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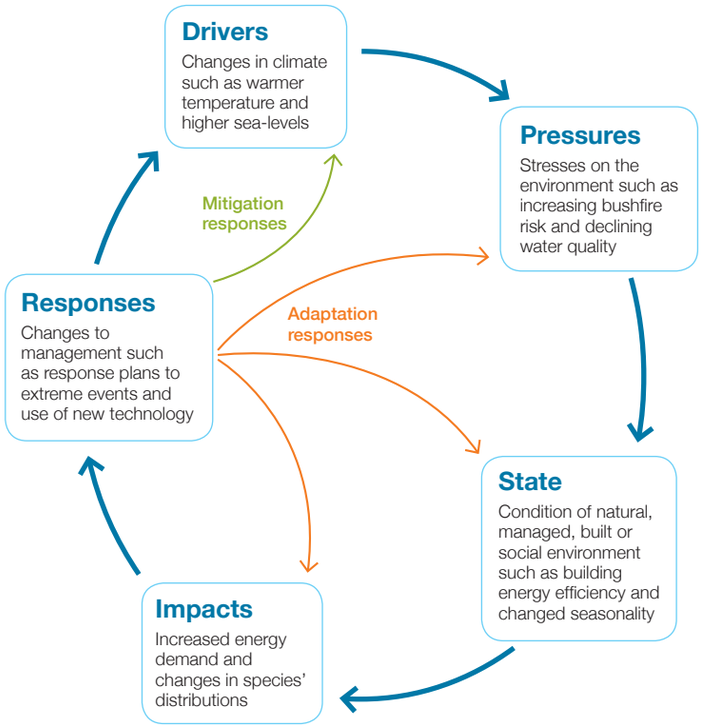
DPSIR Framework

Statements in *iClimate* are structured using a framework which identifies a causal chain linking Driver-Pressures-State-Impacts-Responses (DPSIR).

While the framework provides a structure for *iClimate* statements, each statement should be considered its own context so the nature of the state and pressure can be seen in the context of the impact. There may be multiple lines of evidence within each of the framework stages.



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iClimate

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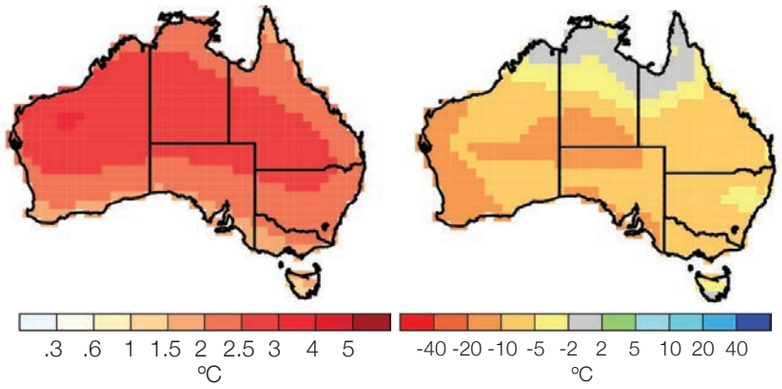
A searchable database of statements documenting the impacts of climate change in Australia and adaptation responses. *iClimate* covers natural and managed ecosystems, human health and well-being, and built environments. Each statement is fully-referenced and a searchable, supporting bibliography is provided.

The *iClimate* project was funded by the National Climate Change Adaptation and Research Facility to conduct a review of the climate change impacts and adaptation literature for Australia covering natural and managed ecosystems, human health, well-being and security, and human built environments, industry and infrastructure.

The information was synthesized into user-friendly statements which can be thought of as storylines tracing the impacts of climate change and responses. The statements have been structured to show the links from climate change and impacts to adaptation responses.

Climate change in Australia

Surface temperatures in Australia rose by an average 0.9°C since 1950 (CSIRO and BoM 2007). Australia is projected to warm further, by around 1°C by 2030, and between 2.2°C and 5°C by 2070. Since 1950, most of eastern and south-western Australia has experienced substantial rainfall declines. Over the coming decades, there is likely to be less rainfall in southern areas of Australia, especially in winter, and in southern and eastern areas during spring. Soil moisture is likely to decline over much of southern Australia. Sea surface temperatures have also warmed, particularly off the south-east coast and in the Indian Ocean. Events that happen every few years now are likely to occur every few days if mean sea-level rises by just 50 cm (*Department of Climate Change 2009*).



Projected changes in annual average temperature (left) and rainfall (right) by 2070 across Australia relative to the base period of 1980-1999 under a medium emissions scenario. The images show the mid-point of the spread of results from Global Climate Models.

CSIRO and BoM (2007) Climate change in Australia. www.climatechangeinaustralia.gov.au. Department of Climate Change (2009). *Climate Change Risks to Australia's Coast: a first pass national assessment*. Department of Climate Change, 172 pp. http://www.climatechange.gov.au/publications/coastline/climate-change-risks-to-australias-coasts.aspx

Natural and managed ecosystems

Terrestrial ecosystems face challenges of changing rainfall, stream-flow and soil moisture. In ocean waters, changing currents, ocean acidification and warming temperatures all challenge natural ecosystems, fisheries and aquaculture. Increasing human populations are placing escalating demands on natural resources and, in many cases, will amplify climate change impacts.

Climate change will bring negative and some positive impacts on our iconic species and natural ecosystems, as well as agriculture and fisheries. Greater problems with pests, diseases, invasive species and bushfires are expected. Climate change is also likely to bring ecological surprises.

Adapting to climate change will be necessary to reduce negative impacts and take advantage of opportunities. Development of knowledge-action networks and industry-government relations can build adaptive capacity. Statements included in iClimate, cover agriculture, forestry, fisheries, aquaculture and conservation.

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Human health and well-being

Increasing urbanisation, increasing population size and increasing international travel and trade are likely to compound climate change impacts on human health and well-being. Climate change will bring greater health problems with increased disease risks and heat stress in some regions. Loss and damage of coastal properties and infrastructure will impact livelihoods and well-being.

Adaptation responses can include early detection monitoring, predictive modelling and the development of response plans and indices. Community education programmes are likely play a key role on adaptation planning. Engineering solutions will be needed to underpin adaptation responses to heat stress, rising sea levels and extreme weather events. *iClimate* statements consider health risks of vector, food and water-borne diseases, and heat stress under a changing climate.

Built environments

Warming temperatures and increasing likelihood of severe weather and bushfires will place increasing pressure on human settlements, for example on electricity and water demand, the reliability of transport and electricity infrastructure and the durability of concrete buildings and structures. Population growth and urbanisation will increase the exposure of our human settlements to change.

Current designs of buildings and infrastructure may require major changes to deal with future climate. Updating design and industry standards will improve the energy efficiency of buildings, and maintain or improve durability to accommodate potential climate change impacts. Technologies and engineering solutions will play a key role for us to adapt to climate change. For example, renewable energy not only reduces greenhouse gas emissions but also enhances a supply capacity to meet electricity demand. Desalination plants and new water infrastructure may also reduce water-supply stresses. Statements provided convey information on considerations for electricity and water demand and supply, building construction materials, building energy consumption, and transport infrastructure.