



Summary of Climate Change Impacts Sydney Region



NSW Climate Change Action Plan



Projected regional climatic changes by 2050

NSW government agencies and the University of NSW have been developing climate change forecasts for the NSW State Plan regions. These pages present the interim findings. In summary, spring and summer rainfall is projected to increase, while winter rainfall is projected to decrease. Sea levels will rise, changing flood patterns and affecting the coast. An increase in maximum temperatures is projected for this region. The increase is projected to be greater in winter and spring than in summer and autumn.

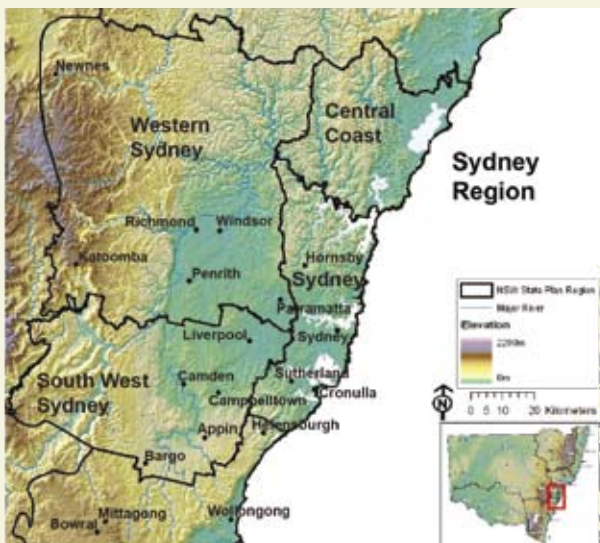
A more detailed study looking specifically at the potential climate change impacts on Sydney's water supply and demand is currently underway. This study, being conducted as part of the Sydney Metropolitan Water Plan, will take into account local conditions in Sydney's drinking water catchments, as well as projected customer demand, under climate change scenarios.

A hotter climate

Days are projected to be hotter over all seasons, with the greatest warming in winter and spring (2 to 3°C). Nights are also projected to be warmer, particularly in spring (2 to 3°C).

Increased rainfall in summer

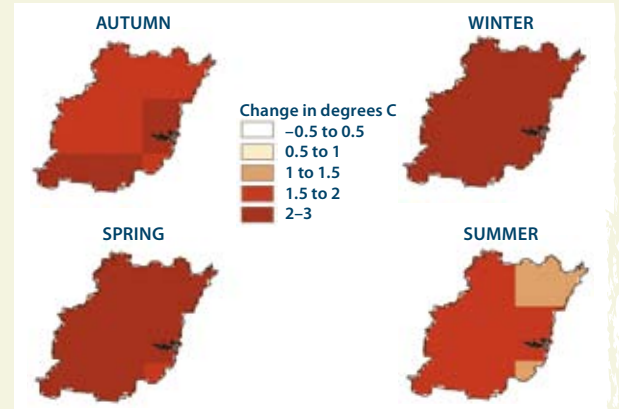
Summer rainfall is projected to increase across the region by 20–50%, with a smaller increase in spring. Winter rainfall is projected to decrease.



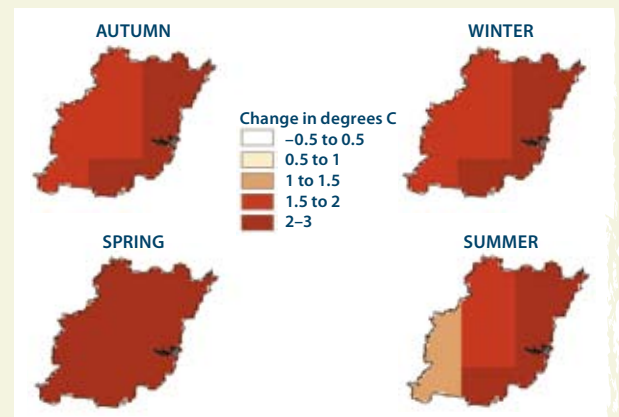
Drier conditions in winter and spring

Higher temperatures and changes to evaporation are likely to create slightly drier conditions in winter and spring.

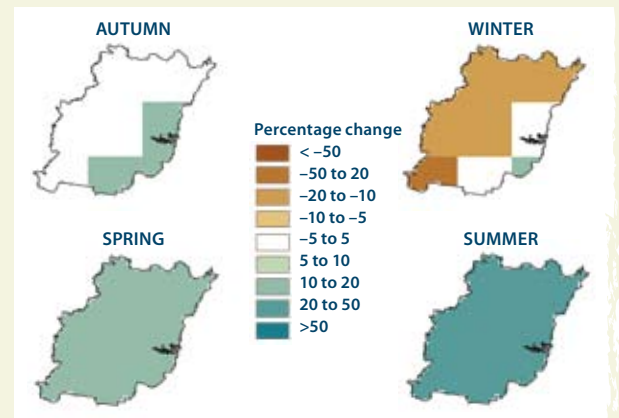
Projected change in mean maximum temperature by season



Projected change in mean minimum temperature by season



Projected change in seasonal rainfall



Increase in sea levels

The figures for sea level rise are based on projections by the Intergovernmental Panel on Climate Change and CSIRO and are still being reviewed to quantify expected local changes. Along the coast, storm events and sea level rise are projected to have a significant impact. Sea level rise and the potential for increased storminess will exacerbate the risks of coastal erosion, as well as subsequent inundation of low-lying areas. Sea level is projected to rise up to 40 cm above 1990 mean sea level by 2050 and 90 cm by 2100. Coastal erosion is likely to result in a recession of sandy parts of the coastline. Further regional work is required to determine the extent of this recession in particular locations.

