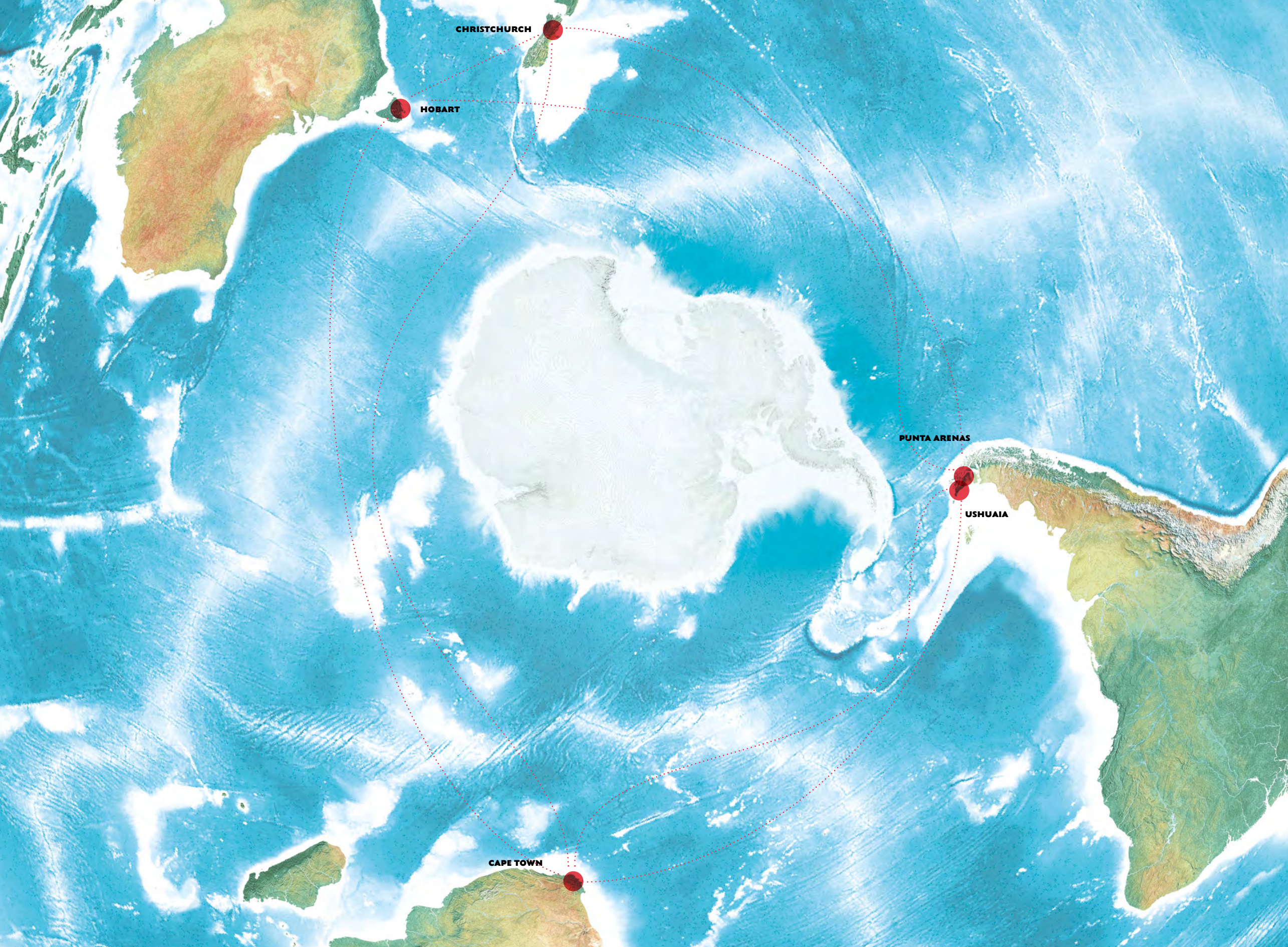


**FROM
GATEWAYS
TO
CUSTODIAL
CITIES**

ANTARCTIC CITIES

ISBN-13 → 978-1-74108-528-0
DOI → 10.26183/29c7-kj09



CHRISTCHURCH

HOBART

CAPE TOWN

PUNTA ARENAS

USHUAIA

© 2021 THE AUTHORS

To cite this report

J.F. Salazar, P. James, E. Leane, L. Magee, Antarctic Cities: From Gateway to Custodial Cities, Institute for Culture and Society, Sydney, 2021.

This research project was funded by an Australian Research Council Linkage grant (LP 160100210) 2017–2021. This final report was commissioned for partner institutions Hobart City Council, Christchurch City Council, and Instituto Antártico Chileno (INACH), Chile.

Project website

<https://antarctic-cities.org/>

Creative Licence copyright

© Juan Francisco Salazar, Paul James, Elizabeth Leane, and Liam Magee

Published by the Institute for Culture and Society

Western Sydney University
Locked Bag 1797, Penrith,
New South Wales, 2751
Australia

Design

Pablo Ruíz Teneb

Printing

Dark Star Digital, Sydney, Australia

First published 2021

Report Authors

Juan Francisco Salazar, Western Sydney University
Paul James, Western Sydney University
Elizabeth Leane, University of Tasmania
Liam Magee, Western Sydney University

With the Project Research Team and other Chief Investigators

Project Chief Investigators

Juan Francisco Salazar, Western Sydney University
Paul James, Western Sydney University
Elizabeth Leane, University of Tasmania
Liam Magee, Western Sydney University
Daniela Liggett, University of Canterbury
Eliás Barticevic, Instituto Antártico Chileno
Claudia Estrada, Universidad de Magallanes

Project Research Team

Doita Datta
Andrea Herbert
Marina Khan
Chloe Lucas
Sebastián Martín Valdez
Silvia Martínez
Katie Marx
Hanne Nielsen
Andrea Pollio
Gabriela Roldán

Project Partner Institutions

Hobart City Council, Australia
Christchurch City Council, New Zealand
Antarctic Office, Christchurch, New Zealand
Tasmania Department of State Growth, Australia
Instituto Antártico Chileno, Chile

The report Antarctic Cities comprises the following volumes

Antarctic Cities, Volume 1:
From Gateway Cities to Custodial Cities
Antarctic Cities, Volume 2:
Urban Sustainability Profiles
Antarctic Cities, Volume 3:
Antarctic Connectivity Index
Antarctic Cities, Volume 4:
Principles for Antarctic Connectivity



ANTARCTIC CITIES

FROM
GATEWAYS
TO
CUSTODIAL
CITIES

ISBN-13: 978-1-74108-528-0

Table of Contents

9 1. Executive Summary

- 11 Key aims of the project
- Key outputs of the project
- 12 Key outcomes of the project
- 13 Key Engagement and Impact Figures at a Glance

15 2. Introduction

- 20 Reimagining Gateway Cities as Custodial Cities

25 3. Insights and Recommendations

- 25 Key Insights
- 27 Key Recommendations

33 4. Background, Aims, and Outputs

- 33 Background to the Antarctic Cities Project
- 34 Research Team
- 36 Partners
 - Antarctic Youth Coalition Ambassadors
 - Core Partner Organizations
 - Other Partners and Sponsors
- 37 Project Aims
- 37 The project has the following aims:
- 39 Project Outputs

43 5. The Urban Sustainability of the Antarctic Cities

- 47 Background to the Urban Sustainability Profiles
- 48 The Urban Profile Method
- 49 The Expert Panels and Workshops
- 50 Key Findings of the Hobart Profile Process
- 52 Key Findings of the Punta Arenas Profile Process
- 54 Key Findings of the Christchurch Profile Process
- 57 Comparative Findings between
 - Hobart, Christchurch, and Punta Arenas
- 59 Built Form and Mobility
- 60 Level of Physical Activity and Obesity Rates
- 63 Resilience of Regional Ecosystems
 - Sense of Belonging and Identification with the Urban Area
 - Level of Personal Security
 - Housing Affordability

65 6. The Antarctic Connectivity Index

- 65 Background to the Index
- 66 Why this index?
- 67 Index Questions, Indicators, and Means of Measurement
- 68 What is the general question guiding the index?
- 68 Key Findings from the Hobart Connectivity Workshop
- 70 Key Findings from the Christchurch Connectivity Workshop

73 7. Informed Citizens in the Antarctic Cities

- 74 Circles of Social Life Survey 2018
 - Method and Instrument
- 76 Key Findings of the Hobart Survey
- 78 Key Findings of the Christchurch Survey
- 80 Key Findings of the Punta Arenas Survey
- 84 Comparisons Between the Three Cities
- 85 Antarctic Urban Identities Online Survey 2020
 - 86 Methodology
 - 90 Multidimensional Connections
 - 92 Information
 - 93 Engagement
 - 97 Social Imaginaries
 - Public Policies
- 100 Antarctic values

103 8. Anticipating the Future of Antarctica: The *Antarctic Futures Game*

- 105 Developing a Functioning Prototype
- 106 Storyboarding the Game
 - Prototype Development
- 108 Prototype Testing
- 109 Testing and Improving the Beta Version
- 110 Key Findings
- 111 Conclusions

113 9. Antarctic Custodians and Youth Engagement: The Antarctic Youth Coalition

- 116 Recruitment
- 117 The Antarctic Cities Youth Expedition
- 123 Planning the Antarctic Youth Coalition in Antarctica
- 129 A transformative experience

133 10. From Gateways to Custodial Cities

- 136 Principles for Antarctic Connectivity Preamble
- 137 The Principles in Summary
- 138 References
- 141 Commissioned Essay The Secret Weapon Against the Climate Crisis: Indigenous Sovereignty by Jamie Graham-Blair

157 Appendix 1. Academic Publications and Presentations

159 Appendix 2. Participating Stakeholders and Engagement Activities (2017-2020)

- 162 School engagement (Hobart)
- 163 Project engagement activities
- 164 Research participant numbers

167 Appendix 3. Media Strategy

- 168 Media Coverage 2017 to 2020

176 Appendix 3. Antarctic Youth Coalition Strategy

181 Appendix 4. Antarctic Futures Resource Pack

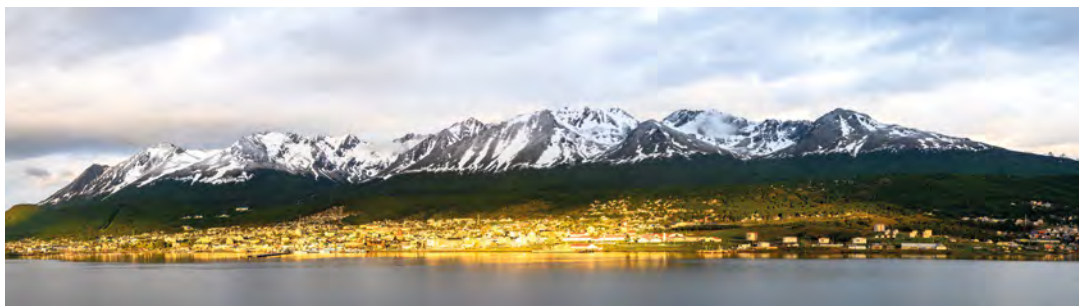
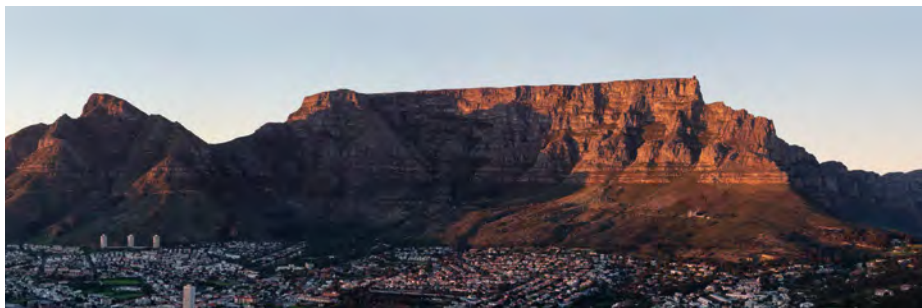
- 182 Theoretical Underpinnings
 - Methodology
 - Learning Objectives
- 184 Aspects of the Game
- 186 Instructions
- 189 Settings
- 190 Learn with Antarctic Futures

1. Executive Summary

The cities of Cape Town, Christchurch, Hobart, Punta Arenas, and Ushuaia are formally recognized international gateway cities through which flows most travel to the Antarctic region. All significant engagement with the South Polar region is co-ordinated through them. By geographical placement and historical contingency, these cities have a special connection to their bioregions to the south. They are the most connected to the Antarctic in the world. They have become important scientific hubs where the diplomatic and logistical co-operation underpinning most of the world's interactions with the Antarctic and the Southern Ocean take place. Through these cities, Antarctica has exercised a powerful hold on the global imagination since the late nineteenth century.

In 2009, these five cities came together to sign a document, the first of its kind, the Statement of Intent between the Southern Oceanic Rim Gateway Cities to the Antarctic. The agreement invoked the spirit of the Antarctic Treaty, outlining in-principle support for knowledge exchanges and 'promot[ing] the enhancement of peaceful and co-operative relations between signatory nations' (Sciurano, et al., 2009). Although the statement expired 18 months after it was signed, in the period since, the 'Antarctic city' status of several of the cities has been reinforced by policy papers at all levels of government that put forward visions for enhancing this place-identification (Leane, et al., 2021).

Today, the Antarctic region faces unprecedented challenges. These Southern Oceanic Rim cities, individually and as a group, are in a position to play an important role in defining how Antarctica is imagined, discursively constructed, and vicariously experienced. This requires elaboration of the more conventional roles they have played as 'gateway cities', portals for goods and services (Hall, 2000). As this report shows, these five cities are much more than gateways. They are intimately connected to the south in ways—historical, cultural, political, affective—that exceed the logistical and transport function implied in the notion of gateway. With the 'ice continent' taking on a new centrality in global public consciousness in the Anthropocene, these cities' relationship with the region to their south is likely to become an even more valuable part of their urban identity. As the future of the Antarctic hangs in delicate balance, this research project argues that these cities are key to securing the future of this fragile region.



