



Winds of Change
2021

Common Issues

Sea Level Rise

and challenges for Chile and New Zealand

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Contents

Introduction	2
What is sea level rise?	3
The situation in Chile	4
The situation in Chile	5
New Zealand	6
Sea level drivers	7
Responses - Dunedin Nz	8
Organizations in Chile	9
Conclusions	10

SOMETHING EVERYONE SHOULD KNOW

The sea is rising at an accelerating rate. This poses a major problem for humanity, especially in those places considered vulnerable. Chile and New Zealand, two countries connected by the same ocean, face similar scenarios and challenges. This seems to be a problem we will have to learn to live with, but what are the causes of sea-level rise, and is there a solution to this impending problem?

While we analyse the causes, we also need to analyse the solutions, develop strategies to deal with increasingly complicated future scenarios, and transform our cultures in ways that take into account all aspects of the earth system in which we are immersed.



Prepare

Anticipate the effects that rising sea levels could have on the world. Working together

Change

Adapting to new scenarios, daring to new challenges and lifestyles.

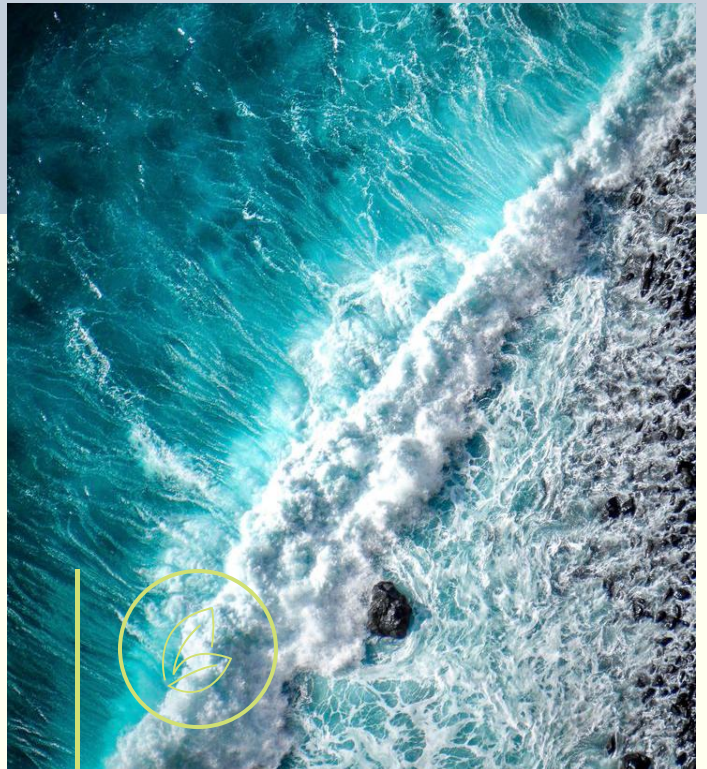
Disseminate

Educate the population about climate issues through all possible means.



While the evidence indicates that there has not been an accelerated growth, projections estimate that there will be a growth of up to 1 mt in sea level if the world continues under current business as usual scenarios.

These growth scenarios are alarming especially for those low-lying countries and many islands that will have to adapt and prepare for these impending changes.



An approach?

Much research, specifically research carried out by the IPCC, indicates that the sea has been rising for the past 100 years at a rate of 0.5 to 3.0 mm per year.

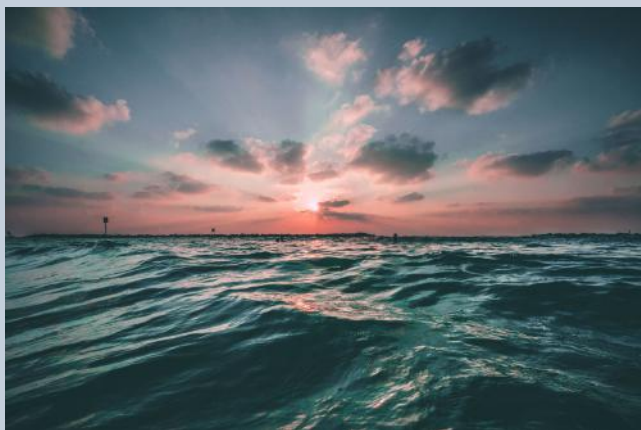
Raise awareness

Projections made by different experts indicate that although the sea is rising, it is difficult to make clear estimates due to the lack of sufficient tide gauges on different continents.

Adapt

Adapting can be a complex and painful process, but it will make us more resilient.

