briefingnotes

Invasive plants and climate change

Weeds CRC briefing notes

Expected climatic changes

Current predictions for the future climate of Australia in the next 30+ years are for a general increase in mean temperatures with a larger increase in mean minimum temperatures as well as a reduction in frost days.

Changes in rainfall are less certain: in the tropical north there is expected to be an increase in rainfall especially in the north-west, with reduced rainfall in south-west WA and eastern and south-eastern Australia generally.

In all areas, an increase in extreme events, including droughts, floods, severe storms and extended wet seasons, is expected. There is no clear picture for cyclone patterns although more severe cyclones are expected.

Impacts on invasive plants

- All invasive plants can be expected to demonstrate a southward range shift, with tropical and sub-tropical species moving south, and temperate species being displaced southward.
- Species currently restricted to the lowlands can be expected to move into higher altitude areas such as the Atherton Tableland in the north, and the Snowy and other mountain ranges further south.
- For temperature sensitive plants such as lantana this shift may be significant and there is some evidence that lantana is already invading higher altitude areas on the Qld-NSW border.
- Frost-intolerant species such as rubbervine and chromolaena can be expected to shift their ranges significantly further south.
- There is a high risk that some weed species not presently considered high priorities and which are currently limited by temperature and rainfall may show increased spread with temperature rise and rainfall change.

Impact of increased CO_2

Increased CO_2 can be expected to influence the invasiveness of some plants.

- Many weeds are C3 plants, with a carbon metabolism which benefits greatly from increased CO_2 levels, while most tropical grasses are C4 plants and will not show increased growth in higher CO_2.
- As a result, invasive weeds such as parthenium will be even more competitive in the raised CO_2 environment, independently of temperature and rainfall effects.
- Some pasture grasses, both native and introduced, may also benefit and show increased growth.

Impact of changed rainfall on invasive weeds

- Until the new rainfall patterns are clear it is difficult to predict where weeds will move.
- Increased rainfall, with associated increased flood severity and frequency, will spread weeds such as athel pine or mesquite.

All invasive plants can be expected to demonstrate a southward range shift

Gamba grass creates very high fuel loads, up to seven times that of native grasses. These intense fires destroy native plant communities. Gamba grass forms dense patches and grows to 4m tall, out-competing native plants. Gamba grass is now common in the NT and north Qld, and also found in parts of the Kimberley region of WA.

Increased rainfall will spread weeds

The worst infestations of Athel pine occur along 600 km of the Finke River in Central Australia near Alice Springs. A single tree can produce thousands of seeds/year. Outbreaks occurr throughout inland Australia in SA, Qld, NSW and WA. Based on climate, athel pine could potentially infest inland watercourses throughout Australia, including parts of NW Vic.

Temperature sensitive plants may shift into higher altitude areas

Lantana forms impenetrable thickets that take over native bushland and pastures on the east coast of Australia. Mature plants can produce up to 12,000 seeds/year. It is now found across 4 million ha east of the Great Dividing Range. Climate change could see it extend its range.

Climate change can be expected to favour invasive plants over established native vegetation, especially if accompanied by an increase in extreme conditions such as droughts alternating with very wet years.

- Increased rainfall may also increase the distribution of some weeds, such as lantana, mist flower, and fireweed, which are currently limited to higher rainfall zones.
- Reduced rainfall may limit or reduce the distribution of many weeds such as lantana and the vine species growing in riparian areas.
- Reduced rainfall will also reduce growth of pastures and crops, increasing bare ground and reducing canopy cover which favours weed invasion.
- Increased extremes, eg long dry or drought periods interspersed with occasional very wet years, will worsen weed invasion because established vegetation, both native and crop, will be weakened, leaving areas for invasion. For example, mass germination and spread of prickly acacia has occurred in the past after a series of very wet years.
- More severe cyclones will both disperse weed seeds through wind and floods, and also open up gaps for weed invasion in areas of pristine native vegetation, especially in the wet tropics. This happened after severe Cyclone Larry in north Queensland in 2006.

General

- Overall, climatic changes force range changes in native vegetation. Species with efficient dispersal mechanisms, whether by bird, wind, water or human activities, are better equipped to make these range changes.
- Invasive plants generally have excellent seed transport mechanisms, often by human activity or by birds, and are likely to spread rapidly into new areas, quickly exploiting changing climatic conditions that favour their establishment. Climate change can therefore be expected to favour invasive plants over established native vegetation, especially if accompanied by an increase in extreme conditions such as droughts alternating with very wet years.
- There is a strong need to modify existing weed risk assessment systems to take into account possible sleeper weeds that may be favoured by a changing climate. Further research will be needed on a regional basis to determine the most detrimental species within local contexts and to consider possible sleeper weed species establishing across different land uses.

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