Antarctic gateway cities are urban centres that can embody the values associated with Antarctica—international co-operation, scientific innovation, environmental protection—and act as global stewards of the South Polar region. As Antarctic custodial cities these urban centres can strengthen an existing interlinked southern-rim network, to better learn from and benefit each other. The project has sought to shift the emphasis on the role and responsibilities of nation-states in Antarctica and pay attention to the roles and responsibilities of these five cities formally recognized as the Antarctic gateway cities. Most importantly, the Antarctic Cities project has sought to summarize this change in conception and function by interchanging ‘gateway’ with ‘custodian’. In this context, it seeks to inform decision-makers and citizens on how their Antarctic gateway cities can best effect a cultural, political, ecological, and economic transition towards becoming Antarctic custodial cities.



FIGURE 1.1. Mount Wellington or kunanyi, overlooking the city of Hobart. ©Photo: Public Domain, Wikimedia.org.

FIGURE 1.2. A panoramic view of Christchurch City. ©Photo: Public Domain, Wikimedia.org.

FIGURE 1.3. The Arturo Prat pier looking towards the Strait of Magellan, Punta Arenas. 2018. ©Photo: René Quinan.

FIGURE 1.4. The iconic Table Mountain, also called *Huriotaxa* (Khoekhoe) or *Tafelberg* (Afrikans) overlooking the city of Cape Town. ©Photo: Public Domain, Wikimedia.org.

FIGURE 1.5. A Panoramic view of Ushuaia with the Fuegian Andes in the background. ©Photo: Public Domain, Wikimedia.org.

Key Aims

THE KEY AIMS OF THE PROJECT INCLUDED THE FOLLOWING:

- ↳ To assess how five Antarctic gateway cities can act collectively as global custodians of Antarctica and explore the possibilities of a commensurate shift in urban practices and imaginaries from gateway to custodial cities.
- ↳ To propose a systematic rethinking of both the engagement and outlook of five Antarctic gateway cities—not as five far-flung ports but as members of an interlinked southern-rim network that can learn from and benefit each other.
- ↳ To generate impact and contribute directly to the Antarctic strategic planning and policy considerations of the cities of Hobart and Christchurch.

Key Outputs

THE KEY OUTPUTS OF THE PROJECT ARE AS FOLLOWS:

- ↳ Urban sustainability profiles for Hobart, Christchurch, and Punta Arenas.
- ↳ An Antarctic connectivity index.
- ↳ Two surveys (n=1,659) of citizens' perceptions and attitudes towards Antarctica across the five cities.
- ↳ The *Antarctic Futures* online game.
- ↳ The Antarctic Youth Coalition.
- ↳ A draft charter of principles for Antarctic cities.

Key Outcomes

The key outcomes were far-reaching, and include the following:

- ↳ **Informing the cities** of Hobart and Christchurch's Antarctic gateway strategies, providing context and comparison across the five gateway cities with the potential to tell a wider story of these special cities.
- ↳ **Heightened understanding** of the cities' connectivity to Antarctica.
- ↳ **Greater connection** between the Antarctic gateway cities and their citizens and aspirations.
- ↳ **Importance of online** serious games as educational tools to debate Antarctic futures.
- ↳ **The Antarctic Cities Youth Expedition** provided a unique experience for five young people from the gateway cities—an experience that has acted as a catalyst in their development as future Antarctic leaders. This was a global first, representing an innovation in thinking about the relationship between the Antarctic, the urban centres that surround it, and the people who live in them.
- ↳ **Launching a global first Antarctic Youth Coalition** linked to local decision-makers and community groups.
- ↳ **An understanding of the uses** and application of an Antarctic connectivity index.
- ↳ **An early draft of a charter** as a starting point to instigate collaboration with other Antarctic gateway cities.
- ↳ **A demonstrated economic multiplier effect** in the local economy, including the creation of casual jobs in Hobart, Christchurch, and Punta Arenas.
- ↳ **Extensive academic research outputs** including 13 publications (a co-authored book under contract; 6 journal articles; 2 book chapters, and 9 academic and public presentations).



FIGURE 1.6. Hobart's waterfront at Sullivans Cove. In the left, the icebreaker *Aurora Australis*, which served for over three decades to support the Australian Antarctic Program. The ship returned from its last voyage to Antarctica in March 2020. ©Photo: Public Domain, Wikimedia.org.

FIGURE 1.7. The Christchurch Tram and the Regent Theatre in Cathedral Square, two icons of Christchurch city. ©Photo: Public Domain, Wikimedia.org.

FIGURE 1.8. Street art in Punta Arenas. ©Photo: Public Domain, Wikimedia.org.

Key Engagement and Impact Figures at a Glance



A total of 155 urban and Antarctic experts took part in stakeholders' workshops in four Antarctic gateway cities: Hobart (2017 and 2018), Christchurch (2017), Punta Arenas (2017), and Ushuaia (2019). These stakeholders represented over 70 industry, government, scientific, and community organizations.

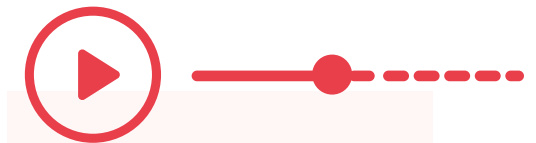


More than 60 young people took part in stakeholders' workshops in the five Antarctic gateway cities.

A total of 2,559 residents were surveyed through two online surveys in 2018 and 2020 in the five cities.



More than 500 people played the game internationally.



Over 150 media pieces with coverage in the five cities and internationally, across radio, the press, national television, social media, and the web.



Two multi-authored pieces published in *The Conversation* in 2016 and 2020 to launch and conclude the project attracted more than 40,000 readers at time of publication of this report.

An estimated 250 people visited the Antarctic Cities project booth at the 2018 Australian Antarctic Festival in Hobart.



A public panel with project industry partners was held at the SCAR Standing Committee on Humanities and Social Sciences conference *Depths and Surfaces: Understanding the Antarctic Region through the Humanities and Social Sciences*, University of Tasmania, Hobart, 5–7 July 2017.

A series of mayoral and councillor briefs were held in Hobart (2017, 2018, 2019, and 2020) and Christchurch (2017 and 2019).

A commissioned essay written by Jamie Graham-Blair.



2. Introduction

Antarctic Cities is an engaged research project that ran from March 2017 to March 2021 in six cities in five countries. The project involved a team of 24 researchers, of which 16 were women. Thirteen of the researchers were based in Australia (Hobart and Sydney) and 11 were based internationally (Christchurch, Punta Arenas, Ushuaia, and Cape Town).

We regard our project as a form of commoning practice. In developing this broad interdisciplinary research, we have aimed, in the words of Louise Crabtree (2019), to 'create and sustain a space for ourselves, our teams, and our work cultures to be transformed by the work that we do'. We have attempted to foreground the work of experienced and emerging researchers in several countries, bringing diverse voices into the research space in meaningful ways and through a myriad of participatory and co-designed research methodologies, via the recognition of co-creation in intellectual property and authorship and of increasingly diverse practices of research dissemination. The researchers in the team were Australian, New Zealander, Argentine, Chilean, South African, German, Italian, and Pakistani.

Over these four years of research, we engaged with city officials, Antarctic stakeholders from government, industry, and science, youth groups, and a myriad of citizens who live in these five unique cities. We invited everyone we collaborated with to look at the map of the globe from a different perspective: placing Antarctica at the centre. The area is considered in international law as one of four global commons, and it has effectively been governed through the Antarctic Treaty System (ATS) since 1959. The ATS establishes the region as a natural reserve, devoted to peace and science. These have been translated into the three so-called intrinsic Antarctic values of nature conservation, peace, and scientific co-operation.

The Antarctic Cities project is underpinned by an engaged research ethos developed at the Institute for Culture and Society, Western Sydney University (James, 2019). Throughout the duration of this project, we have practised this mode of engaged research, which we regard as 'an orientation to others, including those with whom we are researching and those who are involved in the area in which we are researching' (James, 2019).



FIGURE 2.1. A Humpback whale diving in Antarctic waters in front of Collins Glacier during the Antarctic Cities Youth Expedition in February 2020. ©Photo: F. Garro.

FIGURE 2.2. Trinity Church, a Russian Orthodox Church built in 2004 at the Bellingshausen station, King George Island, Antarctica. ©Photo: J.F Salazar.



This approach is guided by seven principles:

Principle 1. Engaged research is developed through relations of reciprocity.

Principle 2. Engaged research is long term and future-oriented, even as it begins with the present and takes seriously the constitutive importance of the past.

Principle 3. Engaged research is conducted in relation to lived places, recognizing that places are stretched across various extensions of spatiality from the local to the global.

Principle 4. Engaged research works critically to understand the human condition, but it does so by working at the intersection of the social and the natural.

Principle 5. Engaged research seeks to work through difference rather than dissolve that difference.

Principle 6. Engaged research recognizes that knowledge and enquiry are bound up with power and practice.

Principle 7. Engaged research is sensitive to the issue that methodological decisions have ethical and practical consequences, both for understanding and practising in the world.



Bringing these seven principles to life we can positively show how the Antarctic Cities project thrived in developing future-oriented long-term collaborations grounded in relation to lived places in the Southern Oceanic Rim, spanning globally across five countries and six cities. We acknowledge that the five cities are emplaced in traditionally owned or otherwise occupied and used lands, territories, waters, and coastal seas where Indigenous people continue uphold their responsibilities and distinctive spiritual relationship with their land now and for future generations. The Antarctic Cities project succeeded in its intent to always pay attention to the interplay between social and environmental conditions in the connections of these urban centres to Antarctica and the urban sustainability of the cities themselves. We worked with a research impact ethos in mind across cultural and political differences, recognizing that knowledge and enquiry about the role and responsibilities of a network of Antarctic custodian cities will always be bound up in complex local political and economic factors.



FIGURE 2.3. Melting icebergs have become a symbol of climate change and the fragility of the Antarctic. ©Photo: Public Domain Wikimedia.

FIGURE 2.4. A couple of penguins on Ardley Island, Antarctic Peninsula region. ©Photo: J.F Salazar.

FIGURE 2.5. A large iceberg floating in the Southern Ocean. ©Photo: Public Domain Wikimedia.

“*The notion of custodial cities mobilized throughout this project is partly inspired in First Peoples’ knowledge systems which for many generations have refined—and engaged with—a diversity of embedded, reciprocal, and holistic social ecological practices of care and management of land and sea.*”



Drawing from recent work on research impact as ethos (Rickards, *et al.*, 2020) that develops a typology of three generations of research impact cultures in academic institutions, this project aimed from the outset to complement academic rigour. First, it showed the research relevance of urban polar studies, making it more publicly accessible while also inviting end users, specifically local councils, to adopt some of the methodological approaches and tools developed. This is what Rickards, *et al.* (2020) call first-generation research impact. Secondly, it positioned our engaged research approach with key partners from very early on, to ensure that the research proposal would create value for and with research partners, enhancing the research impact literacy across the partner institutions. This is what the authors call second-generation impact research. But most importantly, our project was from the outset purposefully designed to foster ‘synergies, insights and learning’ (Rickards, *et al.*, 2020) across the project as a whole, but most significantly across the diverse subsets of discrete projects, most notably the *Antarctic Futures* game and the Antarctic Youth Coalition.

The notion of custodial cities mobilized throughout this project is partly inspired in First Peoples’ knowledge systems which for many generations have refined—and engaged with—a diversity of embedded, reciprocal, and holistic social ecological practices of care and management of land and sea. This was also the reason to invite marine and Antarctic scientist, cultural practitioner, visual artist, and climate activist Jamie Graham-Blair to contribute to the project with a commissioned essay on Indigenous perspectives on Antarctica. We pay respect to First Peoples’ ecological knowledges and acknowledge that across their vast diversity, it is possible to recognize how these are always attached to place and territory and entail custodianship obligations. The notion of custodianship of Antarctica that we mobilize here aims to learn and put into practice these principles. We regard citizens who identify as belonging to these places (Antarctic cities) as engaged and inspired to speak for the Antarctic region.

Christchurch is the first of the five cities to develop an Antarctic gateway strategy outlining the city’s involvement in the Antarctic region. In their 2018 strategy they identify three principles underpinning the city’s engagement with the Antarctic region: *kaitiakitanga*, a Māori concept which relates to guardianship and protection of the environment; *manaakitanga*, a Māori concept to describe the process of showing respect, generosity, and care for others; and *exploration*, to highlight the city of Christchurch’s long history of exploration from early Māori to more recent waves of migration, through to its current profile as a city that is open to and keen to explore new ideas, ways of doing things, and experiences.



FIGURE 2.6. Tourists at Palaver Point, Two Hummock Island, Antarctic Peninsula region. ©Photo: E. Leane.



Reimagining Gateway Cities as Custodial Cities

As has been discussed in more detail elsewhere for instance Leane, *et al.*, 2021, which we have drawn on throughout this section, **Antarctic 'gateway' cities have been primarily considered as entry and exit points through which people and goods flow on their way to and from Antarctica** – essentially logistical facilitators of traffic with concomitant economic benefits. Our research shows that this interpretation limits our understanding of these cities' relationship to Antarctica. Rather, the concept should embrace forms of connectivity that include the experiences of residents of the cities as well as their temporary visitors, and that stretch beyond the economic domain to incorporate political, ecological and cultural dimensions.