Assessment of regional biophysical impacts

Characteristics of the region

The Sydney Region has a population of over 4 million people. The region has a warm temperate climate with rainfall evenly spread throughout the year. The coastline extends from the Royal National Park in the Sutherland Shire to Barrenjoey Head in the Pittwater local government area.

There is a well-established tourism industry in the region. Sydney is recognised internationally as one of Australia's premier tourist destinations. The region includes the major ports at Sydney and Port Botany as well as the busiest airport in the country located at Mascot.

Urban development is focused on the coast, nearby coastal plateaus, the Cumberland Plain, and the Blue Mountains. Large tracts of the sandstone plateaus remain relatively undisturbed and have been included in an extensive network of reserves. The estuaries of the region include drowned river valleys such as Broken Bay, Sydney Harbour and Port Hacking, enclosed embayments such as Botany Bay, and small lagoons such as Narrabeen Lakes and Manly Lagoon. The region includes many national parks including the Blue Mountains, Royal and Ku-ring-gai national parks.

El Niño-Southern Oscillation

The pattern of the El Niño-Southern Oscillation cycle is projected to continue but with higher temperatures than currently experienced. El Niño

years are likely to continue to be drier than average and become hotter. La Niña years are likely to continue to be wetter than average and also to become warmer. In El Niño events, water stress is projected to be more intense due to higher temperatures. During La Niña years, storms with heavy downpours are projected to be more frequent.

Fire

The frequency of very high or extreme fire-risk days is predicted to increase across NSW. Increases in temperature, evaporation and high fire-risk days are likely to influence fire frequency and intensity across the region. The fire season is likely to be extended as a result of warmer temperatures. More fire is likely to impact on air quality, by increasing the levels of fine particles.

Biodiversity

Ecosystems in the region are likely to be affected by rising sea levels, coastal erosion, increased fire intensity, increased temperature and more regular extreme events such as hot spells, dry spells or intense rainfall. Low-lying coastal ecosystems will be at increased risk of inundation, erosion and saltwater intrusion into the water table, reducing the extent of these ecosystems. Estuarine habitats including salt marsh seagrass beds and mudflats are likely to be severely disrupted, with resulting impacts on migratory shorebirds, invertebrates and vertebrate species. Fish populations are likely to decline due to changes in food availability and migration of saltwater further upstream. Predicted changes to fire regimes are likely to cause major changes to less fire-tolerant ecosystems.

Soils

Changes to rainfall are likely to increase sediment shedding from the hinterland, potentially causing changes to stream channels including bank erosion. Sediment deposition and saltwater inundation on floodplains are likely to affect agriculture and urban development. Acid sulfate soil problems are likely to remain in the short term but improve in the longer term. The potential to build soil organic matter will likely improve with increased rainfall and higher temperatures.

Coastal erosion and flooding

The major impact within the coastal zone is likely to be from sea level rise and resulting inundation and erosion of foredune areas. The Sydney Region has a heavy density of residential and commercial beachfront developments that may be threatened by either ocean inundation or sea level rise induced recession. Settlements adjacent to estuaries and beaches are the most vulnerable. Rising sea levels may exacerbate flood risk in coastal rivers, floodplains and around estuaries. In addition, any increase in rainfall intensity in severe storms may impact on flood risk more broadly across the area.

Hydrological change

Overall, there will more likely than not be a slight increase in average annual runoff. However, there will be some redistribution of runoff across the seasons, with likely increases in summer and autumn and decreases in winter and spring.

- In summer, it is very likely that there will be a major increase in average runoff depths (with estimates ranging from 0% to +26%).
- In autumn, there is likely to be a moderate increase in average runoff depths (with estimates ranging from -6% to +19%).
- In winter, there will more likely than not be a minor decrease in average runoff depths (with estimates ranging from -15% to +7%).
- In spring, there is likely to be a moderate decrease in runoff (with estimates ranging from -23% to +4%).

- The net result in average annual runoff is more likely than not a slight increase in average runoff depths (with estimates ranging from -9% to +10%).

The consequences of the changed catchment runoff for streamflow and consumptive water users will clearly depend on what part of the reported range of change is realised, as well as the influence of water infrastructure. The bulk of Sydney is served by Sydney Water Corporation's infrastructure. Impacts of hydrological change are the subject of a specific study underway as part of the Metropolitan Water Plan.

Air quality

Sydney's air generally complies with national standards, although exceedances occur on peak pollution days each year. These are caused by particles and formation of ozone which is a product of the chemical reaction between volatile organic compounds and NO_x. Particle pollution is likely to be increased if there are more fire days, and ozone pollution is likely to increase with higher temperatures. Both these risks will be the subject of further research.

More information

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