

# CLIMATE ADAPTATION MISSION

## CHALLENGE BRIEFING

Challenges facing communities that  
rely on natural resource  
management and natural capital

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### Declarations of Conflict of Interest

The authors have no conflicts to declare.

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# OUTLINE

This document briefly explains the climate-related challenges that communities that rely on natural resource management (NRM) and natural capital are facing and the behaviour change problems to be solved to address those challenges. This document is based on the results of data collection in the prioritisation phase of the Climate Adaptation Mission (e.g., survey, desktop review, prioritisation summit), and input from prospective participants to the co-design phase of the mission.

What's contained in this document:

- Background on the Mission
- The adaptation challenges for communities that rely on natural resource management and natural capital
  - Challenge #1: Environmental degradation
  - Challenge #2: Changed or reduced economic foundation or activities
  - Challenge #3: Food and water insecurity
- Examples of behaviour change problems related to the challenges

# BACKGROUND ON THE MISSION

Climate change poses an increasing threat that impacts the lives of all Australians. Current research emphasises that Australia is amongst the most exposed countries to climate change impacts, with a range of climate change changes already observed in the last 20 years. At present, these impacts disproportionately threaten the lives and livelihoods of our most vulnerable and disadvantaged communities. If globally agreed emission reduction targets are not achieved, increasingly catastrophic and even existential threats can be expected, making adaptation increasingly difficult, or impossible.

The Climate Adaptation Mission led by BehaviourWorks Australia (BWA) and its partners explores how systemic behavioural public policy experiments could have a substantial impact on reducing projected harms from climate change. It is part of the BWA Consortium, which has a focus on identifying shared policy challenges between partners and tackling them with behavioural approaches.

This Mission leverages the combined reach, resources and expertise of the following BWA Consortium partners: Department of Environment, Land, Water and Planning (Vic), Sustainability Victoria, The Shannon Company, and the Australian Government Department of Agriculture, Water, and the Environment.

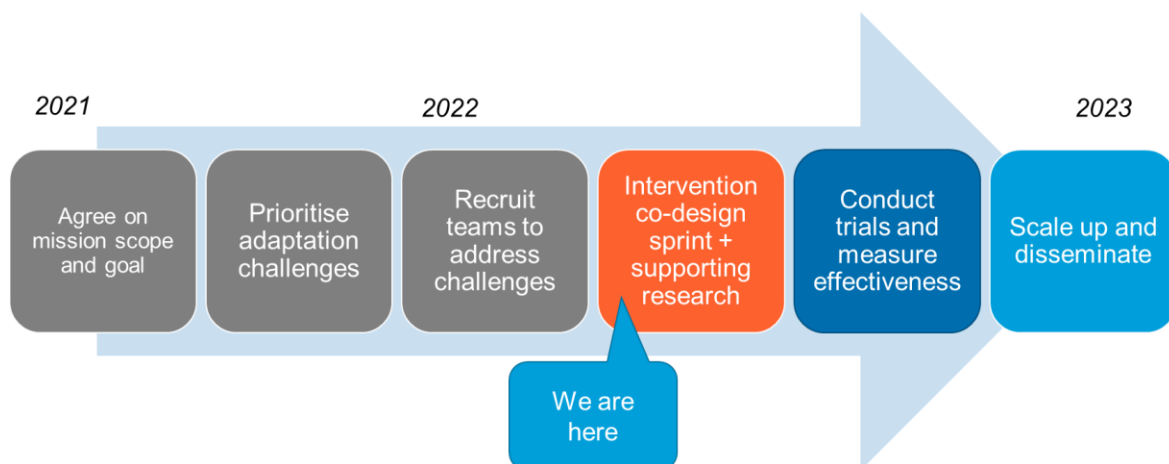
To protect valued aspects of life, we need to prevent harm through building *adaptive capacity*: "the ability or potential of a system to respond successfully to climate variability and change, which includes adjustments in both behaviour and in resources and technologies."

The goal of the BWA Climate Adaptation Mission is:

**Increase the adaptive capacity of communities most at risk of climate change impacts by 2030.**

For more information on the Mission, visit [climateadaptationbehaviour.com](https://climateadaptationbehaviour.com).

