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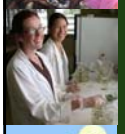


The status of Climate Change research in the Kakadu landscape context

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Working to protect the environment through: environmental research and monitoring; and environmental supervision, audit and inspection.

Outline

- Brief review of climate change projections for KNP
- Current knowledge in relation to KNP's management plan objectives
- Main threats to landscape health
- Management options
- Key knowledge gaps

Climate Change Projections: KNP

- Temperature relative to 1990
  - Wet season average temperature may increase
    - 0°C – 1.5°C by 2030
    - 1°C – 5.5°C by 2070
  - Dry season average temperature may increase
    - 1°C – 2°C by 2030
    - 1°C – 5.5°C by 2070

- Rainfall
  - Wet season rainfall –little change
    - +/- 8% by 2030
    - +/- 20% by 2070
  - Dry season rainfall may increase
    - -8% – +20% by 2030
    - -20% – +60% by 2070

Source: Hennessy K, et al (2004)
Climate Change in the Northern Territory
www.cmar.csiro.au/e-print/open/hennessy_2004a.pdf

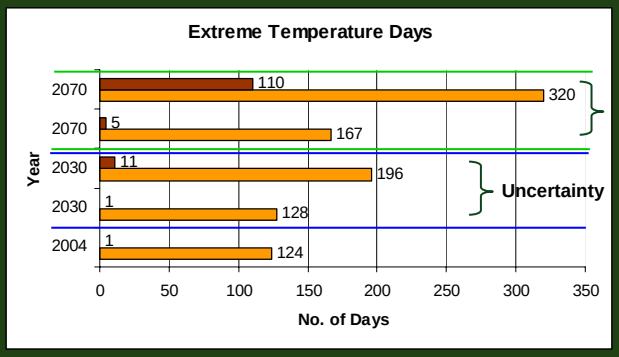
Climate Change Projections: KNP

- Potential evaporation
  - Wet season potential evaporation may increase
    - 1% – 4% by 2030
    - 2% – 12% by 2070
  - Dry season potential evaporation may increase
    - 2% – 7% by 2030
    - 4% – 20% by 2070

- Moisture balance is expected to decline
  - Wet season declines
    - 50 – 100 mm by 2030
    - 25 – 320 mm by 2070
  - Dry season declines
    - Up to 75 mm by 2030
    - 50 – 250 mm by 2070

Climate Change Projections: KNP

- Extreme Temperature
  - Average number of days over 35°C and 40°C for Gunbalanya



Climate Change Projections: KNP

- Extreme temperature: Hot spells (3-5 days)
  - Hot spells over 35°C at Gunbalanya
    - 31 in 2004
    - 33-53 by 2030
    - 44-99 by 2070
  - Hot spells over 40°C at Gunbalanya
    - 0 in 2004
    - Up to 2 by 2030
    - Up to 29 by 2070
- Sea level rise
  - IPCC Third Assessment Report (TAR):
  - 1990-2100 global average = 0.11-0.77 m (model based and 'Business As Usual' scenario).
  - 35 Special Reports on Emission Scenarios (SRES): 0.09-0.88 m
  - IPCC Fourth Assessment Report (4AR):
  - 0.18-0.59 m – lower range than previous as only thermal expansion is taken into account (no ice sheet contribution)
  - UNCERTAIN

Climate Change Projections: KNP

- Tropical cyclones

The cyclone story is complex and uncertain
  - Believed there will be an increase in cyclone intensity
  - Frequency and pathways are difficult to project due to link with ENSO and how ENSO will behave under climate change scenarios

- Storm surge: Uncertain due to no detailed studies in the NT
  - Cairns study-effect of increase cyclone intensity:
    - 1-in-100 year storm surge event becomes a 1-in-55 year event
  - Effect of sea level rise may reduce return period of storm surge event

Current knowledge in relation to KNP's management plan objectives

- KNP will be subject to impacts of climate change:
  - **Sea level rise, increases in extreme temp, increases in extreme events such as hot spells & storm surges, increase in tropical cyclone intensity & changes to localised rainfall patterns.**

- The coastal environment of KNP is highly dynamic & habitat change has occurred in the past due to sea level fluctuations in sea level.

