



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**

MONDAY, 18 AUGUST 2008

DARWIN

BY AUTHORITY OF THE HOUSE OF REPRESENTATIVES



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

**Monday, 18 August 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:

- 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.

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**Committee met at 10.18 am**

**CHAIR**—I declare open this second public hearing of the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts and welcome you all here today. 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. This hearing is open to the public and a transcript of what is said will be placed on the committee's website.

[10.19 am]

**WOEHLER, Dr Eric John, Chair, Birds Tasmania representing Birds Australia**

**CHAIR**—Welcome. Do you have any comments to make on the capacity in which you appear?

**Dr Woehler**—Birds Tasmania is a regional group of Birds Australia, a national organisation, and I am here representing the national organisation.

**CHAIR**—Although the committee does not require you to give evidence under oath, I should advise you that these hearings are legal proceedings of the parliament and, as such, 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 contempt of parliament. The committee has received your submission and has authorised it for publication. I would like now to invite you to make a brief opening statement, if you wish, before we proceed to questions and discussion. Over to you.

**Dr Woehler**—On behalf of Birds Australia, I thank the committee for their interest and for inviting us to make an additional submission and representation here. The submission used coastal birds to identify issues that we felt were relevant to the terms of reference for the inquiry. You may have noticed that we changed it from ‘coastal communities’ to ‘coastal bird communities’ just to reinforce some of our concerns.

We ask the committee to remain cognisant of the distinction between resident and migratory species. We have some species of shorebirds and coastal birds that travel to Australia from as far away as Siberia and Alaska and rely on the wellbeing of our coastal environments in the summer months before they return to breed in the Northern Hemisphere. We also have species of birds that are present year-round—365 days of the year—that rely on the beaches and coastal areas of Australia to breed, feed and rest upon. With these species sharing common habitats, we have the mechanism by which we can provide them with protection—both resident and migratory species—by protecting their habitats. However, clearly state, local and federal governments have a greater capacity to protect resident species because of the year-round presence of such species.

We wish to remind the committee of two very important roles of monitoring. As you can see from our submission, we have identified two very important and complementary roles of monitoring. One is monitoring in order to detect a signal or a change in an attribute being measured. We are all well aware of the long-term records, for example, from the Bureau of Meteorology that tells us that it is the warmest or driest year on record. We are lucky that we have 120 years or more of environmental information. We do not have a similar sort of information for many of the biological datasets. We are challenged in not being able to provide a biological comparison for saying, ‘This is the worst breeding year for 100 years for a particular species.’ We do not have that capacity at the moment.

These long-term datasets, which we do not have, challenge our capacity to understand the dynamics of the system. If we cannot understand how the system has forced a species or a community to change, we will have very little power to make any predictions as to how a

species, a community or a population might respond to changes in the environment. The submission makes it very clear that we are challenged in our capacity, and we are challenged because of the lack of value given to what is deemed to be monitoring. Monitoring has been seen very much as a second rate science. We need to be very clear that monitoring can make a genuine contribution at all levels of government and management.

I will close this brief opening statement by reminding committee members of the very important role that canaries once occupied: canaries were taken into mines to provide early warning systems to the miners in terms of the dangers inherent in the build-up of dangerous gases. Today about 15 per cent of all bird species on the planet earth have a conservation status: vulnerable, endangered or critically endangered. Very clearly, birds are giving us a very good signal about the deteriorating state of health of our environment. The issues that Birds Australia raises in its submission contribute to our understanding of the state of the environment and our concerns, using birds as indicators.

**CHAIR**—Thank you very much. There are just a couple of issues from your paper. At 1.4, the paper argues:

There is an urgent need to manage Australia's biodiversity and resources on a biological basis—the arbitrary lines on maps (eg boundaries of Local Government Areas, NRMs, coastal reserves etc), where management ends at the high-water mark or the edge of river—

or at the low-water mark, as we have just heard in relation to Kakadu—

lead to inefficient and unproductive management strategies, inappropriate land use, a dysfunctional and uncoordinated/non-integrated ad hoc approach to land management.

You suggest in your recommendations that we ought to be giving greater attention to the listing of threatened ecological communities. Would you like to comment on what you see to be the dysfunctional nature of the existing arrangements and comment further on whether the Australian shorebird and seabird community should be formally listed as a threatened ecological community so that it goes beyond the identification of species to communities? So it is those two points I ask you to comment on, if you would not mind.

**Dr Woehler**—Many of the experiences that I have personally had are based on my involvement in coastal management in Tasmania for more than 25 years; at the same time, many of these issues are common across the entire continent. So we are seeing a variety of local governments, NRMs, state government agencies and statutory authorities that have varying roles, terms of reference and interests in coastal management or, in some cases, a species-by-species approach or a management strategy to address a particular threat or threatening process. There is no apparent clear coordinated approach to how to tie these various efforts together.

I gave the example in Tasmania in paragraph 1.2 where the NRM regions were actually based on the distribution of telephone books from the early days, even though there was in existence a contemporary and biologically valid bioregionalisation for Tasmania that would have provided a more biologically sound basis for land management practices and strategies for the state. In other parts of Australia—for example, in Victoria—the NRMs are based around catchment management area, so there is at least a biological aspect to the division of responsibility, if you

like. In other parts of Australia—for example, the Northern Territory—a single NRM covers everything from Kakadu to the middle of the desert. We do not have a way of integrating across all spheres of government and community engagement.

This capacity to look at how we deal with an issue is always reactive and it is always after the fact in terms of an issue or a threat being identified and something being done afterwards. Very little attention is being paid to a proactive approach to land use management and the biological implications. Particularly, for example, in the instance of water, we have water falling in the highlands of Australia, wherever they may be, and it might take a period of time before that water reaches the coastline. The water is dealt with in different manners down that catchment until it gets to the coast. There is no integrated approach to the way we deal with our resources.

In terms of the second aspect, proposing the consideration of the beach-nesting bird community as a threatened ecological community, that was proposed on the basis that we are seeing very large-scale, long-term decreases in the populations of our resident species. Many of our resident shorebird and seabird species are long lived—for example, pied oystercatchers, which is one of the species found quite commonly around south-east Australia and around Tasmania; individuals of these species can live for more than 30 years. A couple of these birds in the Derwent are 34 years old and still breeding. These birds, because they have a long life expectancy, generally have a low breeding success from one year to the next. The idea is that, if you have one bad year, it will not matter too much because you have another 30 years of trying.

What we are seeing for many of our coastal breeding species are decreases in the order of 20 to 50 per cent or more in the last 20 years. Long-lived species that are decreasing generally show very low breeding success. The birds are present year after year, but they are not getting any chicks away because of four-wheel drives, dogs, people, human disturbance and loss of habitat.

For example, on the east coast of Tasmania, we have seen decreases in the hooded plover, a small beach-nesting resident species, where the decreases on our beaches have been between 50 and 100 per cent over the last 20 years, reflecting a complete absence of breeding success. The adult birds are able to live for up to 15 years. The birds are there year after year. People see the birds year after year. There is not a problem. The birds were there last year, the birds are here this year and the birds will be here next year. However, in actual fact the birds are not capable of producing chicks to replace themselves when they die. We face the situation as was described in the US of what is called ‘blink-out’: the birds are there one day but they are gone the next. When the adult birds die, there are no young birds there to take their place.

We are cognisant of the variety of threats to coastal birds as we have identified in our submission—four wheel drives, dogs, horses recreational activities, coastal development, loss of habitat and habitat fragmentation. Sea level rise in particular will destroy much of the existing remaining coastal habitats for beach-nesting birds. Many of these birds breed only a few centimetres above the high-water mark. Many of these birds nest in shallow cups in sandy beaches and, if you like, are obligate or dependent upon sandy beaches. They cannot just go somewhere else to breed. If the beach is not there to breed, they cannot breed. So our submission suggested, proposed, recommended that there should be consideration for nominating these species or this community under the terms of the EPBC Act as a threatened ecological community, integrating existing threats that we know to be occurring to these species as a whole and future threats faced as a result of sea level rise to these species.

**CHAIR**—Is the decrease in the numbers observable also for migratory birds or just for our resident population? For the information of the committee, particularly for me—I am not aware of our obligations under the different international treaties. Could you just tell us a little more about that please?

**Dr Woehler**—Approximately two months ago, there was a lot of media attention paid to the results of some surveys by Richard Kingsford from, I believe, University of New South Wales and one of his PhD students. They have been conducting inland surveys covering about the south-eastern third of Australia from somewhere in southern Queensland covering most of New South Wales and into northern Victoria. They have run annual surveys now for 25 years from a small aircraft flying what are called strip transects. So they fly the same routes every year and do, I believe, about 10 to 15 parallel surveys that cover many of the inland wetlands in southern Queensland, New South Wales and Victoria. I do not have all of the numbers from his surveys off the top of my head, but the decreases were of the order of 75 per cent in numerical abundance of those migratory species over the last 25 years.

The paper has been published and I am happy to provide a copy of that paper to the committee. It is in the public domain. It is a peer reviewed article. The species mix in inland wetlands comprises both migratory and resident species and probably more so migratory species than resident species. The decreases varied from one river system or catchment to another, but there was a broad agreement between the degree of water removal from the individual catchments and the decrease in species abundance over the 25 years that the surveys have been conducted.

Under the EPBC Act, which encapsulates Australia's obligations under the various international, typically, bilateral agreements, such as JAMBA and CAMBA that were in existence before the EPBC Act was promulgated, there are various obligations—for example, between Australia and Japan for the protection of birds and their habitats recognising that there were migrating species travelling between the two countries. So we have JAMBA and CAMBA, which is the Japan-Australia Migratory Bird Agreement, the China-Australia Migratory Bird Agreement, and recently there was also the ROKAMBA, which is the Republic of Korea-Australia Migratory Bird Agreement. So Australia has entered into a number of bilateral agreements to provide conservation measures for birds and their habitats for internationally migrating species. Australia is also a signatory to the Bonn convention, which is another international agreement for the conservation of migratory species. I do not have the full title—it is a longer title—but it is typically referred to as the Bonn convention.

In the last two years, there have also been efforts under way that have succeeded in establishing what is known as the flyway agreement, which is an agreement that covers the East Asian-Australasian flyway. This is a large area that covers approximately 10 per cent of the earth's surface and it encapsulates the migration routes of all the birds that travel between northern Siberia and Alaska, down through eastern Asia, through South-East Asia and into Australia. It is known as the East Asian-Australasian flyway. At the moment, Australia is hosting the interim secretariat for that agreement and there are moves to increase the profile and the conservation efforts. The flyway agreement has been designed to provide a mechanism to improve the conservation status of the species that use this flyway.

Typically, we have an annual estimate of somewhere between 3 ½ million and five million shorebirds that migrate into and out of Australia each year. These birds migrate between Australia and northern Siberia. Some of them weigh as little as 15 grams—that is half an ounce in the old measure—and it will fit into the palm of your hand. They will travel between south-east Australia and Siberia in six weeks, and they will do the round trip for 15 years. We are seeing incredible decreases in these species.

Earlier on when I mentioned that we had very few long-term biological datasets, we are lucky in Australia that, in fact, some of the longer biological datasets that we do have are bird datasets—either numbers of breeding birds or numbers of migratory birds. The Richard Kingsford surveys were based on aerial counts in south-eastern Australia. In some cases, we have long-term biological datasets of counts at roost sites or beaches in south-eastern Australia that span 40 years. The results that Dr Kingsford has shown for birds using inland waterways are paralleled with counts on coastal areas. It is not an artefact of the method; it is not an artefact of where his team have been surveying. We are seeing continent-wide decreases in the numbers and the diversity of species migrating into and out of Australia on an annual basis.

**Mr DREYFUS**—I acknowledge that this strays a little from the subject of your submission and the inquiry. You have raised migratory bird species and you have just listed for us, very helpfully, a whole range of agreements that Australia is a party to on a bilateral or multilateral basis. People in my electorate, which is in south-east Melbourne, raise this issue with me sometimes. We have a bird species called Latham's snipe, which comes from Japan every year to the Edithvale-Seaford wetlands on the eastern shores of Port Phillip Bay. At the Australian end, we have maintained a pathetically small remnant of what was once the large Carrum Carrum Swamp, but it is there and there is a wetland. It is a bit dry at the moment because of the drought, but it is a wetland and the Latham's snipe could potentially find its seasonal habitat there. If, however, it is unable to make the trip because of a shortage of waterways and places to stop off, for example, in China, beyond entering these agreements and providing interim secretariats or staffing up and resourcing the agreements that we enter into—and enforcing it in Australia to the extent that we are able through the EPBC Act—what else can Australia do as a nation to make sure that migratory species like the Latham's snipe continue to come to Australia?

**Dr Woehler**—I made the point in my opening statement that we have far more capacity to protect the species that are present year-round in Australia than the ones that are migrating through. For example, Korea has recently drained a large coastal wetland, called the Sae Man Geum wetlands, which are an important feeding area for migratory shorebirds. It is estimated that a half a million birds of one particular species used that wetland alone as a feeding point in their route to Australia.