In this sense, our project makes a contribution to research on gateways internationally. The term gateway is not a new one. Even fifty years ago, the term had already appeared in “innumerable publications poured out by urban promotional groups” (Burghardt, 1971: 269). Within the scholarly literature, the term was initially analysed through the lens of urban geography research, described as a city “in command of the connection between [a] tributary area and the outside world” (Burghardt, 1971: 269). In nature gateway cities, of which polar and Antarctic gateways are a subset, this tributary is typically some form of nature reserve – Mariposa, California, for example, is the gateway to Yosemite National Park (Line and Costen, 2017). The academic literature encompasses a wide range of gateways, from those focussed on trade, in which the tributary area is an economic region (Huff, 2012), to “immigrant gateway cities” (Knapp and Vojnovic, 2016). Emphasis, however, has shifted from an initial emphasis on concrete measures such as transport and logistics to a focus on the less tangible factors. For example, residents' perceptions are important where the needs of commerce, environment and community potentially conflict (Frauman and Banks, 2011), or where tourism branding exercises ignore the values and identities of local citizens (Keitumetse and Pampiri, 2016). Nonetheless, this shift towards a broader understanding of the term has created concern among some scholars, with C. Michael Hall criticising the diffuseness of the term as it is now applied both in the scholarly literature and as a branding device, arguing for a ‘more robust categorisation of gateways’ that draws on empirical measures (2015, 273).

Within Antarctic-specific contexts, the term ‘gateway’ has attracted a considerable body of literature since the turn of the twenty-first century from diverse disciplinary perspectives, ranging from tourism studies (Hall 2000; Muir, Jabour, and Carlsen 2007) to literary studies (Leane 2016). Academic research on Antarctic gateways often focusses on individual cities, with uneven attention across the five: Cape Town features relatively little in the secondary literature, while Hobart is disproportionately present, perhaps due to the high number of Antarctic researchers based in the city. Both within and beyond this literature, increasing attention is being paid to gateway geopolitics. Given that these cities are located in specific national contexts that provide their own and other nationals with access to the internationally governed space of the southernmost continent, they have been associated with a “gatekeeping” function: the gateway allows a particular state to control other states' access the Antarctic region, enacting a “performance of national authority over others through legal and administrative measures associated with air and sea-port state jurisdiction” (Dodds, 2017: 26; see also Dodds and Salazar, 2021). Gateways are also places which a nation's extraterritorial claims can be propagated and justified to local

citizens and visitors through (for example) heritage sites and museum exhibits (Elzinga, 2013; Leane, Winter, and Salazar, 2016). It is no coincidence that four of the five Antarctica gateways are located in states – Australia, New Zealand, Chile and Argentina – that claim territorial sovereignty in Antarctica. In the case of the South American gateway states, this situation is complicated by the overlapping nature of the two territorial claims, which both also overlap with territory claimed by the United Kingdom. On occasion, underlying ‘gateway geopolitics’ come to the surface, as occurred in Ushuaia on the thirtieth anniversary of the Falklands/ Malvinas war, when Argentina put a sudden ban on cruise ships chartered by British companies (Herbert, 2014: 221–236). However, even where territorial claims do not overlap, geopolitics can be explicitly evident in debates over gateway identity. The promotion of Hobart as a point of access for the Chinese Antarctic program has at times provoked strong political responses expressed in the local media. In Hobart’s case, these debates are stoked by the presence in the city of the Commission for the Conservation of Antarctic Marine Living Resources (1959). The Commission hosts an annual meeting that has increasingly been the focus of public attention due to the continued failure to progress recent Marine Protected Area proposals, which have been repeatedly opposed by Russia and China (see e.g. Sylvester and Brooks, 2020). The need for Antarctic “[g]ateway diplomacy” (Dodds and Hemmings 2020) has become increasingly prominent as regions and states deal with differing commercial, environmental and geopolitical interests.

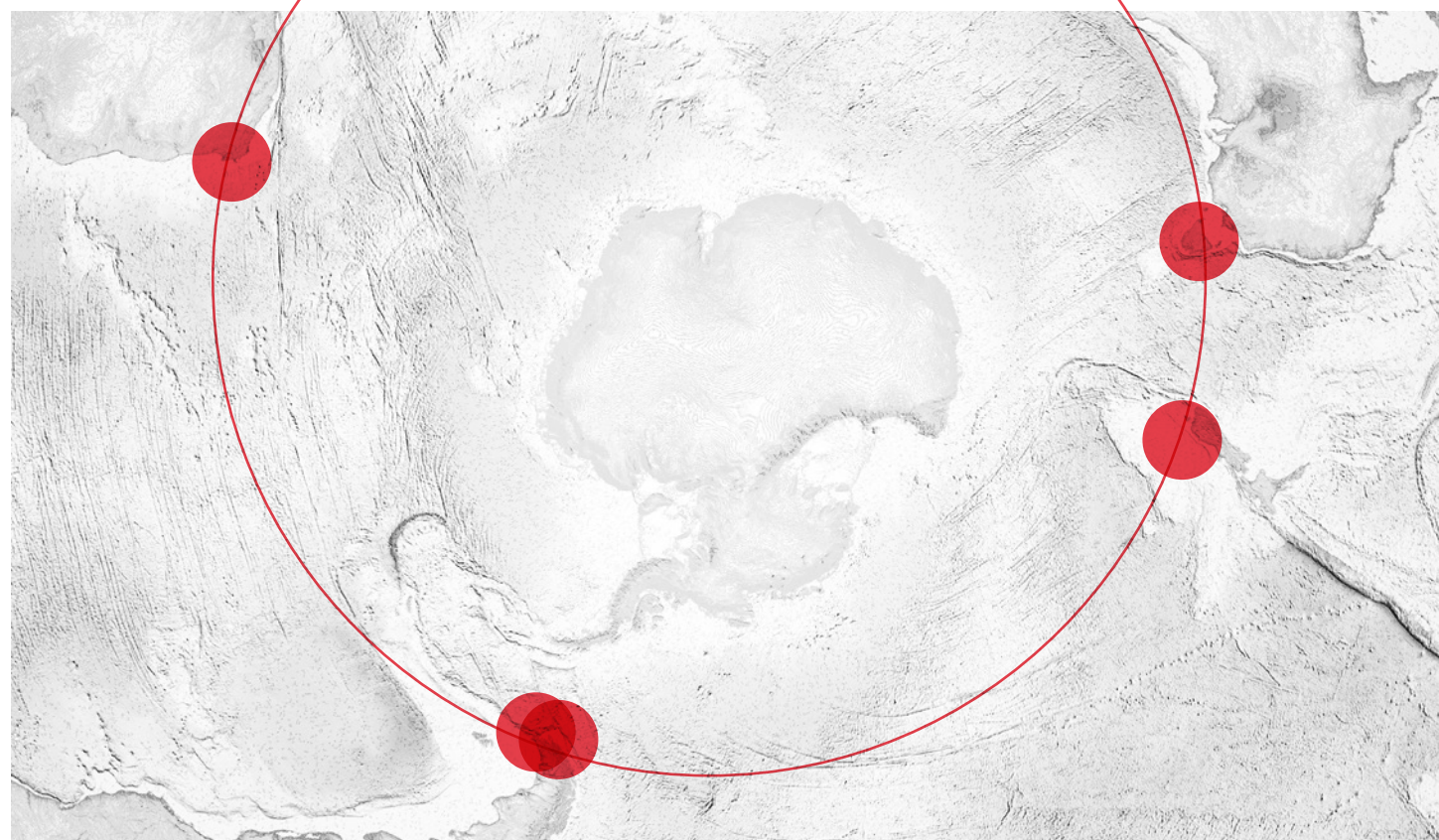
While this geopolitical focus expands understandings of the meanings and functions of Antarctic gateways, there remains relatively little emphasis on the experiences and views of actual residents of the cities. Exceptions include Herbert’s study of placemaking in Ushuaia, which “looks beyond the image presented to tourists to explore frictions among residents, the city council, and touristic enterprises” (2014: xii; see also Herbert, Liggett, and Frame, 2020); and Roldán’s work on Antarctic identity in gateway citizens, which explores sociocultural as well as economic and historical factors, and proposes an expanded definition of gateways that emphasises the particular city’s “dynamic community” (2020). The qualitative methods employed in these studies – ethnographic and interview-based respectively – complement the range of tools and activities, including the quantitative surveys, undertaken in the present project.

In the context of this shift towards community in understandings of gateways, the 2018 Christchurch Antarctic City Strategy is particularly salient. The Strategy leaned substantially towards the notion of Christchurch as a “custodian city” and fostering a

reimagining of this city’s interpretation for its future role with the Antarctic. As Roldán (2017) notes “the real value and opportunity for Christchurch and New Zealand in the custodian role is where there is active engagement with all our communities and where we use the international Antarctic relationships and enabling infrastructure to create a point of ‘competitive difference’ for the city. Only then can we be a thought leader and influencer on Antarctic and Southern Ocean issues.” In this line, and as Eric Assendelft notes, this “concept completely reorients the role of an Antarctic gateway city not just as a thoroughfare but as an urban centre and nation that embodies the values associated with Antarctic custodianship: international cooperation, scientific innovation and ecological protection. Acknowledging this role, Christchurch and New Zealand become guardians, global custodians of the Antarctic” (2017: 27).



Our research shows that this interpretation limits our understanding of these cities relationship to Antarctica.



3. Insights and Recommendations

Key Insights

Our urban sustainability and Antarctic connectivity index stakeholders' workshops, conducted between 2017 and 2018 in all five cities, brought together Antarctic science, government, and industry with urban planning decision-makers to discuss challenges and opportunities for rethinking policy strategies. While tourism and other economic benefits of Antarctic proximity will ensure healthy competition between the cities, these events drew attention to the need for ongoing collaboration across this emergent network.

A number of project indicators convey the importance of connectivity and custodianship among Antarctic Cities youth. More than 60 young people contributed to scenario workshops that informed development of the *Antarctic Futures* game, and more than 500 people have played the game. Forty-seven videos were submitted for the Antarctic Youth Coalition just in Hobart, with another 40 submitted by youth in Christchurch, Punta Arenas, and Ushuaia. Yet the 2020 survey results show much greater concern and despondency among 18–29-year-olds than any other group.

Despite cultural and linguistic differences, residents across all cities are connected by a shared sense of polar identity. The commonality of concerns and identity provide the basis for communities, local governments, and scientific and cultural institutions to work together to reimagine the Antarctic city as a custodian rather than a gateway. Both surveys (2,559 residents) show that Antarctica matters immensely and is recognized and positively valued by the public in all five cities. There is widespread agreement across the five cities that the Antarctic is "important" or "very important" for their respective cities. There is citizen support for the role of science, civil society, and local government and the relevance of cultural institutions and scientific centres.

❶—Many organizations and citizens in all five cities drew inspiration from the idea of a custodial Antarctic network spanning the Southern Ocean Rim.

❷—Young people care passionately about the Antarctic but are pessimistic about its future.

❸—Antarctic cities' residents are concerned about the sustainability of their cities and the Antarctic.

The five cities vary in their distance from major centres of global trade and politics. Their status waxes and wanes in importance alongside global interest in the environmental and economic value of the Antarctic continent. Building a sense of future across economic, ecological, political, and cultural dimensions—for young people in particular—depends upon the multilateral coordination of care and custodianship within and across the five Antarctic cities.

Our project was (knowingly) complex to set up and administer, and we ran into various issues with local government and university staff turnover, shifting degrees of interest, and the time poverty that afflicts all organizations (including participating universities, governments, institutional partners, and young people we looked to include). Several technological shifts—the rise of Zoom during COVID-19, the use of Facebook as an increasingly common research platform, the project’s use of social media and digital games—point to ways to address this challenge at least partially.

④—The sustainability of Antarctic Cities is intimately connected with the sustainability of Antarctica itself.

⑤—A key challenge in fostering Antarctic city-to-city collaborations lies in the logistics of coordination across time zones, languages, and differing degrees of local government sovereignty and interest in Antarctic issues.

Key Recommendations

①—That “custodianship” be translated from an academic concept to an active theme of urban identification with high public awareness and institutional support in the five cities. Specific recommendations include the following:

- 1.1.** Developing policy support for initiatives at the interface between Antarctic and urban-planning sectors.
- 1.2.** Positioning a mutual relationship to Antarctica as a central part of the five cities’ urban collective identity and practice.
- 1.3.** Building upon cultural and political strengths in the five cities to develop a more publicly celebrated sensibility of Antarctic custodianship within each city.
- 1.4.** Developing an Antarctic Custodial Network with the five cities as core participants.
- 1.5.** Considering the different sensitivities of particular cities, e.g., greater concerns about culture preservation, economic futures, and political corruption in Punta Arenas, and greater concern about environmental conservation in Hobart (as captured in our 2018 survey).

2—That all five cities work to establish an international alliance in the form of an Antarctic Custodial Network through a number of specific supporting mechanisms towards a shared long-term vision of promoting action to foster Antarctic custodianship. Specific recommendations include the following:

- 2.1.** An Antarctic Mayors Permanent Forum is held every two years in each of the cities. This forum would have a targeted agenda of fostering Antarctic custodianship with a sustainability focus linked to the UN Agenda 2030 and the Principles for Antarctic Connectivity.
- 2.2.** An ongoing mechanism of exchange is established between the Antarctic offices and city planning departments in the five cities. This might also include ongoing spaces for dialogue and exchange between the Antarctic cities on the interrelated themes of urban sustainability practices and Antarctic custodianship.
- 2.3.** Continued formal support and expansion of the Antarctic Youth Coalition is confirmed, including through funding incentives and respect for its mandate of self-governance.
- 2.4.** An Antarctic research, development, and knowledge network is established, comprising universities (including University of Tasmania, University of Canterbury, and Universidad de Magallanes), industry, and communities. Each university could host an urban reference group to co-ordinate local and regional research agendas.
- 2.5.** An economic incubator fund is established, directed towards sustainable business initiatives led by young people (aged 18–29), with advisory boards comprising industry, science, and government representatives.
- 2.6.** Each of the cities regularly revisits its urban sustainability profile and develops policy recommendations based in the sustainability challenges mapped by those profiles.
- 2.7.** A common bilingual English-Spanish Antarctic education resource kit is co-developed for the five cities and made available to schools and universities.