Current knowledge in relation to KNP's management plan objectives

- Impacts of climate change will impact:
  - Bininj use of natural & cultural resources
  - Fire regimes
  - Flood inundation patterns in freshwater systems
  - Location of biodiversity
  - Availability of freshwater to both the natural environment & people

Main threats to landscape health in KNP

- Saltwater intrusion of freshwater coastal environments due to sea level rise & storm surge events.
- Response of mangrove communities to climate change disturbances (rising sea level, cyclonic activity etc)
- More intensive fire regimes (due to hotter dry seasons-hot spells) & the hot fires may result in a decline in fires sensitive plant communities (eg: monsoon forest).

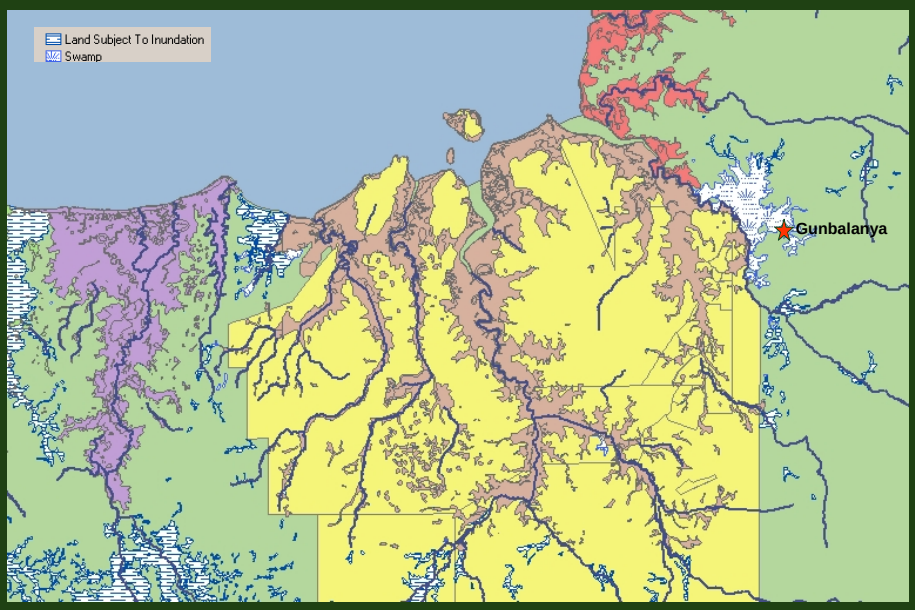
Management Options

- Honest conversation amongst the stakeholders to draw a line in the floodplain. What are people willing to forego?
- Information management (that facilitates data acquisition & custodianship).
- Implementation of an integrated environmental research & monitoring program to underpin management decisions.
- Raising awareness & communication of climate change impacts with people living in the region.
- Identification of hazards & risks (natural env, built env, cultural & heritage, & environmental health) & plans to minimise these.

Management Options

- Strategic management of regional development that recognises the competing interests of stakeholders.
- Mitigation activities may be an option (eg: suitable barrages in strategic locations positions to protect freshwater envs from saltwater inundation.
- Governance structure enabling impacts to be addressed on a regional scale, considering:
    - connectivity of floodplains to the east and west of KNP boundary
    - key stakeholders in the region.

Kakadu National Park



Key Knowledge Gaps

- Record of the wide range of stakeholder perceptions & values in management of climate change impacts.
- Documentation of the potential impacts on Bininj use of natural & cultural resources.
- Economic value needs to be derived for the resources that are at risk from climate change impacts within KNP.
- Assessment of the ability of refugia to conserve freshwater habitat bodiversity in the past in the context of identifying refugia that may conserve existing biodiversity in the future.

Key Knowledge Gaps

- Observed rainfall trends such as build up rainfall have not been studied in detail.
- The rate at which overbank flows evolve (hydraulic changes in estuarine & river envs)
- The response of macro-tidal estuaries to sea level rise within short time periods is only partially understood.
- Susceptibility of various plant communities.