



According to the World Bank, tens of millions of people in 84 developing countries including Vietnam, Bangladesh, Jamaica and the Maldives will likely be displaced by rising sea levels over this century. In our region, a rise of one metre would effectively put the small Pacific Island nations of Kiribati and Tuvalu at ground zero, a prospect that raises a host of humanitarian issues for Australia and New Zealand, writes **Mary-Lou Considine**.

It's hard to imagine moving your home – not just the contents but the entire dwelling – every one to two years to prevent it being washed out to sea. But according to Emeretta Cross, this is now a common experience for many I-Kiribati, the inhabitants of the tiny nation of 33 islands that rise just metres above the Pacific Ocean, halfway between Australia and Hawaii.

Cross – born and raised in Kiribati by her Tuvaluan mother and Australian father – says life on the islands is an escalating struggle between the people and the sea, with the sea steadily gaining the upper hand.

'In our culture, when a young man takes a wife, it was traditional for them to build a hut next to their father's, overlooking the water,' she says. 'Today the young men are building inland from their fathers' huts. But there's not much further inland for them to go.'

While the media has been quick to link recent flooding events on low islands like Kiribati, Tuvalu and the Carterets to a rise in mean sea level due to global warming, many scientists believe the current events could be a combination of storm surges linked to the El Niño/La Niña cycles in the Pacific, and eroded coastlines made vulnerable by development and building of seawalls, causeways and other structures.

But they stress that progressively throughout this century, global warming-induced sea-level rise will threaten the lives and livelihoods of tens of millions of people living in low-lying settlements,

* This online version has been altered from the original.

Top: Children from Rurubao School, Kiribati. The nation sees education as a tool for developing the resilience needed to deal with global warming impacts. Kiritours.com

Right: The narrowest part of this islet on Funafuti, Tuvalu, is only 20 metres. During king tides and storm surges, water and debris wash over from the ocean to the lagoon. J. Carlin/Panos

including heavily populated areas such as Bangladesh and parts of South-East Asia.

In 2007, the Intergovernmental Panel on Climate Change projected that by 2100, the global average sea level would rise 18–59 cm above the 1980–1999 average, largely due to thermal expansion. Contributions from the Greenland and Antarctic ice sheets sliding into the oceans would add an additional 10–20 cm, giving an upper estimate of around 80 cm by the end of the century. However, since 2007, some scientists have reported faster-than-predicted contribution of polar ice sheets with implications for a higher-than-anticipated rise in sea level.

While scientists debate the extent and timing of the problem, Emeretta Cross – now an Australian citizen living in Melbourne – would like us to think more about the human cost of projected climate change impacts in her homeland. This includes everything from loss of critical infrastructure – buildings, roads, sewerage and water supplies – to loss of food crops from saltwater intrusions in the soil, and of traditional skills and customs handed



down from mother to daughter and father to son over hundreds of generations.

In the worst-case scenario, people would have no option but to migrate – as citizens of countries that may have ceased to exist.

'There's a stigma associated with the word "climate change refugees",' says Cross. 'Our people would not be refugees, they do not want to leave their country. There's been no over-exploitation of resources, no political unrest in their country – their political leaders have not caused this problem.'

'They do not want to be held in detention centres, in places like Nauru,' she says, referring to the former Australian Government's notorious 'Pacific solution' for detaining illegal immigrants. 'What if they were rejected – where would they go?'

Better targeting of aid

Australia has provided almost \$3 million towards the World Bank's Kiribati Climate Change Adaptation Project to reduce



Sea-level rise: the view from ground zero

Kiribati's vulnerability to climate change, climate variability and sea-level rise, and \$1 million to Tuvalu to improve water storage capacity.

In recent years, Tuvalu's Prime Minister, Apisai Ielemia, and Kiribati's President, Anote Tong, have visited Australia and New Zealand to plead for wealthy countries to do more – in particular, to make immediate, deep cuts to carbon emissions to reduce the risk of catastrophic sea-level rise.

While the Australian Government's 2020 carbon emissions targets continue to draw criticism from environmentalists, the government has, through AusAID, announced an investment of \$150 million over the next three years to address climate adaptation needs in vulnerable countries in the Asia-Pacific region. Much of this assistance will be targeted at Pacific countries.

It's a reasonable start, says Mara Bun, CEO of the non-government organisation (NGO) Green Cross Australia. But she says

these small nations, already handicapped by poverty, will need to dramatically improve their socioeconomic situation so they can develop the resilience to deal with the erosion of their familiar environment, infrastructure and way of life.