3—That the methods, instruments, and findings of the project continue to be funded, maintained, and adapted. Specific recommendations include the following:

- 3.1.** The administration of Antarctic city surveys is continued beyond the two surveys already administered in 2018 and 2020. We recommend surveys continue to be administered every two years (2022, 2024, etc.) in the five cities. This will build a longitudinal and comparative database of Antarctic city attitudes and knowledge that can be used to inform and evaluate research and policy. The two-year time frame echoes an existing successful Quality of Life survey administered in New Zealand since 2012.
- 3.2.** The Urban Sustainability Profiles are used to inform policy recommendations based in the sustainability challenges mapped by those profiles.
- 3.3.** The *Antarctic Futures* online game and education resource pack is used in primary, secondary, and tertiary education contexts.
- 3.4.** The extended Principles for Antarctic Connectivity are used for public discussion and debate in each of the Antarctic cities and refined as guides for practice.





FIGURE 3.1. The Western Sydney University and University of Tasmania research teams with research partners from Hobart City Council, Department of State Growth, Christchurch Antarctic Office Hobart, and INACH. Hobart, July 2017.

FIGURE 3.3. Launch of the *Antarctic Cities and the Global Commons* project at Hobart City Council, July 2017. From left to right: Cr of City of Hobart; Jane Eldershaw (Department of State Growth); Lucy Knott (Hobart City Council); Juan Francisco Salazar (Western Sydney University); Paul James (Western Sydney University); Elizabeth Leane (University of Tasmania); Daniela Liggett (University of Canterbury); Liam Magee (Western Sydney University).

FIGURE 3.2. Institute for Marine and Antarctic Studies, University of Tasmania, at Salamanca Place, Hobart, June 2018. ©Photo: J.F Salazar.

FIGURE 3.4. First meeting at IMAS, University of Tasmania, of the research team and research partners from Hobart City Council, Department of State Growth, Christchurch Antarctic Office Hobart, an INACH. Hobart, July 2017.

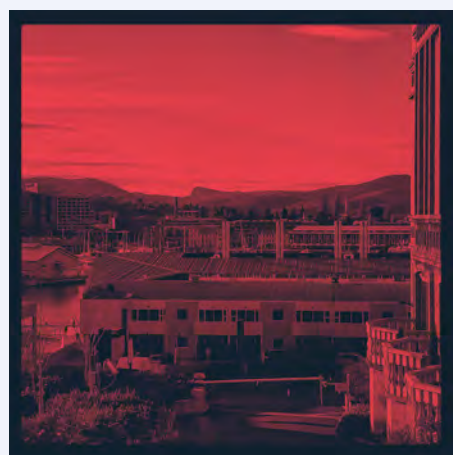


FIGURE 3.5. Members of the research team with local authorities and partners. Punta Arenas, November 2017. From left to right: Liam Magee (Western Sydney University); Claudia Estrada (Universidad de Magallanes); former Premier of Magallanes Region Jorge Flies; Paul James (Western Sydney University); Juan Francisco Salazar (Western Sydney University) and Elías Barticevic (INACH).

FIGURE 3.6. Alice Queen, Deputy Head of Mission, Australian Embassy in Chile, launching the project in Punta Arenas in November 2017.

FIGURE 3.7. Public Forum on Antarctic Cities with project research team and partners in Hobart, 5 July 2018. From left to right: Cr Anna Reynolds, Mayor, City of Hobart; Elías Barticevic (INACH); Tim Short (Hobart City Council); Chloë Dear (Christchurch Antarctic Office); Gabriela Roldán (University of Canterbury); Juan Francisco Salazar (Western Sydney University).



4. Background, Aims, and Outputs

Background to the Antarctic Cities Project

Over a two-year period, 2014–2015, the core team from Western Sydney University began discussions both amongst ourselves and with potential partners about the future of the Antarctic gateway cities and their global engagement with Antarctica. Our strong sense was that as pressures on the continent continued to increase, the five gateway cities would become critical to its future. Initial meetings with the University of Tasmania and Hobart City Council to co-develop a research project on Antarctic gateway cities were held in the second half of 2015. We envisaged the project as the first substantial comparative program to investigate how the gateway cities might both reimagine and intensify their relations to Antarctica and each other. This meant reaching out beyond Hobart around the Southern Oceanic Rim to Christchurch, Punta Arenas, Cape Town, and Ushuaia.

In association with partners in Hobart, Christchurch, and Punta Arenas, a Linkage grant application was submitted to the Australian Research Council (ARC) in early 2016. The grant was awarded in late 2016 and an agreement was signed between the host institution, Western Sydney University, and the co-host, University of Tasmania, with partner organizations Hobart City Council, the Department of State Growth (Tasmanian Government), the University of Canterbury, the Antarctic Office within Christchurch City Council, the Chilean Antarctic Institute, and the University of Magallanes.

The core research team was Professor Juan Francisco Salazar (Western Sydney University, lead investigator), Professor Paul James (Western Sydney University), Professor Elizabeth Leane (University of Tasmania), Associate Professor Liam Magee (Western Sydney University), and partner investigators Associate Professor Daniela Liggett (University of Canterbury), Professor Claudia Estrada (Universidad de Magallanes), and Elías Barticevic (Instituto Antártico Chileno). They went on to lead a team of 15 researchers from six cities in five countries. The ARC-funded part of the project ended in March 2021, and this Final Report details our findings and recommendations.

Research Team

Juan Francisco Salazar is an environmental anthropologist and Professor in the School of Humanities and Communication Arts at Western Sydney University, where he is also a fellow of the Institute for Culture and Society (ICS).

Paul James is a Professor in the Institute for Culture and Society at Western Sydney University. He is author or editor of many books, including *Urban Sustainability in Theory and Practice* (with Liam Magee, Andy Scerri, and Manfred Steger, Routledge).

Elizabeth Leane is a Professor of English and Associate Dean (Research Performance) in the College of Arts, Law and Education at the University of Tasmania. Her books include *South Pole: Nature and Culture* (Reaktion) and *Antarctica in Fiction* (Cambridge University Press).

Liam Magee is an Associate Professor in the Institute for Culture and Society at Western Sydney University. He is author of *Interwoven Cities* (Palgrave Macmillan) and *Towards a Semantic Web* (Elsevier).

Daniela Liggett is an Associate Professor and an Antarctic social scientist at the University of Canterbury. Her work explores a range of matters related to the human engagement with Antarctica, with a focus on environmental governance, tourism regulation, and science-policy interaction.

Claudia Estrada is a Professor of social psychology at Universidad de Magallanes, where she teaches and researches in various aspects of the field.

Elias Barticevic is a journalist and social scientist from the Chilean Magallanes Region with much interest and experience in science communication and social valuation. He has participated in research around the relationship between science, society, and cultural development related to Antarctica. He is currently head of the Competitive Projects section of INACH.

Doita Datta is a research assistant with a background in psychology and economics, who has worked in the public health, social sciences, and humanities sectors.

Dr. Andrea Herbert is an anthropologist and researcher at Gateway Antarctic, University of Canterbury.

Marina Khan is a PhD candidate at the Institute for Culture and Society at Western Sydney University. Marina's research explores diverse aspects of international migration and mobility. She also a co-producer of a research communication podcast called Blab Coats.

Dr Chloe Lucas is a human geographer at the University of Tasmania. Her research explores the social dimensions of climate change, including the ways that communication, values, and cultural context can drive social understanding and adaptation to changing climatic extremes.

Dr Sebastián Martín Valdez is a social anthropologist at the Institute for Culture and Society, Western Sydney University. His research interests include human rights, political anthropology, Latin American studies, and sustainability science.

Silvia Martínez is an administrator at Western Sydney University and Spanish-English interpreter and translator. She has provided administrative and linguistic support to the project since 2017 and interpreting services to organizations within the Antarctic Treaty System over a number of years.

Katie Marx is a PhD student from the University of Tasmania researching the different connections between Hobart residents and Antarctica. She has a professional background in community development and is interested in how place attachment and social capital influence our relationship with the world's wild spaces.

Dr Hanne Nielsen is a Lecturer in Antarctic law and governance at the University of Tasmania's Institute for Marine and Antarctic Studies. She specializes in representations of Antarctica in cultural production, the commercial history of the far south, and Antarctica as a workplace.

Dr Andrea Pollio is a Marie Skłodowska-Curie research fellow, jointly at the African Centre for Cities, University of Cape Town (South Africa), and the Polytechnic University of Turin (Italy). His focus is on the interface between urban transformation, development expertise, and technological innovation in Africa.

Dr Gabriela Roldán is a social researcher at Gateway Antarctica, University of Canterbury. She specializes in Antarctic gateways and human engagements with Antarctica. Gabriela's other research interests are in polar geopolitics, Antarctic tourism management and practices, and the popularization of Antarctic education.

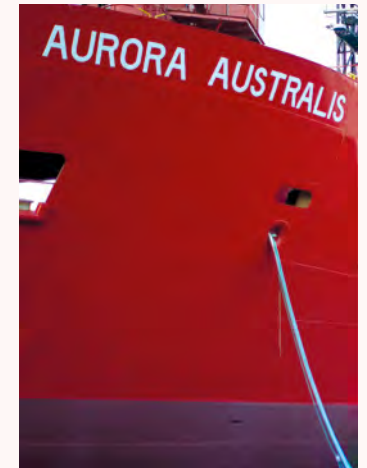


FIGURE 4.1. Detail of the *Aurora Australis* icebreaker in Hobart, July 2018. ©Photo: P. James.

FIGURE 4.2. Graffiti on an earthquake damaged building, Christchurch, October 2018. ©Photo: P. James.

Partners

Tim Short is Director, Community Life, Hobart City Council

Lucy Knott is Senior Advisor, Economic Development, Community Life, Hobart City Council

Karen Rees, is Director, Antarctic Tasmania and Regional Economic Development Coordination, Tasmania Department of State Growth (from 2018)

David Kennedy is Head, Christchurch Antarctic Office (from 2018)

Sue McFarlane is Manager, Relationships, Christchurch Antarctic Office (from 2018)

Jane Eldershaw is Project Manager, Antarctic Tasmania and Regional Co-ordination, Tasmania Department of State Growth

Eric Assendelft Antarctic Office, Canterbury City Council (until 2018)

Chloë Dear, Manager, Public Engagement, The Antarctic Office, Canterbury City Council (until 2018)

Ria Oliver, Antarctic Legacy of South Africa, Stellenbosch University, South Africa

Antarctic Youth Coalition Core Partner Ambassadors Organizations

Chloe Power, Hobart, Australia

Katia Macías, Punta Arenas, Chile

Caleb Fraser, Christchurch, New Zealand

Florencia Garro, Ushuaia, Argentina

Rudzani Silima, Cape Town, South Africa

City of Hobart, Australia

Tasmanian Government, Department of State Growth, Australia

University of Canterbury, New Zealand

Christchurch City Council, New Zealand

Antarctic Office, Christchurch, New Zealand

Instituto Antártico Chileno, Chile

Universidad de Magallanes, Chile

Other Partners and Sponsors

Municipality of Ushuaia, Argentina

Bookend Trust, Hobart, Australia

Qube Ports, Hobart, Australia

Gateway Antarctica, Christchurch, New Zealand

Latin American Centre for Asia-Pacific Excellence, Wellington, New Zealand

South African National Antarctic Programme, Cape Town, South Africa

Antarctic Legacy of South Africa, Stellenbosch University, South Africa

Department of Science and Innovation, Pretoria, South Africa

National Research Foundation, Pretoria, South Africa

Project Aims

The project aimed to work through the many issues that would enable or limit the potential for the five Antarctic gateway cities to act collectively as global custodians of Antarctica.

As its overarching goal, the project set out to explore the possibilities of a shift in urban practices and imaginaries from the condition of being a gateway city to becoming a custodial city. This crucial reorientation would mean changes in practice in those gateway cities that allow the world to see the Antarctic cities not just as thoroughfares and transport hubs but also as urban centres that might embody the cosmopolitan values associated with Antarctic values: international co-operation, scientific innovation, and environmental conservation.

The project had the following aims:

1. To rethink polar gateway research through a comparative appraisal of local/national Antarctic imaginaries, regional Antarctic city-to-city relations, and global Antarctic city-to-city mobilities.
2. To identify the possibilities and obstacles for reconceptualizing the Southern Oceanic Rim cities as a custodial Antarctic network, creating new links and encouraging relationships between Antarctic gateway cities.
3. To bring together the Antarctic sectors (science, government, and industry) of each city, fostering links with communities to engage both locally and globally with different views on the role of gateway cities.
4. To develop a set of sustainability tools, guidelines, and principles through an integrated framework that supports a broad custodial network. This involves first developing these practical tools and guidelines with local government councils, regional development agencies, and national Antarctic programs as a basis for monitoring and assessing that relationship. This platform of tools, guidelines, and principles guides practice and aids the cities in drawing comparisons with other Antarctic gateways and in providing evidence to feed into strategic decisions affecting the relationship of the city with Antarctica.
5. To design an online serious game that encourages young urban citizens to consider sustainability scenarios, effective decision-making, and policy delivery for these five cities in relation to Antarctica.
6. To evaluate opportunities and barriers for developing the first intercity Antarctic Youth Coalition in support of stronger community and youth engagement in Antarctic affairs and custodianship locally and globally.



FIGURE 4-3. Antarctic iceberg
©Photo: Public Domain
Wikimedia.

FIGURE 4-4. Cape Town
looking towards Table
Mountain. ©Photo: P. James.

There were two levels of involvement in the project: Group 1 and Group 2 cities. Contributors from Group 1 cities (Hobart, Punta Arenas, and Christchurch) worked closely with the project team to ensure that their goals were embedded in the project during the early stages. Group 2 cities (Ushuaia and Cape Town) did not contribute funding, with the research limited to working with a small group of experts and involving their young people in the project via an online game.