## THE ROLE OF THIS BRIEFING FOR THE MISSION



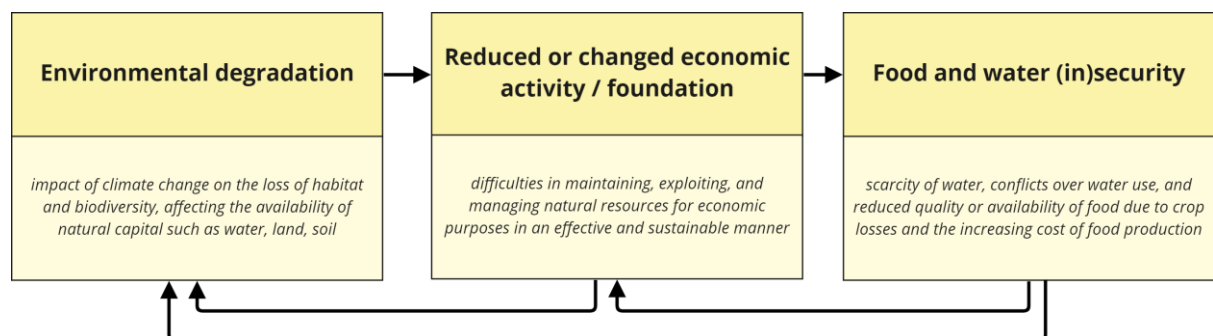
**Figure 1. Mission Activities**

To date, we have worked to agree on the mission scope and goal (above), identify and prioritise adaptation challenges, and have recruited teams to address these challenges. This briefing provides information about the prioritised challenges that communities that rely on natural resource management (NRM) and natural capital are facing.

# THE ADAPTATION CHALLENGES

## OVERVIEW

Communities dependent on natural resource management and natural capital include groups relying on natural capital (e.g., land, water, biodiversity, national parks, waterways) and natural resource management (NRM) (e.g., ecosystem services, land erosion protection) to generate their regular income. Both natural capital stock and NRM are extremely vulnerable to climate change and its impacts. Three top prioritised challenges associating with these communities are: environmental degradation, changed and reduced economic activities, and food and water (in)security (Figure 2).



**Figure 2. Three interconnected challenges facing communities dependent on natural resource management and natural capital**

Environmental degradation refers to the impact of climate change on the loss of habitat and biodiversity, affecting the availability of natural capital such as water, land, soil. Reduced or altered economic activities or foundations refer to the challenge that these communities face in maintaining, exploiting, and managing natural resources for economic purposes in an effective and sustainable manner. The challenges include the impact of past, recent, or projected climate change or weather extremes; and the risk of losing income from their economic activities if these communities do not change their productive routines to mitigate the adverse effects (e.g., managing the use of fertiliser to prevent greenhouse emissions); it also includes adapting to socio-technical changes as broader climate change mitigation and adaptation processes impact agriculture, NRM and natural capital (e.g. market access, natural capital markets, regulation, etc.).

These three challenges are intertwined, interrelated, and can overlap. One way to explain this complexity is that climate change and its subsequent risks, such as droughts, storms, and flooding, lead to environmental degradation, especially the loss of habitat and local species. These risks threaten the availability and economic readiness of natural resources and put greater pressure on natural resource management, which limits the way local people maintain and develop their livelihoods. As a result, local people and industries face conflicts in water use and demands and a considerable decline in food security due to crop losses and the increasing cost of food production.

Addressing the three mentioned challenges also require paying attention to other challenges facing communities dependent on NRM and natural capital, including: injury, illness, and death; mental health and stress; barriers to adaptation planning and implementation; damage or disruption to the built environment and essential services; loss of culturally important values, sites, or species; and loss of social capital, communities, or forced climate migration.

## CHALLENGE #1: ENVIRONMENTAL DEGRADATION

Under the impact of climate change, there are 24 entries reporting increasing environmental degradation in many areas, especially in regional inland Australia. This phenomenon affects severely the availability of natural capital, including biodiversity, ecosystems, water, soil, and snow cover, which are the basis for communities dependent on natural resource management and natural capital, such as crop-based, livestock-based, eco-tourism, communities, fisheries, forestry, fossil fuel, and mining communities. This challenge also exposes weaknesses or lack of capacity in the current mitigation and adaptation schemes.

