the US and Europe. Here we do it on a limited scale in a couple of locations. Whilst we have not done much sea wall construction and much sand nourishment in Australia there is certainly enough data available to enable us to model and predict the outcomes of such works around the Australian coast.

**Ms LIVERMORE**—I am thinking of the Gold Coast. Does sand nourishment have to be done on a regular basis? It is not a one-off thing.

**Prof. Short**—In northern New South Wales right up to Fraser Island the sand just keeps moving along at a rate of about 500,000 cubic metres a year. So you have to keep putting in that much each year. With respect to the Sydney coast, where there are big headlands jutting out, if you put that much sand into a Sydney beach, such as Bondi, it would stay there for decades if not centuries because there is no sand racing around Bondi and Ben Buckler headland or Long Reef in northern Sydney. The Sydney beaches and any bay beach around Australia has a much longer shelf life for sand nourishment than the long beaches you get up in northern New South Wales and South-East Queensland. You need to design your system for your particular environment.

**Ms LIVERMORE**—We have a real problem emerging on the Central Queensland coast near Mackay.

**Prof. Short**—You have the Pioneer River coming out there.

**Ms LIVERMORE**—It is not far from the river.

**Prof. Short**—A lot of sediment comes out from the Pioneer, a very coarse sand, and then it goes northwards up towards Slade Point.

**Ms LIVERMORE**—This is probably 30 kilometres south of the mouth of the Pioneer River.

**Prof. Short**—Any structures that might impact on the supply of sediment from those river systems, particularly in Queensland where the rivers are pushing sand out onto the coast—such as the major dam on the Burdekin—are going to have major impacts on the mouth of the Burdekin in time. It is not just silt, if you interrupt the sediment supply as well as sea level change you can exacerbate the erosion on that coast.

**Mrs IRWIN**—In page 4 of your submission and on page 37 of the documents that we have in front of us, you talk about promoting sustainable coastal communities. You state:

On a personal and community level the general public needs better information about climate change ...

Then you went on to say:

This could be achieved through an annual climate change report (a “state of the climate report”) that provides accurate information on trends in temperature (air and sea)—

and so forth. Could you tell the committee more about this suggestion?

**Prof. Short**—As I said earlier, the public needs good, accurate information. At the moment, people get most of their climate change information from the media, which tends to be biased towards the more sensational aspects of climate change. The front page of the *Sydney Morning Herald* has shown beaches being washed away but never shows estuaries being inundated. The media never provides the detail of what is actually happening. We have very good reporting on what climate is doing—the temperature trends and sea level trends are available—but we do not have as yet any system set up to monitor the actual impacts when the shoreline starts to retreat or areas start to be inundated. That is the monitoring part of what I mentioned. The Australian public needs to be well informed about both what is happening with climate and what is happening where those changes are impacting, not only on the coastline but inland and on vegetation. People need to know about the whole range of impacts throughout Australia. We have a very well educated population, and I think helping communities recognise the changes would prepare them to support adaptation to those changes at a state and local government level, some of which changes government may not like if it means retreating or moving.

**CHAIR**—That was very informative. Thank you very much. Your long involvement in this area and your wisdom are going to be very useful for our report. Thank you for attending the hearing today, for providing the committee with your expertise and for the written submission you have made. I would be grateful if you sent the secretariat any additional material you think would assist the committee in its brief. I thank the members of the committee.

Resolved (on motion by **Dr Washer**):

That this committee authorises publication of the transcript of the evidence given before it at public hearing this day.

**Committee adjourned at 11.52 am**