While many critical issues intervened to complicate these aims and qualify our ambitions—in particular the COVID-19 crisis, which deferred the meetings of mayors and slowed down the last stages of field research—the outcomes have been strong.

Over the course of the project, our partners and us have proposed a systematic rethinking of both the engagement and outlook of five Antarctic gateway cities—not as five far-flung ports competing for the same Northern Hemisphere commerce but as members of an interlinked Southern Oceanic Rim network that can learn from and benefit each other. We have developed a platform of integrated methods, tools, principles, and datasets that can support co-operative and ongoing research projects on and in Antarctic cities in their unique connection to Antarctica. This includes tools for evaluating the link between the sustainability of the cities and their connection to the Antarctic region.

In summary, the research has come to inform both decision-makers and citizens on how the Antarctic gateway cities can best effect cultural, political, ecological, and economic transitions towards becoming Antarctic custodial cities.

Project Outputs

1. *Urban sustainability profiles* have been developed for Hobart, Christchurch, and Punta Arenas, allowing organizations in those cities to argue from an evidence-based standpoint about the city's strengths and weaknesses regarding its sustainability planning strategies. Both the profiles and the associated Antarctic Connectivity Index (Output 2) can be used to inform industry, government, and community on key drivers of sustainability and Antarctic connections and to track the impacts of tools, policies, and practical interventions.
2. An *Antarctic connectivity index* has been developed to an in-principle stage that could potentially be used to demonstrate the nature of the cities' links to Antarctica across a comprehensive set of economic, ecological, cultural, and political indicators. The index is an instrument that provides an evidence-based means of showing the centrality of these cities in considerations of Antarctica. To bring the index to its current level, extensive consultation was conducted with experts in the three main case study cities—Hobart, Christchurch, and Punta Arenas (see chapter 5 and volume 3 of this report). To take the index to an operational stage it will need to be refined through compiling available data from the cities, testing the index's parameters, and trialling comparisons across the five cities.
3. A *scenario projection process* was developed with youth groups through workshops in Hobart, Christchurch, and Punta Arenas, focusing on future trajectories of engagement with Antarctica. The process involved youth groups from each of these cities and was linked directly to the development of the online serious game *Antarctic Futures* (see Output 4 below).
4. The *Antarctic Futures* open-source game was co-designed and co-developed with youth groups in the five gateway cities between June 2017 and November 2019. It was initially intended to promote local-global exchanges and flows of knowledge about Antarctica among youth in the five cities. The game asks players to find solutions to future challenges faced by these cities and Antarctica and invites players to explore future scenarios of Antarctica and the gateway cities in which they live. The game has the potential to be repurposed for general exhibition at local museums and science centres in each city.



The index is an instrument that provides an evidence-based means of showing the centrality of these cities in considerations of Antarctica.



The Antarctic Futures open-source game was co-designed and co-developed with youth groups in the five gateway cities

5. A set of principles, *Principles for Antarctic Cities*, has been developed for engagement in the Antarctic region, drawing upon the expertise of Antarctic specialists in Hobart and Christchurch. With further consultation and reworking, these principles could potentially provide both high-level and detailed operational guidance to cities in their future engagement with and in the Antarctic region.
6. An *Antarctic Youth Coalition* was launched with a charter in King George Island, Antarctic Peninsula, in February 2020, with the supported participation of a youth ambassador/ leader selected from each of the five gateway cities. Coordinated as part of the Chilean Antarctic Institute's 56th Antarctic Expedition, the coalition was formed with the aim of instigating an enduring network and legacy of young people committed to pursuing positive custodial work for the Southern Ocean region.
7. A set of academic, media, and online publications have been developed outlining ethical values and responsibilities. These are part of the larger process of establishing a new global ethos of care towards the Antarctic, targeting young people in custodial cities, policy-makers, and Antarctic stakeholders.



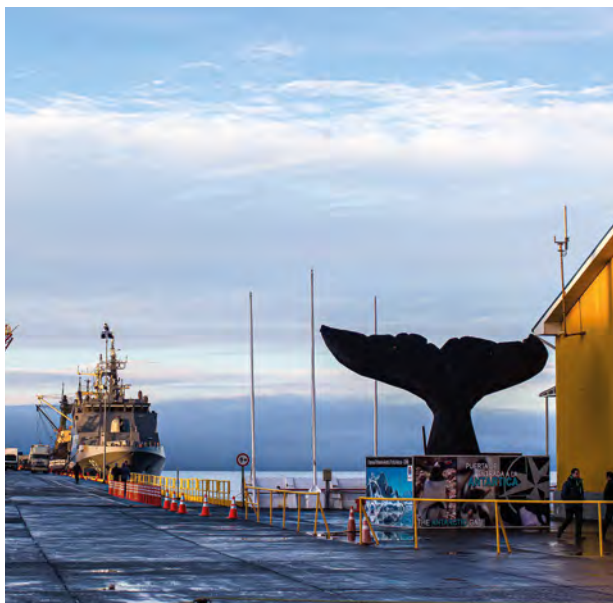
An Antarctic Youth Coalition was launched with a charter in King George Island, Antarctic Peninsula, in February 2020.



FIGURE 4.5. The Arturo Prat pier in Punta Arenas. ©Photo: J.F Salazar.

FIGURE 4.6. Daffodil lawn in Hagley Park, Christchurch. ©Photo: Public Domain Wikimedia.

FIGURE 4.7. South polar skua, Antarctica. ©Photo: INACH.



5. The Urban Sustainability of the Antarctic Cities

The Antarctic cities of Hobart, Christchurch, Punta Arenas, Cape Town, and Ushuaia are complex and rapidly changing urban centres. Despite their relatively small size in terms of population and GDP (with Cape Town being the largest of the cities), these cities are the global hubs of the scientific, diplomatic, and logistical co-operation underpinning most of the world's interactions with the Antarctic and the Southern Ocean. As such, they are of strategic importance in supporting Antarctic global sustainability strategies. However, in order to reach out as custodians of this remote region—a region that most people living in those cities will never see in person—and also to generalize the process of engagement and care beyond the scientific and governance cohorts in those cities, the cities need to also understand themselves more deeply and systematically. As research in other areas attests, any generalized imaginary of planetary sustainability tends to start at home—even when dealing with large structural considerations or engagement at a distance. The ecological aphorism 'think locally, act globally' may be reductive in attempting to give a sense of this relation between where one lives and what it means share Planet Earth, but it contains an element of truth. In order to reach out beyond the local to a remote region or a global commons it is important also to take the local seriously.

Thus, our motivating hypothesis for employing the urban sustainability profile process was that the cities needed to map and understand their own sustainability in order to understand their capabilities for custodianship. They needed to understand their own strengths and weaknesses—ecologically, economically, politically, and culturally—in order to reach out to Antarctica without a false sense of what was possible and without romanticizing what custodianship entails. For example, tensions over economic sustainability, such as an unbalanced economic dependence on the logistics profits or tourist returns that come from being a gateway city, could skew local political decision-making or cultural perceptions about how the city should relate sustainably to Antarctica. Put in more general terms, care beyond one's borders is strengthened by a culture, politics, economy, and ecology of local care.





FIGURE 5.1. Macquarie Point 2017. ©Photo: Public Domain, Wikimedia.org

FIGURE 5.2 Punta Arenas view from La Cruz Hill. ©Photo: P. Ruiz

The urban profiles presented in this report provide a practical monitoring tool to assess urban sustainability in the context of a changing global environment. We consulted with local policy-makers and expert panels in Christchurch, Hobart, and Punta Arenas to undertake comprehensive sustainability assessments of the cities. The insights offered by the stakeholders were triangulated and refined through existing data—peer-reviewed articles, policy reports, and statistics from each city—and then circulated among participants for a second round of assessment. It is expected that the findings of these monitoring processes will provide the basis for future collaboration within and between the cities, serving as a platform to identify common goals and challenges and guiding sustainability transitions in the cities.

The implementation of a collaborative approach has been critical throughout this project, and the conduct of the urban profile process was no exception. By effectively engaging with both local and external experts, as well as local constituents and policy-makers, the project brought together relevant actors of the Antarctic sector in each city, laying the ground to build stronger communities of practice.

The sustainability assessments and available data for each city indicate some common areas of concern (for a discussion of the method used see Volume 2 of this report). Overall, participant cities scored poorly on issues pertaining to the ecological domain and received high scores on issues related to the cultural domain. These cultural strengths linked to the sense that people have in the cities that their existing relation to Antarctica is something to build upon (see Chapter 7 ‘Informed Citizens in the Antarctic Cities’). The status of biodiversity, the prevailing modes of transport, the level of carbon emissions, and the generation of hard waste received the lowest scores in Hobart,

Christchurch, and Punta Arenas. On the other hand, experts assigned the highest scores to the quality of water and air in the urban area (ecological domain), the sense of bodily integrity and wellbeing, and the sense of belonging and identification with the local area (cultural domain). It is most likely the case that the quality of water and air is explained by the cities being provincial cities in relatively pristine subpolar regions without significant polluting industries (a condition that has not always been the case in provincial regions, particularly in relation to water pollution), but the sense of cultural wellbeing, belonging, and identification is a more complex and positive phenomenon to be built upon.

Cross-sectional evidence suggests that urban form and low residential density have important sustainability implications across domains in the three cities. As the sustainability assessment covered a wide range of themes, we will only summarize them here (refer to Volume 2 for more detail on the most relevant findings).

In the following sections of this chapter, we describe the background and methods underlying the development of the urban profiles. We then present the main findings resulting from the assessments, paying special attention to the strengths and challenges that are common to the three cities. Importantly, the profiles are based on a dynamic monitoring method called Circles of Social Life (James, *et al.*, 2015) which can be repurposed to address more targeted sustainability concerns or urban planning goals. The findings we present here offer a baseline reference to guide future monitoring and assessments. The profiles also provide a collaborative assessment model to engage key stakeholders in the design and implementation of sustainability monitoring actions.



FIGURE 5.3 Hobart bookstore shopfront display. ©Photo: P. James 2018.

FIGURE 5.4. Hobart's stakeholders working on the Urban Sustainability Profile, IMAS, July 2017.

FIGURE 5.5. Members of the research team after a workshop session in Ushuaia, September 2019.

FIGURE 5.7. The urban sustainability profiles reported by the La Prensa Austral newspaper, Punta Arenas, February 2019.

FIGURE 5.6. A woman reads the early newspaper on a cold spring morning in Punta Arenas. ©Photo: P. James 2018.



Background to the Urban Sustainability Profiles

The potential of cities as drivers of sustainable change has been recognized in prominent international forums and documents, including the Paris Agreement on climate change and the United Nations (UN) Sustainable Development Goals (UN, 2015a, 2015b). Moreover, the renewed attention granted to cities has been accompanied by a burst of data about many aspects of urban life. Following the UN's call for a 'data revolution' (UN IEAG, 2014), there has been an exponential increase in the volume and types of information available for policy-making, ranging from geospatial data and social network activity to various forms of remote sensing devices and digital surveillance. While more and better data is certainly needed to guide sustainability policies (see, for example, *Nature Sustainability*, 2018), the most pressing issue is actually the unevenness of data collection and the lack of alignment between datasets between cities and across time.

To fully harness the so-called 'data revolution' and the potential of cities as global agents of change we still need to overcome significant challenges. We suggest that the urban profiles presented here respond to three critical issues that are high on the global sustainability agenda. First, they address an urgent need to improve the interfaces between science and policy-making. While it is tempting to think that more and better information will improve policy decisions and frameworks, experience shows that this is far from automatic. In fact, as has been widely documented (Holden, 2013; Moreno Pires, Magee and Holden, 2017; Klopp and Petretta, 2017), the proliferation of datasets and indicators do not always lead to evidence-based policy-making. We believe that one way to overcome this issue is by effectively engaging decision-makers in the design and implementation of

monitoring tools—including tools which produce qualitative, comparative and subjective (though informed by expertise) evidence across different sustainability dimensions. The sustainability assessment process conducted in all cities for the present project involved several stages of consultation and collaboration with experts, policy-makers, and local constituents, facilitating the implementation of the tool and setting the stage for future monitoring actions.

The profiles also respond to the challenge of enhancing the global/local interface of sustainability affairs. The proposed assessment process entails framing cultural, political, economic, and ecological problems in a way that is context-sensitive but also able to influence policy beyond the city's boundaries. Given their status as Antarctic gateways, the participant cities are in a privileged position to translate global sustainability aspirations into meaningful policies and programs at the city level. Conversely, monitoring actions and policies established by the gateway cities have the potential to influence the global sustainability agenda towards the Antarctic and the Southern Ocean.

A third key strength of the urban profile process is related to the use of data. By consulting with local experts and developing a systematic *qualitative* assessment, the profile assessment process helps to overcome two key obstacles related to existing databases: first, the panels can provide guidance on the vast amounts of existing datasets and indicator systems regarding aspects of urban life, and secondly, local experts offer valuable input when there is a lack of high-quality data. In this case, there was significant disparity in terms of the amount and quality of available data for each city, and the advice offered by local city planners and scientists was crucial to build a solid comprehensive assessment of the respective urban regions.

The Urban Profile Method

We conducted three Urban Profile Process assessments, one for each of the main participant cities. The assessments are based on a nine-point scale and guided by a systematic series of qualitative questions organized around a four-domain model: ecology, economics, politics, and culture (for details on the process and the results see the accompanying volume to the present report, *Antarctic Cities, Volume 2: Urban Sustainability Profiles*).

We sought to measure were four basic questions across the four domains of social life:

This was then linked in other interpretative work in response to the question, 'Why is this relevant to understand the city's connection to the Antarctic region?'

