Preparing Australian Communities Program - Local

Climate change, natural hazards and key disaster risk reduction concepts

The National Recovery and Resilience Agency (NRRA) and the Australian Climate Service (ACS) have developed and prepared this document to assist you to prepare a grant application for your proposed project under the Preparing Australian Communities Program for projects of local significance (PACP Local).

This document offers advice from the ACS on how climate change is affecting natural hazards, as well as guidance on additional resources applicants can use to address Assessment Criterion 1(a). This document also contains definitions of key disaster risk reduction concepts which are referred to in the Grant Opportunity Guidelines (Guidelines) as well as Factsheet 4 (Hints and Tips – Addressing Assessment Criteria).

This document should be read in conjunction with the Guidelines, which detail all the requirements you and your project will need to meet, and FAQs for PACP Local provided at business.gov.au/PACPL. This document does not revoke, replace or amend the Guidelines.

Definitions of hazards and the impact of climate change

Summary advice below has been provided by the Australian Climate Service on how climate change is affecting hazards. You may wish to support your response to Assessment Criterion 1(a) with information contained below.

Bushfires

Climate change is likely to have an impact on many factors that contribute to intense bushfires, however, the weather is the only one that can be projected with confidence at the moment. 'Fire weather' considers drought, humidity, temperature, and wind – these factors are captured in the widely used 'Forest Fire Danger Index' or FFDI. While the weather contributes to the risk of damage from bushfires there are other contributing factors, including the availability of fuel, the shape of the landscape, proximity of buildings or infrastructure to the fire and their vulnerability (how susceptible they are to damage). **Most factors that contribute to dangerous fire weather are expected to worsen under climate change (with high confidence)**, rising temperatures, more rapid drying of fuels, and lower humidity are already occurring in many areas and projected to continue.

Floods

Flooding is a complex hazard with a number of causes. Intense rainfall may cause a flood depending on soil moisture content, water management – such as changes to reservoirs – and land-use changes – such as the locations of building and paving. A warmer atmosphere can hold more water vapour than a cooler atmosphere, and **so as the climate warms, there is an increased likelihood of heavy rainfall events (high confidence).** Increased atmospheric moisture can also provide more energy for some events that generate extreme rainfall, such as thunderstorms, or tropical cyclones (low confidence).

Rising sea levels, which is projected with high confidence as the climate changes, will increase the risk of flooding in coastal and estuarine regions from storm surge and extreme high tides. The interaction between riverine flooding and coastal flooding is complex but is expected to significantly increase flood risk in many low-lying coastal regions.

Tropical Cyclones

Tropical cyclones cause damage because of high windspeed, and because of the heavy rainfall and storm surge which is often associated with them. Tropical cyclones **are expected to decrease in frequency across northern Australia, with likely increase in average intensity (medium confidence).**

Note: Projecting changes in the future climate requires tracking of long-term trends, an understanding of weather and climate processes, and assumptions about future policy, technology and behavioural changes. **Confidence in future climate trends is based on multiple lines of evidence and requires an assessment of the quality and agreement between peer-reviewed evidence under multiple scenarios published in scientific literature**.

Resources to understand the impact of climate change on hazards in your area

These resources will assist you to understand how climate change might be affecting hazards in your area, and whether bushfires, tropical cyclones and/or floods will increase in your area due to climate change. You may wish to support your response to Assessment Criterion 1(a) with information contained in the sources below.

The Intergovernmental Panel on Climate Change's Interactive Atlas is a handy visualisation tool that can be used to understand geographic changes in various weather and hazard measures. This includes information on changes to fire weather, and flooding (river flood, heavy precipitation, surface water flooding from heavy rainfall ('pluvial' flooding) and coastal flooding) in Australia under climate change. Alternative sources contain more accurate information about tropical cyclone, please refer to these below.

To understand what climate models are projecting for Australia's future climate, we encourage you to explore the various projections tools on the Climate Change in Australia website. The range of tools allow access to information of differing levels of complexity. The tools are listed below.

To better understand what information on the Climate Change in Australia website is most relevant and appropriate to you, please see a decision tree here may be useful.

Tool	What information does this tool contain?	Complexity rating of information
Regional Climate Change Explorer	Climate projection information by Australia's climatic zones.	Basic
Summary Data Explorer	Projected changes in eight climate variables for Australia's climatic zones. Here you can view bar plots of multi-model regional-average seasonal changes for eight variables.	Basic
Extremes Data Explorer	Projected changes in climatic extremes (e.g. coldest night, hottest day, wettest day) for Australia's climatic zones.	Basic

Thresholds Calculator	Data on the number of days above or below a threshold level of temperature or rainfall. Data available by locality, and for different climate models, time periods, emissions scenarios and seasons.	Intermediate
Map Explorer	Projected changes for different variables (e.g. temperature, wind speed, rainfall) relative to historical periods. Data available for different climate models, time periods, emissions scenarios and seasons.	Intermediate
Time Series Explorer	Historical and future projections of several variables (e.g. temperature, rainfall). Data available for different regions, climate models, emissions scenarios and seasons.	Intermediate
ESCI Climate Data	Access datasets that contain projections of different variables (e.g. rainfall, temperature, FFDI) under different emissions scenarios, time periods and Global Climate Models. Location specific information is also available.	Advanced

Several of the intermediate and advanced tools may provide data for 40 different climate models. If you do choose to use one of these tools, we recommend that you focus on information for one of the eight climate models identified here.

Other resources

For a more detailed assessment of the current evidence on the physical science of climate change, we suggest you read the sixth assessment report by the Intergovernmental Panel on Climate Change, published in 2021. Working Group I addresses the most up-to-date physical understanding of climate change.

To understand how the climate is changing in Australia, the sixth biennial State of the Climate report draws on the latest climate research, including analysis and projections to describe the year-to-year variability as well as longer-term changes in Australia's climate.

We also encourage you to consult state and local government websites for detailed information on local climate change.

Resources to understand your community's vulnerability to hazards

To understand your community's vulnerability relative to other communities across Australia, we encourage you to explore local area profiles which include information socio-economic indices developed by the Australian Bureau of Statistics, and the Relative Adaptive Capacity Index developed by the Productivity Commission. The Guidance on Vulnerability report provides further information on ways to understand and talk about systemic sources of vulnerability, and developing a vulnerability assessment. The National Resilience Taskforce's report, Profiling Australia's Vulnerability, is also a useful resource to understand systemic vulnerability.

Key concepts and definitions

Disaster risk: the potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community.

Disaster risk reduction: Disaster risk reduction is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.

Natural hazards: a natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.

Exposure: refers to people, property, systems or other elements present in hazard zones that are thereby subject to potential losses.

Vulnerability: the conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, community, assets or systems to the impacts of hazards.

Resilience: the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner through the preservation and restoration of its essential basic structures and functions through risk management.

Confidence: Confidence in a climate projection is based on the type, quality, and agreement between different lines of evidence drawn from the scientific literature. These include, for example, whether the results are consistent with long term trends and with an understanding of climate and weather processes, agreement between the results from different climate simulation models and whether the models can simulate the physical process (for example, thunderstorms are generally too small for climate models to simulate well). Confidence is expressed qualitatively (i.e., very low, low, medium, high, and very high), for example, where there is limited evidence with low agreement, confidence is low, but where evidence is robust with high agreement, confidence is high. Confidence is independent of the direction and magnitude of change.