



COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

**HOUSE OF
REPRESENTATIVES**

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

Reference: Climate change and environmental impacts on coastal communities

THURSDAY, 25 SEPTEMBER 2008

CANBERRA

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

Thursday, 25 September 2008

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

Members in attendance: Mr Dreyfus, Ms George, Mrs Irwin, Ms Livermore, 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

**CARRUTHERS, Mr Ian, First Assistant Secretary, Adaptation and Land Management Division,
Department of Climate Change 1**

**HOPKINS, Mr Angus John Malcolm, Director, Coasts and Tourism Adaptation, Adaptation
Partnerships Branch, Department of Climate Change 1**

**PICKER, Dr Greg, Acting Assistant Secretary, Adaptation Partnership Branch, Department of
Climate Change 1**

Committee met at 10.50 am**CARRUTHERS, Mr Ian, First Assistant Secretary, Adaptation and Land Management Division, Department of Climate Change****HOPKINS, Mr Angas John Malcolm, Director, Coasts and Tourism Adaptation, Adaptation Partnerships Branch, Department of Climate Change****PICKER, Dr Greg, Acting Assistant Secretary, Adaptation Partnership Branch, Department of Climate Change**

CHAIR (Ms George)—I declare open 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 this 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 welcome officers from the Department of Climate Change 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 for the parliament and warrant the same respect as proceedings of the House itself. 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 it has been authorised for publication. I now invite you to make a brief opening statement if you so wish before we proceed to questions and discussion.

Mr Carruthers—Thank you. I will make just a few brief remarks. Firstly, just a word about the Department of Climate Change, since it is a new department within the government. The department was established in December 2007, and its mission is to lead a whole-of-government policy coordination approach on the complex and crosscutting issue of climate change. I am sure the complexity and the crosscutting nature of climate change matters will come out in the discussion. The government's climate change approach is founded on three pillars. The first concerns reducing Australia's greenhouse gas emissions; the second, adapting to climate change that we cannot avoid, and I think that is really the pillar that we will be most focusing on in discussions in this committee; and the third deals with helping to shape an effective global solution.

One of the key areas of focus for the committee will no doubt be the impacts of climate change in the coastal zone. I will not take up time now going into those details but I will just draw attention to the content of our submission on page 3 in that regard, where we identify the range of impacts that are most relevant from the viewpoint of the reference before this committee around sea-level rise, rising temperatures, changing work patterns, consequences around shoreline erosion and inundation, coastal flooding, effects on water resources in the coastal zone and so on.

In terms of the role of the department, I draw attention to the fact that, in our coordinating approach to strategic action on climate change, we are working closely with a range of other departments that have relevant portfolio responsibilities—and I am sure some of those departments will be appearing before you—around science and information, infrastructure, natural resources and ecosystems, disaster management and so on. We are also working across the levels of government, with state and territory governments through the Council of Australian Governments and ministerial councils, and to a very large extent with local government as well.

In terms of the primary activities of the Department of Climate Change at present, we have a range of activities that we are leading on in developing the knowledge and tools that are needed for adaptation response in the coastal zone—we would be very happy to talk more about those—identifying the risks and vulnerabilities to climate change impacts in the coastal zone, and, as I have mentioned already, working across government and with stakeholders on these matters. I will leave it there for questions and discussion.

CHAIR—Thank you very much. We have received your submission, and many others have come in. One thing that seems to be a major issue of concern is the issue that you touched on in the work that you are doing on knowledge and tools, particularly in enabling planners in the future to make more rational decisions based on the impacts of climate change. I understand that a ‘first pass’ national coastal vulnerability assessment is due by the end of this year. I think it would be very useful for the committee to go through that so that you can explain, if possible, to the committee some of the relevant issues. It seems that in some areas there will be high-resolution DEM, digital elevation modelling, and in others, mid-level DEM. As I understand it, there has been some LiDAR modelling done by state governments. Also, could you draw the picture of where all this modelling fits in and whether it will be accessible in a way that is region and site specific so that, for example, a local government authority could tap into the modelling and use that knowledge to inform them about planning changes that they might envisage for the future. Because we are asked questions on the technicalities of all this, it would be very useful if you could elaborate a bit on that first pass assessment for us.