Again, in other interpretative work we built upon the data derived from this question to ask, 'Why is this relevant to understand the city's connection to the Antarctic region?' This further connecting question refers to the extent to which an urban community can engage holistically in economic activities relevant to the Antarctic sector and be confident about pressures concerning the sustainability of their local economies without turning Antarctica into a mere resource, particularly in the face of changing structures and pressures in and beyond their locale.

This is connected to the same implied extended question: 'Why is this relevant to understand the city's connection to the Antarctic region?' Here the urban profile can be elaborated on to give an understanding of the extent to which members of communities can sustainably participate and collaborate meaningfully in structures and processes of power that affect them and others. Active and creative political participation in Antarctic matters depends upon a political milieu of active and creative engagement in general.

The implied extended question here refers to the extent to which communities are able to maintain and develop their Antarctic heritage, celebrate Antarctic festivals, and cultivate a sense of Antarctic custodianship-for-itself rather than instrumentally for other purposes—for example, for making money through unsustainable tourism. Tourism can be an honourable industry, but research has shown, for example, that festivals conducted just for return on investment counterproductively quickly either become unviable or have unintended negative consequences for local communities (Mulligan, *et al.*, 2007).



At what level and how sustainable is the *ecological resilience of the urban region?*

At what level and how sustainable is the *economic prosperity of the urban region?*

At what level and how sustainable is *political engagement of people in the city?*

Finally, at what level and how sustainable is the *cultural vitality of the urban region?*

As the assessment process moves forward, these four basic questions are disaggregated into second- and third-level variables. Each of the four domains of social life includes seven subdomains which, in turn, have 49 third-level questions (making a total of 196 variables across the whole circle). By answering all subdomain questions, it is possible to generate a simple graphic representation of the assessment, which can be used both for communication purposes and for visualizing the planning process (see Figures 5.5–5.7 below).

The Expert Panels and Workshops

The assessment process involved three main stages. First, we conducted workshops with expert panels in the three participant cities (Hobart: July and October 2017; Christchurch: October 2017; and Punta Arenas: November 2017). A total of 31 participants took part in the two Hobart workshops, 16 in Christchurch, and 17 in Punta Arenas.

→ At the expert workshops we attempted to respond to four basic questions across the four domains of social life—ecological, economic, political, and cultural:

→ At what level and how sustainable is the ecological resilience of the urban region and why is this relevant to understand the city's connection to the Antarctic region?

→ At what level and how sustainable is the economic prosperity of the urban region and why is this relevant to understand the city's connection to the Antarctic region? The basic question here refers to the issue of the extent to which local urban communities can engage in activities relevant to the Antarctic sector and be confident about the sustainability of their local economies in the face of changing structures and pressures in and beyond their locale.

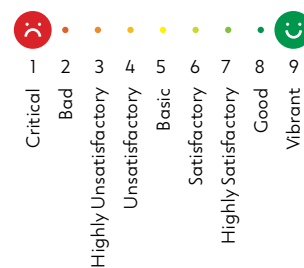
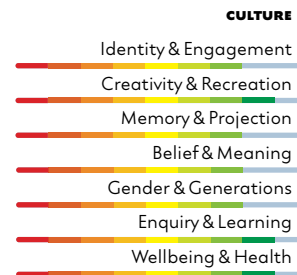
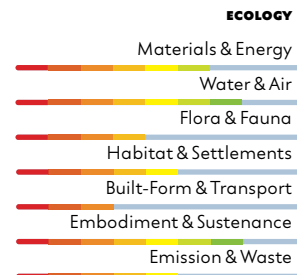
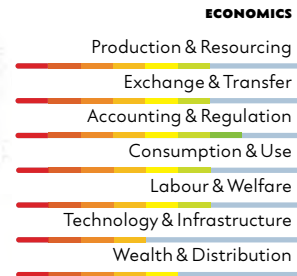
→ At what level and how sustainable is the political engagement of the city's people and why is this relevant to understand the city's

connection to the Antarctic region? Here the urban profile gives an understanding of the extent to which members of communities can participate and collaborate meaningfully in structures and processes of power that affect them and others. This includes political participation in Antarctic matters of concern.

→ Finally, at what level and how sustainable is the cultural vitality of the urban region and why is this relevant to understand the city's connection to the Antarctic region? This refers to the extent to which communities are able to maintain and develop their Antarctic heritage, celebrate Antarctic festivals, and cultivate a sense of Antarctic custodianship.

The workshops had a duration of half a day. We divided participants in four groups according to their main area of expertise, with facilitators and scribes in each group, and asked them to answer the questions from the urban profile templates. Based on these answers the assessment panels produced a simple graphic representation of the sustainability of each city (see Figures 5.8–5.10 below).

Finally, the core team put together a final version of the assessment, incorporating the experts' commentaries and clarifications as well as updated statistics and data. The assessment process for each city took between 12 and 18 months, and it involved refining and revising the initial results as well as continued consultations with the assessment panels in each city.



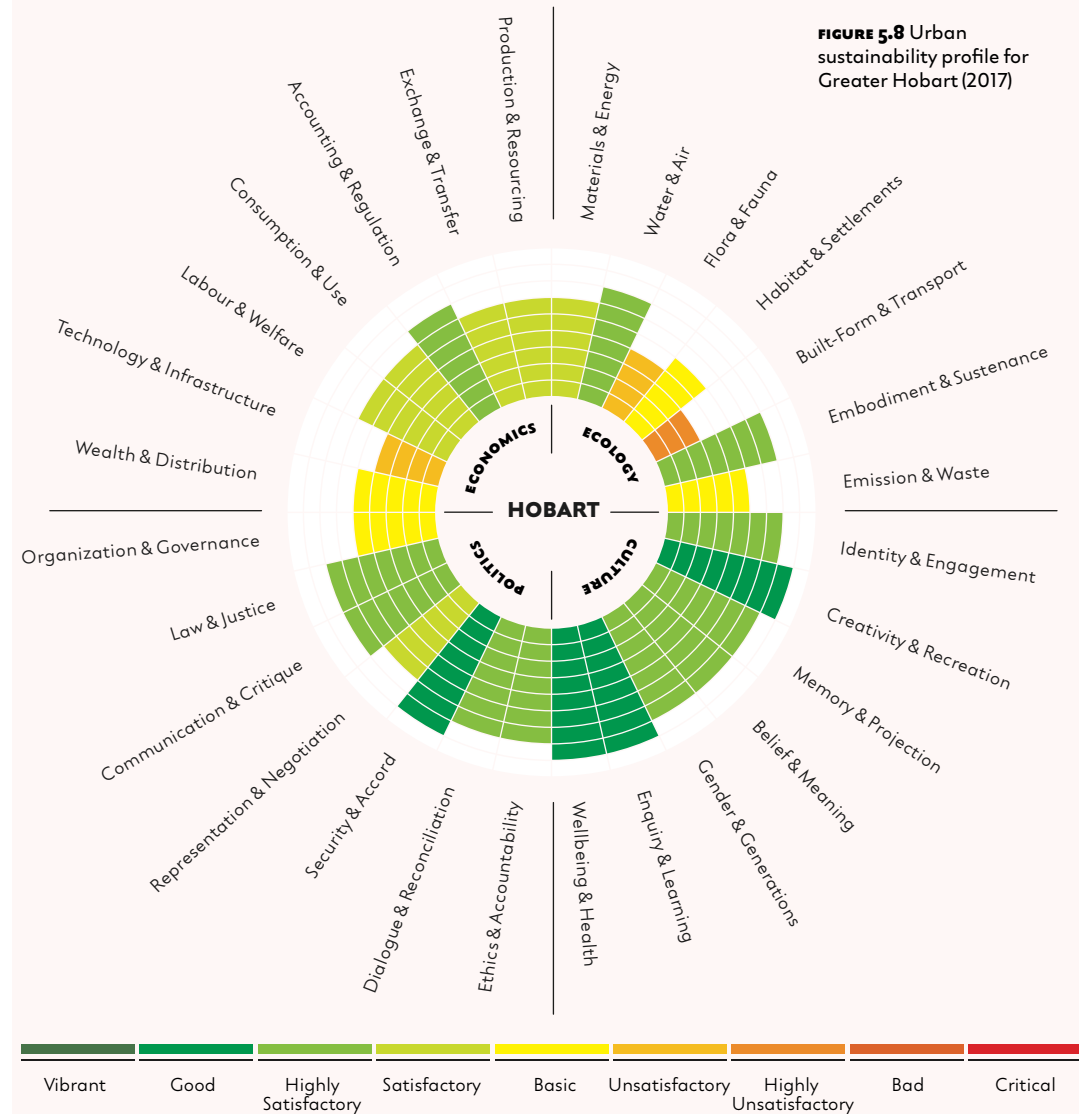
Key Findings of the Hobart Profile Process

Hobart received very high scores in the cultural domain, scoring at least 7 ('highly satisfactory') in all subdomain indicators. The city was also assessed very positively with regards to the political and economic domains. The ecological domain, on the other hand, received relatively low scores, with four subdomains out of seven scoring 5 ('basic') or lower. The most salient results of Hobart's sustainability assessment are as follows:

The city received very high scores on cultural subdomain indicators linked to *enquiry and learning* as well as *creativity and recreation*. Hobart has relatively high rates of university graduates (above the national average) and is a global hub for Antarctic science and research. The city has a vibrant cultural scene, with high rates of attendance and participation in the arts and cultural events. It hosts important museums and cultural institutions, including the Museum of Old and New Art (MONA), which has become an international drawcard, attracting tourists to Hobart and amplifying the existing cultural scene, with the resultant rise in visitor numbers known as the 'MONA effect'.

When considering cross-domain issues, Hobart was assessed very positively in terms of the residents' *health and wellbeing* as well as the levels of personal *security* and bodily integrity. Available data confirms that Hobartians report high levels of health screening and understanding of basic health issues. The levels of personal security were also assessed very positively. However, other aspects of residents' health performed relatively poorly, such as excess weight, obesity, and levels of physical exercise—that is, the ecology of *embodiment* had distinctly mixed results.

Access to services and infrastructure tended to receive low or very low scores across the economic domain in relation to *technology and infrastructure*, including housing affordability and the ecological domain in relation to *built form and mobility*. Housing affordability is an enduring problem for the city residents, particularly for minority groups and younger generations. Access to public transport and active forms of transport (cycling, walking) also rated very poorly across domains (see below for a more detailed analysis on this issue).



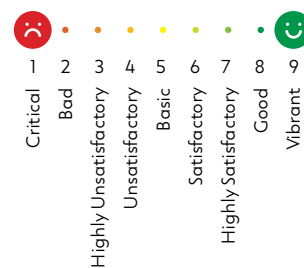
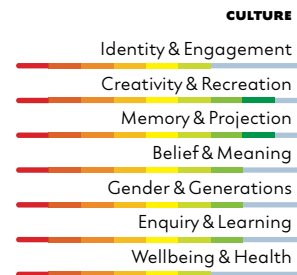
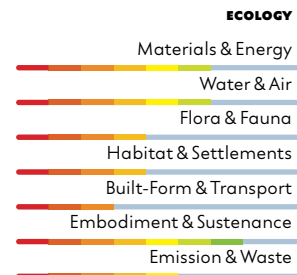
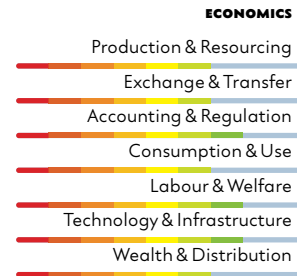


Key Findings of the Christchurch Profile Process

As the graphic representation of Christchurch's profile shows (Figure 5.9 below), the city received high or very high scores on issues pertaining to the cultural, economic, and political domains, while the protection of the natural environment and ecologically sustainable processes tended to receive poorer scores (4 out of 7 subdomains were assessed as 'basic', 'unsatisfactory' or 'highly unsatisfactory'). The most salient and distinctive results of Christchurch's sustainability assessment included the following points:

↳ The city was particularly strong on the economic and cultural domains, with all subdomain indicators scoring at least 6 ('satisfactory').