Part of the efforts that are under way at the moment under the flyway agreement is to provide guidance and leadership to other countries, other NGOs in other countries and also at the government level. Australia has perhaps a greater capacity for conservation efforts than many of the countries that are included in the flyway and, in many ways, Australia is seen as a leader in conservation efforts. Non-government organisations such as Birds Australia are engaging with similar organisations in other countries to provide guidance. We are involved in educating community groups and members of the public. An increasing awareness of the role and importance of migratory species and the need to protect their habitats en route will provide a local mechanism for conservation. We can only provide guidance; we can only provide

interpretive and educational material. Clearly, we have no way of enforcing our values or our concerns elsewhere. But, certainly, by working with other community groups in other countries we have the capacity and the potential for increasing awareness and increasing conservation efforts in other countries.

**Mr DREYFUS**—Does it help Australia’s NGOs or government agencies in dealings with other countries that we are in fact making efforts in relation to bird conservation here in this country?

**Dr Woehler**—Clearly, if we are saying one thing and doing something else we would lose credibility. Internationally, it is viewed well that Australia is talking about and even engaged in the conservation of coastal birds and that we have taken a very proactive role in conservation of our migratory species and, from a leadership role, can argue for the conservation of the species.

**Mrs IRWIN**—At 3.2 on page 12 of your submission, you have stated:

The establishment of coastal buffer zones specifically designed to be lost over next 50 to 100 years as sea levels rise will provide a mechanism for human communities and coastal shorebirds and seabirds to adapt to a rapidly changing coastal zone.

Are you aware of any moves to establish such buffer zones?

**Dr Woehler**—Within Australia or elsewhere?

**Mrs IRWIN**—Within Australia and elsewhere.

**Dr Woehler**—Specifically within Australia, no. I think what is happening at the moment is that insurance companies are tapping various coastal councils on the shoulder and saying, ‘You need to be cognisant of the fact that we have sea level rise.’ The insurance industry is getting somewhat nervous about the implications for them from inappropriate coastal development. As far as efforts elsewhere in the world are concerned, I believe there are discussions in some European countries, particularly in the Netherlands where they have a long history of being very aware of sea level rise and sea levels generally. As the sea level rises, particularly for sandy beaches, for every metre upwards you have a 100-metre inland migration of the coastline. The coastal geomorphologists call this, I think, Bruun’s rule. It is simply a reflection of the sea level rise then reflecting inland in terms of the changed coastline.

The concern that we identified here and throughout the submission is that the development and construction of coastal infrastructure such as roads and houses will stop that inward migration of the coastline. So, as the sea level rises, essentially what you are going to end up with is a seawall rather than the capacity for the coastline to find its new line inland of where it is now. What is happening at the moment in Australia is that we are essentially putting a lot of effort into coastal infrastructure and reducing our capacity or our opportunity for making decisions or choices in the future.

There have been some excellent photos shown from Gold Coast storms during the 1950s and 1960s where the beaches were completely eroded; essentially, you had a seawall and that was the coastline. It was only through the artificial replacement of the beach sand that had been washed

away that those beaches returned. We are not going to have that capacity when the sea level rises, and we are going to have the coastline hard up against infrastructure. So the point of our submission there is that we need to, if you like, identify sacrificial areas whereby we make some precautionary assessment that says: 'Based on our best understanding now we might expect the coastline to be 100 metres inland of where it is now in 50 years time. Let's put this area aside; we won't develop or use it. It's going to be sacrificed. We're going to lose it as sea level rises and the beach and the coastline move inland.'

**Mrs IRWIN**—So you would strongly suggest as one of your recommendations that we look at establishing a buffer zone?

**Dr Woehler**—The federal government at the moment is in the process of identifying a coastal sensitivity to sea level rise. It has been done in Tasmania at very fine resolution. A coastal geomorphologist by the name of Chris Sharples has gone around the entire Tasmanian coastline at very high spatial resolution and identified the susceptibility of various beaches to erosion and loss through sea level rise. The same approach is underway at the moment at the continental scale, but at a lower spatial resolution simply because you have that much more coastline to deal with. So, in a sense, the information is being collected now by the federal government with a view to identifying those areas that are most sensitive to sea level rise. In that sense, as soon as that particular survey is finished, we will have the information available to us to identify which areas are more likely than others to be lost or flooded through sea level rise. Clearly, sandy and muddy foreshores are much more sensitive to flooding and erosion than rocky foreshores; however, until we have that information, we are not in a position to identify which areas are more sensitive than others are. But clearly a flat, sandy beach is going to be in a lot more trouble than a rocky headland.

**Mrs IRWIN**—Thank you very much for that. I think we needed that on the public record.

**Dr WASHER**—Eric, you said that the ever-increasing proportion of the Australian human population living in close proximity to the coastal margins is a major contemporary contributor to these long-term, widespread population decreases in Australian coastal birds. I happen to agree with that. If I could elaborate on this, we now have a population of just over 21 million people, increasing, if you take net losses and gains, by a quarter of a million per annum. Do you think that we should be looking at some level of population cap, knowing that 87 per cent of these people are going to live in this coastal zone—mainly urbanised—and, again, that the footprint is 150 times the size of the cities that they occupy? I did not put any words in your mouth, I hope.

**Dr Woehler**—I could answer that question in many ways. Obviously I am here to represent Birds Australia, so I have to be cognisant of what Birds Australia might think of that. Clearly, there is a very strong correlation or association between human activities and presence in the coastal areas and the resultant disturbance and potential loss of coastal habitat and coastal bird species. The last 25 years have seen an increased human presence in the coastal areas. We are also seeing an increased proportion of discretionary time and money available to the Australian population. People are spending more time away from work, and they have more money to do things when they are not at work. That has really opened up a broader spectrum of potential behaviours and activities that people can undertake in the coastal areas, so we are seeing, for example, in the last 10 years an explosion in the number of jet skis around the Australian coastal

margin. We are seeing more and more four-wheel drives, as I pointed out in the submission. All you have to do is watch television for an hour of an evening and you will see a four-wheel-drive barrelling along a beach somewhere throwing up spray and being identified as part of the Australian recreational repertoire, if you like.

**Mrs IRWIN**—I think dogs on beaches, as well, are a big problem.

**Dr Woehler**—And dogs on beaches. What we are seeing is an ever-increasing spectrum of threats that are increasing forever in their intensity, so the birds that we are monitoring and using as indicators for the state of the health of the coastal margins are decreasing, be it in absolute numbers, in breeding success or in some combination thereof. I am giving a presentation to the Coast to Coast Conference on Friday, and I am making the prediction that we are going to lose most of our beach-nesting birds in the next 20 to 50 years, reflecting both the ongoing human activities and pressures and the flooding of coastal margins, certainly around Tasmania—and I would argue that there is no difference between the Tasmanian beaches and mainland beaches. I have been involved in coastal research and coastal management in Tasmania now for 30 years, working both on shorebirds and on seabirds, and in the 30 years that I have been involved I have seen, at a state level average, a loss of 50 per cent of the numbers of birds and the mix of birds. There are birds that I remember seeing in the 1980s that I have not seen now for more than 20 years anywhere in Tasmania. They are just not there anymore.

**CHAIR**—Is that all species you are talking about, Eric?

**Dr Woehler**—Yes. For example, again, there is a published a paper on the loss of the eastern curlew in south-east Tasmania—and I am happy to provide a copy of that to the committee—where we have seen a loss of approximately 60 per cent of these birds coming to south-east Tasmania. There are wonderfully anecdotal records from the early 1920s and 1930s of the locals shooting these birds—of the flocks of thousands of them. You are talking about a bird that weighs about a kilo. It was a ready supply of protein for people at the time. Now, if we see 20 birds or 25 birds in a flock anywhere in Tasmania, it does the rounds; it is a newsworthy item. So we are seeing very clear losses both in breeding species because of human disturbance and in these migratory species. As I said before, the results of Richard Kingsford's surveys from inland wetlands in Australia are typical of what we are seeing in coastal margins as well. They are not artefacts of the area or the species or the methods being used.

**Ms LIVERMORE**—Coming back to where you started, Dr Woehler, talking about the importance of datasets, can you just explain who collects this data and how it is collated and used? Who holds it? What do you see as the key datasets where the gaps are at the moment?

**Dr Woehler**—Birds Australia is a largely voluntary organisation. There are approximately 5,000 or more members around Australia. With the exception of a small staff in the national headquarters in Melbourne, with one or two in Sydney and Perth, all the counts that are conducted around Australia are done by volunteers. I have been counting an area in south-east Tasmania since 1983. Back in the early 1980s, we had a shorebird atlas effort that was underway for five years, where these sites were visited at a minimum of once a month for five years. We are very lucky that birdwatchers seem to go out and record things and count things. In some parts of south-east Australia, and in particular south-east Tasmania, we had members of the public, before there were even local organisations, going out and counting birds. So, for some

parts of south-east Tasmania, we have records going back to the early 1960s—1962, 1963, 1964—of the numbers and variety of species at some of these wetlands. The people who collected this information are credible observers. We have no reason to doubt them. The species that were there would be expected to be in that area. So we have useful baseline data.

Since the 1980s surveys and recently in the last couple of years, Birds Australia has reinvigorated the shorebird surveys with a view to being aware that these are providing very good indicators for both migratory species and resident species. All of the datasets are coordinated by Birds Australia. There are project officers whose work is to collate, compile, synthesise and report on these datasets. The datasets are in the public domain; they are provided to the government. The Department of the Environment, Water, Heritage and the Arts and Birds Australia have a very good data-sharing agreement. For example, approximately five years ago the department put out a biodiversity audit for terrestrial biodiversity in Australia. Birds Australia's atlas data were made available to the department for inclusion in the synthesis and the analyses.

In the current efforts that are underway for collating shorebird data now, the reports are made available to the counters within a month or so of the counts going on, but all the efforts are done in a voluntary capacity, as I said, with the exception of a number of project staff in Melbourne. The people who go out and count are volunteers, as are the people who go out and train other counters, other community groups, to get involved. There is an incredible network of volunteers that state, local and federal governments rely on in a de facto sense to collect the information that is then used to feed back into management and conservation measures.

**CHAIR**—Do you get any funding from state or federal governments for this work?

**Dr Woehler**—Birds Australia attracts funding from the department, more so for the data synthesis rather than for the collection of raw data. State governments will make some contribution. Birds Tasmania, of which I am the chair, as a regional group of the national organisation receives no funding from any government agency. We go out, collect this information and feed it into the national data synthesis. It costs me my time, my petrol and my effort, and I do so willingly. As I said, it is done by the volunteers on the basis of goodwill.

**Ms LIVERMORE**—I have a related question. Are the numbers of your members or your volunteers out doing this increasing, decreasing or static?

**Dr Woehler**—The demographics of Tasmania are working against us. We have an ageing population. Gen Y just does not seem to be as interested in some of these community groups or in community involvement. I also have an honorary position at the University of Tasmania, so I am training honours, masters and PhD students. Several of my students in the last five years have worked on shorebirds. That is my contribution to promoting the ongoing surveys.

Birds Australia and the various regional groups are also actively involved in engaging with other community groups. We do a lot of work training other 'friends of' groups or some Coastcare groups to get involved—for example, in stewardship of their beach. We have done a lot of work in Tasmania promoting responsible dog management and dog practices on coastal areas. In the last three years, we have worked with all the councils going up the east coast of Tasmania, holding what are called 'dog's breakfasts', where we engage with the dog owners in

providing information, working with the councils, working with the managers—whoever is responsible—to identify high-value beaches that should be off-limits to dogs, and we identify low-value, essentially sacrificial beaches that can be used for dog owners. So there is a huge effort underway at the moment to engage with other community groups to provide education, interpretive work and awareness raising in other community groups. It is working, but it is all done in a voluntary capacity.

**Mr DREYFUS**—When the committee were in Kakadu yesterday, some of the people that work in the park talked to us about bird tourism, which might not be quite the correct term. I am wondering if you could tell the committee a little bit more about what bird tourism is. We were told that people come from all over the world to go to Kakadu, as indeed they do to other parts of Australia, but Kakadu is a particularly interesting place simply because of its scale.

**Dr Woehler**—Ecotourism is the general term used to describe a visitor who might be looking for some sort of natural history experience. In the US, ecotourism and in particular just bird watching in itself are a multibillion-dollar-a-year industry in terms of the travel, the accommodation and the equipment—buying the cameras, the telescopes and whatever. Unfortunately, in Australia we do not undertake the collection of statistical data to give us a sense of the scale of ecotourism in Australia. We have some information on the number of tourists are coming in and out of the country. We have some sense that people are coming here for conferences or recreational holidays or whatever, but we do not take the opportunity to capture the information that would give us a sense of what value is actually being placed on the natural environment.

In the last five years within Australia, for example, the number of tourists coming into Tasmania has almost doubled—again, using the natural environment as part of the bait to bring people into Tasmania, in the same way that Kakadu provides an international and national focus for ecotourism, be it for looking at crocodiles, seeing the wetlands of international significance or looking at birds. Different people have different interests when they undertake their ecotourism activities. So it is very difficult because, as I said, we are not collecting the information in terms of primary purpose—when somebody identifies themselves as a tourist or as an ecotourist, we do not have the information that tells us whether they are looking at bird watching or are just looking to get away from the rest of humanity. And I think that in doing so we are denying ourselves the opportunity to put a dollar value on an intact, functioning ecosystem. People are not going to travel halfway around the world to see a degraded landscape or a wetland that used to be really, really good once upon a time but is not so good anymore.

So there would be a very good case for identifying the role of, the scale of and the dollar value associated with ecotourism as an argument for further funding for appropriate management. For example, if it turned out that—pulling numbers out of the air—we had a million visitors a year to Kakadu bringing in \$100 million a year to the Northern Territory and Australian economies, then clearly there would be a strong case for appropriate funding levels to maintain the values that people are coming to Australia to see.