Mr Carruthers—That is fine. I will turn to Mr Hopkins in a moment to do that—he is leading that work on a day-to-day basis. I just have a word of context. Coming in as the Department of Climate Change, and climate change being a relatively new issue, if you like, in terms of planning and strategy in the coastal zone, one of the things we find is that there are certain legacies of longstanding approaches to planning and management in the coastal zone. Climate change is a new and very important and serious pressure and threat in the coastal zone. We are seeking to put in place a knowledge based, sound strategic approach nationally, and we do find that there are certain legacy effects in arrangements for planning about knowledge and tools.

On the specific example of a digital elevation model, one might have asked the question: why did we not have this as a piece of information infrastructure already, given that it is fundamental to good planning in the coastal zone? Simply speaking, it is a matter of history, a matter of fact, that we do not, so it is really through the arrival of climate change as a key issue that we find we are needing to get involved there. It is a very good example of the need to work across governments to do that—to meet the total needs of government, not just from a climate change perspective. Angus, why don’t you go through and discuss the several components of the first

pass vulnerability assessment. One of those of course is the digital elevation modelling, but there are several other parts to it as well.

Mr Hopkins—Certainly. Thank you for those remarks, Chair. Let me lead you through this. As Ian has indicated there are several components, and the digital elevation modelling is but one of those as we seek to understand better what the impacts of climate change might be in the coastal zone and provide that information to all of the various stakeholders, including local governments, to assist their planning. I will talk about nine components, but this is just a particular way of thinking about it. There are two projects for digital elevation modelling. Ian has indicated that we really need to know for the entire Australian coastline where the coast is. That sounds like a funny remark, but there is actually not a consistent map of the Australian coastline and the part of the Australian coast that is affected by tidal waters. The gap in our knowledge about the mapping is at a very basic level.

The second thing we really need to know is the elevation component of that, and we are talking about information that we need at the level of 10 to 15 centimetre resolution. So they are not your ordinary contour maps; a much finer resolution is needed if we are going to understand the changes with sea-level rise, for example. Of the two products we are involved in that we have commissioned, one is the mid-resolution digital elevation model, which is using optical remote sensed information from spot satellites. When we say ‘mid resolution’ we are talking about five to 10 metres in elevation. It is going to be a consistent coverage for the whole of Australia, but it will not give us the level of detail we need in terms of elevation rise.

Part of the motivation for doing that was that we are developing what is called a national elevation data framework—a kind of system or a set of specifications and information tools that will enable us to fit all the new DEM work that is done around Australia into this framework. All the new data that is being collected should theoretically be able to be compiled in a way that is consistent with this. If you think about something like Google Maps, for example, you are able to look at the data and slowly drill down through the data layers until you get more and more resolution. That is the intention. We are working on that. But, again, the issue is to try to get all of the state, territory and local governments on board with this process so that all the work that they do is consistent with this framework and can be integrated into the framework.

The second project is the urban digital elevation modelling that was announced in June. Basically, that is an attempt to compile all of the high resolution DEM data for all of the major urban centres of Australia in this framework. That is being done by the CRC for Spatial Information and was commissioned in June. It is on track to deliver a whole range of products by the end of next year, but it will be rolled out in advance of that. They are actually buying access to existing datasets and recompiling those datasets so that they are consistent with this framework. Those datasets will be available publicly to all levels of government for non-commercial purposes.

The next important part of the work on the coastline is mapping the geomorphology. We are interested in knowing, simply, which bits of the coast are hard and which bits are soft; if they are hard, what is the geology and how erodible is that geology; if it is soft, what are the sediments that make up that. We are collecting information on the littoral and sub littoral zones—so just off the beach and also behind the beach up to 500 metres. We are interested in knowing, for example, what is behind the beach. If it is a low-lying flat plain, it would be easily flooded; if it

is a sequence of high dunes, it is better protected. That dataset will be available publicly on the Geoscience Australia OzCoasts website by the end of the year. It is very close to completion. Basically that gives us that consistent level of mapping for the entire Australian coastline, specifically looking at how erodible it is.