Chile accounts for 80% of South America's glaciers. Most of these glaciers have been steadily shrinking and thinning. According to studies carried out on 100 glaciers, 87% of them show regression according to the world trend. Most of the glaciers in the northern zone of Chile do not show great changes or have been very little studied. Of the glaciers in central Chile, several of them show evidence of retreat and environmental damage caused by mining activity.



Retrocediendo

Likewise, glaciers in Patagonia have been the most studied and the ones that show more signs of damage. Most of the glaciers in Western Patagonia are flowing into the ocean or into lakes. It is estimated that losses due to calving in the Southern Pacific doubled in the period from 2000-2009 compared to the period from 1990 to 2011 due to the increase in average annual temperatures and increased rainfall in the region.

MAINLAND CHILE

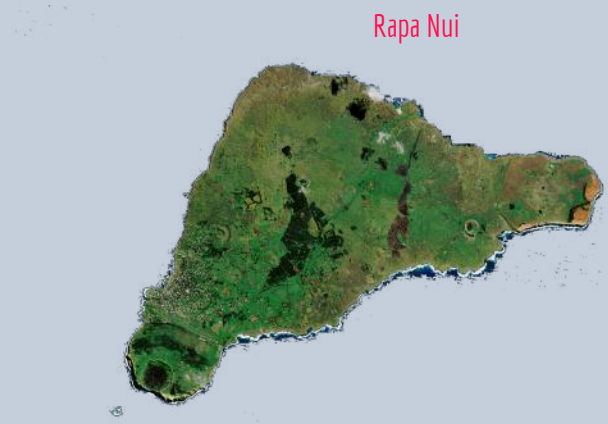
- It is estimated that Chile will not be heavily affected even in the most unfavourable of scenarios, because of its high profile coastline geography. However, there are locations that would be affected, in particular, tourist sites, fishing coves and river mouths.
- The change in maritime climate conditions resulting from climate change has been affecting a number of ports throughout Chile. This can be measured simply by observing the availability of ports and downtime due to swell.



- It is estimated that between Arica and the Chacao Canal the beaches will experience average recessions of 3 -23 metres due to the effects of changes in waves and sea level in the CPR 8.5 scenario between 2026 and 2045.

Easter Island and Robinson Crusoe

Rapa Nui (Easter Island) and the Robinson Crusoe Archipelago are the furthest island points from continental Chile and have proven to be among the most vulnerable points to natural disasters historically



Mitigation projects

In July 2019, in a meeting with the Easter Island Development Commission CODEIPAII, the draft of the Framework Law on Climate Change and the Climate Change Adaptation Plan for Easter Island were presented. The draft is being prepared within the framework of the National Climate Change Action Plan 2017-2022. All the authorities of the island and representatives of the community met to discuss these measures which will be prepared in a participatory manner by the Easter Island community.

Rapa Nui (Easter Island) is at risk of suffering constant inundations in all the harbor infraestructura because of regular tidal and one of two beaches on the island to be permanently inundated. Quiliam et al (2011)

This will affect the island's inhabitants economically as income decreases as the number of tourist spots on the island decreases.



Vulnerability to rising sea levels is low in many places due to the extensive lengths of high rocky or cliffed coast. But there are two types of coastline at risk. Some cliffed coasts are eroding at high rates, such as the unconsolidated alluvial cliffs in the Canterbury Bight, which may worsen with increased storminess and sea-level rise. However, the most vulnerable areas are where our urban centres, ports and holiday resorts cluster around low-lying portions of the coastline, such as harbours, estuaries, beaches, inlets and bays. (Ministry for the environment, 2001)



South Dunedin meets many of the criteria for being at risk due to sea level rise. Situated on low ground and in some parts reclaimed land, the area is highly developed, heavily populated and is adjacent to the coast. (Morris C., 2010). Sea level rise contributes to and exacerbates existing flood risk.

Mitigations



A document called :“Planning for climate change - Effect on coastal margins, outlines the mitigations and responses that New Zealand needs to take in response options to climate change impacts in coastal margins. Among them are:

- planned retreat
- adaption (or accommodation)
- protection (or defence).
- Working together



Resilience

- Prepare for future scenarios by creating more resilient cities that are able to withstand catastrophic weather events with people prepared to respond effectively to events of that magnitude.



Glaciers Melting

It is estimated that the loss of ice from Antarctic ice caps and glaciers would contribute to 6% of global sea level rise (Casassa et al., 2019).