**Mr DREYFUS**—For your information, we were told yesterday that the number last year was 226,000. But your point is taken about the scale of the potential business.

**Dr Woehler**—And the fact that those dollar values are collected, recognised and used in other parts of the world but are overlooked in Australia.

**Mr DREYFUS**—If I could ask a question on a completely different topic: at page 12 of your submission, you have made a recommendation in relation to use of the Environment Protection and Biodiversity Conservation Act. The particular recommendation is this:

The coastal shorebird and seabird community that uses the Australian coastal zone should be formally listed as a threatened ecological community under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999.

This is to some extent a technical question, but the EPBC Act at the moment, in the way it is used by the Commonwealth department, lists particular threatened species of animals and birds and also lists, to some extent, threatened vegetation communities. To my knowledge, there is no broad-scale listing of the kind that you are here suggesting is appropriate—is that right?

**Dr Woehler**—That is right. This would be an innovative use of the legislation.

**Mr DREYFUS**—Is it possible, Eric, to use the act in this way? As I understand it, the act does focus on identifying threatened species or identifying threatened vegetation communities—this is a very broad net that you are wanting to cast here.

**Dr Woehler**—It is. But, at the same time, the act does also allow for issues such as key threatening processes. The department at the moment is looking at a threat abatement plan for marine debris, for example. So there is the capacity to look at an issue. You could argue that sea level rise might be the key threatening process to a number of beach-nesting species in the same way that marine debris or—I am trying to think what else has been identified as a key threatening process. It could be done if the willpower was there. Given that we are facing such a broad spectrum of existing threats now that are really hammering beach-nesting birds, and we are going to see something else that is essentially going to take away most of their habitat in a very short period of time, clearly there is the potential there for at least consideration of sea level rise as a key threatening process, given that it is going to affect a broad spectrum of species that have common elements of their habitat that will be threatened by the process.

**Mr DREYFUS**—So that is a different suggestion again that you are making—that there would be a ‘threatening process’ listed, that being sea level rise, as distinct from listing a threatened ecological community.

**Dr Woehler**—Either approach could potentially be worked under the EPBC Act.

**Mr DREYFUS**—What do you see as the practical consequence of that that is going to give rise to more things being regarded as potentially controlled actions and therefore more developments and more aspects of human activity being governed by the EPBC Act processes?

**Dr Woehler**—More beach locked up from developers. We have an obligation under the bilateral agreements for the migratory species. Under the terms of the act, we have an obligation to protect resident species and this would be a mechanism to increase the conservation status of some of our species. Failure to do so will see an ever increasing number of our beach-nesting species being listed individually as a threatened species to the point where you are going to have

an even greater piecemeal approach to beach management and beach conservation. By looking at it from a community perspective, you then deal with the community as a whole rather than as a group of, say, 10 to 15 species that you need to deal with individually or separately or in different ways to the different species depending on their conservation status.

Yes, there would be an additional administrative burden if you came to assessing proposals under the act or managing the areas where the community would be present. Remember also that around much of Australia's coastline we have already lost these species. You will not find a beach-nesting bird along the Gold Coast or Sunshine Coast at all. But we also still have the habitat in more remote parts of Australia where these birds are hanging on, where we just do not get the level of disturbance and we do not get the level of destruction that we are seeing in parts of Australia. We made this recommendation on the basis that we saw it as a valid approach to using the legislation to protect the community given the commonality and habitat needs and the commonality in threats being faced by the community.

**Mr DREYFUS**—I take it that you are making this recommendation on the basis of understanding that the EPBC Act is essentially a reactive control mechanism. As you have indicated throughout the submission and indeed in your opening remarks, a proactive conservation regime would involve introducing some kind of regulation that is quite different to the EPBC Act, which is reactive.

**Dr Woehler**—Yes. Every time I have made submissions, certainly to state government and local government, the long history is that a proactive approach is always cheaper in the long run than a reactive approach. Bandid solutions after the damage has been done or a species has been threatened or the habitat has been lost are always going to cost you much more than if you left the thing alone in the first place. The proactive, precautionary-principle approach makes economic sense—not to destroy something in the first place and then try to spend money to rehabilitate, restore or whatever after the fact.

I think we need to really consider changing the way we look at land use management, as we have said throughout the submission. The regime that we are seeing at the moment is very much reactive—something happens and we have to go out and fix it. We have enough information, experience and expertise to be reasonably confident in making some of the predictions in terms of changes to rainfall and changes to the way the landscape is going to look in the next 10, 20 or 40 years that we do not have to wait for the damage to be done before we then start doing something about it. That is equally true for the species, the birds that we are dealing with here, as well as the landscape as a whole.

**CHAIR**—Could I interrupt for a moment. I just want to let the committee members know that we have had late notification that the Northern Land Council representatives are unable to attend. They have been called to an emergency meeting. Dr Woehler, are you happy to continue until all the questions are exhausted? We have the time and then we will consider what we might do at the end of that.

**Dr Woehler**—I am happy to continue.

**Mr ZAPPIA**—I have three fairly quick questions. Firstly, are there any other creditable organisations within Australia that also provide information or carry out research work in respect

of birds and bird numbers? Secondly, is there an international body that collates the work you do and shares it, or is it simply a case of having world conferences once a year that you all might attend? Thirdly, on the question relating to the answer you were just giving about birds being driven away from the coastal areas, is there any evidence of those same birds relocating where perhaps they can?

**Dr Woehler**—I will answer your three questions. On the first question relating to whether there is any alternative credible organisation within Australia dealing with birds, the answer is no. Birds Australia was originally founded in 1901 as the Royal Australasian Ornithologists Union. It is still in existence; the Birds Australia name is simply its trading name. The organisation has been in existence now for more than 100 years and it is the Australian partner to an international network known as BirdLife International. All the data collected and compiled by Birds Australia is then shared on various international databases. For example, BirdLife International is the international agency that is responsible for implementing the red list, which is the conservation assessment of species. BirdLife International collates the population data and undertakes the global syntheses and analyses to assess whether species should be listed as endangered, critically endangered, threatened or whatever, so there is a very strong ongoing effort to share data within, for example, the East Asian-Australasian flyway. So there are no problems in terms of data sharing within the country and across international boundaries. The third question was—

**Mr ZAPPIA**—The birds migrating to better coastal areas.

**Dr Woehler**—The species we are focusing on in this particular submission are beach-nesting species. To make a sweeping generalisation, they are dependent upon sandy beaches for their nesting sites, their feeding areas and their resting or roosting areas. We do not see those species generally moving into other areas. The one exception we are seeing is with a species called the pied oystercatcher. We see birds occasionally going into pastures behind a beach and sometimes nesting but we have no information on the extent of that particular behaviour in the population as a whole, nor do we have any information on how successful the birds are breeding in pastures as opposed to breeding on the beaches. Given what we do know about the biology of these species, we could predict with reasonable confidence that the breeding success would be lower and the option of nesting in pastures would be an option for a very small proportion of the population given the biological needs of the species. The decreases we are seeing in the numbers of individuals in the species reflect a loss of habitat and a lack of suitable alternatives for these birds to go to as a backup.

**CHAIR**—You made a startling prediction that in 25 years time we could see a loss of beach-nesting birds. For a layperson like me, who is not an expert in birds, can you tell me: are they birds like terns, plovers and oystercatchers?

**Dr Woehler**—Yes.

**CHAIR**—Are there any other specific species that you are aware of that might fall into this category or are they the main ones?

**Dr Woehler**—They would be the primary species based on the fact that at the moment they nest on soft sandy beaches just above the high-water mark. Depending on the species and their

habitat, we would also expect to see losses of, potentially, some populations of little penguins, or fairy penguins, in some parts of their range. The penguins are very general in their habitat needs, so they are not as specific as, say, the hooded plovers or the fairy terns might be in terms of their habitat needs. But certainly we would expect losses of some of the penguins currently nesting very close to high-water mark in habitat that would also be sensitive to sea level rise, by either erosion or flooding. But the penguins are much more generalist than some of these other species, so we might predict broader changes in habitat needs compared with some of the beach-nesting birds.

**CHAIR**—And you have in your submission the photograph of the flooding that occurred in a section of the south-east of Tasmania where the oystercatchers were forced out of their habitats, onto the roadway and were indiscriminately killed. Is that a current common occurrence or is it a one-off associated with the flooding that occurred that year?

**Dr Woehler**—That event happened in winter and spring last year. We had a combination of a high tide with a strong, deep low-pressure system that resulted in strong onshore winds. At the time, it was described as a once-in-a-lifetime event, but, since it has happened several times since then, it is not so much a once-in-a-lifetime event. We, namely Birds Australia, saw it as a predictor of what we could reasonably expect in the future. The roadway here in question is just south-east of Hobart at South Arm Neck Road. It is a shallow, sandy neck connecting two parts of the coastline. The road is typically about half a metre above the high-water mark but, with the low-pressure system, the high tide and the onshore winds, the roadway was flooded on several occasions. The Tasmanian government really does not have a response other than just putting a few rocks along the water's edge to try to keep the sand that is still there present. As a consequence, the birds that would normally roost on sandbars close to the water's edge were pushed up onto the road and, yes, were being killed.

**CHAIR**—Just finally, the federal government have identified a number of priority coastal hot spots—and none of us on the committee are from Tasmania—and they have nominated the Derwent Estuary and its catchment and the Pittwater Orielton Lagoon Ramsar site. It would be of value to the committee if you could advise the secretariat whether, if we were to travel, we could look at the coastal hot spots. Anything in particular that is relevant to the submission you have made today that you would like us to look at firsthand would be of value.

**Dr Woehler**—I would be delighted to take the committee out bird watching for a morning.

**CHAIR**—We will definitely take you up on that. That is now on the public record.

**Dr Woehler**—If I could respond to those two areas: the Derwent Estuary and the Pittwater Orielton Lagoon Ramsar area form the southernmost extent of the East Asian-Australasian flyway. So, yes, there are birds in those two areas that we see every year that travel from Siberia. Some of the longest data sets that we have for the shorebirds in Australia come from the Pittwater Orielton Lagoon Ramsar area. I can take you to some of these areas and show you some of these sites that have been counted since the 1960s. I will show you the birds there now and then I will tell you about the sorts of numbers and the species mix that used to be there around 40 years ago. I would be delighted to show the committee some of these areas.

**CHAIR**—So will you follow that up with the secretariat?

**Dr Woehler**—Yes, I would be happy to.

**CHAIR**—Thank you very much.

**Mrs IRWIN**—I want to follow on from the chair's question. I found the photos that you have with your submission very disturbing. You can actually look at the damage that has been done to our beautiful coastline by four-wheel drives, horses, dogs and bicycles. I have to admit: I do walk my dog along a beach; I do have a doggie bag and I do not let her off her leash.

**Dr Woehler**—Well done.

**Mrs IRWIN**—But I have noticed the damage that has been done. Do you feel that there should be a complete ban on dogs, four-wheel drives and bikes because of the damage they are doing to our beaches and to our birdlife?

**Dr Woehler**—I have been involved for the last three years, as I said before, in engaging with councils, NRMs and local community groups. I would dearly love to see the threats to our beach-nesting birds decrease to the point where they are not having an impact on the birds. I also realise, pragmatically, that people will do whatever they damn well feel like doing. Even if there are signs that say 'No dogs allowed on this beach' or 'No four-wheel drives allowed on this beach', people will ignore them. So, my pragmatic component suggests that I work with these groups and identify sacrificial areas—those sites where we have already lost our birds—and say, 'Give those areas to the dog walkers and the four-wheel drivers and let's keep the high-value areas undisturbed as much as possible.'

The photographs that we put in the submission are typical of anywhere that you will see when you drive around Tasmania. We see much more control of beaches on the mainland of Australia than we do in Tasmania and, as a result, we are very aware of four-wheel drive vehicles coming down to Tasmania to drive on coastal beach areas because they cannot do it on the mainland. The mainland states seem to be much more capable of closing off beaches for the protection of beach values than we are. It just does not happen in Tasmania at all.

I would dearly love to see a reduction, as I said, in the variety of the threats and in the intensity of the threats. The sad thing is that most people spend most of their time at the beach in the summer months. The disturbance to birds is far less during the winter months than the summer months. Unfortunately, the summertime is also the breeding season, and that is the most sensitive time and the most critical time for the birds. So we are seeing the greatest intensity, frequency and spectrum of threats during the breeding season. This is why we are seeing essentially zero breeding success in these birds and a long-term decrease in the number of birds on the beaches.

**Mrs IRWIN**—Thank you very much for that. I think it is also about educating people. These people love their beaches and do not realise the damage that they are doing to them.

**Dr Woehler**—As I said, we have been having dog's breakfasts in Tasmania, which I will explain. They are a public event that we put on specifically to address the lack of information and also the lack of knowledge of dog owners. We provide them with information about the potential impacts of dogs on shorebirds and beach values. We try to engage with the dog owners

to identify, say, 'This area has been sacrificed; this is a dog beach area; but we would ask you to stay away from this beach over here.' We give every dog owner who comes along a leash for their dog with the words 'I am a wet sand walker and do not chase chicks' to reinforce the message that they keep their dog on a leash and down on the wet sand, away from the nests.

