*Dead mangroves line a Gulf shoreline near Karumba & Norman River mouth (Qld), photo Norm Duke.*

**Northern Australia Environmental Resources Hub**

National **Environmental Science** Programme

# Assessing mangrove dieback in the Gulf

Start-up factsheet

## Mangrove dieback has affected more than 1000 km of Gulf coastline

Australia is home to 7% of the world's mangroves, with the majority located in the tropical regions.

During the summer of 2015–16, one of the worst mangrove dieback events ever recorded devastated around 7400 hectares of mangrove forests along more than 1000 km of Gulf of Carpentaria coastline.



*Map showing the Gulf coastline affected by mangrove dieback in 2015.*

## Overview

This project will:

- provide a survey, description and analysis of the extent and condition of dieback

- examine the extent, patterns, condition, trend and likely cause of dieback

- train local Indigenous ranger groups in mangrove assessment and monitoring methods

- provide recommendations for recovery, potential intervention, future monitoring and further studies

Field visits suggest that a relatively low percentage of trees have recovered and most are dying or dead, but there is no current formal assessment of the condition of affected forests and what proportion are recovering. There is also little understanding of the patterns of impact across the extent of dieback – in some areas, all mangrove species in all tidal elevations have been affected but in other areas only some species in specific locations have been affected. The dieback was not discovered for nearly five months, and individual reports did not recognise the scale of the event, demonstrating shortcomings in coastal monitoring capability. **A better understanding of extent, patterns, condition, trend and the likely cause of dieback-affected mangroves will inform monitoring and management responses.**
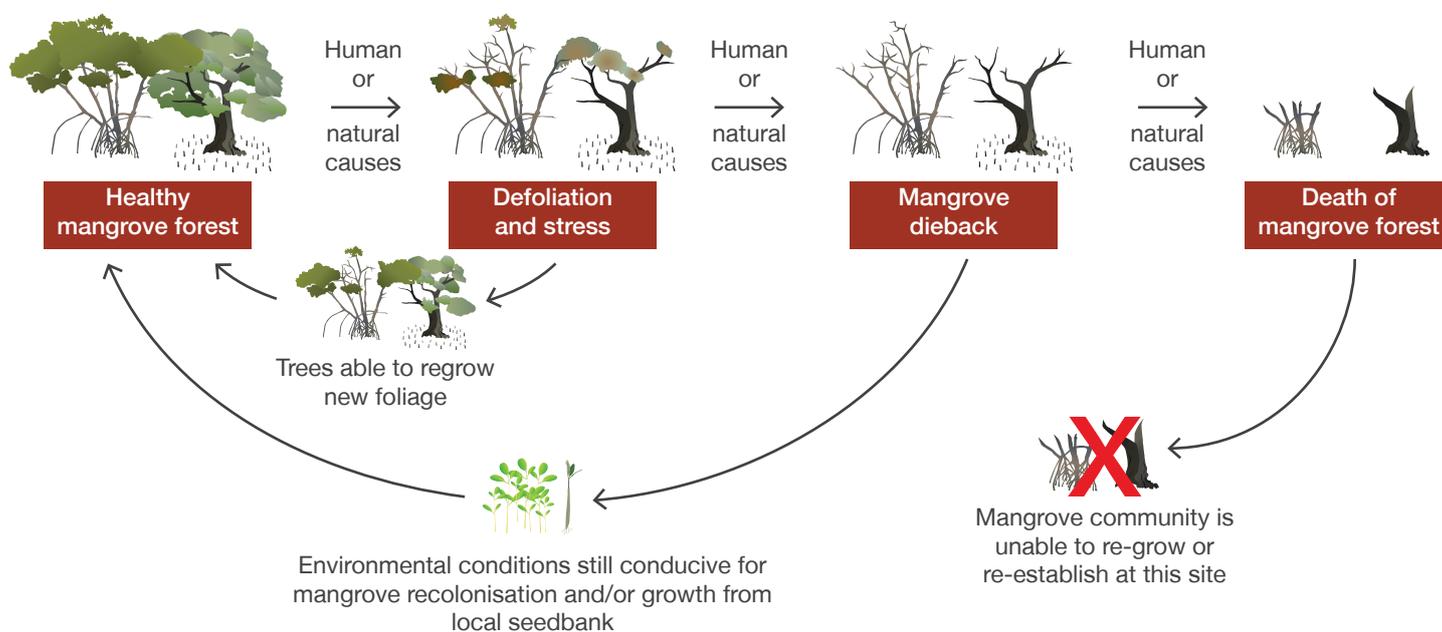
Conceptual diagram showing progression of mangrove dieback, modified from OzCoasts.