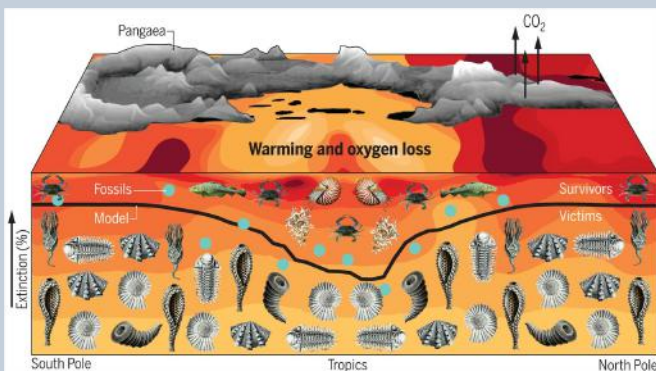
The Antarctic continent contains enough ice to raise sea level globally by around 60 m (Siegert et al., 2017). For example, in the Pliocene about 5 and 3.5 million years ago, the sea level rose to 20 meters higher than today.

Glaciers in the Southern Alps of New Zealand are suffering substantial damage. It is estimated that 400 glaciers from Arthur Pass to Milford Sound have lost about 77% of their maximum volume since pre-industrial times due to rising temperatures, which peaked in the summer of 2017.



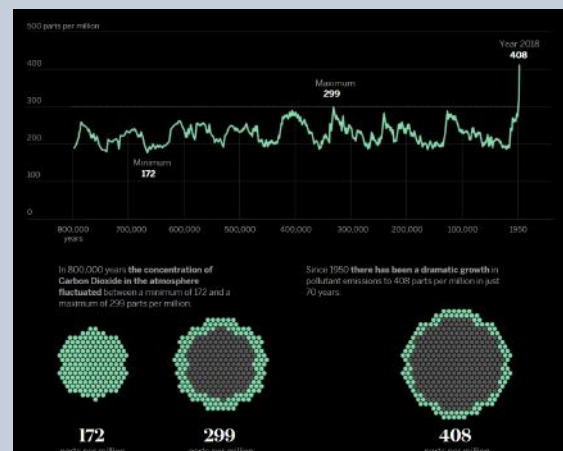
Ocean Warming

Until now, the ocean has protected us from the impacts of climate change, altering its chemistry by absorbing significant amounts of the extra carbon dioxide we release into the atmosphere, but it has also warmed at an alarming rate in recent decades. In this context, sea-level rise is increasing through the heat expansion of water, ice sheets and glaciers are melting and biological processes at cellular to ecosystem scales are altering by its dependence on temperature (Fuentes et al, 2016).



Anthropogenic climate change

The planet is embarked on a climate change due to energy consumption since the Industrial Revolution, the concentration of gases is growing steadily, trapping heat within the Earth's atmosphere. The biggest driver of this global warming is CO₂ and it is fundamentally linked to the burning of fossil fuels: coal, oil and gas.



The Challenge

At a local level, people in New Zealand are already dealing with how climate change is impacting their lives. South Dunedin is a low-lying area built on reclaimed land over what was previously a wetland. As sea level rises, the water table rises along with it, increasing flooding risks.

Infrastructure has already changed the natural capacity of the land to absorb water, and left it vulnerable to flooding. Many residents need only dig 20cm into their backyard to reach the water table. The area is also densely populated, low-income, and home to many people who are elderly and disabled (Morris, 2010).

Sea level rise is often viewed as a 'future problem', but these risks are already influencing lives in South Dunedin, after floods in 2015 caused huge damage to homes and possessions. As the frequency of floods increase, insurance providers are pushing up premiums, and may withdraw from insuring houses in South Dunedin even before 2050 – forcing people remaining to lose their homes and property. Only 14cm of sea level rise would push the frequency of severe flooding to once every 20 years, and cause insurance premiums to quadruple (Storey, Owen & Zammit, 2020).

Faced with these prospects, the people of South Dunedin are anxious about the future. Many people in South Dunedin would find it difficult and costly to move, and in the meantime, they still face the costs of being exposed to the increasing risks of flood damage and sea level rise (Stephenson et. al., 2020).



South Dunedin Community Network

Following 2015 flooding events, local community members and the Dunedin City Council have started to build a new kind of relationship. The South Dunedin Community Network provides a centre-point for community discussion of sea level rise and other challenges. The network and the council are currently working together to meet with hundreds of small community groups, including bowling clubs, schools, businesses – to discuss the risks and to invite people to take part in shaping the future. The network has also held larger meetings of up to 180 people to discuss various challenges (South Dunedin Community Network, 2020).

The idea of this action is to build the resilience of the community in a holistic way, and to discuss together how to adapt to the changing landscape. The council are part of an important approach to climate change and governance that is based on collaboration with communities rather than a one-way education model. This governance approach is documented by social scientists and other researchers and may provide a model for governments across the world when it comes to tackling difficult climate adaptation challenges (Stephenson et. al., 2020).