Building on that, those same people who are doing that piece of work at the University of Tasmania—their commercial arm, UTas—are doing modelling on what happens with sea-level rise on that coast. Obviously if it is a soft coast, it will retreat. The commonly known rule is the Bruun rule. It says that for every one metre of sea-level rise it goes back 100 metres. But actually that is a generalisation, so you vary the Bruun rule depending on the type of sediments. You do not erode around the hard bits of the coast. That is giving us an idea of what is going to happen to the coast, firstly, with sea-level rise and, secondly, with changed wave climates—the waves eroding onto the beach are going to change. They will become more intense, they will change direction and the actual form of beaches will change. That is the modelling component that builds on this Smartline coast.

We have a project also to look at the natural habitats around the coast. This is being done by people in Tasmania again. Basically there are a number of generalised habitats—10 habitats—that have been mapped for Australia, and we are looking at the way in which they will be affected or impacted by climate change so the natural environment components are not left out of the equation.

We have six case studies and the case studies are designed specifically to tease out particular issues that arise around the coasts. I will just run through those case studies. The first one is Kakadu, where we are looking at the way in which sea-level rise and storm surges will impact on the coastal wetlands, particularly because there are low bund walls or banks that protect the wetlands from the sea and salt water. The second one, going anticlockwise, is on the Pilbara Coast, looking at the impacts of climate change on the oil and gas infrastructure in particular, but there is a very strong emphasis there on the socio-economic impacts—thinking back to the fire at Apache, for example. The third one is the Yorke Peninsula, south of Adelaide. That is an area under great pressure for urban development mostly for holiday purposes. We are looking at those issues and the socioeconomic impact.

Further around we are looking at the impacts on the western rock lobster fishery on the east coast of Tasmania. The entire east coast is the most valuable fishery in Tasmania and it goes the entire extent. There is a very strong relationship between sea surface temperature and the rate of growth and arrival at reproductive maturity of rock lobsters. Further up the coast we are at the Hunter and Central Coast of New South Wales. The issues there are about flooding in the estuaries and on the coast. There is a lot of infrastructure, including residential infrastructure. Further north we have a project in the southern part of Moreton Bay in the Pimpama catchment—it is just at the top end of the Gold Coast—looking at response to urban development pressures. There is an oyster fishery in that catchment and a small amount of mangroves. Those are the case studies and obviously they tease out different issues. We will be putting all that information into the final report.

Mrs IRWIN—Sorry to interrupt. When will that final report be due?

Mr Hopkins—We are running a little bit behind time with this work, but we are expecting the final report will be due by the end of February. There is a small piece of work being done on governance arrangements, which are a key issue on the coast, because of the range of levels of government with interests there and the different ways in which they implement planning controls and so on. Lastly, we are trying to compile this into a ‘lessons learned, where to next’ final report, which, as I said, is due at the end of February next year.

CHAIR—That is a very substantial workload and we commend the department for the work that it is doing and will continue to do to help inform our deliberations. When this report is finalised, at a practical level, what will be the outcomes for people at the local government level; in other words, can they drill down to a region or site-specific location to help inform them at that local level?

Mr Hopkins—We would be reluctant to provide information that gives details at the individual property level. What we will probably be doing is saying: there are regions or areas that are highly vulnerable and some that are less vulnerable. The problem for us is that the level of resolution of some of the datasets is not sufficient at this point for us to say, ‘Here is the line on the map.’ So at this point I would say it would not be wise for us to give the line on the map, because there are so many uncertainties in the data. The digital elevation model is a classic example—for most of Australia at this point we are using this mid-resolution DEM when we really need to have something that differentiates 15-centimetre resolution.

CHAIR—The minister indicated in June this year that funding would be available to develop:

... an interactive web-based tool to enable planners, engineers and policymakers incorporate projections of high sea-level events into their planning codes.

What would be the interrelationship between your studies in aggregate and this interactive tool?

Mr Hopkins—The interactive tool is about providing information on what is happening in terms of climate change at the local and regional level. That is telling planners, for example, that sea-level rise is in the range of 50 centimetres to one metre by 2100. We are attempting to use the same information sets about what is happening with the climate at the regional scale in the work that we are doing.

CHAIR—And in your modelling are you using the 0.5 to one metre range?

