WHAT NEEDS TO BE DONE?

The good news is that our nation and people have a proven record of resilience, through a history of preparing for and dealing with natural disasters and developing highly productive primary industries suited to our climate. The journey of adaptation is just beginning and although some impacts of climate change are already being felt in New Zealand, we still have time to adjust our approach.

We need to adapt our thinking to address the projected changes in our climate. Individuals, communities, businesses, central government and local councils have a shared responsibility to consider adapting to climate change.

We need innovative solutions that will help us to be resilient to New Zealand's future climate. We need to reduce the risks of negative impacts of climate change and take advantage of the positive opportunities that may arise.

We need to continue to review our approach when new information on the impacts of climate change becomes available.

WHAT CAN YOU DO TO ADAPT?

The first step is to get involved. Understand how climate change might affect your area by using the resources in this document. The Ministry for the Environment provides information about impacts in your region and your local council may provide more detailed information specific to your area.

Look into how you can prepare and get involved in local planning decisions to make your views heard.

Some ways you can adapt include:

- Become informed about what is happening to your coast now and what could happen to it in the future.
- If you're in an area where water supply is limited and could become more limited under climate change, be proactive in developing household, business or farm water conservation measures and incorporate wider use of water-efficient devices.
- Be aware of flood risks when buying or developing property.
- Support the protection and enhancement of lakes, rivers and wetland areas in your region.

Published in August 2014 by the Ministry for the Environment Publication number: INFO 723

New Zealand Government

Image courtesy of Greg Kempthorne

Adaptation example 2: State Highway 16

The design for the raising and widening of the State Highway 16 causeway in West Auckland (part of the Western Ring Route Road of National Significance) takes into account future sea level rise and is based on advice from the National Institute of Water and Atmospheric Research and the Ministry for the Environment.

FURTHER INFORMATION

This document is designed as an introduction to New Zealand's framework for adapting to climate change. While this document focuses on specific climate change adaptation initiatives, other work across central and local government in areas such as natural hazard management, infrastructure planning and urban design will assist New Zealand to adapt to the impacts of climate change. For more detailed and broader information on our specific responses please access the links provided in this document.

To find out more about adapting to climate change, please visit: www.climatechange.govt.nz/physical-impacts-and-adaptation/

More information can also be found at:

- Ministry for the Environment: www.mfe.govt.nz/issues/climate/adaptation/
- Ministry for Primary Industries: www.mpi.govt.nz/environment-natural-resources/climatechange/impacts-and-adapting-to-climate-change.aspx
- National Institute of Water and Atmospheric Research: <u>www.niwa.co.nz/our-science/climate/information-and-resources/clivar/climate_change</u>
- Ministry of Civil Defence & Emergency Management: <u>www.civildefence.govt.nz</u>
- The Treasury (National Infrastructure Plan): www.infrastructure.govt.nz/plan

Please contact the Ministry for the Environment for more information about climate change:

Phone: (o4) 439 7400 Email: <u>info@climatechange.govt.nz</u> Postal address: PO Box 10362, Wellington

This document is available on the Ministry for the Environment's website: www.mfe.govt.nz



The New Zealand Transport Agency has planned the project based on a 50 year prediction of sea level rise, with the design of certain aspects, such as erosion control structures, being based on a 100 year prediction. When the upgrade of the causeway is complete, the motorway will be about 1.5m higher than it is now.



NEW ZEALAND'S FRAMEWORK FOR ADAPTING TO CLIMATE CHANGE

WHAT IS CLIMATE CHANGE?

The Earth's climate is being affected by human activities like driving cars, farming, burning coal and cutting down forests. These produce greenhouse gases – mainly carbon dioxide, methane and nitrous oxide – which build up in the atmosphere and trap the sun's heat. The climate does change naturally, but greenhouse gas levels are now higher than at any time in the last 800,000 years and the climate is changing faster.

As well as warming the Earth there are also effects on wind, rainfall and oceans. Climate change is also likely to influence extreme weather-related events: hot days, frosts, floods, storms, cyclones, droughts and landslips. Our continued emissions of greenhouse gases will cause more warming and more change to our environment.

IMPACTS ON NEW ZEALAND

We are already seeing the effects of climate change in New Zealand, but the impacts will vary depending on where you live.

We have a long coastline and varied landscape, our cities and key infrastructure are mainly on the coast and our economy relies on agriculture. Our people and the economy are vulnerable to extreme weather, sea level rise and shifts in climatic conditions. All of these effects are expected with climate change and this may also affect our plants and animal life on land and in the sea. People could also suffer if new pests and diseases take hold.

While there is uncertainty about what might happen and when, we can avoid or reduce the impact with effective planning. And we can do that now.

WHAT IS ADAPTATION?

Adaptation is preparing for the impacts of climate change to protect our people, environment and economy. It's an ongoing process. It involves taking action to reduce risks as well as taking advantage of any opportunities that result from climate change.

We can do things like improve flood protection, change the way we build houses, roads and other infrastructure and where we build them. We might move vital power lines or telecommunications away from the coast. Farmers could change the crops and animals they farm to ones better adapted to a changing climate. We will have to continually review what we do as the impact of climate change on our communities becomes clearer. Climate change is expected to have significant impacts on our people, environment, economy and the way we live. New Zealand needs to be adapting to climate change now. The Government is working with local authorities and other organisations to understand what might happen and where, and the options for dealing with change. To do that we are using an adaptation framework based on:

INFORMATION | RESPONSIBILITIES | INVESTMENT | ACTION



Image courtesy of Department of Conservation

Adaptation example 1: Sand dunes

Around the country, councils and community groups are working together to restore sand dunes. This recognises that healthy dune environments will play an important role in successfully adapting to expected sea level rise.

