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Agriculture

Cropping

- The potential impacts of climate change on wheat vary regionally - south-western Australian regions are likely to have significant yield reductions by 2070, while regions in north-eastern Australia are likely to have moderate increases in yield.
- Land-use in southern Australia is likely to change, with cropping becoming non-viable at the dry margins and expanding into the wet margins if rainfall declines. In the north of Australia, climate change and CO_2 increases are likely to enable cropping to persist, with existing warming trends already reducing frost risk and increasing yields.
- Grain quality is likely to be affected. Elevated CO_2 reduces grain protein levels and increases in nitrogenous fertiliser application or increased use of pasture legume rotations would be needed to maintain protein levels. There is also increased risk of heat shock proteins in wheat grain with warming greater than 4^oC

Horticulture

- Australian temperate fruits and nuts are all likely to be negatively affected due to inadequate winter chilling.
- Crops reliant on irrigation are likely to be at increased risk where irrigation water availability is reduced.
- Climate change is likely to make the Queensland fruit fly a significant threat to southern Australia.
- In warmer Australian climates, earlier ripening and possible reductions in wine grape quality are likely by 2030.
- In cooler Australian climates, warming is likely to allow alternative grape varieties to be grown.

Pastoral and rangeland farming

- A rise in CO_2 concentration is likely to increase pasture growth, but if rainfall is reduced by 10%, this CO_2 benefit is likely to be offset.
- A 20% reduction in rainfall is likely to reduce pasture productivity by an average of 15%, substantially increasing variability in stocking rates and reducing farm income
- Climatic changes are likely to increase major land degradation problems such as erosion and salinisation.
- The potential distribution and abundance of exotic weeds and native woody species is likely to increase, increasing competition with pasture grasses and reducing livestock productivity.
- Increased heat stress on animals is very likely.
- Less cold-stress is likely to reduce lamb mortality.
- Impacts of the cattle tick on the Australian beef industry are likely to increase and move southwards.

The material contained in this factsheet has been taken from research outcomes identified in Chapter 11 of "Climate Change 2007: Impacts, adaptation and vulnerability", the second volume of the Intergovernmental Panel on Climate Change's Fourth Assessment Report. The full chapter will be available from www.ipcc.ch.

Forestry

- Productivity of exotic softwood and native hardwood plantations is likely to be increased by CO_2 fertilisation effects, although the amount of increase will be limited by projected warming, reductions in rainfall and by changes in nutrient cycling Where trees are not water-limited, warming expands the growing season in southern Australia, but pest damage is likely to negate some gains.
- Reduction in average run-off in some regions and increased fire risk are very likely to reduce productivity, whilst increased rainfall intensity is likely to exacerbate soil erosion problems and pollution of streams during forestry operations.
- In *Pinus radiata* and *Eucalyptus* plantations, fertile sites are likely to have increased productivity for moderate warming, whereas less fertile sites are likely to have decreased production.

Fisheries

- Changes in ocean temperature, currents, winds, nutrient supply, acidification and rainfall will be the main factors impacting marine fisheries.
- Impacts are likely to be greater for temperate endemics than for tropical species and on coastal and bottom-feeding fisheries relative to mid-water and deep-sea fisheries.
- Different management regimes are likely to be required: fishers will be faced with relocation or face reduced catches *in situ*.
- Reductions in upwelling of nutrients and extension of warm water along the east Australian coast may reduce krill and jack mackerel abundance, upon which many other species are reliant, including tuna, seals and seabirds.

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