Mr Hopkins—At the moment we are trying to get regional projections of sea-level rise from the people in CSIRO. So while we can use those simple numbers, if I can say that, we are trying to get something that is actually more relevant, because we know, for example, that sea-level rise and subsidence and things are not happening uniformly around the Australian coast.

CHAIR—This will be my last question; I know people have others. In our inquiries, obviously, people are looking for the national government to provide what they hope is some degree of certainty. A number of submissions have noted that a nationally consistent basis, for example, even on projected sea-level rise, would help ensure consistent planning and outcomes. Does the department have a view about this issue?

Mr Carruthers—Yes, I think we would agree with that. In terms of the thrust of your questions, we clearly are looking to build a major and integrated piece of what is essentially informational planning infrastructure. That is a major undertaking, particularly given that the starting point for this is pretty much ground zero. The nation has not invested in this kind of informational planning infrastructure for other purposes. It will be extraordinarily valuable for other purposes, but we are beginning at the beginning. So we have had to think about this as moving in steps. We are trying to move this, obviously, as quickly as we can, within available resources and thinking about how you do this in the most cost-effective way in terms of managing resources. What Angas Hopkins has described is really a first stage of work that represents the product of those 18 months to two years of effort, which I actually think is pretty speedy progress. There will need to be stages that build on that over the next few years that really give us the technical precision and reliability in the kinds of tools and information that planners, communities, local governments and so on are going to need, but we cannot deliver that overnight. The principle is that there will be open access to this for public good purposes. That will apply with this first stage effort and we will continue to build from there. It is a national undertaking involving a whole range of organisations and enterprises with different specialisations. We are confident we can succeed on it. We are also conscious that it is impossible to deliver this at the pace which users—local government, planners and so on—are realising they need, but there is a reality as to how far and how fast this agenda can be moved on.

Dr WASHER—You might handball this on, but I guess I will ask you: is the high-resolution DEM done overflight by aircraft? Are satellites capable of that or does it have to be aircraft?

Mr Carruthers—It will be a combination of technologies. Regarding the high-resolution data that is being assembled at the present time for the urban areas, we have had a process through the Australian Academy of Science and the Australia and New Zealand Land Information Council to decide which would be the best approach. As Angas has mentioned, there is in fact data available already through aerial photogrammetry—essentially, stereo imaging from aircraft that has been taken. Those datasets are available in raw form and are being turned over for this use and processed. We are interested in, essentially, a bare earth high-precision elevation model. We are not so much interested in the tops of the buildings or the tops of the trees. Other people are interested in that information for other purposes. We need a bare earth elevation for the purposes of understanding inundation. In other areas where we need to do the high-precision work, we do expect to be using satellite data. We will also have to do work for the near-shore seabed, and that will involve a range of new technologies. It is technically quite a difficult area, but we are going to need that if we want to understand the changes in wave patterns—and Angas has described why that is relevant—and we are going to need to understand much better the bathymetric patterns. That of course will be extraordinarily valuable as well for things like tsunami risk assessment. That is another purpose there. We are really working with the technical experts nationally to decide which technologies will do the best job for particular purposes.

Dr WASHER—Basically then this high-resolution model will be applied to densely populated areas or hot spots where we have got valuable infrastructure. At what level of sea-level rise do you anticipate you would worry about it? In other words, what is the height range from current sea-level where you are going to say, ‘We’ve got a problem here’?

Mr Carruthers—I think that is essentially a planning and governance issue. That is not so much a technical question; it really is a question about governance, of risk management. That is

not something we have grappled with as a nation in the coastal zone. We have done it in flood plains. The conventional metric in flood plains is that you consider very carefully the wisdom of putting development and infrastructure within the one-in-100-year-flood line. That is the metric there and the basis for the insurance industry. We are going to have to come up with some kind of planning metric around sea-level rise. That is a discussion that has been going on this year with the state governments through the Council of Australian Governments and the climate change and water working group, which Senator Penny Wong is chairing. Those discussions have not finished yet, but I think we can expect that we will, through COAG, arrive at a commitment to develop some kind of a standardised approach to this kind of risk management in planning in the coastal zone.

Mr DREYFUS—I appreciate that the COAG process is not complete and that the standardisation is in train. How much consistency is there at the moment, state to state, as to planning responses?

Mr Carruthers—On risk of sea-level rise?