Gisborne District Council and the Department of Conservation (DOC) are working with a number of dune care groups on the East Coast to restore and protect the dune ecosystems.

The council supports the volunteer efforts of the Wainui Beach Coast Care Group and other groups in Tolaga Bay and Tokomaru Bay. Advice on dune restoration and reducing erosion is provided by the council, along with \$10,000 annually in resources such as native plants, fertiliser, signage and fencing.

DOC assists by lending planting equipment and support. School students and community members participate in planting activities.

What risks and opportunities will emerge as the climate changes?

Key risks to New Zealand resulting from climate change are sea level rise, flooding and wildfires. Drought is also expected to increase. There could be some benefits for agriculture, forestry and horticulture, due to increased temperature, longer growing seasons and fewer frosts. However, negative impacts are expected to outweigh the positive and there will be effects on human health, fishing and tourism industries, biodiversity conservation, marine ecosystems through ocean acidification and infrastructure development.

What has happened already?

New Zealand is already experiencing higher temperatures (0.9 °C warming over the past 100 years), fewer frosts, ocean warming and acidification, less snow cover in alpine areas, glacier retreat and sea level rise (about 17cm over the past 100 years).

What is New Zealand going to be like in the future?

We expect further warming, about 1 °C by 2040 and about 2-4 °C by 2090. This will depend on global changes in greenhouse gases. Other impacts include even fewer frosts, more chance of high temperatures and extreme daily rainfalls, less snow cover and a possible increase in strong winds.

Differences in effects between the seasons are also likely, with more westerly winds in winter and spring, more rainfall in the west of both islands and drier conditions in the east and north. Less westerly wind conditions in summer and autumn with drier conditions in the west of the North Island are also expected. These changes will have consequences for our farms, forests, rivers and oceans. The impacts will flow on to our economy.

Follow this link to find out how climate change will affect your region: www.mfe.govt.nz/issues/ climate/resources/impact-map/

For a detailed assessment of global and New Zealand specific impacts, please refer to the latest Intergovernmental Panel on Climate Change report: www.ipcc.ch/report/ar5/wg2/

INFORMATION



We all have a role in managing the risks and adapting to climate change, including central government, local councils, communities, individuals and businesses.

RESPONSIBILITIES

Central government is spending approximately \$100 million over 10 years on research and projects relating to adapting to climate change. This research will assist local councils. businesses. individuals and communities to identify impacts and implement effective adaptation solutions. Research and projects include:

Agriculture and forestry

- ↗ Sustainable Land Management and Climate Change Research Programme.
- Ministry of Primary Industries Adaptation Toolbox to help agricultural businesses find out how climate change may affect them.

Natural hazards and science

- Climate Change Impacts and Implications Research Project.
- Natural Hazards Research Platform.
- "Deep South" National Science Challenge.



Biodiversity

Adapting to a changing climate: – a proposed framework for the conservation of terrestrial native biodiversity in New Zealand.

Coastal zones -**Estuaries and sand dunes**

Coastal Adaptation to Climate Change Research Project including coastal sensitivity index.

Urban and business

Impacts of Climate Change on Urban Infrastructure and the Built Environment Toolbox.

Preparing the Tourism Sector for Climate Change Research Project.

INVESTMENT

Water storage and irrigation

- The Government has also allocated \$35 million over five years from 2011 to support the development of irrigation infrastructure proposals. Irrigation can help agriculture adapt to changes in rainfall.
- ↗ A further \$80 million was set aside in 2013 to invest in regional water infrastructure projects and an extra \$40 million was announced in the 2014 budget.

ACTION



Image courtesy of Ministry of Civil Defence & Emergency Management





Image courtesy of Tauranga City Council

Central government

Local councils

Central government sets the direction so that New Zealand's national infrastructure, people, environment and economy are more resilient to the impacts of climate change. It also provides the legislative framework and governance to support local councils and communities in how they adapt to climate change.

NEW ZEALAND'S FRAMEWORK FOR ADAPTING TO CLIMATE CHANGE

Central government

Central government:

↗ Sets legislation and policy – the key piece of legislation for adapting to climate change and associated natural hazards is the Resource Management Act (RMA). All people exercising duties and functions under the RMA are required to have particular regard to the effects of climate change and this is undertaken as part of wider natural hazards management.

» Other adaptation related legislation, policies and plans include the Civil Defence Emergency Management Act, the National Infrastructure Plan and the New Zealand Coastal Policy Statement.

- ↗ Provides information and guidance to local government and businesses such as the manual "Preparing for coastal change" and the report "Impacts of climate change on land-based sectors and adaptation options".
- ↗ Funds research and publishes information on climate change impacts.
- Prepares for, and responds to, major natural hazard events.

Local councils

Each part of the country will be affected differently by climate change so preparing for and managing the risks is carried out by local councils, because they are best placed to know what is appropriate for their region.

Councils use the legislation, policy and guidance produced by central government to consider the risks for their region and respond appropriately through such actions as preparing adaptation strategies, building adaptation into existing district /city plans, construction of protective works and land use planning.

The New Zealand Transport Agency's design for the raising and widening of the State Highway 16 causeway in West Auckland is based on a 50 year prediction of sea level rise.

↗ Increasing the capacity of urban stormwater systems to cope with larger flooding events such as upgrades completed in Tauranga. Systems that incorporate natural wetland features can also be introduced to increase capacity and reduce pollution levels.

Industry / business

- Changing the time of calving on dairy farms so stock is dried off during drought-prone months which maximises production and shifts feed demand.
- ↗ Investment in maintenance technology to ensure New Zealand's rail tracks are less vulnerable to damage in extreme weather events and to prevent rail buckling in high temperatures.

Community / individual

Restoration of sand dunes to prevent erosion expected from the projected sea level rise and increase in storm surges.