# Mangroves protect shorelines and support fisheries

The dieback event has caused concern amongst local communities and industry bodies such as commercial and recreational fishing groups that rely on many ecosystem services provided by mangroves. The wider national and international community are also concerned about the dieback event due to its scale, diverse impacts and possible link to climate change.

Biodiversity is likely to have been significantly impacted by the dieback. For example, epibiont communities – the small plants and animals that live on mangrove trunks and aerial roots – have been shed, and leaf litter supplies, an important part of aquatic food chains, have almost ceased.

Of the affected mangroves, approximately 200 km are shoreline mangroves whose death would expose the coast to erosion and storm surge effects causing extensive geomorphic and ecological disturbance.

# A better understanding of patterns, trends and causes of dieback will inform monitoring and management

## Project activities

- Initial Rapid Assessment of dieback recovery using the Shoreline Video Assessment Method and LiDAR – an airborne technology which takes precise, three-dimensional measurements of the shape of the mangrove forest and forest floor.

- Field verification and detailed monitoring including building the capacity of local Indigenous ranger teams to help monitor mangroves.

- Formal assessment of the condition of affected forests and what proportion are recovering.

- Analysis of the patterns of impact across the extent of dieback – in some areas, all mangrove species in all tidal elevations have been affected but it can be different in other areas.

Field work will cover the entire dieback zone along southern Gulf shorelines from Weipa in the east to north of Numbulwar in the west with more detailed ongoing monitoring near Karumba, Burketown, Borroloola and Numbulwar townships.



Gulf mangrove affected by dieback near Karumba & Norman River mouth (Qld), photo Norm Duke.

*Increasing coastal monitoring and reporting capability in the Gulf is a critical component of this project, photo Norm Duke.*

## Anticipated outcomes

- A best practice standard baseline assessment of the affected shoreline to underpin future assessments of mangrove forests and/or associated environmental changes.

- More informed management options in response to mangrove dieback events, i.e. deciding on whether to intervene in the recovery process, and if so, where and how.

- Better informed management policies for fishery species and biodiversity that depend on mangrove habitats (e.g. catch quotas, seasonal closures), for carbon accounting, and for water resource planning where freshwater flows influence mangrove health.

- Increased coastal monitoring and reporting capability in the Gulf, including increased capacity of local Indigenous ranger groups (e.g. extension of MangroveWatch training courses and joint fieldwork) to continue coastal monitoring after the project has ceased.

- Improved understanding of the effects of the dieback on shoreline erosion and geomorphology.

- Improved understanding of the values and ecological services provided by mangroves and associated coastal ecosystems.



*Aerial views of seaward mangrove fringes showing foreshore sections of minor damage (left) and extreme damage (right) near Limmen Bight River mouth (NT), photos Norm Duke.*

*Indigenous rangers will continue to be trained in shoreline assessment methods such as MangroveWatch, photo Norm Duke.*

## Anticipated outputs

- A map and report assessing the extent of the dieback, its condition, the patterns of processes across the full range of the dieback in detail.

- Contributions to an online, interactive portal for displaying the dieback imagery collected by rangers, scientists and others, including a baseline dataset and associated condition metrics for each assessment location for monitoring change and recovery into the future.

- An evaluation of risks to shorelines and recommendations for the on-going standardised monitoring of tidal wetland vegetation bordering Gulf dieback areas.

- An assessment of the amount of carbon lost from dead and rotting trees, and the likely consequences.

- A review of mangrove habitat recovery and whether

mitigation interventions might facilitate shoreline restoration.

- Factsheets, peer-reviewed scientific publications and other products.

## Who is involved?

This project is being led by Professor Norm Duke at James Cook University.

Professor Duke will be assisted by additional researchers from James Cook University and Indigenous ranger groups in the region.

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For further information and project updates, visit the project webpage at www.nespnorthern.edu.au/projects/nesp/gulf-mangrove-dieback

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