The photographs that I have shown you are of dogs eating eggs and sniffing at eggs and nests. I have been told a number of times by dog owners that their dog is harmless and would not harm a fly, and everything else. I just say to them, 'Look, I would really love to believe you but the reality is that every dog is a hunter and, given the opportunity, they will take it.'

**CHAIR**—In terms of the proposal that you have put to us, is there a particular time of the year that would be best for the committee to visit to look at these migratory species?

**Dr Woehler**—The birds start arriving in Australia and in south-east Tasmania any time after the end of September. So October and November would be suitable times if that were suitable for the committee.

**CHAIR**—Or early next year?

**Dr Woehler**—That is fine. The birds are present during the summer months, so essentially October to February would be the window of time in which the birds are present in south-east Tasmania.

**Dr WASHER**—From a governmental point of view, you said that you have worked with local government. I guess you have worked with the state government and you are talking to the federal folk. Where do you think you are getting the biggest bang for your buck? Is it at a local government level?

**Dr Woehler**—Yes. The Tasmanian government has not been as willing to take on board our concerns as have councils, NRMs or other community groups. I cannot say what the experience has been on the mainland because I am not involved in regional discussions. But, from the Tasmanian perspective, there is a wealth of community groups—beach care, coast care, friends-of-type groups—that want to do something to protect the habitat, the birds or some other aspect of their coastline. We have provided them with a lot of educational, interpretive material.

We have three NRM regions in Tasmania. Two of them have been very good in engaging with us and taking on board our concerns. The other one has been less interested. Local governments vary. Some local governments are very keen to do the right thing. A lot of the dog's breakfast activities are as a result of a recent revision of the Dog Control Act in Tasmania. It puts an obligation on each council to provide a dog management plan for their municipality. So there was an engagement through that.

It simply depends on the individuals on the councils or the individuals involved with the NRM committees. Some of the councils just do not want to know about it at all. I gave an example of the King Island Council. They have recently developed a strategic plan for the next 30 years and are talking about coastal infrastructure. The words 'sea level rise' and 'threatened species' do not appear in a 100-page document. So there is just this, literally and figuratively, head-in-the-sand approach to dealing with coastal issues for the next generation.

**CHAIR**—On that point, we thank you for a very informative and interesting contribution, and thank the many volunteers who work for your organisation. Their efforts are truly appreciated. Dr Woehler, thank you 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 as soon as possible, particularly the research study. We look forward to further liaison with you about a proposed visit to Tasmania and about what we could usefully do while there in terms of the issues that you have raised.

**Dr Woehler**—Thank you. It has been a pleasure and I look forward to taking you all out and showing you some birds that have flown to Tasmania all the way from Siberia.

**CHAIR**—Just for interest's sake, what was the bird's name?

**Dr Woehler**—It is called a red-necked stint. It starts out at 15 grams and fattens up to 25 grams—so it almost doubles its weight but it still weighs less than an ounce and can fit in the palm of your hand—and then flies all the way up to Siberia in six weeks. We will show you some.

**CHAIR**—Thank you.

**Proceedings suspended from 11.27 am to 3.04 pm**

**BLANCH, Dr Stuart, Northern Landscapes Manager, World Wide Fund for Nature Australia**

**CERCARELLI, Mr Luccio Franco, Director of Technical Services, City of Palmerston**

**GARNETT, Professor Stephen, Private capacity**

**HALE, Mr Damian, Member for Solomon, Commonwealth Parliament**

**POPPLER, Mr Stephen, Member, Northern Territory Division, Planning Institute of Australia**

**ROBINSON, Ms Pam, Acting Environment Manager, Darwin City Council**

**ROCHE, Mr Charles Phillip, Coordinator, Environment Centre Northern Territory**

**ROUSSOS, Mr George Michael, President, Northern Territory Chamber of Commerce**

**SAWYER, Mr Graeme, Lord Mayor, Darwin City Council**

**SKOV, Dr Steven, President, Northern Territory Regional Committee, Australasian Faculty of Public Health Medicine**

**CHAIR**—I am very pleased to resume the public hearing of the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts and to welcome you all here. Special thanks to the member for Solomon, Damian Hale, and his staff for organising such a representative and broad cross-section of people to participate in our hearing this afternoon. As you know, 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 hearing is open to the public and a transcript of what is said will be placed on the committee's website.

Just for the information of participants, we had made the arrangements to come to the Northern Territory prior to the announcement of the election, and this afternoon we were scheduled to have a visit to Darwin Harbour to look at some of these impacts on the harbour and to hear formally from the Northern Territory government. But, once the election was called, the plans that we had both for a formal submission to be presented today and for a site visit of the harbour were not able to occur. So some of us will be following what you have to say with great interest because we are not from the Northern Territory nor have we had the opportunity to spend time familiarising ourselves with some of the issues that are clearly at stake here.

We are very lucky that a member of our committee, Mark Dreyfus, has previously worked in the Northern Territory—for the Northern Land Council—and has firsthand experience; and of

course we will be indebted, too, to the views that local federal member, the member for Solomon, will present to the committee. There may be issues that you would like to take on notice arising out of our questions. We are fortunate also to have had a briefing from Mark, who is also a QC, about the recent High Court decision and the implications that has for the intertidal zone.

We have before us this afternoon, at this public hearing, representatives of a range of Northern Territory organisations, and we are very thankful to all of you for coming along. I do not know how we intend to manage the presentation—is there someone who is going to speak on behalf of the whole group or are we going to just go around the room and hear from individual submitters?

**Mr Hale**—Individually, I imagine, we have not touched base to talk as one.

**Dr WASHER**—Can we go around the room then?

**CHAIR**—Yes, that is fine. Before we do that I should advise you that, although the committee does not require you to give evidence under oath, the hearings are legal proceedings of 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. Having said that, I would now like to invite each of you to make a brief opening statement as a precursor to questions that we might have and an informal discussion about issues that arise out of the presentations you will make to the committee. Again, thank you very much, and please understand the constraints that we are working under, not being as familiar as we would like to be with issues relating to Darwin in particular. We have spent the past few days in Kakadu, observing what goes on in that very iconic part of our nation and also looking at the likely impacts of climate change on Kakadu and the wetlands there. I know some of you have come along with an overhead presentation. Should we begin with that, if that is all right with you, Dr Skov?

**Dr Skov**—Yes.

*A PowerPoint presentation was then given—*

**Dr Skov**—Thank you very much for the opportunity. I would like to give the committee a bit of a public health perspective of climate change as it might affect the Northern Territory. To begin with, I would like to say that from a public health perspective, pretty much everything, all areas of public policy have either a direct or an indirect effect on people's health and wellbeing. People's housing has an effect on health and wellbeing—overcrowding, substandard housing; we know about that. Clearly food and water have an impact but also things like transport policy. In the big cities transport policy and pollution go hand-in-hand. In more remote areas, if you do not have access to transport, you do not have access to services and that has an effect on people's health and wellbeing. More broadly, economic policy directly affects people's health and wellbeing. We know that unemployed people and people of lower socioeconomic status have substantially worse health outcomes than people who are better off. So all aspects of public policy have an impact on health and wellbeing.

In relation to the health impacts of climate change, there is often a perception by people that this is something that might actually happen sometime in the future. But I think there is good

evidence that the bodies, in fact, are already piling up. The World Health Organisation estimated that in the year 2000 there were already 160,000 deaths per year occurring in the world due to the impacts of climate change. That was just looking at a relatively limited range of causes of people dying.

If we look at a range of more direct impacts, there is obviously the heat. Heat stress: heart attacks and strokes are more common during heatwaves. That is the way that people die more immediately from hotter climates. I would note that in the 2003 European heatwave, it was estimated that there were 70,000 excess deaths due to that heatwave. One of the reports that is part of the Garnaut report estimated that in Darwin by the year 2070 there would be 220 days each year where the temperature was in excess of 35 degrees and by the year 2100 that figure would go up to 300 days per year over 35 degrees. The same report estimated that, related to that, we would see 280 direct heat related deaths per year in Darwin, compared to 63 if there had been no climate change. Direct heat related deaths are quite substantial.

Another major impact is on food. Food is going to be less available, more expensive and the impact on Northern Australia, where much of our food comes from the southern states and has to be transported up here, is going to be substantially greater on food availability and food prices. In remote communities it is going to be worse. If you have been to remote communities you know that the range of food that is now available, the quality of the food and the price of food are terrible compared to what we might get in Darwin, for example. If food and energy become more expensive, that is going to get substantially worse. We know that poorer people in any society eat less healthily when food becomes more expensive, they have to spend more of their income on food and that has very negative direct health consequences.

In Indigenous communities in the centre of Australia, it is going to be hotter than the coastal regions. That is where many remote Indigenous communities are, so heat stress events and infectious diseases are going to get worse in those communities. I have already mentioned the cost of food and energy; that is going to become worse. It is estimated that water quality will be affected in many communities as well.

In the coastal regions, if there is loss of coastal flood plains due to salinity or if there is damage to coastal waters due to extreme weather events, it is thought that there will be a loss of food resources for those people. That will affect not only their nutrition but a lot of the gathering of that food which gives them valuable cultural activities, looking after country and connection with country which, it is thought, will be lost or severely damaged.

So those communities that are already economically marginalised will become more marginalised and there will be a loss of many of their culturally valuable activities. The effect of that is that those people will drift into the urban centres, and we already know that the impact of urban drift from remote communities into towns has increased alcohol abuse amongst those people, with substantial social dysfunction. Aboriginal communities and remote communities are likely to be greatly affected by the impact of climate change.

We also know that in South-East Asia and South Asia there is likely to be substantial loss of food production, substantial water insecurity and a large number of climate refugees from those countries. They are going to head towards Australia in great numbers. In some of the best-case scenarios we are talking in the hundreds of thousands of climate refugees, and they are going to

come to Northern Australia. That is the port of entry for them. We are going to have to deal with those people—we are going to have to receive them, feed them, house them and process them in some sort of way, which is going to be a substantial cost and impost on Northern Australia. In addition to that, they are coming from regions where there are high rates of HIV, high rates of multi-drug resistant tuberculosis and high rates of many other infectious diseases, all of which we are going to have to deal with.

More generally, on the impact of climate change on the economy in the north, Garnaut has estimated that there could be a three to four per cent reduction in the GDP in Australia as a result of climate change. Stern has estimated a four to five per cent reduction in the economy of Great Britain. That is going to have an impact on the north Australian economy as well as on the whole economy. In the north, energy prices have a much greater impact. So much of the stuff that we consume, build with and eat—whatever—has to be brought up from the south for us. So energy prices are very important. Air conditioning is really important in the north of Australia. Along with Western Australia, the Territory already has the highest per capita greenhouse gas consumption from stationary energy in the country. So airconditioning in the north is really important. I have mentioned food prices. Regarding transport prices, everything has to come here and people have to get out of here as well. All of this, along with 300 days a year of temperatures over 35 degrees, is likely to have an impact on the liveability of Northern Australia for many people, and this could have a negative impact on population growth here and on the growth of the economy.

So, in thinking about these issues, there are physical, mental and cultural health impacts of climate change in Northern Australia that are quite different to what they are in the rest of Australia. Really we need Top End expertise located in the Top End to come up with Top End solutions. So I think that really what is required is some sort of dedicated cross-jurisdictional resource located in Northern Australia. By cross-jurisdictional I mean Queensland, the Northern Territory and Western Australia working together to come up with solutions for the north. I am aware there have been several attempts to get these sorts of things going—there was recently the Office of Northern Australia, there is a biosecurity initiative and there is a northern borders protection initiative. There are a number of them, but none of them seems to be particularly going anywhere just yet. But I think that if we really want to get across adapting to climate change in the north we need something in place in Northern Australia to address this.

One other small thing is that the National Health and Medical Research Council really ought to be looking at setting aside some money particularly for climate change related health research. It is going to be a major thing for the whole of Australia coming into the future.

In relation to the cross-jurisdictional resource, I will just mention one example. Charles Darwin University is leading an effort to pull together a consortium of action along with the Reef and Rainforest Research Centre, NAILSMA and, here, the North Australian Emerging Infectious Diseases Alliance along with the national climate change research foundation and tropical rivers. They are trying to pull something together to create a cross-jurisdictional resource that can come up with solutions that are appropriate for Northern Australia. Thank you very much.

**CHAIR**—Thank you very much. To try to follow on thematically, if we could, we might leave the councils, the business community and the planning issues until the end. Would anyone like to

follow on from Dr Skov so that we can deal with those broader issues and then some of the planning issues?

**Prof. Garnett**—Certainly. I would like to table some pictures. What these show is the sea level rises at a number of points around cities. They show the sea level rise around Darwin and Nhulunbuy under conditions when Greenland melts. We do not know when that will be, but I understand that there is enough heat in the atmosphere to make it inevitable and, therefore, the sorts of planning we need to do in the long term, particularly for infrastructure, has to take that into account. There is only going to be a shallow channel between here and the airport but eventually boats will be needed.

**CHAIR**—Sorry—I missed that.

**Prof. Garnett**—The sorts of sea level rises will take in substantial proportions of Darwin and Nhulunbuy as they exist at the moment. Those seem to be the most vulnerable communities.