First, snow-based communities in the Mountain Pygmy Possum or Alpine region are experiencing negative changes, including lower snowfall and declining reliable snow cover, which threaten the habitat (e.g., wetlands) and snow-based species and cause the loss of tourist attractions. Snow cover in the Victorian Alpine has been estimated to have decreased by 50% since 1960.

Second, crop-based communities in regions such as the Grampians are experiencing land erosion, the loss of soil health, and increasing desertification thanks to bushfires, drought, increased temperature, and lower rainfall. Storms or flooding may increase the risk of weed growth, pest and disease incursions, a lack of pollination, and decreased revegetation. Local fruit growers are facing the challenge of wildlife movement (flying foxes, lorikeets) and weather extremes, which demands a large amount of investment in infrastructure to cope with disaster risks and prevent fruit damage. This affects their crop production and productivity considerably and threatens their livelihoods.

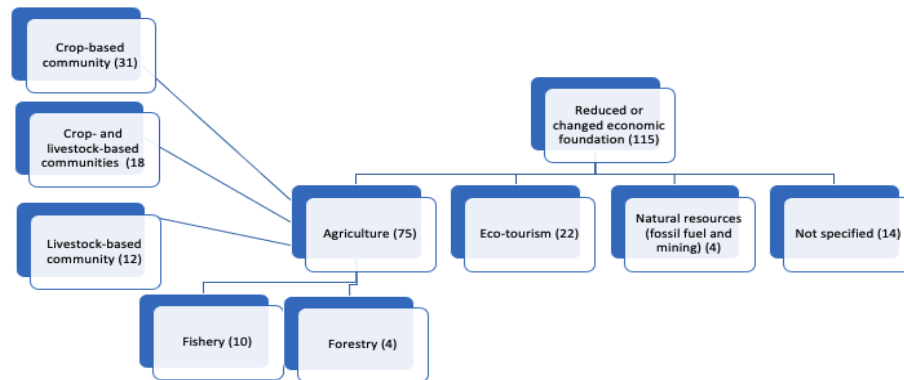
Third, fishers, livestock-based and crop-based communities are increasingly prone to losses of vegetation cover due to the negative influence of bushfires and droughts on local lakes, estuaries, and wetlands.

Fourth, fishers and marine ecosystem-based communities are facing coral bleaching, increased ocean temperature, ocean acidification, and heat waves. These changes threaten the persistence of shell-forming animals and the migration of marine species (especially commercial fishes), subsequently affecting these communities' productivity and livelihood development plans.

Fifth, land holders and land and water managers in fisheries, eco-tourism and crop-based communities located in regions such as Gippsland are struggling to implement projects aimed at habitat enhancement, restoration, revegetation, and species conservation because of bushfires, drought, and drying conditions. This challenge is also shared by natural resource management and restoration practitioners, environmental volunteers, or community groups whose jobs are negatively affected by inundation, storms, or drought. For instance, dry conditions could lead to the high mortality rate of seedlings in restoration and revegetation programs.

## CHALLENGE #2: REDUCED OR CHANGED ECONOMIC ACTIVITY AND FOUNDATIONS

Reduced or changed economic activity is the most reported challenge facing communities dependent on NRM and natural capital, based on our survey and desktop review. This challenge appeared in 115 entries, including 53 surveyed responses and 62 documented instances (Figure 2).



**Figure 3 – economic challenges and affected communities**

Below are the descriptions of the challenges facing each specific community.

### Crop based community

Crop-based communities in rural and regional inland Australia, such as Gippsland, Hume, and Grampians, Loddon Mallee, and the urban fringe, could have reduced crop production due to climate change affecting the availability of natural capital (land, water). The main reasons for this impact are natural risks, such as land erosion, bushfires, and drought. These risks can lower the quality of land and water and increase user water demand, putting more strain on ecosystems. This will reduce crop production by damaging the environment, polluting the land and water, and making it difficult for crops to grow.