Mr DREYFUS—Yes.

Mr Carruthers—We have not done any survey or synthesis on that question. I would simply observe that what is emerging through media coverage of various disputes over planning decisions in different states suggests that this is becoming an increasingly vexed issue. That is based on the reports of various appeals to planning tribunals and which way the decisions are coming out. There was a case in the South Australian Supreme Court not so long ago basically finding that there is not consistency at the present time and nor is there consistency in decision making when this is being taken to appeal. I think as a nation this is going to become an increasingly important issue—to try and get some kind of common basis for proceeding.

Mr DREYFUS—Perhaps there are two levels in what you have just said. I appreciate that it is very difficult to achieve consistency in decision making, but the stage before that is consistency in rules or consistency in planning schemes or whatever frameworks are applied. I take it from what you have just said that you have not done a state-by-state survey—but you would be prepared to say even without full analysis that there is no particular consistency between the approaches that the states have at the present time taken to sea-level rise?

Mr Carruthers—That is right, even to the level of whether they are or are not considering it at the present time—that most basic question, let alone the question of, when you consider sea-level rise, how you do it.

CHAIR—Will you be traversing some of these issues in your governance discussion paper that Angas referred to?

Mr Hopkins—The answer is yes.

CHAIR—I think it is sorely needed.

Mr Carruthers—Yes.

Ms LIVERMORE—Once you have the national ecosystem framework for information in place, I guess the next logical step is establishing a nationally consistent approach to using that information.

Mr Carruthers—Exactly—an approach for the coastal zone that is the equivalent of the one-in-100-year-flood line in the floodplains. Then there will be the question of—

CHAIR—liability issues.

Mr Carruthers—new development versus exposure of existing development. It is important we get this right. The economic and social implications here are potentially very great. We know from the history of, if you like, flood risk in drainage systems what the implications are of getting it right or wrong. We have a major issue here to approach. From the department's viewpoint, we have been advising that we need to do this on a sound evidence base that is technically strong; otherwise, we risk making less than good decisions.

Ms LIVERMORE—On that point, are you aware of or is the department doing any work to quantify the level or the cost of potential scenarios in terms of infrastructure at risk or—

Mr Carruthers—Yes, we are. Angas, probably in the interests of committee time, did not go quite through all the actions that are in place. We recently commissioned a major assessment of vulnerability of infrastructure in the coastal zone. That is proceeding in parallel with the technical tools so that we will have a good basis for understanding relative risks to existing exposure. Also, we are working very closely with Minister Albanese's infrastructure department and the new Infrastructure Australia in discussions about the basis of infrastructure decisions in terms of the risk to new infrastructure investment. That, of course, will address questions of location and design standards.

Ms LIVERMORE—Will that information, together with the technical information that Angas described, all be available to feed into the climate change forum next year?

Mr Carruthers—The plan is to have a great deal of this first stage work available for convening a forum of interested parties into a national forum to take stock of what we have achieved and then to think about what guidance can be given and what level of agreement can be established on the steps forward from there. I think your committee's inquiry will play an important role in that as well.

Mrs IRWIN—Mr Carruthers, I would like to congratulate you on the briefing that you have given today, because you are a new, or young, department, having only been formed in December of last year. I have two questions following on from the discussion we have just had about the national coastal climate change forum in early 2009. Could you tell us the key stakeholders that will be going to that forum and whether there will be a report available after the forum?

Mr Carruthers—Basically, we are just beginning the planning process for convening that forum. But, in general, we will be looking to have wide engagement from all levels of government; from community groups with particular interests around the issues of climate change and the coastal zone; from the private sector—the insurance industry is an example; from

the infrastructure industry, obviously; and from the professional bodies—groups such as Engineers Australia and the Planning Institute of Australia and so on all have a lot to contribute. It will obviously be up to our minister to decide the nature of the event, but that is the kind of advice we will be giving her and I am quite confident that she will be looking for an inclusive approach. Yes, I am confident that the report on the forum will be publicly available.

Mrs IRWIN—So that will be early in 2009 and not late in 2009?

Mr Carruthers—It will certainly be in the first half of 2009. We have not picked a date just yet.