**CHAIR**—How high will the sea level have to rise to have the impact that you are talking about?

**Prof. Garnett**—It is talking about seven metres on top of the high tide at the moment.

**CHAIR**—Which is much higher than the IPCC.

**Prof. Garnett**—Yes, it is much higher than the IPCC.

**CHAIR**—But not out of the realm of possibility?

**Prof. Garnett**—They are predicting it for the next century. This is a prediction at a point when Greenland melts. By the time that happens the mining in Gove is likely to have finished because the mining resource will be mined out. But those communities will still be vulnerable. There is less infrastructure in Indigenous communities, and in talking to Indigenous people they have stories of when the sea level last rose. There are many important freshwater sites offshore from when the sea level last came up. So they talk of adaptation but in fact many of their coastal plains, as Steve was suggesting, are important sources of protein in particular and they are likely to become more so as food prices go up. There is a strong dependence in some communities on those food resources from the flood plains that continues.

The biggest risk here is probably cyclones. The models are very uncertain about the cyclone frequency. There is a suggestion of greater intensity. It is something that is going to happen to Darwin again at some stage. At the moment it is hard to know how well we are prepared for that. Supposedly, the government, in the event of a Tracy-like event would move to Alice Springs. There is not the capacity in Alice Springs to absorb a government at the moment. We have limited lines of retreat in terms of one access to the place. The contingency plans in terms of that sort of natural disaster, particularly with a storm surge on top of the high tide, are not particularly strong.

You have been to Kakadu and seen the wetlands. I was out at Kakadu the other day talking about the inevitability of those turning into mangroves in the relatively near future because they

are so flat and so near to the sea. Those flood plains will be reshaped as the sea rises. I suggested there should be concentration of management effort on those freshwater wetlands that are going to disappear last of all. If they are going to put investment in they should have cyclone contingency plans because, if a cyclone goes through, there will be greater disturbance and greater opportunities for invasive weeds, which are probably one of the biggest threats across the whole of Kakadu. Because of its inevitability they are going to have to think of their marketing strategy as being a place that has adapted to climate change in the past, which it has, and which is doing now and will do in the future, rather than just being somewhere to go and see the water park and wetlands.

**Dr Blanch**—Broadly, we have greater opportunity across Northern Australia to address climate change risk and build resilience in the natural environment, our social systems and the economy than in the south. Typically, from an environmental point of view, most of our land is not cleared and most of our rivers are not dammed. That has built in the resilience that helps to withstand the shocks of climate change, whether it be high temperatures, sea level rise or greater cyclonic activity. So in terms of our natural resilience we are in a much better position here in the north than, for example, in the Murray-Darling or in south-west Western Australia.

One of the challenges that has always bedevilled the north is, as Steve said, that there are three jurisdictions and the Commonwealth—resulting in significant legal and jurisdictional issues. It is not like a river catchment, as is the Murray-Darling Basin or the Lake Eyre Basin, and that has always made it difficult for governments to collaborate between the four key governments as well as local government and catchment bodies across the jurisdictions. It would be worth revisiting some sort of institutional arrangements, perhaps modelled on, for example, the Lake Eyre Basin Ministerial Forum. The north, say from Cairns to Broome, is about 150 million hectares of tropical savanna, most of which are within 100 or 200 kilometres of the coast. There are major rivers, marine ecosystems and coastal areas. Through, for example, an intergovernmental agreement at the COAG level we could bring in climate change resilience, Indigenous futures, tropical health, environmental matters, oil and gas and the mining sector.

I will go through some of the references. In terms of existing policies and programs, from an environmental point of view, the Environment Protection and Biodiversity Conservation Act is not much implemented here in the north. We have a lot to do with the federal environment department in Canberra and they are always scratching their heads as to how to look at their jurisdiction here in the north. Thankfully, we do not have a lot of threatened species or endangered communities here for them to have an increased role in terms of assessment, but there could be some way, through the review of the EPBC Act, which is due, to look at enhanced strategic environmental assessment capacity for the federal environment department by using bioregional planning, which has never been used in terrestrial environments. That could be rolled out in part in some of the areas in the north.

The north is identified by many federal programs as a priority; for example, the Indigenous Protected Areas program, which seems to be working quite well in the north. The Indigenous rangers' commitments by Labor leading up to the election is very well received by most Indigenous communities. A lot of the targets for the federal National Reserve System—all the national parks and Indigenous protected areas—are here in the north because we do not have as many national parks, for example. Looking after nature, whether it is terrestrial, rivers or the

marine areas helps build capacity to manage the climate change shocks in the next century, so revisiting and strengthening those efforts as an existing policy is something to look at.

Interestingly, excluding the Coburg Marine Park north of Darwin, there are no marine parks between the tip of Cape York and Broome in the federal jurisdiction or in the state and territory jurisdictions. And yet, more and more of the focus is here for the Northern Australian task force and the Office of Northern Australia, given the increasing potential for invasive species to invade south of the equator. Marine parks are a way, whether Indigenous or non-Indigenous managed parks, to help people to get access to country to look for new invasive species, to look for illegal fishing entry and to have people out on the land and sea country earning a living—having a job. Having a ranger station or base to work from is very important.

The other obvious one is the Natural Resource Management Ministerial Council. There is a current policy being developed called the High Conservation Value Aquatic Ecosystems policy, which rolls out underneath the National Water Initiative. Essentially, it is the flip side of the Murray-Darling—what do you do with all the good rivers, estuaries and wetlands? The federal environment department will put something to the ministerial council next year.

If that goes well, a lot of that will be rolled out here in the north, because that is where most of our best rivers are, as you will know from going to Kakadu the other day. What does that mean in terms of the legal protection—which is obviously important—and also jobs and alternative development strategies that help earn wealth, create jobs and keep people in the country without going down the path of the Murray-Darling Basin? That is a key opportunity that ties in, I think, with the goals of this inquiry.

If you look at sea level rise impacts, our modelling indicates, based on the detailed modelling for the Kakadu region, that a 30- to 50-centimetre sea level rise by the end of this century would inundate or put at risk of salinisation around four to five million hectares of nationally important wetlands between the tip of Cape York and Broome, so it is very significant.

**CHAIR**—Whose modelling is that?

**Dr Blanch**—That is our modelling and that of ERISS, the federal environment department's office of supervising scientists, based here, which does a lot of modelling on sea level rise impacts. We go through the GIS analysis and look at—

**Dr WASHER**—Sorry to interrupt. That is half the world's current ice melted, though.

**Dr Blanch**—That is based, I think, on about a 30- to 50-centimetre sea level rise.

**Dr WASHER**—It would be seven metres of ice rise if we had melted the lot.

**Dr Blanch**—I am trying to take a very conservative figure. If it were seven metres, yes, it would be a lot. It would take you to the Arnhem Land escarpment. It is very significant—perhaps less so than the actual average sea level rise and the storm surges. If you get one or two storm surges that dump a lot of salt in there, it is very significant. A lot of that is locked in; we cannot do anything about it now. We cannot build those levees that they have at the Mary River from the tip of Cape York to Broome. You can do it in a few high-value assets. There is also the

issue of buying, and managing better, more protected areas further up the catchments. A lot of those will be on pastoral land. It is expensive cattle country; we cannot buy a lot. We need to work with cattlemen and Indigenous communities. It seems to me that there are not too many other opportunities. We think that maybe four million hectares of wetlands are at risk from mangrove invasion and salinisation by the end of the century. I will not say anything more, but it is very significant. We should build the natural assets through a comprehensive interjurisdictional agreement at the COAG level—I think that is the appropriate level to work at.

**Mr Roche**—I am very supportive of some of the comments made earlier. Thank you for the opportunity to speak. I am glad that you have been to Kakadu. I hope that you stopped by the Mary River on the way back. The saltwater inundation at the Mary River that has already occurred gives us a really good picture of what those millions of hectares will look like with only a very small rise in the sea level. I would like to say here that I believe the IPCC report significantly underestimates the risk that we are looking at and that the data in it is obviously derived from several years ago. The latest information that has come out, in the last 12 to 24 months, to me is significant—even overwhelming—in terms of taking much more significant action in response to the risk of climate change.

I would like to add to the comments of Professor Garnett and Dr Skov to say that the disproportionate impacts on coastal communities will be felt in remote Indigenous communities. We have the large centres of Darwin and Gove, but as the developed part of the Northern Territory they should at least have a greater capacity to adjust, whereas some of the remote Indigenous communities are obviously already challenged, so any additional challenges will bring further risks to those communities.

I was thinking of putting a Northern Territory perspective, since you are here. I was looking with interest at the Australian Network of Environmental Defenders Offices submission, which I heartily endorse. They brought up a range of things that we would need to deal with climate change on coastal issues. I will not go through the points. I was looking at part 2 of their submission. There were eight points there, including wildlife corridors, planning and environmental impact assessment, and basically I have a cross for each of those in the Northern Territory.

That brings me to this main point, which I will probably stick to. Professor Garnett put around some maps of what Darwin will look like with seven metres of sea rise. There is a map that you have probably all seen, but I can table it. It is a storm surge map of Darwin at the moment. Basically, the coloured area is the area of maximum storm surge risk. We are currently building in that storm surge area. Even without climate change, we are currently putting suburbs and industrial development in a storm surge area, which would indicate to me that, try as the Northern Territory might to keep up with its southern cousins and big brothers, we have a Chief Minister who is unashamedly pro development, and it occurs to me that one of the biggest threats to the Northern Territory is obviously not climate change per se but the way we respond to it.

At the moment, we are choosing to tackle climate change in a very compartmentalised way, where one small ministry looks at climate change whilst we are still developing inappropriately. A great example is the Inpex development, which you might have seen in the media in the last few days. Part of Inpex's gas proposal is going on in the white area that will stay above sea level

with current sea level rise in a storm surge. The rest of it is actually in the wet areas. Again, this is without climate change. So it seems to me that the Northern Territory government's actions make the case more effectively than I can for federal engagement on climate change issues. Clearly, we have major risk to our population centres. We have major risks to our significant environmental areas. And we continue to grow in a way that is inappropriate now with even 20 centimetres let alone two metres or more of sea level rise.

I suppose I am inviting the federal government to come in here and make sure that there are policies, procedures and legislation in place, so that we are actually planning a society. The difference here in the Northern Territory is that we have not fully developed. Obviously, we are a very small population. We have the opportunity here to build communities in the knowledge that climate change is coming, rather than in the south where they are trying to build walls to stop the sea water coming in. We can actually place our developments here in appropriate locations now rather than trying to retrofit them in 20 or 30 years time. That will be enough from me.

**CHAIR**—Thank you. Before we move on to the next presenters, I guess one thing that is strikingly obvious about the Northern Territory is that the system of planning and land management use is quite different to the that of the states and other areas that we visited, so that presents a different set of challenges. Steve, maybe we could hear from the Planning Institute and then we will go to the level of the two councils. Would you like to say something from the perspective of the Planning Institute?

**Mr Popple**—Sure. You have to pity us poor planners, I think! The national office of the Planning Institute has made a written submission to the inquiry, so I am here today representing the Northern Territory division. Our members are comprised mainly from the public sector, although some work in the private sector. We are pretty much at the pointy end of policy, if you like. We are the ones who have to decide on a daily basis whether a development for a house or whatever that could be affected by storm surge should be approved or not. To support our processes, we need to have fairly robust policy behind us, because, if we do not, we very easily end up in the tribunal having to argue the case as to why development has been refused. Unfortunately, some of the supporting data is not robust enough at this stage to support refusal of proposals that we would like to see refused. So the institute would really like to encourage a lot more research and modelling to be done into really good, strong data about what the effects would be of higher storm surge levels or a substantial decrease in rainfall, cyclone intensity and those sorts of things. It is fairly challenging.

Unfortunately, planning does not operate in a vacuum. We also have to contend against issues like affordable housing and competitiveness. Seeing as you are striving to take developmental rights away from someone on the basis of climate change, you really need to have some strong policy and information sitting behind you to support that. It is an evolving situation and it certainly is not easy. We would really like to encourage more of a risk management approach to the whole climate change issue and make certain that it is firmly supported in policy so that we can deliver it on a daily basis.

I guess we are also looking for more training for planners. The institute has started a series of climate change workshops around the country to try to update planners' skills in terms of climate change so that they are more aware of the issues and how they can be addressed. The institute was fairly interested to see the decision that came down last week by the Victorian Civil and

Administrative Tribunal with regard to the subdivision proposal that had the potential to be impacted by climate change. That was very interesting. That was the first time we had seen that and I think that it is something we could take on board more.

What we are really looking for are some more effective ways of including mitigation strategies into the regulatory environment and also into the strategic planning to ensure that we are getting the right mix of development in the right locations and that it can take on board the impacts of climate change. A good example is the Darwin rural area, which is within the greater Darwin area, where we have about 3,000 properties that rely solely on groundwater for their drinking water—each property has a bore. The modelling is telling us that there is an increased drawdown on that groundwater every year and with the decrease in rainfall there could be a great propensity for those bores to fail, which would mean we would have residences without access to drinking water—which is a significant cost to government in the long run. That sort of thing is just one example of where we need that modelling and data to help us make good decisions. The sooner we can get the policy to reflect that the better placed we will be to respond. As other people have mentioned, development is going on every day of the week and every day of the week we have to make decisions. Some of these developments can be there for a long time. They can be fairly substantial developments. These are the key issues we wanted to bring along.

**CHAIR**—We might turn to Graeme as the Lord Mayor of Darwin. Do the city councils in Darwin and in Palmerston have any direct planning responsibilities for development?

