5.1.8 Northern Territory

Key findings

- Up to 180 residential buildings in the Northern Territory may be at risk of inundation from a sea-level rise of 1.1 metres.
- The current replacement value of the residential buildings at risk is between $23.5 million and $57.7 million.
- Up to 190 residential buildings in the Northern Territory are located within 110 metres of 'soft' erodible shorelines.

The population context

The Northern Territory represents just over 1 per cent of Australia's population.[129] The territory experienced the third highest rate of growth of all states and territories in the five years to 2008 (9.9 per cent or 1.9 per cent per year), with Darwin the fastest growing of all capital cities over the same period (12.3 per cent) and home to over half of the territory population.[130]

The Northern Territory has a large percentage of lands under Indigenous management, around 48 million hectares or 36 per cent of the Northern Territory. Communities in these areas are small and dispersed.[131]

The nature of the coast

The open coast exhibits a very high proportion of muddy shores, mainly muddy tidal flats with mangroves (31 per cent), which are a characteristic of northern Australian tide-dominated coasts. These will be very mobile shores in response to climate change and sea-level rise; although many will recede and be over-washed during cyclone events, accretion is likely on some of these coasts (due to increased rainfall supplying increasing amounts of river sediment to the coast).[132]

Compared to the rest of Australia, the open coast has a high proportion of low-profile soft rock coasts (15 per cent). These are actively receding and will continue to progressively recede with sea-level rise. In contrast, hard rock (robust) shores are a comparatively minor component of this coast.

Photo credit: A.D. Short

Hut Point.

Sandy shores are also moderately common in the Northern Territory, although in contrast to other states a higher proportion is bedrock backed (18 per cent) and thus less prone to recession with sea-level rise.[133]

Existing risk

Coastal areas in the Northern Territory are already exposed to natural hazards without the compounding effects of climate change. This includes tropical cyclones and associated storm surge, flooding and coastal erosion among other natural hazards.

The most significant cyclone event in Australia's history was Tropical Cyclone Tracy, which devastated Darwin in 1974. Seventy-one lives were lost, thousands of homes destroyed and over 70 per cent of the population evacuated.[134] Direct and indirect costs of Cyclone Tracy have been estimated at between $1.9 billion and $4.2 billion (1998/1999 dollars), and cyclones have accounted for over 90 per cent of costs from natural disasters in the Northern Territory since 1967.[135] While measures such as improved building standards have been implemented since Cyclone Tracy, the risk from the 2–3 cyclones that occur on average in the region each year[136] cannot be completely mitigated.

Coastal erosion has also become a concern for some cliffs at East Point and Nightcliff in Darwin. A recent study[137] for the Darwin City Council has identified that sections of the coast have been eroding at an average rate of 0.2–0.4 metres per year over the last few decades and some areas of erosion are now close to roads and residential buildings. The study[138] also identified that a more rapid erosion rate of 5 to 10 metres over a matter of weeks could occasionally affect parts of the coast.

The erosion is a natural occurrence caused by wave action and other factors, and compounded in some sections by groundwater flows and stormwater and surface runoff. Some areas may be vulnerable under climate change, with the erosion likely to be exacerbated by sea-level rise.[139]

Photo credit: National Archives of Australia

Darwin in the aftermath of Cyclone Tracy, 1974.

Photo credit: Shelley Franklyn

Cliff erosion in Nightcliff, NT.

Climate change risk to settlements

Inundation analysis suggests that up to 180 residential buildings in the Northern Territory may be at risk of inundation from a sea-level rise of 1.1 metres. The current replacement value of the residential buildings at risk is between $23.5 million and $57.7 million. If the inundation analysis included storm tides for the Northern Territory it is likely that a higher number of properties would have been identified as at-risk.

Local government areas (LGA) that have the greatest level of risk are Litchfield, the 'Unincorporated' area and Darwin, which represent over 85 per cent of residential buildings at risk of inundation in the Northern Territory from sea-level rise by 2100 (upper end; Figure 5.40). An inundation footprint of the Darwin LGA is shown in Figure 5.41.

Around 75 buildings in the LGA of Litchfield may be affected by inundation from sea-level rise by 2100, with the upper estimate representing about 1 per cent of the current residential building stock. The other local government areas have comparably small percentages of current residential stock at risk of inundation, with Wagait the highest at less than 3.5 per cent.