Green Cross has set itself the task of identifying the humanitarian issues associated with climate change in the Pacific region (including Australia) and using its networks – in government, education, business, communities and NGO sectors – to mobilise resources for targeted action.

In 2008, Green Cross Australia convened a National People's Assembly in which a panel of 14 'representative Australian citizens' listened to a series of experts talk about climate change and its impacts, after which panel members deliberated on what they had heard and wrote a report with recommendations for action.

One of those recommendations was that the federal government develop policies to establish 'more flexible options

for our neighbours impacted by climate change, to work, study and, where appropriate, live in Australia.'

Bun points to recent reforms in government migration policy, especially the Pacific Seasonal Workers Pilot Scheme, which enables the placement of seasonal workers from Tonga, Vanuatu and Kiribati – and later from Papua New Guinea – to work as fruit-pickers in Australia, while young Indonesians now have the same visa flexibility in Australia as backpackers from the UK.

'If Pacific islanders can have access to job markets where Australians have left a gap, they can contribute to the economy as well as send remittance money back to their families at home,' she says.

For small economies like Kiribati and Tuvalu, remittance income is a significant source of revenue. About 15 per cent of Tuvalu's adult male population work on ships, sending the equivalent of 17 per cent of the country's GDP home annually, to help support extended family and build local schools and churches.

Educational opportunities are another important support mechanism for countries developing their adaptive capacity to deal with sea-level rise and other climate change impacts. Griffith University, with AusAID funding, has been offering a scholarship program enabling young I-Kiribati to study nursing at Brisbane's Metropolitan South TAFE – an initiative that could be replicated in universities and colleges across Australia.

Human rights

One of the NGOs working with Green Cross Australia on the humanitarian and



The island of Nonouti, Kiribati, is a typical coral atoll island – a low-lying narrow strip of land separating ocean and lagoon and highly vulnerable to storm surges. NASA

human rights issues of climate change is the Brisbane-based Refugee and Immigrants Legal Service (RAILS).

RAILS Director Sonia Caton says one of the biggest risks attached to I-Kiribati



Kiribati men use coral blocks to build a retaining wall near their homes at the water's edge on Tarawa atoll, Kiribati. Such barriers could be contributing to shoreline erosion, rather than preventing it. J. Carlin/Panos

and Tuvaluans losing their land is the consequent loss of sovereignty. 'The issue of preserving the sovereignty of displaced communities needs to be worked through beforehand or people will be traumatised,' says Caton. 'Added to the trauma of flight will be an embedded experience of displacement and loss that would be passed on to younger generations.'

'Australia and New Zealand have the resources to guide and support island people to arrive at a solution as close as possible to satisfying all parties.'

'But we need to start now. We need to provide high quality information and research data on current migration and human rights laws, land tenure issues, issues of statelessness and loss of national identity.'

Dr Jon Barnett, Principal Research Fellow at the University of Melbourne's

Department of Resource Management & Geography, says that while it is important for developed countries to provide assistance, they also need to be aware of how affected communities perceive the threat of sea-level rise and what their preferred response may be.

In a survey of residents of Funafuti, the capital of Tuvalu, Barnett discovered a frequently cited reason for people's reluctance to leave their homeland and work overseas is their deep attachment to the low-stress island way of life centred around family and social networks. He says large-scale migration should be avoided at all costs as it 'would arguably be a violation of people's human rights.'

'Remember there used to be this kind of discussion about why and where to put indigenous Australians too – not

a great part of our history, but worth remembering.'

'The rights of Tuvaluans to continue living in Tuvalu – and the value of Tuvaluan identity and culture to Tuvaluans and the world – means that there needs to be far greater effort at implementing adaptation in the islands to sustain the population and their way of life. Migration should not be regarded by outsiders as the only or most important form of adaptation strategy.'

Scientific support

CSIRO is currently assisting the Bureau of Meteorology and AusAID on projects to improve monitoring and prediction of sea level and climate in the South Pacific. This assistance includes helping set up meteorological stations on the islands and training local people to run them.

Dr Andrew Ash, Director of the CSIRO Climate Adaptation Flagship, believes Australian researchers can help island nations better manage risks associated with climate change by providing more accurate, detailed scientific information and predictions – for example, on the timing, extent and causes of sea-level rise.