**Mr Sawyer**—Sadly, no.

**CHAIR**—I just wanted to make sure that I had that right.

**Mr Sawyer**—That is a big part of the reason why it is in such a mess. There are a number of different issues for us. In particular and right at the top level of those—and there is a report which we have had commissioned on this—is coastal erosion. We have a copy of it here for the group. It was done by the Centre for Regional Climate Change Studies and shows some quite alarming erosion rates already around the coastline of Darwin which may or may not be increasing due to global warming at this point in time. It also paints quite an alarming picture of what the future will be given some of the sea change scenarios that come with that and the impact on our coast. There are obviously issues around the inundation of low-lying areas, as has been mentioned already, but there is also a rapidly increasing erosion factor on the high-lying areas as well, which has significant implications for us in the short to medium term—things like Nightcliff Swimming Pool ending up as a saltwater pool, not because we pump salt water in but because it falls off the cliff. This is quite feasible under that scenario.

We have put in some funding and I note that the federal government has identified Darwin Harbour as a priority hot spot and that includes the area around it, not just Darwin Harbour itself. We have put in for a Caring for our Country grant to extend that research and have it followed through properly. We are quite keen to become involved with all the other groups that are involved in similar studies so we can compare the resources and the information that we have got.

On a number of other levels too we are really keen to build the relationship between the federal government and local government in terms of generating a response to this. Adaptability

is obviously the single biggest issue in terms of coping with climate change. We think that local government is in an extremely well placed position to assist with the community attitudinal changes that need to be generated to make this stuff happen, in getting people to understand what the issues are and why they should change and what the actual behavioural things they need to do are. Because local government has that close relationship with the community we are well placed to do that. We are already starting on some of those processes in council at a quite simple level—for example, the liveability of the city and what you need to do to Darwin to make it more comfortable on a 36-degree day. Those sorts of issues are already part of our planning and thinking and are starting to come through in our activities. Some people would have seen the master plan for Cavanaugh Street. At a really base level they are some of the responses that we need to get in place quite quickly.

There are other issues on a broader scale that we also want a dialogue with the federal government on. Some of them have already been mentioned here. Darwin has already seen some negative impacts from people moving into the city from remote communities. The potential for that type of disruption and the potential for refugees from climate change and how all that is managed needs to be looked at quite significantly. Whilst it is not something that is going to happen in a hurry, it might happen a lot quicker than we hoped it would, so we need to make sure that there are plans in place to deal with some of those sorts of things.

There are issues about building codes and a whole range of other things that which are not directly our responsibility. We have an Australian standard building code which applies in the Northern Territory, and it would seem pretty stupid to apply it in the tropics in the same way as you do down south, because I know from personal experience that it does not work. We really need to be smart when we are dealing with a lot of these policy issues about all sorts of areas of climate change and not think that a one-brand-fits-all approach is going to do for Australia, because north of the tropics, and particularly up here, there are an enormous number of issues that are quite different, ranging from water through to the way you design a house so that you can live in it and take advantage of the dry season and evening breezes. So there are a range of issues at that level about which we would be really keen have dialogue with the federal government and other agencies that are developing these policies to make sure that we do not get policies that do not make sense up here. I think they are the main things, aren't they, Pam?

**Ms Robinson**—Maybe there are a couple of things.

**CHAIR**—We had in our briefing notes that the Darwin council had developed an environmental management plan after consultation with the community. You might like to say something about that for the *Hansard* record, Pam.

**Ms Robinson**—Just to add a little bit of perspective, I have been in this position for five weeks. I was up here in 2005 when that was being developed on a consultancy basis, so I am familiar with it. It in fact goes down to quite succinct areas around Darwin and around the coast, so different things could be looked at very closely and brought back to the local level, as well as looking at a wider area. The environmental management plan is available and we can certainly provide that. A lot of what has been said so far has been picked up in some very good joint things that are happening. In fact, out of the background and backbone of that environmental plan, council has looked at a range of things that they can do in building, planning, addressing waste—in addressing quite a few different things. It has an atlas that goes with it in that sense.

There are a couple of things just to follow on from that. What I have seen in the short time I have been here—I have also been writing applications for funding as part of my role—is very good cooperation. There are frustrations between the different levels. I think it is an important time and that each does not pick each other off as to who has the best science or who has the best research. I think some of the things that have been said today about getting together in some way on that are really good. For instance, the applications we did for Community Coastcare 2008 did have the backing of the Northern Territory Department of NRETA, but, prior to that, the minister, the Northern Territory government, was prepared to support it. The coastline is made up of Darwin City Council, Northern Territory government, the Australian government through Defence, and the Larakia peoples, so there is quite a range. All of that support came through, as well as from the NGOs we approached. There is a lot of cooperation.

One of the confusions, I think—and I would like it taken back to the Commonwealth—is on one level through the new Caring for our Country programs, with Darwin Harbour being a priority hot spot. Equally in June there was a media release about \$2.8 million to help our coast adapt to climate change. It mentioned, I think, every capital city except Darwin. I have a copy of that. That came from Minister Wong's portfolio. We have written a letter and I will give you a copy of it. We did not expect that we would necessarily have a reply at this stage, but what we have really said is that, given that sort of thing—of saying on the one hand that it is a hot spot—it is really important that it gets included in work that might be done. I just wanted to draw that to your attention as well.

I think that what the lord mayor mentioned about the things that Darwin City is looking at is really where it is. It is very much because of local government approach from the community that we are going to have to do a lot with climate change community adaptation. In some areas the community is ahead of where we are ready to work with that, and I think we need to keep that in mind as well. There are many other things, but on the biodiversity side of things that I have mentioned, Darwin City Council is well across a lot of those.

**CHAIR**—Thank you. We will now hear from the Mayor of Palmerston City Council.

**Mr Cercarelli**—I am the director of technical services.

**CHAIR**—Sorry. I have promoted you, have I!

**Mr Cercarelli**—Our mayor might take offence!

**CHAIR**—So you have decided not to run for mayor! Sorry, Luccio.

**Mr Cercarelli**—No, you're right. Thank you for this opportunity to speak. I am not as well prepared as I would like due to a timing issue.

I might just break this down a bit. We have heard a lot today about the effects of climate change, and we support a lot of the comments that have been made today. To give you a perspective from a much smaller city, Palmerston is located approximately 21 kilometres from Darwin and covers an area of approximately 52 square kilometres. We adjoin the Elizabeth River, which forms part of the catchment area for Darwin Harbour, so we support Darwin's and

the territory and federal governments' move to do work on Darwin Harbour and its catchment area.

We currently have a population of 26,000 to 27,000 people and we are approximately 50 per cent through our development. We see an opportunity to really put some things on the ground that can make a significant change and to build a community that is actually forward thinking in addressing climate change, as opposed to trying to retrofit it, as was mentioned earlier. We are very conscious, however, about affordable housing. We have a very young demographic. We were originally seen as a first homebuyer location; however, if you go out to Palmerston today there are a lot of homes that are outside that affordability range—and as to what exactly is affordable is a discussion in itself.

When we talk about climate change and the infrastructure that we should put into place to minimise its impact, to minimise our footprint as we develop, we start to add to that affordability issue. We need to have a good explanation for the mums and dads. There seems to be a lot of debate; we need to get all levels of government together to engage the community and to bring them along with us. The engagement of the community is something that we see as very important. We did a minor environmental survey not long ago as part of a grant submission and we found that the majority of our community understood the effects of climate change and their impact on the environment. However, very few people would actually take on change to reduce that impact. Transportation and rising fuel costs, for example, are big issues in the Northern Territory. When we asked: 'Do you think that catching a bus would reduce the impact on climate change?' everyone said yes. When we asked: 'Would you catch a bus?' the majority said no. I am happy to make that survey available to this group. So affordable housing is something that we are conscious of, and we are also conscious of finding that balance. It needs all three levels of government—federal, state and territory—to work together to engage with the community and to bring the community along with us, because if the community does not understand what we are doing we will never implement these things.

Other concerns for us are emergency services and the potential for cyclones and what impact that has on us. The development of infrastructure is very important to us and we have been doing some work recently with the Northern Territory government. I support Darwin City Council's comment that even though there are barriers between levels of government there are people who are working towards bringing those barriers down.

We have been working on water sensitive urban design. In the territory, councils are not responsible for the provision of domestic water; however, we play a role in talking to our community. Especially here in the tropics where people see a lot of rainfall, it is very hard to convince them that we need to have change and that we need to start thinking smart about the way we use water. We have heard about groundwater issues and draw down. Our city relies a lot on groundwater to irrigate its open spaces. We are trying to rationalise that and to bring the community along on that ride—to make them understand that we do not necessarily need to have every piece of open space that we own as green park. It is a very difficult measure because they just do not understand the need to preserve water now for the future.

We have a lot of transient people coming into our municipality who move up from interstate and we need to capture that ability. They are coming from a culture, I suppose, that is wise about the use of water. We need to keep that culture. They change very quickly. We find that they

communicate with us very quickly in the first few instances about people washing boats and cars on concrete but within a month or two they are probably doing the same thing. Water-sensitive urban design is something that we have been focusing on in recent times. We have been working with the Northern Territory government in line with that. However, even amongst the planners, engineers, private industry, government and councils, it is very hard to get a consensus at this level about the effectiveness of water-sensitive urban design in the tropical arena that we are in.

That is probably all I can add to what has been said. The main point is community engagement; we need to bring the community along. There are opportunities, as has been stated, for good strategic land-use planning, which I think is lacking in the Territory. We have 50 per cent of our community left to develop, and there is a great opportunity to put things in place right, but it does require all levels of government to work together because we do not control planning, we do not control building and we do not control land release. The land is owned by the Northern Territory government—by the Crown—and released at their discretion. There needs to be that cooperation at all those levels. It is happening; it just needs to happen at a greater pace. We need to ensure that we have a balance of affordable housing. Otherwise we just make it beyond the reach of the normal mums and dads that are our community and that create our city and our lifestyle. That is all I have to say.

**CHAIR**—Thank you. Mr Roussos, you are last on the list, so over to you.

**Mr Roussos**—Thank you. I very much appreciate the opportunity to represent the chamber of commerce here, although I have had limited opportunity to consult the membership on the matters before you, which are very significant. Having said this, that I appear today at short notice indicates the importance which the chamber attaches to these issues. I thank our member, the member for Solomon, Damian Hale, for the invitation.

The chamber is the leading business organisation in the Territory. It represents 1,200 businesses across the Northern Territory, including the coastal communities of Darwin and Nhulunbuy. Our membership is principally small to medium businesses operating across a diverse range of industries, including manufacturing and exports. The business community, as you would appreciate, reflects the community where it resides, and the economic wellbeing of the business community produces economic outcomes for the community more broadly. Development is part of that. Having said this, the health of the business community relies on a sustainable community and, accordingly, the chamber recognises the need to address the impact of climate change on the coastal environment. We want to play a role in dealing with the issues of climate change and the impact it has on the coastal environment here in the Territory.

In order to contribute meaningfully and sensibly, the chamber requires fundamental information that assists us in making sensible decisions—information that it can understand—about the risks. For much of this information we rely on the resources of government. In particular, we rely on information to enable the chamber and its members to take action to withstand and recover from extreme weather events. Some of the issues we want consultation about include: the availability of insurance for property and other assets, ensuring affordable insurance products to manage the risks, particularly of flood and storm surge; decisions regarding the planning framework, which is important to enable business to make long-term investment decisions since, as long as we know the rules, we can make decisions about that; involvement of the chamber in the review of building standards and planning codes; access to

accurate storm surge and flood maps; and consultation regarding emergency services and natural hazards mitigation.

**CHAIR**—Thank you very much for your contributions and your opening remarks. It is the usual procedure that we have a period of question time and then engage in discussion between the submitters and members of the committee. To clarify something for the committee, as I understand it, the planning powers essentially reside with the government through the minister. But I read that in March 2008 the Environment Protection Authority was created. If you look at the guidelines for the assessment of projects, the guidelines appear to be quite strict in terms of looking at the impacts of climate change. They go to increasing average temperature, variation in rainfall, increased incidence of flood, sea level rise, increased frequency and intensity of cyclones and storm surges and altered distribution of pests and diseases. So it seems that those requirements, and particularly the specification of sea level rise against which projects are theoretically going to be assessed, are quite stringent. Yet, from what you are saying, the reality appears a little bit different to my understanding. Maybe I have got that wrong. So would someone like to enlighten us?

**Mr Sawyer**—The biggest issue there is that the planning authority controls the implementation of the planning act at the moment, but on the other front the EPA has to be invited before it can make comment.

**Ms Robinson**—It is different to other states. It does not have the same teeth as other sorts of slightly different—

**CHAIR**—So it is not a totally independent statutory authority—

**Ms Robinson**—It is not like the Victorian EPA at all.

**CHAIR**—that proposes things on its own. It only gets involved if the minister chooses to refer a matter to it.

**Mr Roche**—The Environment Centre put in lengthy submissions throughout the process for the EPA. It is an independent EPA, in that it has an independent board. But it does not assess proposals. It looks at legislation and makes recommendations about changes. At the moment, it is reviewing the Environmental Assessment Act, which is the act that we use to assess environmental impacts in the Northern Territory, and it will make recommendations about what might need to be changed in the future. That will take approximately the next 12 months. So we have an environmental protection authority that does not assess major developments. Speaking plainly here, we have just had an election decided. The Chief Minister went to the public saying, ‘We’re going to put a major gas development in Darwin harbour.’ The bureaucrats within government are the ones who assess that proposal and decide whether it is okay environmentally and can proceed. There is no independent environmental assessment. If there is overwhelming very high-level support for a project, it is difficult to see those factors—including climate change, and I will here take on Steve’s comments about the lack of science in terms of factoring in climate change to decision making—being given sufficient merit in that process.