Mrs IRWIN—The committee recently heard from the Torres Strait Regional Authority. Have you done any work with the Torres Strait Islands on climate change impacts?

Mr Hopkins—Let me fill in a little bit of detail. The national coastal vulnerability assessment deals with that but we do not have the digital elevation models that are necessary for the Torres Strait Islands. That is something down the track, but there is work being done elsewhere in the other part of Ian's division to develop work with the northern Australian communities and they have met specifically with Torres Strait islander communities just recently.

Mrs IRWIN—When we were in Darwin we had a submission from the Torres Strait Regional Authority, and I am told by the secretariat that they have sent some photographic evidence, particularly of impacts of inundation on key infrastructure. Regrettably, we did not have the input of the Northern Land Council or the Land and Sea Management Alliance, but I did note that the minister has recently announced funding for research for Indigenous communities. Could you tell us a little bit more about what that is planning to do?

Dr Picker—Broadly speaking, and one of the issues that we are dealing with here, if course, is that we have both fanatic approaches and geographically specific approaches. My understanding of the research—and I can only describe it generally; I apologise but it is not something for which I am responsible—is that it is to have a conversation with Indigenous communities about both their perception of and their experience in dealing with climate change risk, realising that they are holders of a great wealth of historical information, as well as working with Indigenous communities to discuss how they have responded in the past and would look to respond to the impacts of climate change. In relation to the Torres Strait, we would be looking to see what the culture of responding to changes in the climate is, but I think that will need to be supplemented as we move forward with this work on the coast, specifically with some of the more technical details and technical work that will follow on from the first pass national coastal vulnerability assessment. While I think that information is useful for setting a baseline, it will not be sufficient in and of itself to manage the risks going forward.

Mr Carruthers—We are also fostering work outside the department in the area of implications of climate change—impacts for Indigenous communities. For example, we mentioned in our submission the establishment of the adaptation research facility. So it is really a venture to harness the total capacity of the best of the Australian science and research community across all relevant fields and disciplines. At the present time we are setting up research networks and research plans in relation to health implications of climate change and another one on socioeconomic issues. In both those instances, obviously Indigenous

communities are identified as a significant focus as potentially more at risk, more vulnerable, than the general community. Of course, they are not the only at-risk group in the community, but they are an important one.

Ms LIVERMORE—In your submission you talk about a couple of initiatives: work to revise the Building Code of Australia and also provision of general climate change risk management tools in line with the Australian risk management standard. Could you expand on those two things?

Mr Carruthers—The Building Code of Australia is another legacy story. The basic tool in the Australian engineering industry is the handbook, *Australian Rainfall and Runoff*, which was last published in the late 1980s. We found in discussions with Engineers Australia and the engineering community that, in fact, much of that was based on very short rainfall records in places like Wollongong and that there is quite a low degree of confidence in some of the design standards that are being used there. We thought that was quite a significant issue in engineering and planning work. Of course, climate change comes in on top of that, saying: ‘Hang on; that was all done on the basis of a notion of some kind of stasis in the climate system based on the historic record, whatever that historic record might be.’ But we do know that the climate conditions in future will be different, so we need to take a fresh approach to *Australian Rainfall and Runoff*. We have commissioned Engineers Australia to begin that process with funding from the department. We do not have sufficient funds for that whole job at the moment. We are looking to see whether we can gain funds from other quarters for that or whether we can get additional funds in future. The overall project cost of that, from memory, is \$17 million, and the engineering profession is putting up about half of that. So, here we are. It is not really a very expensive tool for the nation when you consider the value of the decisions that are being taken. A new generation handbook has been commissioned. It will obviously be done in the modern age form; it will be computer-based, rather than a book, and it will factor in the climate change dimension. Sorry, what was the other item?

Ms LIVERMORE—It is about ‘the provision of general climate change risk management tools in alignment with the Australian Risk Management Standard’, on page 6 of the submission.

Mr Carruthers—Do you want to comment on that one, Greg?

