

## **Introduction**

This report was prepared by Northwest Carbon in April 2013 for Rangelands NRM WA as part of the update of the Regional Plan. The purpose of the report is to provide information and advice regarding predicted climate change that may occur between now and 2050 that may have implications for Natural Resource Management in the Gascoyne subregion.

## **Predicted climate change**

The great majority of the Gascoyne region experiences a dry and arid climate with typically high levels of moisture and growth in the warm season and low levels in the cool season.

The predicted impacts of climate change for the Gascoyne region are:

- **Average annual increase in temperature in the range of 1 – 2 °C by 2050**
  - Summer: increase of 1 – 2 °C
  - Autumn: increase of 1 – 1.5 °C
  - Winter: increase of 1 – 1.5 °C
  - Spring: increase of 1 – 2 °C
  
- **Average annual rainfall to decrease between 2 – 10% by 2050**
  - Summer: decrease of 2 – 5%
  - Autumn: decrease of 2 – 5%
  - Winter: decrease of 5 – 10%
  - Spring : decrease of 5 – 10%
  
- **Average annual relative humidity to decrease by 1 – 3% by 2050**
  - Summer: decrease of 0.5 – 2%
  - Autumn: decrease of 1 – 2%
  - Winter: decrease of 1 – 3%
  - Spring: decrease of 1 – 2%
  
- **Annual average wind speed to remain constant through to a 5% increase by 2050**
  - Summer: increase of 0 – 2% (northern extent 0 – 2% decrease)

- Autumn: increase of 2 – 10% (northern extent 0 – 2% increase)
  - Winter: decrease of 5 – 10% (northern extent 0 – 5% increase)
  - Spring: no change
- **Annual average potential evapotranspiration will remain unchanged or increase by up to 4% by 2050**
    - Summer: no change or increase by up to 4%
    - Autumn: increase of 2 – 4%
    - Winter: increase of 2 – 4%
    - Spring: no change or increase by up to 4%

In summary, annual temperatures are forecast to increase, whilst annual rainfall and humidity are predicted to decrease.

## **Impacts of climate change for natural resource management (NRM)**

Addressing the predicted impacts of climate change will require NRM projects that will reduce the risk of further impacts, or which will attempt to mitigate impacts that have already occurred.

The potential impacts of climate change in the Gascoyne in the context of future management of the region's natural resources are summarised below:

### **1. Erosion**

Less rainfall may lead to reduced groundcover. This could have a big impact on both agriculture and native flora and fauna which depend on groundcover for refuge, potentially exacerbating erosion as climate change progresses.

However, there is also a risk of increased intensity of rainfall at unusual or irregular times of the year. Erosion from wind and water is likely to cause negative impacts on biodiversity and increase sedimentation in rivers, creeks and streams. This could have negative impacts for storing carbon in the soil and reduce the potential for productive land use.

Increases in temperature, evapotranspiration and reduced rainfall may lead to a reduced flow of surface water. In turn, this could lead to an increase of salt in freshwater swamps and rising salt in groundwater systems.

Climate change may also cause some loss of coastal habitat as a result of sea-level encroachment.

## **2. Overgrazing by stock**

There is a high risk of overgrazing, as productivity may decrease with reduced annual rainfall and an increase in temperature.

The potential for climate change to impact on overgrazing is complex and is highly dependent on the human response to changes in natural resource condition and adaptation. There is a clear need to develop and implement effective strategies for sustainable grazing, and reduce the incidence and severity of unplanned fires in order to improve the resilience of the landscape.

## **3. Impacts caused by human management**

The impacts of predicted climate change on potential NRM projects will be influenced by many complex interactions between the climate, changes to land use, human management responses, and broader ecosystem and species level responses to changes in environmental conditions. For example, pastoralism may fall into decline as the land becomes drier.

In the future, more detailed examination of the sensitivity of biodiversity to climate change will need to be undertaken to allow for a broader consideration of climate change and how it will impact NRM planning. It is likely that future ecosystems will look and function differently than those we are managing today, according to the CSIRO (2013) (available at <http://www.csiro.au/nationalreservesystem>).

## **4. Fire**

The likelihood of unmanaged wild fires is expected to increase as a result of climate change. This may also create potential risks for environmental assets not currently identified as at risk from fire.

NRM projects may need to be altered to cope with potential changes in fire seasonality.

## **5. Feral animal impacts**

A reduction in average rainfall could lead to overgrazing of native vegetation by feral animals such as camels and goats. Overgrazing pressure could lead to a significant degradation of vegetation, biomass and diversity of species. This would be in addition to any negative impacts that reduced rainfall and increased temperatures may have on the biology of the region.

## **6. Weeds**

Less rain and drier land as a result of climate change could lead to a more disturbed environment. Disturbed habitats may be more easily colonised by pest weeds, for example after a drought or fire. Land managers may need to adjust the timing of their weed control strategies, or may need to adapt to invasions of new weed species.