**CHAIR**—Does the current Environmental Assessment Act 1994 require that developments meet the criteria that I enumerated earlier or is this something that is now being looked at for possible amendments to the acts?

**Mr Roche**—The guidelines are crucial. The guidelines to a particular proposal set out what the environmental impact assessment has to cover. The act is more of an instrument that sets up that process, I suppose. In this case, the guidelines are crucial for a development. If you are referring to the current one in the harbour—the proposal for which I have not quite read as it only came out today—it seems like there are points in there to do with climate change. But I again draw your attention to the map. The Northern Territory government selected the site for this particular proposal on the basis that it was already in a storm surge zone, so there seems little likelihood of the sea level rise that Steven was talking about being taken into account.

**Dr Blanch**—For smaller developments that do not trigger high levels of environmental assessment, the planning act is critical. Under matters to be taken into consideration by the minister or a delegated official, section 51, I am not aware of any explicit requirement for a decision maker to take into account the impacts of climate change; nor does it require the decision maker to take into account greenhouse gas emissions from a decision—for example, major land clearing, which is another issue of importance to the government. So the planning act, which probably deals with more bread and butter issues, is very significant. The guidelines and the regulations underneath that may require that but it is not actually in the substantive provisions of the planning act.

**CHAIR**—As I understand from some comments made by Mr Dreyfus, unlike other states there is no right for community appeal or intervention in a legal sense.

**Dr Blanch**—I am not sure if I am aware of open-standing provisions, but they have certainly been improved since Labor took office in 2001. But where there are provisions for appeal to the Land Tribunal or to a higher court, it is largely from the applicant, certainly not open standing.

**CHAIR**—Not third-party intervention.

**Dr Blanch**—Generally no. That is not my understanding. I think Indigenous communities have a greater degree of standing—for example, under the Mining Management Act—but often you do not even have objector appeals to a tribunal or to a court, let alone open standing. I think they are concerned about the floodgate issue and think they will be overwhelmed in court by endless litigation, which I think is a bit of a furphy.

**CHAIR**—So, if a community assess that a proposal for development along the coastline is inappropriate, what is their recourse?

**Dr Blanch**—Depending on what sort of development and under what act it is being considered, you can appeal through the lodgement of a submission objecting to the proposal to the Development Consent Authority, to the minister. But it generally does not go much past that if it is just a matter being considered under the Planning Act. There are greater standing provisions under the other environmental assessment acts.

**CHAIR**—Okay. That is a little bit clearer. It is just so different to other jurisdictions.

**Ms Robinson**—Yes, and I think actually it is coming up very quickly. It is moving on from where it was when I was here in 2005, when really it was quite far back from the last of the other states to set EPAs up. Things are happening very quickly now, but at the same time, from my observation, given the enormity of what we are talking about now, it is still behind where things are at that need to be dealt with, and I think that is a very major thing for all parties who are here, who are from a diverse range of interests—a collective range as well. I do think that it is something that, from my observation, probably needs to develop into EPA having a greater part. Some people would say there are some advantages in not having an EPA, if you look at some of the states, but really mostly I would not agree with that. I think it is the other way around now, given where we are at.

**Mrs IRWIN**—I have a follow-on question to Charles. Tell me if I am wrong. You stated that some building applications are being approved on unsuitable land. I think, Pam, you were saying that you have seen a great difference from 2005 to 2008, since you have been back up here in the Territory, and I have seen a big difference just walking around the town centre—the development of these new homes that I believe are close to \$500,000 or \$1 million, right on the shoreline. Does the Northern Territory government have a national disaster emergency plan in place specifically for the coast? If we had another Cyclone Tracy—and I cannot get over the multistorey buildings that are being built here in Darwin—how would they go with a cyclone? There was the one similar to Tracy that did not hit Darwin a number of months ago.

**Mr Roche**—I think it is a great question. I think I should let someone from the Darwin City Council or the Palmerston City Council answer that. They would be in a better position to answer that.

**Mr Sawyer**—The engineers assure us that they will stand up. I do not believe them, but they assure us.

**Dr Skov**—To category 4 or category 5?

**Mr Cercarelli**—My understanding is that there is an emergency plan in place that the government instigates that involves a number of groups, including Health, engineering and so forth, in the case of a cyclone or other natural disaster. It has not been tested in the time that I have been with council. We have come close a number of times, with Monica and a few others coming by and giving us a bit of a blow, the most recent one being a category 1, I think—

**Mr Hale**—Category 2.

**Mr Cercarelli**—A category 2 that came across in January that we experienced in Palmerston, mainly with the loss of a lot of trees. We had a damage bill of over \$100,000 just from vegetation, and it was only a category 2, potentially a category 1 by the time the winds came through us.

**Ms Robinson**—I have a quick observation. I think it is important that you do not go away with any sense that there are not very good building codes. As in any place, obviously some buildings will be better than others. The thing is that some of the ornamentation that is going on some of the buildings would become missiles in such a situation, such as small tin louvres over windows for attractiveness sake. That is the area within some of the building codes that maybe

needs to be considered, because, as soon as the cyclone warning goes out, the immediate thing for councils is that they have to go into overdrive to get rid of any missiles. Everybody has to have an enormous clean-up of their gardens. That would maybe be the part of the development that needs to be considered.

**Mr Cercarelli**—I think legislation is one way of getting changes to houses—if we even just focus on homes in Palmerston—so that they are more environmentally friendly. But another big driver is the community, the purchaser. There is normally an upfront cost, but you need to convince the purchaser that there is a long-term benefit not just to the environment but also to them in the hip pocket to have an energy efficient rating on their appliances, to have water efficient gardens, just simple things like that. If we get the consumer driving that—it is a bit like recycling—eventually the house builders and the like may come along. I am not saying that we should not have legislation, but if we simply legislate we may end up in tribunals all the time, debating with developers. The data is vast; we do not have a clear guideline as to what we should achieve for temperature change or the building footprint on the environment. So we need to think about both arms: legislating, as well as bringing in the community. The community has great power over what happens.

In Palmerston we have the new suburb of Bellamack coming online. As I said, we are talking with the government about water sensitive urban design in partnership with them, so it is not all negative. We are working with them. When you get to the bottom line and you see what that does to the cost of development, convincing the community and others that it is money well spent, that it goes onto the price of their land, is a task in itself. You need that information, that supporting data, to get there. People come over here and see the rain coming down in buckets at times and they just do not understand that we have potential groundwater issues. As Darwin and its outer regions grow, the potential to have water supply issues is quite great, especially with climate change.

**CHAIR**—Do you have mandatory codes like we have in New South Wales—the basics code? Do you have that here in the Territory too, where you have to have a rainwater tank?

**Mr Sawyer**—We do not have those in place yet, but the building codes are quite strong in relation to the cyclone coding.

**CHAIR**—But you do not have the energy efficiency or water efficiency mandatory requirements?

**Mr Sawyer**—Not yet.

**Mr Cercarelli**—It is a matter of sharing information too. I notice that in the Australian Local Government Association of the Northern Territory submission, the LGANT submission, they talk about the dissemination of information. It was mentioned a few times. It is important. We are in the tropics. We were talking about rainwater tanks. We get three months of heavy rain and then we get relatively dry weather, so you need relatively large tanks. With assistance at all levels of government, we need to think about what are some of the simpler things that we can put into households—greywater systems, for example. We are a small population. The population of Darwin, Palmerston and the rural area—correct me if I am wrong; someone give me some assistance here—is about 120,000. We are not talking about a large catchment. To even

convert our sewerage system into greywater is complicated. To plumb into houses for toilets and the like and the irrigation of yards, the sheer cost of that, given our size, compared to larger cities where the populations are a lot denser, is a barrier to us. It comes back to sustainability and affordable housing. We want to do the right thing, but trying to get there and bring the community along with us to convince them that they should be doing these things is a challenge in itself. I do not think that governments are doing enough to do that. There is a lot of scientific argument out there but nobody puts it in plain English, for want of a better term, for the normal person who is going to buy a simple light globe. You go into a shop and there are a variety of light globes in there.

**CHAIR**—So the codes apply to commercial development but not residential, or do you have some basic codes for residential development too?

**Mr Sawyer**—They do not go down to the level of water tanks and the things you are talking about, but they are quite strong. One of our problems up here that I mentioned earlier is that the Australian building standards, which are applied to our buildings, are predicated on heating and cooling, which does not make sense. For example, when I want to build an extension with a big window in it so that I can not have an air conditioner for seven months of the year, they do not let me.

**CHAIR**—So it is the one-size-fits-all approach.

**Ms LIVERMORE**—Where is your water supply from in Palmerston or Darwin and do people pay water rates? Does the average household pay for their water?

**Mr Sawyer**—Our water authority controls the water and the payments for that. Basically, it comes from the Darwin River dam with supplement from some borefields in the rural area.

**Mr Cercarelli**—They have done some recent work in surveying the community, which is available on their website and provides some very interesting results about water usage behaviour in the Territory. They were trying to get a gauge. That is available on their website. I just happen to know because I had a look at it. In Palmerston we use a lot of groundwater, a lot of the aquifer, to irrigate our public open spaces as I said and we are very conscious of the effect we may be having on that. We have been doing work with the Northern Territory government about the potential to use greywater on open spaces and we are progressing that. It is just taking some time, but we are looking at our future developments. We are hoping that if we can get it right, we will get a level of balance in there such that in our future developments we have an opportunity to put it in the ground and not try to retrofit, which is very expensive.

**Ms LIVERMORE**—So people do pay for their water?

**Mr Sawyer**—From our point of view we have asked the government to look at the project being planned at the moment to redirect one of our sewerage outlets, which at the moment puts raw sewage into Darwin Harbour, back to a treatment plant. At the same time as that is happening we have asked them to look at the possibility of putting in a water treatment process to give us recycled water back the other way. At the moment, we spend over a million dollars a year putting perfectly good drinking water on parks.

**Mr Roche**—I think that the approach to water in the Territory is probably best summed up by the fact that it is the only place in Australia where you water your parks and gardens during the day and your roads at night. That is pretty typical. When you fly into Darwin, you will see us watering roads at night.

**CHAIR**—Is groundwater being used on the mango plantations that you see as you drive into Darwin from Kakadu?

**Prof. Garnett**—Yes. Groundwater does recharge each year. It gets drawn down further each year as well.

**Dr Blanch**—The direct impacts of climate change will be significant around those issues that we have mentioned, but the shorter term impacts are probably the indirect impacts such as increased water use because it is getting hotter, increased energy use because of airconditioning and that will have roll-on impacts in terms of more pressure for dams and more pressure for fossil fuel powered power stations. This is, I think, a challenge for the Territory government because there is an avowedly pro-development stance. That is not necessarily a bad thing; it is how you develop. As Graeme said there is pressure for more water. We do not recycle much. I think we have five or six sewerage treatment plants around the harbour; they all discharge into the harbour. Yet in other states there is a very strong discussion around desalination and indirect potable reuse. We have not had that discussion much here. It is seen as the preserve of the elites or the loonies and yet at the same time the Power and Water Corporation, the GOC responsible for power and water, is actively planning to dam the Adelaide River, which is one of our best rivers, with a \$150 million dam. Yet we have very little public discussion about turning around our five sewerage treatment plants and reusing it on our parks and gardens, selling it to the mango producers and putting it on to non-potable uses. Similarly, we have a lot of pressure for more energy. Power and Water think they have a narrow window to harvest more energy and Blacktip gas will come on soon, but they are not adequately and quickly looking at solar, for example.

**Ms LIVERMORE**—No-one here can really answer it, but I am just wondering what happens to power and energy when the mandatory renewable energy target gets increased.

**Dr Blanch**—They are doing some good stuff on solar but it is in Indigenous communities; it is small-scale. Here, in the Katherine-Darwin grid, which is isolated from the major electricity grids on the east and west coasts, there is a very big question mark in their mind. They are looking at solar but they are very nervous about it because of the cost. I think there is a preponderance of view that they look at buying RECs from down south. Walk outside and look up. It is sunny for eight months of the year. I think it partly is, of course, that they always think that Canberra will bail them out on some of these major issues, whether financially or whether in terms of disaster relief, as per post-Cyclone Tracy and the Indigenous intervention. They will help us out on the emissions trading system or the mandatory renewable energy target. But if there is any jurisdiction that could have baseload solar power for 120,000 people on the Katherine-Darwin grid, this is the one.

**Dr WASHER**—I want to ask a bit more about water and the aquifer. Certainly, in the west—and there is an example there—we are now starting to recycle some of the water in our big sewerage systems and reinject into the underground aquifers. Have there been any plans looking

at this? Also, could you tell us a bit more about your rainfall? We actually thought that climate change was going to improve your rainfall and you would be the food bowl here in the north, seeing as the Murray-Darling is drying up. From what you are telling me, you are battling with your own water issues at the moment. Can you talk about water? Australia's No. 1 problem, beyond salinity, is fresh water. If it is going to get worse, we would like to hear about it. Can someone elaborate on water? What is your rainfall, your catchments, your aquifer, your depths, the quality of the water et cetera?