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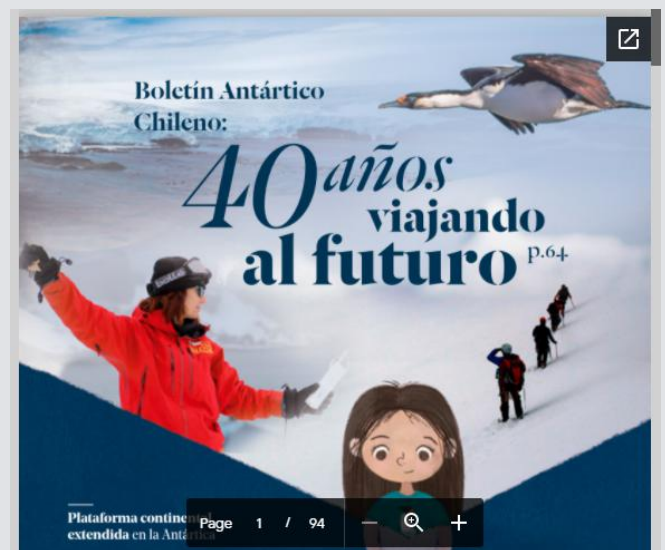
 [glaciareschilenos](https://www.instagram.com/glaciareschilenos)

Fundación Glaciares Chilenos (FGC) is a non-profit organization that works on the preservation and protection of the glaciers located in the national territory, through the development of scientific research, visibility of content and creation of educational programs.

The purpose of this organization is to articulate the collaboration with the scientific and university community, the civil society and localities that depend on glaciers, either economically or as a vital resource for human development. To generate channels of reliable information, considering the current and future preservation challenges resulting from climate change and the water shortage that affects a large part of the country

Chilean Antarctic Institute

It is an institute created in 1963 by the Chilean government, destined to comply with the National Antarctic Policy, encouraging the development of scientific, technological and innovation research in Antarctica, following international canons, effectively participating in the Antarctic Treaty System and related international forums, strengthening Punta Arenas (Chile's southernmost city and the gateway to the Chilean Antarctic) as the gateway to the White Continent, carrying out actions and activities to disseminate and value Antarctic knowledge in the national community, and advising the authority on Antarctic matters. World-renowned scientists have worked collaboratively to produce important material about the importance of the Antarctic, its impact and consequences on global climate change.



You Can't Do This Alone



The South Dunedin Community Network and Dunedin City Council provide one example of how people are starting to realise the necessity of working together as a community to find a future that works for the land and the people. South Dunedin Community Network works to involve everyday community members in governance decisions. It also aims to include those who work in governance in the life of the community.

Sea level rise and other climate risks are challenging because they involve complex probabilities and slow changes through time. How we should respond depends on a lot of social and cultural factors. Sometimes it makes sense to change with the land, and other times we need to resist the ocean's changes. On both a global and a local scale, it is often those that are the most powerless - the poor, the disabled, the indigenous communities - that are most deeply affected by climate change as well as by how we respond to it.

International Collaboration



At the moment, many places being impacted by sea level rise are the first in their countries. We are all moving in new territory. If we can understand how other communities, other governments, even other legal systems are adapting, there are more opportunities to learn and find what can work.

It is also important to recognise that it is not too late to mitigate sea level rise by making changes to how we use our planet's resources. Impacts of sea level rise are the beginning of a future that we are responsible for as an international community.

It is still possible for governments, corporations, and individuals to change our behaviour now, and reduce the impacts of climate change in the future.

Alternative economic models



We need to explore economic models that take us off the path of business as usual. Regenerative models could help us mitigate the devastation caused by the current prevailing model. Whole systems thinking, the organization of geographic zones into bioregions and working together could guide us towards better future scenarios

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Our Journey

Winds of Change ha un camino difícil de recorrer. Como los primeros participantes de este programa, al principio no teníamos un rumbo claro. Hoy, al final de este programa podemos ver con satisfacción que hay personas trabajando con fuerza en temáticas que van en pro de crear un mejor futuro y educar a la población en términos de cambio climático y soluciones sustentables.

Este viaje ha sido una experiencia inolvidable y una oportunidad de conocer a gente con motivaciones similares, que al final del día nos dan ánimo para seguir haciendo nuestra pequeña contribución al cambio.

Nuestro Viaje

Winds of Change has been a difficult road to travel. As the first participants in this program, at the beginning we did not have a clear direction. Today, at the end of this program we are happy to see that there are people working hard on issues intended to create a better future and educate the population in terms of climate change and sustainable solutions.

This journey has been an unforgettable experience and an opportunity to meet people with similar motivations, which at the end of the day gives us encouragement to continue making our small contribution to change.