'We can help support adaptation by providing a better understanding of the drivers of climate,' Dr Ash says. 'For example, the mean incremental changes in global temperature or sea-level rise by 2020 may not have much of an impact on their own, but if you add an extreme event such as a large storm surge, the result for coastal communities could be catastrophic.'

'This means these countries will need to look at adapting their housing construction and design, the location of settlements, water supply, and their agriculture and fisheries.'

'In reality because of the speed of the changes taking place, we may never have all the information required, so it will be a case of these nations making decisions in the face of uncertainty.'

Dr John Church from CSIRO Marine & Atmospheric Research notes that recent data on global mean sea level shows it is already rising at the upper level of the range of IPCC projections – from an average of less than 2 mm per year over the 20th century to more than 3 mm per year since 1993. He says this suggests sea level could be on track to rise by as much as about 80 cm, near the upper level projected by the IPCC, by 2100.

And scientists are still uncertain about the rate and extent of the contribution of melting glaciers and ice sheets. Dr Church says the ice sheet uncertainties are largely one-sided – they could lead to a substantially larger rise, but probably not a smaller rise.

'Certainly the risk of climate change



When stormy weather and high tides coincide, low-lying islands such as this one on Takuu Atoll near PNG can be flooded: even a small sea-level rise will add to the risk. John Hunter

the islands, such as too much fresh water usage or building in unsuitable places,' says Dr Hunter.

In Kiribati, for example, more than half the population of 110 000 lives in the nation's densely populated capital, South Tarawa, a group of small islets joined by man-made causeways.

'Sea-level rise is only a relatively small factor at the moment,' says Dr Hunter. 'In the long term, however, it will be a problem.'

Dr Hunter points out that possible positive biophysical effects of sea-level rise for coral atoll islands are likely to be cancelled out by ocean acidification caused by increased carbon dioxide absorption. Without ocean acidification, he says, sea-level rise could have led to increased growth of corals, building up some reefs and islands. But rising seas and acid oceans together rule out this possibility.

Australian islands vulnerable

In planning how it can assist communities threatened by loss of land as a result of sea-level rise, Green Cross Australia says Australia also needs to consider the 7000 indigenous inhabitants of the Torres Strait Islands, scattered between the Australian mainland and Papua New Guinea.

Six of the inhabited islands are situated metres above sea level, making them as vulnerable to storm surges and sea-level rise as Kiribati and Tuvalu.

In a report prepared for CSIRO, Dr Donna Green from the University of NSW wrote that as a result of global warming, these islands are likely to be exposed to higher temperatures, more extreme rainfall, sea-level rise and more intense cyclones. This will put indigenous communities at risk from increased land erosion, saltwater inundation of water supplies and loss of their main fresh food resources from coral lagoons and mangrove swamps.¹

Mara Bun recently met with the Minister for Climate Change, Penny Wong, to seek the government's input to the National People's Assembly recommendations, including support for developing three pivotal human capacity building networks across the Asia-Pacific region, and for an increased focus on Torres Strait Islands adaptation.

Jon Barnett would like to see Australia and New Zealand even more strongly committed to protecting island communities in a warming world. 'The issue I think is that, as well as facilitating adaptation in vulnerable places so people don't have to move, Australia and other developed countries should be reducing emissions.'



Fishing is integral to the Pacific island lifestyle: many islanders can't imagine life without a boat or canoe at hand. iStockphoto.com

impacts will increase in coming decades,' he adds. 'The concern is that the issue will be ignored until there is a disaster.'

Climatologist Dr John Hunter from the Antarctic Climate & Ecosystems CRC says there is not enough evidence to link widely publicised flooding events in places like Tuvalu and the Carteret Islands solely to sea-level rise from global warming.

He thinks annual incremental rises in global mean sea level may be augmenting



Emeretta Cross with her son (right) and other Tuvaluan Youth members get ready to perform at a Melbourne multicultural festival. Emeretta Cross

king tides that coincide with storm surges and large waves, some of which are linked to the cyclical El Niño/La Niña events in the Pacific.

'Apart from global warming and multi-decadal cycles of sea-level change, other influences of sea-level rise are higher waves due to stormier conditions, sinking of an island's landmass, reduced rainfall, increased erosion due to other factors, and possible poor management practices on

¹ Green D (2006) 'Climate change and health: impacts on remote indigenous communities in northern Australia'. CSIRO Marine and Atmospheric Research Paper 012.