### Livestock based community

Graziers in areas such as Rangelands could have reduced productivity due to climate change affecting the availability of water and pasture. The main reasons for this impact are droughts, increased temperatures, and bushfires. These risks can lower the quality of land and water, and make it difficult for graziers to produce food and fibre. Drought, in particular, is a major problem, as it can cause the loss of surface and groundwater, leading to economic vulnerability for farming families. Bushfires also pose a major risk, as they can destroy farm infrastructure, houses, and even lives. Economic vulnerability due to underinsurance can mean the loss of livelihood after a disaster and also reduce the capacity to get loans for farm improvement.

### Fisheries community

Due to climate change, fishing communities in coastal rural areas could have reduced productivity and lost livelihoods due to the threatening availability of marine commercial species, marine food chains, and webs. First, climate change has led to increased ocean temperatures and more frequent marine heatwaves, which forced many marine species such as seaweed, coastal fishes, and sea



urchins to migrate to cooler waters (e.g., south-eastern Australia), harming the distribution of commercial species. Second, increased ocean temperature and ocean acidification could substantially change the basis of marine food chains and food webs, which subsequently leads to food insecurity for species ranging from small fishes to top predators such as sharks. Third, forecasted decreased cool-season rainfall and increasing evapotranspiration can bring about a reduction in streamflow, causing an increase in water temperatures and a decline in dissolved oxygen levels, resulting in the rise of algal blooms, toxicity, and fish deaths. Fourth, a highly specified economy or low industry diversity because of focusing more on traditional industries (agriculture, fishing) implies higher vulnerability to extreme weather and more difficulty in building economic resilience.

## Forestry community

Due to climate change, forestry communities could have reduced productivity and lost livelihoods due to reduced forest resilience. First, climate change has led to hotter and drier conditions, which can bring about a decrease in tree plantation and persistence in the long run. Second, natural hazards, including drought and bushfires, can severely damage forest and tree growth. These changes pose challenges for native timber plantation and harvesting. Third, a highly specified economy or low industry diversity because of focusing more on traditional industries (agriculture, fishing) implies higher vulnerability to extreme weather and more difficulty in building economic resilience.

## Fossil fuel/mining community

Communities dependent on the exploitation of fossil fuel and mining in regional rural areas such as Loddon Mallee and Gippsland local communities could have reduced productivity due to climate change, revealing a lack of coping capacity. Climate change and extreme weather expose the lack of economic resilience because of the high reliance on traditional industries, including mining and fossil fuels. This is also due to the lack of programmes that aid in developing new skills and coping capacities in the face of risks.

## Eco-tourism community

Eco-tourism communities in coastal regional Australia, such as the Gippsland coastal region and regional inland Australia, such as Loddon Mallee, Alpine, and Hume, could have reduced productivity due to climate change, which affects the variability of disaster risks and the availability of local infrastructure, cultural heritage, and natural resources including water and catchments. First, climate change has led to increased disaster risks, including rising sea levels, destructive storms, and bushfires, which decrease water quality, damage transportation routes, prevent access to water-based sports, limit the use of recreational sites, and severely affect visitation in the holiday and summer periods. Secondly, shorter seasons, a lower amount of snowfall, and a lower snow cover in regions such as Alpine and Mountain Pygmy Possum could threaten local species and reduce tourism opportunities. Similarly, in coastal regions such as the Great Barrier Reef, climate change causes coastal erosion and decreases marine biodiversity, which is the basis for these regions' tourist attractions. Third, the variability of extreme weather conditions poses greater challenges for coping capacities, including the need to adapt annual tourism development plans and diversify local livelihoods.



### CHALLENGE #3: FOOD AND WATER (IN)SECURITY

Food and water security, reported in 29 entries, are the basis for communities dependent on natural resource management and natural capital.

Regarding water security, crop-based communities are the most severely affected by this challenge. Climate change, with its subsequent consequences such as increased temperature, drought, declined rainfall and streamflow, could have led to shortages in both surface and groundwater and decreased water quality. This firstly poses greater challenges to land holders and water managers, who are responsible for irrigation management, because it is harder to timely and equally allocate water to different regions in need of water for crop production. This increased water scarcity could threaten the viability of irrigated crops and perennial horticulture, demanding mitigation and adaptation in crop-based communities.

Secondly, because of the water shortage, there is a risk of increasing conflicts among water-using communities. This situation in turn poses challenges for local governments in managing conflict risks.