Erosion due to higher sea levels is also a key risk for coastal areas, as highlighted by the current erosion concerns in East Point and Nightcliff in Darwin. Along the Northern Territory coast nearly 190 buildings are located within 110 metres of 'soft', erodible coasts. The majority of these buildings are in Darwin, with between 60 and 170 residential buildings located within 55 metres and 110 metres, respectively, of 'soft' shorelines. In the absence of coastal protection measures or other adaptation responses, these buildings may be at risk of increased erosion from sea-level rise and storm surge.

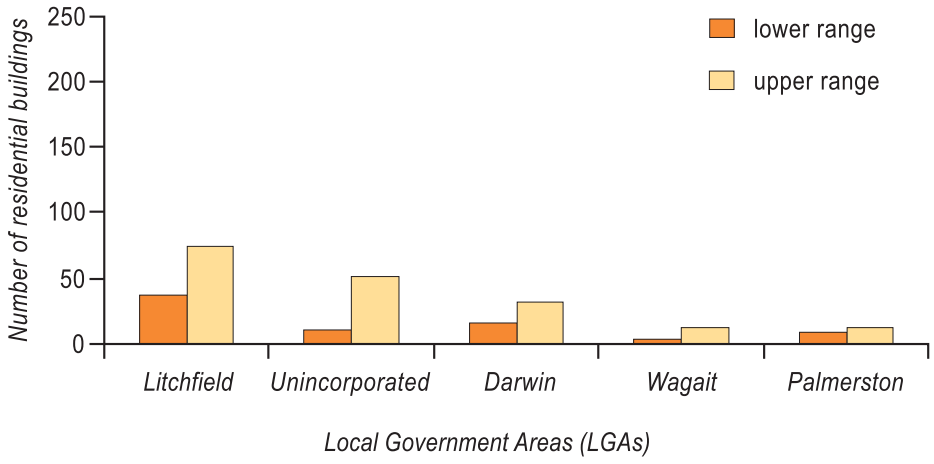

Figure 5.40 Estimated number of existing residential buildings in the Northern Territory at risk of inundation from a sea-level rise of 1.1 metres (the 'Unincorporated' area surrounds the LGAs of Darwin, Litchfield and Palmerston).

Figure 5.41 Image of Darwin in 2009 and with simulated inundation from a sea-level rise of 1.1 metres using medium resolution elevation data (not suitable for decision-making). © CNES 2009 / imagery supplied courtesy of SPOT Imaging Services and Geospatial Intelligence PTY LTD.

Methodology – key points and caveats

- Inundation analysis is based on 1.1 metres of sea-level rise using medium resolution elevation data.
- A *storm tide allowance* (1-in-100 year event) based on CSIRO modelling is included in the analysis for Tasmania, Victoria and New South Wales, although storm tide values for New South Wales are likely to be underestimates as they do not include a wave setup component.
- For the other states where the CSIRO modelling was not available (Queensland, Western Australia, Northern Territory, and South Australia) an allowance for *modelled high water level* (e.g. high tide) was included in the analysis.
- The analysis does not take account of existing coastal protection, such as seawalls, or riverine flooding associated with intense rainfall events.
- The inundation analysis is of existing residential buildings only (sourced from NEXIS database).
- More detailed analysis may change the relative order of local government areas and the magnitude and timing of projected impacts.
- Refer to Chapter 3 for further details.
- The Tiwi Islands and East Arnhem LGA were not captured in the analysis.

Another important issue for the Northern Territory is the impact of cyclones and associated storm surge, with some studies suggesting the intensity of cyclones may increase with climate change. A recent vulnerability assessment[140] of climate change impacts on Darwin identified that cyclone and storm shelters can accommodate only a small proportion of the existing population of Darwin, although plans for further shelter provision will address this to some extent. Most shelters are built to withstand a Category 4 storm, however these may need to be reassessed with future climate change. While crucial infrastructure such as power stations, water treatment plants, sewage treatment plants and hospitals are required to be designed to survive a 1-in-2,000 year event, only a small percentage of Darwin's total buildings are guaranteed to conform to post-2001 strengthened building code requirements.[141] There is also concern that some residents are not fully aware of the capacity of their homes to withstand cyclone damage and as such may be unable to make informed decisions about protecting or evacuating.

The Darwin vulnerability assessment also identified that there is significant variation in population exposure to storm surge with quite small changes in the size of the storm surge zone.[142] For an increase in the storm surge zone of 400 metres inland, an additional 9,000 people could be affected by storm surge.[143] Some lengths of railway and a large number of minor roads could also be impassable due to storm surge from major events.