**Dr Blanch**—It is a misnomer that they call this the wet-dry tropics; it is actually the 'dry-wet' tropics. We are a desert for six to eight months of the year, then it rains a lot and people get flooded. By June, most of the rivers are empty. There is not much discussion yet around aquifer reinjection. We are not even at the stage of thinking we are overallocating many of our aquifers. That is a difficult issue for government to discuss with people who have had a bore and been able to pump it whenever they want at a high rate and have never paid too much for it or been accountable for it. I think where you and the Gngangara Mound in the west are is a ways down the track.

I think of the discussion we had about climate change refugees. The first climate change refugees have already started arriving. They are not from countries to our north; they are from the Murray-Darling Basin or the wheat belt in the west. I meet them on a fortnightly basis. They believe, at the urging of some people in the south, that there is all this excess water that is going to waste, that there is all this land that is not being put to the productive use of the country and that here is the food bowl of Asia waiting to happen. It is never going to happen. We are going to have some more irrigation and agriculture but it will never be a food bowl and it is going to damage a lot of Indigenous communities, fishing and tourism interests, not to mention our ecosystems by trying to do that.

I think the Territory government have come a long way in trying to do water planning for some of the irrigation areas. They struggled to do urban planning. We have the cheapest price of water in the country at 69c a kilolitre. I think in Sydney they pay \$1.20 and in Melbourne something like \$1.30. We have never had water restriction. We do not have a peak stakeholder water consultation group for government. There is very little engagement with power and water on some of their water planning and government are concerned with how to regulate their own government owned corporation. We do not have a water strategy that links urban, rural and Indigenous communities. So I think we have suffered from this view that there is endless water and that we will never run out of water. That is not, in fact, the case.

**Prof. Garnett**—This concept of the food bowl of the north is based partly on the misconception about the amount of suitable soil there is up here. The pattern of rainfall makes horticulture very difficult here. Even though you have the rain, it is broken up even through the wet season. This means that many plants get overheated and die even though they have water coming through. You would need to have irrigation even through the wet season. Those are the major reasons. We have about eight times our use of water per head in the city here, so there is plenty of room to move in terms of constraints on water use.

**Mr ZAPPIA**—I have just a couple of other questions. One is on water again. Is the water that is used from underground licensed by anyone or is it simply the case that you can just put your bore down and extract what you like?

**Dr Blanch**—It is licensed under the Water Act for irrigation sized developments or industry. For water use of less than 15 litres a second, under the Water Act there is no requirement for licensing. So, if you drove out to Arnhem Land and you came back through the peri-urban areas, you would see that a lot of people have bores where they can pump at less than 15 litres per second—which is a lot of water—without paying a cost, without being metered, without being monitored. So the Territory water department is slowly, slowly trying to address that, but we are a long way from discussions about water meters—about all water extraction being metered and monitored and paid for. That would be seen as striking at the heart of Territorians' right to use as much water as they like. It is difficult, even for a Labor government here, to address that in any quick fashion.

**Mr ZAPPIA**—I have one other question, relating to Luccio's comment about the population of the region, or the greater Darwin city area, being 120,000. Have there been any estimates done on what is a sustainable population for this region?

**Mr Cercarelli**—That is a good question. It is a little out of my area of expertise, I am sorry.

**Prof. Garnett**—The policy and the projections are for continuous increase. There are always hopes that it will get up to a million people around Darwin Harbour.

**Mr DREYFUS**—The building we are sitting in is projected for that.

**Mr ZAPPIA**—My question is: is that sustainable? Has anyone done any work on that?

**Prof. Garnett**—It is difficult to know where the first constraints will come in. Certainly, water will be one of them. There will be many more before then, probably.

**Mr Sawyer**—Although, I think the government projections of the Adelaide River dam are that that is a massive amount of water and will keep the place going for a long, long time.

**Prof. Garnett**—If we took our water use down to more reasonable levels, we could increase our population considerably.

**Ms Robinson**—There is an important thing also of protecting the good water that we currently have because, as more bores go in—or even ones that are in now that are perhaps reasonably close to the coastline—with rising seawater et cetera there is a real possibility that the fresh water will become saline or shandied at the very least. So quite a major emphasis needs to be on water.

**Mr Sawyer**—I think also some of the water people are saying that we are going to get wetter, aren't we?

**Prof. Garnett**—The predictions for up here could go one way or the other.

**Mr Sawyer**—I think they have settled on the fact that we are going wetter, so that it will solve their water problem.

**Dr Blanch**—Pick your model.

**Mr Sawyer**—Yes. Exactly. That is one of the issues: that the predictions for up here are very unclear. Some people are predicting that it is going to get hotter and wetter. Whether that extends the wet season, time line wise or not, nobody is really saying—not that I have heard. There are some people who look at places in Arnhem Land and areas like that, where we have remnant wet tropical vegetation and animals from the period when that was last inundated, about 7,000 years ago—they are still persisting in little pockets around the Arafura Swamp and through parts of Arnhem Land—and say that that might be what happened back in those times. But I have not seen anybody who can actually say that that is likely.

**Prof. Garnett**—A shorter, heavier wet season seems to be the consensus.

**Ms Robinson**—There is also very good modelling coming out of BOM, the Bureau of Meteorology, who have now got extra things to do. To look at some of the climate change graphs that I have seen, you would need to move into the next room for where it goes across to the right and you would need to go through the ceiling with the graph that goes up. So some of their work now will become very relevant for this northern area.

**Mr DREYFUS**—I want to ask some questions that follow on from this notion of prediction, not so much about the hotter and wetter or more extreme events or more extreme weather but related to the sea level rise possibilities. These photo montages that have been produced here today are familiar to all members of the committee. We have seen photo montages along similar lines for lots of other places in Australia. There was one spectacular one published in Melbourne last week that showed half of metropolitan Melbourne under water, including the whole of the new Docklands developments. Certainly, these montages show areas like Coconut Grove, parts of Nightcliff, Bayview Haven and Cullen Bay as being decidedly wet at some time in the future. It might well be that you would not choose to build there at all if you had the information that we now have. My question is generally directed to anyone who is able to answer it. Have the Northern Territory government to this point decided on a specific sea level rise prediction or projection for Darwin? If they have not, should they? Does anyone have a comment about what it might look like?

**Prof. Garnett**—I would think they have not. I am not aware of them having done so.

**Mr Sawyer**—They put a 50-centimetre increase on the waterfront wall for global warming, didn't they?

**Mr DREYFUS**—Where does that come from?

**Mr Sawyer**—They built the retaining wall around the waterfront. I understand there was an increase in the height of the wall due to global warming predictions.

**Mr DREYFUS**—Does that include the new convention centre, where we are having our hearing tomorrow?

**Mr Sawyer**—Yes. One of the reasons why Darwin City Council refused to take on the management of that area was that they could not get any assurances about maintenance of the wall or where those predictions had actually come from.

**Mr DREYFUS**—So it might be that the Northern Territory government, from whom we will be hearing at a future time, would be able to provide us with some information about that 50- or 60-centimetre raising of the retaining wall around the convention centre.

**Prof. Garnett**—They are developing a climate change strategy at the moment which is due for release next year.

**Mr DREYFUS**—There is a discussion paper that was released in June 2008, and I am going to ask about that in a minute. On this sea level rise prediction, I do not hear any dissent about there being a need for it; how should it be developed?

**Dr Blanch**—I think the IPCC's estimates at a global level would be the first place to start. CSIRO and people such as Professor Will Steffen at the ANU have taken a particular interest in sea level rise in tropical areas, which will be greater than in temperate areas. From memory, in modelling for the Gulf of Carpentaria they looked at an 88-centimetre sea level rise by the end of this century, and it would be more in an enclosed area. So in terms of a smaller and enclosed area like Darwin Harbour it may be larger. If there is a storm surge coming in, it cannot easily exit. The Environmental Research Institute of the Supervising Scientist, the federal environment agency that works at Ranger Uranium Mine and elsewhere, used a 30-centimetre sea level rise for its modelling, which was probably a decade ago now, looking at wetland inundation in the Alligator River region. Our science has shown that that is on the low side in terms of a century-long prediction. So I would say 50 centimetres would be a good place to start, but I wonder if it adequately takes into account the enclosed nature of the harbour.

**Mr Roche**—Is the committee familiar with the work of Hansen from NASA, which looks at changes in sea level? I have Will Steffen's submission here, which I thought was quite interesting. We definitely need a sea level rise prediction. The storm surge map I showed you is some years old. It has not been updated, so as far as I know there is no allowance. If we could compare several maps, the one showing the IPCC prediction would deal in centimetres, whereas the one showing the predictions of Will Steffen and those fellas from NASA, who are looking at a much greater sea rise, would clearly be a map dealing in metres.

**Mr DREYFUS**—Indeed. You are moving onto the other question, which is not simply sea level rise prediction but also the appropriate adjustment to storm surge as well. That is a different concept and a larger concept.

**Mr Roche**—I am not sure whether the effect would be linear—whether we could just add whatever the sea level rise is on top of the storm surge map we have now. I suspect it would indeed have a magnification factor. In response to your point, the suburbs of Cullen Bay et cetera started to be built a long time ago. The most recent one is Lyons, out near the hospital, which is built in a storm surge area. We have knowingly done that, as in the developments in Coconut Grove.

**Mr DREYFUS**—Which is also very recent.

**Mr Roche**—Yes.

**Mr DREYFUS**—Or indeed Bayview Haven.

**Ms Robinson**—This week is the national Coast to Coast conference, as you would be aware—and Ms George is opening it. I think it is timely. It will raise some really interesting discussions and raise the bar for moving on. Dr Chris Sharples from Tasmania is coming, who is a leading expert on Smartline, an effective coastal data mapping, and things of that nature. We will also have the views of quite a few interesting keynote speakers on what needs to be done, which is going to be really good.

**Mr DREYFUS**—Just while we are here, and I know there must be some people here with an interest in it, does anyone wish to comment on the decision of the High Court on 30 July in the Blue Mud Bay case—particularly as to the implications for the interrelationship between the Northern Territory government, the Northern Land Council and Indigenous interests for management of the coast? I suspect it is perhaps not quite such an issue here in Darwin, but elsewhere on the coast of the Territory it is presumably very important.

**Dr Blanch**—WWF welcomed it. We were hoping that that would be the outcome. I think its time is coming. We have not yet had discussions on it; we are a small player in that matter and not legally involved. But certainly in terms of providing income streams for remote communities and assisting Indigenous communities, particularly around coastal islands—the Wellesley Islands in the Gulf and the Pellew Islands around the north Arnhem Land coast—a lot of people want to manage their sea country well, to make money out of it sustainably, and are concerned about overfishing by the largely non-Indigenous fishing communities' fishing fleets. If there can be a transfer of resources to them, as well as support for having Indigenous marine parks, I think that will be welcomed by many communities and will help build resilience around the Top End coastline as climate change shocks increase. So it is hard to see where the downside is from that ruling.

**Prof. Garnett**—Could I just add to that. I was out at Garma recently, where many of the Yolngu were talking about this and about how, having got the authority to speak for that land, they are now keen to negotiate on it. Certainly, I did not get the impression that they wanted to close it off. They want to talk to people about use of it and they have not had that opportunity before.

**CHAIR**—Is there anything that you would like to add, Damian, before we wind up?

**Mr HALE**—I would just like to welcome you guys up here, firstly, and thank you for coming and speaking to these guys, as would most of these people here—with the exception of the NT government, who got a little bit of a trowel-up. Alison Anderson is the new environment minister and I think Alison is a very straight talker and someone who I think all these guys might enjoy dealing with at some stage. So I thank them for their contribution at such short notice—we only put this together in the last week or so. I thank them for their contribution today and hopefully we can get some good outcomes, certainly in the way of planning.

We have got a lot of area up here but, unfortunately, with the way Darwin is situated, it sort of turns to the west and it is on a peninsula that is quite tight, and we have a dual-purpose airport that takes up a lot of room when it comes to housing the expanding population. So there are a lot of challenges but we certainly have an opportunity not to make the same mistakes that have been made down south in some areas. I would like to see our public transport and our flight paths and all those sorts of things earmarked, probably as far as Adelaide River at this stage, so that we are

not having to shift things as we go and so that development can be controlled and sustainable, without enormous impact on the environment.

**Prof. Garnett**—Could I make one last point relating to the chamber of commerce. You have not had a chance to talk much. We have talked all about the negative things, but there are actually quite a lot of opportunities in this. We are going to have to adapt, and I would like to see incentives in the policies for adaptation. I think the businesses here in the Top End always have to adapt. It is a very tough environment to work in. They have proved adaptable. They have this sort of knowledge of how to cope with hot, humid systems, and it would be a very good thing to have policies and incentives in place that will draw on that adaptive capacity.

**CHAIR**—Luccio made the point about community engagement—‘community’ in the broader sense—and, in particular, as George pointed out, the small and medium-size businesses. We are always conscious of that, and mindful that our policies do not have too negative a consequence for that part of the business community, which is the generator and motor for employment growth in so many areas. So I do take your point.

I thank you on behalf of the committee for your valuable input. We are also looking forward to meeting the new minister, and it is a shame that our time up here did not coincide with her appointment. But no doubt we will make the opportunity, probably when we visit South Australia, to hear from the new environment minister.

I declare this public hearing closed and I thank Hansard staff.

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 4.40 pm**