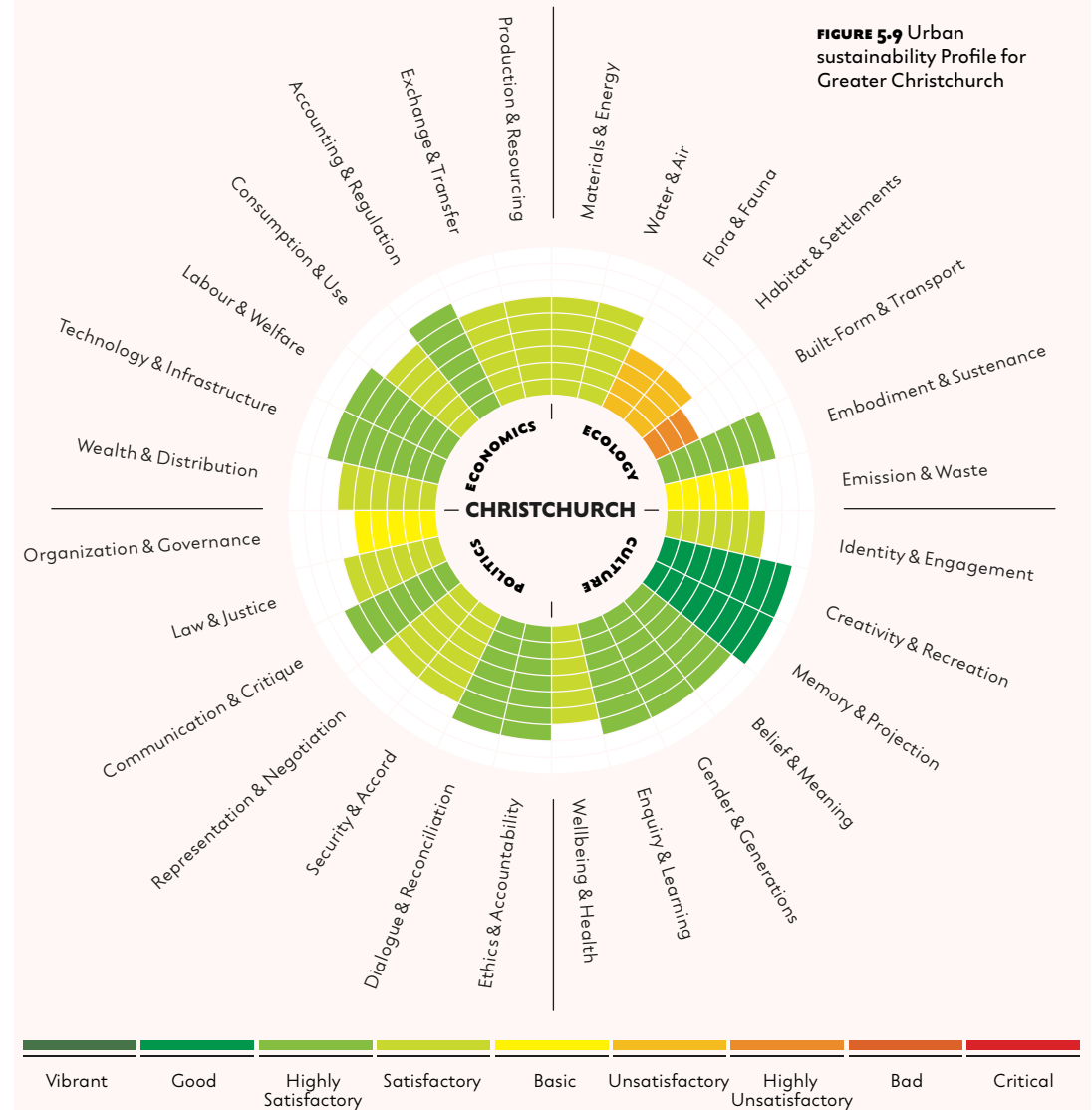
↳ When considering cross-domain issues, the city performed very well on indicators linked to transparency (*accounting and regulation* in the economic domain; *ethics and accountability* and *law and justice* in the political domain). New Zealand has a reputation of financial and institutional transparency worldwide, and the sustainability assessment confirmed that the city of Christchurch is part of that wider culture.

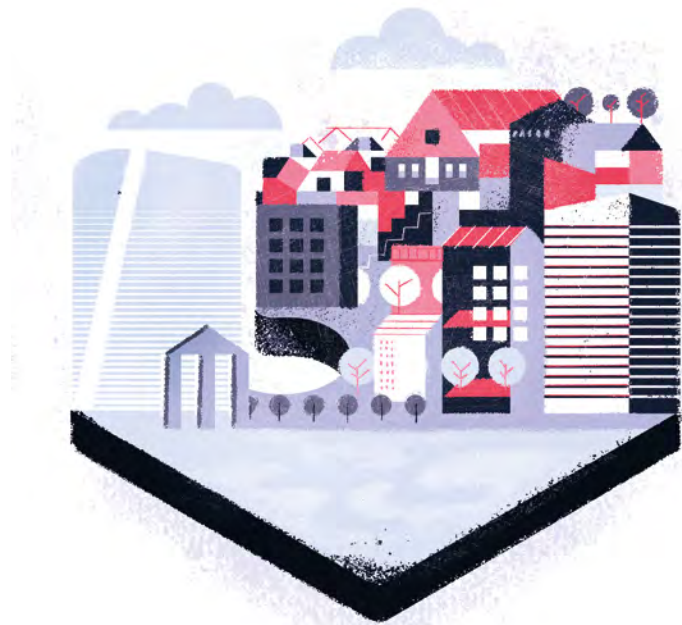


↳ The city also performed very well on issues related to *equity and welfare*, scoring 'satisfactory' (6 out of 9) or higher in all cases (see *labour and welfare* and *wealth and distribution* in the economic domain; *negotiation and reconciliation* in the political domain; and *gender and generations* and *belief and meaning* as well as *wellbeing and health* in the cultural domain).

↳ The 2011 and 2012 earthquakes had a negative impact on several aspects of the city's sustainability across domains, including

issues of equity, health, and wellbeing. For example, data suggests that the earthquakes disproportionately affected women and minority groups on indicators linked to housing and unemployment. Likewise, the earthquakes had enduring effects on the mental health of many local residents, and this challenged the city's capacity to provide counselling and support. Moreover, evidence also shows that the earthquakes negatively affected the image of the local government, electoral turnout, and the level of satisfaction with participation in decision-making.

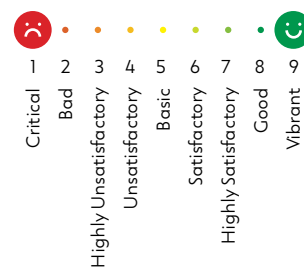
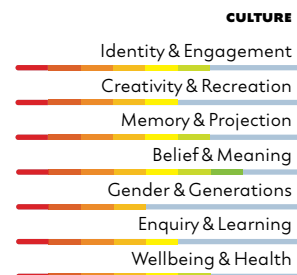
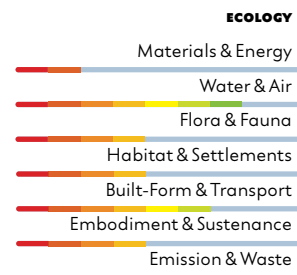
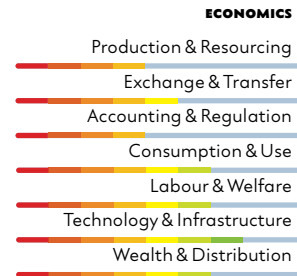




Key Findings of the Punta Arenas Profile Process

Punta Arenas received higher scores on cultural subdomain indicators (with the exception of 'gender and generations') and lower scores on the political and ecological domains (with the exception of 'water and air').

When considering cross-domain issues, indicators linked to cultural, economic, and gender equity tended to receive low scores (*representation and negotiation*—political domain; *gender and generations*—cultural domain; the relative equity of wage levels for different groups/the relative equity of access to secure employment in the area across differences of gender, age, and ethnicity—economic domain). The city reports relatively high rates of domestic violence, and data suggests that this is increasing. Available data also suggests significant disparities across differences of gender and ethnicity when considering wage levels and access to secure employment. Moreover, ethnic conflicts have escalated in Chilean Patagonia in recent years, particularly in the Araucanía and Bío-Bío regions.

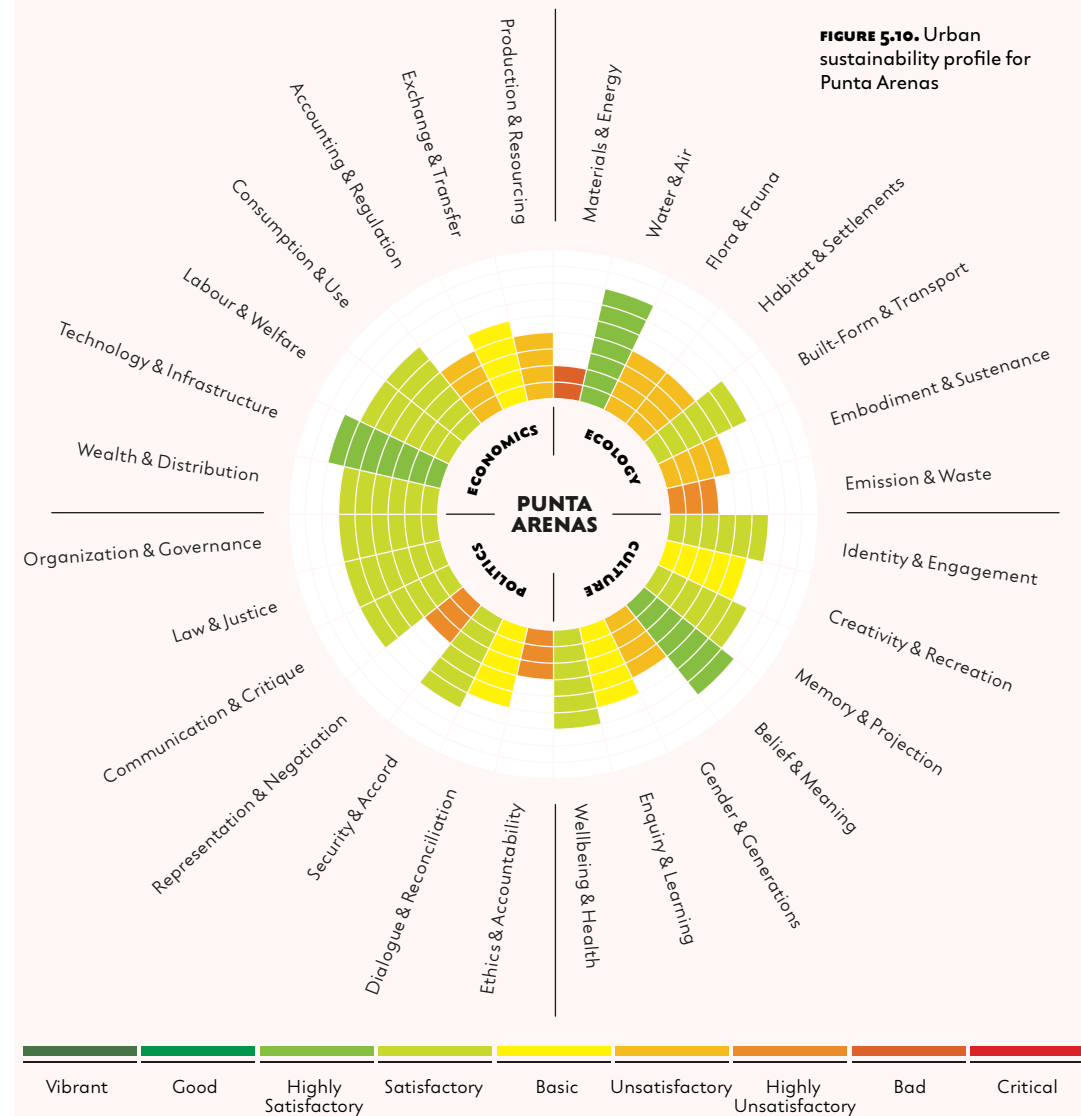


Circles of Social Life is an approach developed by Paul James and colleagues that guides engaged and collaborative practice in making our cities, locales and organizations more sustainable, resilient, adaptable and liveable. As part of this overall approach Circles of Sustainability provides practical tools for creating sustainable cities and communities. The Circles approach provides tools for responding to four key questions. Each of these questions is associated with

four related circles that describe and assess our cities, communities and organizations in all their complexity — economic, ecological, political and cultural.

See the book by Paul James Urban sustainability in theory and practice: circles of sustainability. Routledge, 2015.

www.circlesofsustainability.org/



Comparative Findings between Hobart, Christchurch, and Punta Arenas

While the profiles cover a wide range of sustainability affairs, the qualitative assessments and available data for each city indicate some common areas of concern. At a general level, all three cities received lower scores on issues pertaining to the ecological domain and higher scores on issues related to the cultural domain. This is clearly expressed in the graphic representations of the urban profiles (Figures 5.8–5.10 above).

Lowest scores in the three cities:

- Resilience of regional ecosystems to urbanization
- Status of biodiversity
- Degree of dependence on cars
- Level of carbon emissions
- Generation of hard waste.

Highest scores in the three cities:

- Quality of water and air in the urban area
- Sense of bodily integrity and wellbeing
- Sense of belonging and identification with the local area
- Sense of home and place
- Levels of personal security.

Some relevant insights, however, are not immediately apparent in the graphs and require a more detailed analysis. Although the results are not conclusive, cross-sectional evidence suggests that the urban form and residential density of the cities have important sustainability implications across domains in the three cities. Crucially, all three cities have low residential densities and relatively spread urban areas.

The debate about the significance of urban form, in terms of a city's shape, density, and configuration, on the sustainability of cities has a long history (Breheny, 1992; Williams, Burton, and Jenks, 2000; Neuman, 2005; Bay and Lehmann, 2017). Researchers and urban planners have considered the impact of urban form on several aspects of sustainability affairs, such as transport and mobility, physical activity and health, energy use, housing affordability, biodiversity, social equity, and accessibility as well as the overall quality of life and liveability (James, *et al.*, 2015; Magee, 2015).

In general terms, we found a correlation across domains in the three cities in the direction proposed by the 'compact city' argument, at least in terms of transport, access, and energy use. Third-level indicators linked to the prevalent modes of transport, the levels of carbon emissions, carbon footprint of the urban area, level of physical activity of city residents, and access to certain goods and services (public transport, affordable housing, recreational opportunities) tended to receive low scores in the assessment process. On the other hand, certain indicators, linked to what Marketta Kyttä and her colleagues (2016) call 'experiential and wellbeing outcomes', performed relatively well in the three cases. These include sense of belonging and identification with the local area, sense of home and place, perceived levels of personal safety, level of social trust in other people, sense of bodily integrity and wellbeing, and participation in civic activities.

As we discuss in detail in the following pages, these results do not apply uniformly to all gateway cities. Housing affordability, for instance, seems to be an especially pressing problem for Hobart but not for Christchurch and Punta Arenas. In addition, some correlations do not necessarily express a simple causal relationship between indicators. The relative lack of physical activity might be related to urban sprawl and the low rates of active modes of transport (cycling, walking), but it is unclear how other factors may also play a role in this matter—for example, weather conditions and seasonality. In sum, the findings we present here are not definitive conclusions, but they do sketch clearly some areas of concern that are common to the three cities.



FIGURE 5.11. Tramway in Christchurch. Transport systems are a key concern in the three participant cities. ©Photo: Public Domain, Wikimedia.org.