Algal blooms could increase toxicity, decrease oxygen levels in water and affect water quality. This challenge affects not only crop-based farmers but also horticulture farmers and livestock-based communities (pastoralists).

Livestock-based communities (pastoralists) are facing challenges from the indirect impact of water shortages in controlling grazing pressures and preventing increased movement of goats and kangaroos in search of water and food. This community is also facing reduced pasture due to water shortages and the movement of local animals.

Regarding food security, primary food producers, including crop and livestock farmers, are experiencing increasingly extreme conditions (drought, increased temperatures, lower rainfall) that are not favourable to production. Additionally, they could have experienced the flow-on effect of climate change, which results in increasing costs for production (including expenditure on pest management and transportation) and making inputs for food production more expensive. It is also more challenging for this community to produce safe food, which is increasingly demanded. The fishing industry is also facing a food shortage because of climate change's impact on cold chains and food safety.

## INITIAL IDEAS FOR BEHAVIOUR CHANGE NEEDED TO ADDRESS THE CHALLENGES

Behaviour change is central to the existence and growth of the three discussed challenges. This implies that to solve the challenges, it is more important to focus on changing existing behaviours within communities dependent on NRM and natural capital. Analysing three challenges reveals that most behavioural problems refer to adaptation behaviours instead of mitigation behaviours. The former type of behaviour focuses on readiness/ willingness to make changes in order to cope with extreme weather and the adverse consequences of climate change. Meanwhile, the latter type refers to the process of reducing the affected communities' greenhouse gas emissions so as to slow down climate change.

The following behaviour change problems are identified on the basis of surveys, desktop reviews, and responses from prospective co-design participants.

### Willingness to take necessary changes against new risks

As climate change occurs, the risks of disasters including storms, flooding, drought increase, which requires a change in the affected communities' attitude. They need to understand that their natural resources are decreasing and the government are imposing new restrictions on planning and building codes, which likely impact the way they conduct livelihood activities. E.g., crop-based communities are facing a longer hotter period, extended drying conditions and declined rainfall. To cope with these conditions, they need to change their crop schedule.

### Lack of knowledge of changes and insufficient learning from peer-to-peer networks

When they attempt behaviour changes, farmers and landholders are unaware of peer-to-peer networks and approaches. This could lead to a lower rate of willingness to change as the majority of landholders tend to stick with their conservative approaches and practices. In addition, as a result of a lack of information exchange, it takes much longer to change the behaviour problems.

### Lack of early preparation for incoming climate disasters

Farmers often make decisions without proper access to early climate warnings and forecasts. This habit also implies the role of governments in disaster risk reduction and climate change adaptation, which may not be effective in conveying early warning and forecast that should be tailored to the different needs of different groups within communities dependent on NRM and natural capital.

### Social norms preventing innovation and adaptation

Social norms within each community may prevent farmers from adopting innovative practises by ridiculing new trials and favouring productivity and conventional management practices. This problem implies a collective hinderance rather than individual behaviour.

### Lack of systematic cooperation and support

Farming in particular and agriculture in general is a complex system that involves many stakeholders, from farmers and landholders to government officials (e.g., extension officers, political leaders), scientists, the media, community-based organisations, peer-to-peer networks, and agricultural enterprises. Farmers and landholders need support from these stakeholders in order to learn and implement innovative changes.

## Lack of effective natural resource management

Coping with the decline in natural resources due to climate change requires behaviour change at the management level. This problem refers to the lack of government-level management and private landholders' efforts in managing natural resources that have decreased under the impact of climate change. For instance, it requires local fruit growers to invest more in their infrastructure to prevent fruit damage due to weather extremes. This problem requires public–private partnership in co-designing new natural resources management mechanisms such as volunteering models, cash co-contributions, political advocacy, or reservation/revegetation programs. Moreover, as water becomes scarce, it is required for government officials to manage irrigation schemes, including the even and timely allocation of water to different locations.

## Market investors in land reduce or miss innovation opportunities

There are market investors buying large tracts of farming land who focus on gaining a profit rather than pursuing agriculture and sustainable agriculture. As such, their investment may damage agriculture and farmers' innovation in the long run. This behaviour change problem could involve local governments who support these investors and farmers who are selling their land.