Dr Picker—I might comment a bit on both actually. Just in addition to what Ian was saying in relation to *Australian Rainfall and Runoff*, we are also working with the Building Code of Australia in terms of working with the Master Builders Association of Australia and other stakeholders; we have a project that is underway about where that will need revision in the face of climate change and where, in particular, climate change inputs might require that to be changed. That is an ongoing project which we hope will be released this year, certainly. In part, to be straightforward about it, it is to get the specific outcome of revising the code but there is a broader social and cultural purpose behind that which goes to your second point, which is to encourage building organisations and planning organisations to start weaving climate change considerations into their thinking. In the broad sense, it is an answer specifically on the building code but it is also about how we are helping develop through those codes. We are also working with the Planning Institute of Australia to get them to factor risk management approaches into their thinking about how they go forward with planning guidance as well as building guidance.

Ms LIVERMORE—So is it about avoiding risk but also looking at things like energy efficiency and how you can use design to mitigate emissions?

Dr Picker—The focus is still primarily based on adaptation more than mitigation.

Mr Carruthers—The department is working with the Building Codes Board on the energy efficiency aspects of buildings. From a climate change perspective there are two things you need to look at in the building codes. One is, essentially, the performance standards of the buildings in terms of energy use, whether they be commercial or residential buildings. The other side of the coin is that, under changing climate conditions, we need to be looking at the performance standards of the buildings under changed conditions of wind speeds and other extreme events.

We are progressively putting in place tools for the different professions and for decision makers. There is of course a well-established Australian standard on risk management. We have already published a handbook, which has been quite widely used, on how you might go about applying the Australian standard on risk management to decision making, particularly in the private sector, around climate change impacts. There will always be judgements to be made; it will never be cut and dried as to exactly what you should do in any particular situation. So it is how you take a risk management approach, and then we are underpinning that with various tools. If you would like more information on that, we could perhaps provide that out of session.

CHAIR—We have got time for one more question probably.

Mr DREYFUS—I have got something. This is really a factual inquiry. There have been a range of different estimates made as to what likely sea-level rise we can expect to deal with. The committee has received some recent material which has suggested that some of the estimates are underestimates, these being suggestions that focus on the melting of ice sheets. Are you able to tell us what the department is looking at in terms of expected rises?

Mr Carruthers—We essentially rely on bodies like the Intergovernmental Panel on Climate Change, with their fourth report assessment report in 2007, and the CSIRO for advice in this area. Australia has some of the very best scientists in this field. I do not know whether you are meeting up with Dr John Church in Tasmania during the inquiry, but he really is a world authority on these matters. Perhaps rather than me telling you the answer to that question, I invite you to put that question to Dr Church. He has published in this area. From a simple, non-scientist viewpoint, the estimates that were in the *IPCC fourth assessment report* last year were really based around the degree of sea-level rise associated with thermal expansion of the oceans. The science was not there to form firm conclusions about what ice sheet dynamics might apply. So what is in the IPCC is not taking in the full picture, but they did not know confidently what the full picture would look like.

The other comment I would make is, in terms of these discussions, we think about sea-level rise as the level of water in a bucket increasing and we think about what point it starts to spill over the bucket. It is a static millpond kind of concept. Yes, that is certainly one aspect of thinking about risk of inundation, but in fact what happens in the real world is that inundation occurs under extreme events. Where you will get the inundation problem, it will be driven under conditions of storm surge and associated perhaps with flooding in rivers and so on. It will be that concatenation of events that you really have to plan for, not the millpond effect.

CHAIR—Just before we conclude proceedings, I know that Mr Hopkins in summary form went through the list of various projects. Is it possible for the committee to have access to all that detail? There is nothing commercial-in-confidence?

Mr Carruthers—No.

CHAIR—Could you also pass on our thanks to Jo Mummery from your department. A number of us attended the Coast to Coast conference recently in Darwin and she made a private presentation there which was excellent and did the department great credit. I thank the three witnesses this morning for your very comprehensive and informative input into our deliberations. After you have completed the first pass assessment, if you would not mind, we would like to engage in further discussion with the department about some of the outcomes of that report.

Mr Carruthers—We would be very happy to do that.

CHAIR—Thank you very much for attending the hearing today. The secretariat will send you a copy of the transcript for any corrections that need to be made. I would be grateful if you could also send the secretariat any additional material that you have undertaken to provide to us as soon as possible.

Resolved (on motion by **Mr Dreyfus**, seconded by **Ms Livermore**):

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

Committee adjourned at 11.45 am