Built Form and Mobility

Perhaps one of the most intensely debated issues in urban sustainability is the relationship between urban form, residential density, and the prevalent modes of transport. Although the debate is far from over, most studies tend to suggest that ‘compact’ cities, with a mix of uses in close proximity, achieve the most sustainable and efficient outcomes in terms of mobility and transportation. Contained urban layouts reduce travel demands because people do not need to cover long distances to get to work or to access services and facilities. Higher population densities can also support more efficient public transport systems and, through improved urban design and adequate infrastructure, encourage active forms of mobility such as cycling and walking.

Notably, indicators linked to the prevailing modes of transport scored particularly badly in all cities. The ‘degree of dependence on cars’ was considered ‘critical’ and received the lowest score possible in all cases (scoring 1 out of 9). The qualitative assessments provided by the panels in each city were confirmed by existing data.

In Christchurch, about 72 per cent of trips are made by car (47 per cent as driver; 25 per cent as passenger). In addition, the use of public transport has declined significantly in recent years, and it is estimated that private vehicle trips are growing at a rate of 1 per cent a year. Public transport travel times and reliability in Christchurch are a key problem that limits the use and effectiveness of buses in the urban area. In particular, land-use patterns associated with demographic change are not adequately aligned with transport infrastructure, which results in congestion on key corridors and peak time delays reinforcing private vehicle use.

The assessment panel in Hobart outlined a similar situation. While car dependence has decreased in recent times, private cars still represent around 67 per cent of all weekday trips in the Hobart local government area, and this figure rises to 75 per cent when considering Greater Hobart. The city’s topography, including the river and the mountains, inhibits good public transport options. Buses provide the only form of public transportation across the wider Hobart area. Available data suggests that a significant number of people walk and ride bicycles once in the city, but access to the city from the outer suburbs is by car. On average, around 75 per cent of all weekday trips in Greater Hobart are made by car (either as driver or passenger); around 20 per cent are made on foot; and only 4 per cent are made by public transport (City of Hobart, 2017: 28).



The assessment panel in Hobart outlined a similar situation. While car dependence has decreased in recent times, private cars still represent around 67 per cent of all weekday trips in the Hobart local government area

Private cars are also the preferred mode of transport in Punta Arenas. The city has one of the highest motorization rates in Chile with around one car for every two residents: a total of 56,242 motorized vehicles. A recent study indicates that 62 per cent of all trips in Punta Arenas are made by private car and 21 per cent by public transport, while active forms of transport (walking or cycling) represented only 12.6 per cent of trips. In the last 15 years, trips by private car have increased 322 per cent.

Level of Physical Activity and Obesity Rates

During the workshops, participants expressed some degree of concern about the relatively high obesity rates and the lack of physical activity in the three cities. In Hobart and Christchurch, the 'level of physical activity' of city residents was considered 'basic' (scoring 5 out of 9), whereas in Punta Arenas it was considered 'bad' (scoring 2 out of 9). While we do not attempt to establish a simple causal relationship between low residential density and lack of physical activity (in fact, Chile, Australia, and New Zealand show high obesity rates among OECD countries at the national level), a detailed analysis of the profiles does indicate a correlation between land-use patterns, prevailing transport modes, and lack of physical activity.

In Punta Arenas, experts showed concerns about the physical health of city residents (scoring 4 out of 9). According to available data, the population of the Magallanes Region (which includes Punta Arenas) shows both high obesity rates and high physical inactivity rates. In the Magallanes Region, the rates of obesity and excess weight among children under 6 were 13.6 per cent and 26.4 per cent respectively (above the national averages of 11.3 per cent and 23.1 per cent). In addition, the region reported the highest rates of obesity among postpartum women (43.44 per cent) (Ministerio de Salud, 2016). This is highly significant given that Chile has one of the highest obesity rates among children and young people in Latin America—the national averages are 11.9 per cent for boys and 12.4 per cent for girls (Ministerio de Salud, 2016).

Obesity rates are also relatively high in Christchurch. Data from 2016–2017 for the Canterbury Region shows that the prevalence of obesity in adults is 29.4 per cent, slightly lower than the national average (31.2 per cent). However, this represents a 6-point increase from the previous survey (for the period 2011–2012). Of respondents over 15 years old, 49.8 per cent indicated being physically active (at least 150 minutes of moderate-intensity or equivalent physical activity per week) (Canterbury Wellbeing Index, 2018).



Chile has one of the highest obesity rates among children and young people in Latin America



Hobart also reported high obesity rates and low physical activity rates in the population. According to the 2017–2018 figures, Tasmanians have the highest levels of excess weight and obesity in Australia; more than two-thirds (70.9 per cent) of adults were overweight or obese, with more than one-third (36 per cent) categorized as overweight and over one-third (34.8 per cent) as obese (Australian Bureau of Statistics, 2018).

These findings support recent research (Giles-Corti, *et al.*, 2019) which suggests that low-density residential areas tend to show high levels of car dependency, lower rates of active transport modes (such as cycling and walking), and higher rates of excess weight and obesity in adults and adolescents.

An important factor to ponder is weather and seasonality. In fact, all three cities are exposed to harsh weather conditions and strong seasonality, which may have a negative impact on the levels of participation in physical activity among elders, adults, and adolescents (on this issue see, Tucker and Gilliland, 2007; Chan and Ryan, 2009).



FIGURE 5.12 Sumner, Christchurch, New Zealand. ©Photo: Public Domain, Wikimedia.org.



Resilience of Regional Ecosystems

Another important area of preoccupation in the three cities was the resilience of regional ecosystems (scoring 3 in Christchurch and 4 in Hobart and Punta Arenas), particularly regarding the state of biodiversity in the urban area (2 in Christchurch and Hobart, 3 in Punta Arenas) and the rate of extinction of native plants (3 in Punta Arenas, 4 in Christchurch, 6 in Hobart).

It is still not fully understood what type of urbanization pattern minimizes disruption of regional ecosystems, partly because most research has focused on specific neighbourhoods or municipalities and few studies at the city scale (Lin and Fuller, 2013; Sushinsky, *et al.*, 2013). Most studies indicate that high-density, compact developments have a severe impact on local biodiversity within built areas and, therefore, might result in a relatively high rate of local extinctions, although limited to a small area. Sprawling urbanization patterns, on the other hand, create low-density suburbs spread over a larger area, which tend to result in fewer local extinctions within urbanized areas. However, the ecological impact will be more extended and, therefore, affect larger tracts of natural landscapes. While more studies are needed, recent research indicates that high-density developments with large interstitial green spaces tend to result in lower ecological impact, relative to population size (Sushinsky, *et al.*, 2013; Geschke, *et al.*, 2018)

Sense of Belonging and Identification with the Urban Area

This indicator was assessed very positively in Hobart and Punta Arenas (scoring 9 in Punta Arenas and 8 in Hobart), while in Christchurch it was assessed as 'satisfactory' (6 out of 9). In recent years, sustainability science has paid increasing

attention to the role of place attachment and the citizens' sense of belonging given their potential to encourage ecological stewardship (Chapin and Knapp, 2015; García-Martín, Plieninger, and Bieling, 2018; Halliwell, 2019). Research suggests that place attachment can be a powerful motivation driving conservation actions and the protection of the local environment. The Antarctic gateway cities—with their unique natural environments and cultural histories strongly connected to the Antarctic—seem to be in a particularly privileged position to explore how a strong sense of belonging may help promote sustainable practices and ecological stewardship. Crucially, these findings are consistent with the two surveys conducted in the gateway cities (see chapter 7 'Informed Citizens in the Antarctic Cities').

Level of Personal Security

Overall, the subdomain 'security and concord' was considered 'good' in Christchurch and Hobart (scoring 8) and 'satisfactory' in Punta Arenas (scoring 6). The vast majority (95 per cent) of greater Christchurch residents feel safe in their homes after dark, with 73 per cent saying they feel very safe. Only 4 per cent feel very or a bit unsafe (Canterbury Wellbeing Index, 2019: 45).

Housing Affordability

The affordability of housing for all scored particularly low in Hobart and Ushuaia (scoring 3, 'highly unsatisfactory'), while in Christchurch and Punta Arenas it was considered 'satisfactory' (scoring 6). One key aspect to understanding the housing problem in Hobart and Ushuaia is the role of tourism and temporary rents in the cities' real-estate markets (see Sommer, Welch, and Goess, 2018).

6. The Antarctic Connectivity Index

Background to the Index

The Antarctic Connectivity Index is an innovative and comprehensive instrument developed through a collaborative stakeholder process involving a number of Antarctic experts from universities, government agencies, and the private sector. It seeks to assist in developing collective engagement and provide an evidence-based means for action by showing the centrality of cities in relation to Antarctica—and, in comparison to each other.

The index is a diagnostic tool to assess Antarctic urban connections and guide local governance actions. This first stage of its development has taken it a working-draft stage. It still needs to be operationalized, and one of our recommendations is that the Antarctic cities take this on by testing the tool with data from their own cities.

As is the case of other similar indices, the Antarctic Connectivity Index design is 'a quantitative framework based on qualitative rating descriptions and a participatory assessment methodology, enabling local contextual interpretations of the indicators while maintaining a robust universal framework for city comparison and benchmarking' (Rogers, *et al.*, 2020). The index has the following capacities and design rationale:

- ↳ **The index is a benchmarking tool that enables cities to measure their level of positive connectivity to the Antarctic region** across four domains of engagement: ecological, economic, political, and cultural. It is therefore more holistic than most indices in building the variables for the index on a tested and systematic matrix of domains and subdomains of social life. For example, the Global Connectivity Index reduces connectivity to information and communications technologies, all within the economic domain.
- ↳ **The index is designed as a participatory tool** to be used by city planners and policy-makers, businesses, cultural organizations, and environmental NGOs to define, assess, and operationalize a city's Antarctic connections. This makes it very different from other indices which are organized top-down with much of data being held commercial-in-confidence.
- ↳ **The index is a tool developed co-operatively as a co-design process**, part of the Australian Research Council project Antarctic Cities in collaboration with the cities of Christchurch, Hobart, and Punta Arenas, along with Cape Town and Ushuaia. This is also unusual for index development.



Why this index?

- ↳ It has become increasingly important for Antarctic gateway cities to better understand, quantify and qualify their types of connections to the Antarctic.
- ↳ It is critical to track the impacts of policy and practice interventions on the rapidly changing Antarctic environment that is very much a barometer of global change, and to identify emerging critical issues through a tool that measures positive connectivity.
- ↳ It is important to treat the engagement of gateway cities to the Antarctic region holistically as a combination of economic, ecological, political, and cultural connections.



FIGURE 6.1 The Mawson's Huts Replica Museum on the Hobart waterfront. ©Photo: J.F Salazar 2017.

FIGURE 6.2. Stakeholders workshop on the Antarctic Connectivity Index in Christchurch, October 2017.

FIGURE 6.3. The International Antarctic Centre, Christchurch. ©Photo: J.F Salazar.

Index Questions, Indicators, and Means of Measurement

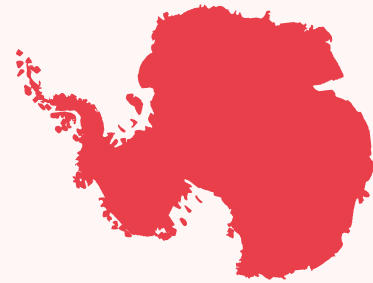
TABLE 6.1. Questions, Indicators, and Measurements

Domain	Question	Indicator	Measurement
Environmental connectivity	To what extent do the city's connections with the Antarctic enhance the ecological flourishing of the region?	The extent to which the city supports the biosecurity and environmental monitoring of the Antarctic.	<p>The level of material support for the biosecurity of the Antarctic.</p> <p>Proportion of the overall annual budget of national/federal and local government authorities spent on programs in managing material flows between the city and Antarctica calculated as a percentage.</p> <p>The level of knowledge, monitoring, and modelling of biogeographic and climatic patterns in the Antarctic. Arithmetic mean of:</p> <ol style="list-style-type: none"> 1. The number of variables monitored and modelled by scientists travelling to the Southern Ocean and the Antarctic. 2. The number of monitoring initiatives launched/monitored from the city (weather stations; remote sensing projects; monitoring of human impact; invasive species monitoring).
Economic connectivity	How consequential is the Antarctic to the economic prosperity of the city?	The range of livelihoods available in the area that derive from the city's connection to the Antarctic.	<p>The percentage of people in the city employed in jobs related to the Antarctic. Proportion of all jobs in the city calculated as a percentage.</p> <p>The level of income for the city from Antarctic-related activities. Percentage calculated as a proportion of the overall annual income of the city—i.e., gross metropolitan product (the value of all final goods and services produced within a metropolitan statistical area during a year).</p>
Cultural connectivity	To what extent is the Antarctic embedded in the cultural life of the city?	The level of cultural engagement with the Antarctic, manifested in the life of the city.	<p>The number of cultural sites in the city that relate to the Antarctic. Number of sites per capita.</p> <p>The intensity of Antarctic-related conferences and cultural events, exhibitions, and archives held in the city. Intensity measured as a proportion of the total of cultural events in the city per capita.</p>
Political connectivity	How important is the Antarctic to the political engagement of the city?	The level of political engagement with the Antarctic region managed through the city.	<p>The number and size of national Antarctic programs that operate through the city. One unit for each nation-state that operates a national program in Antarctica divided by the relative size of the program measured by number of scientists, logistical personnel, and administrators.</p> <p>The proportion of all levels of government budget allocated to Antarctic-related programs in the city. Measured as the proportion of total government budget devoted to the Antarctic that is allocated to the city to run programs in that city or through that city into Antarctica as a percentage.</p>

What is the general question guiding the index?

Usually indices leave the question that they are measuring as a general thematic. This means that much is taken for granted. Here the *general question* is the core consideration for judging the quality of connectivity. Because this is a positive index, in effect treating higher levels of connectivity as normatively better, the question guides all aspects of index development.

Following this general question, we ask a question in relation to each of the domains: ecology, economics, politics, and culture.

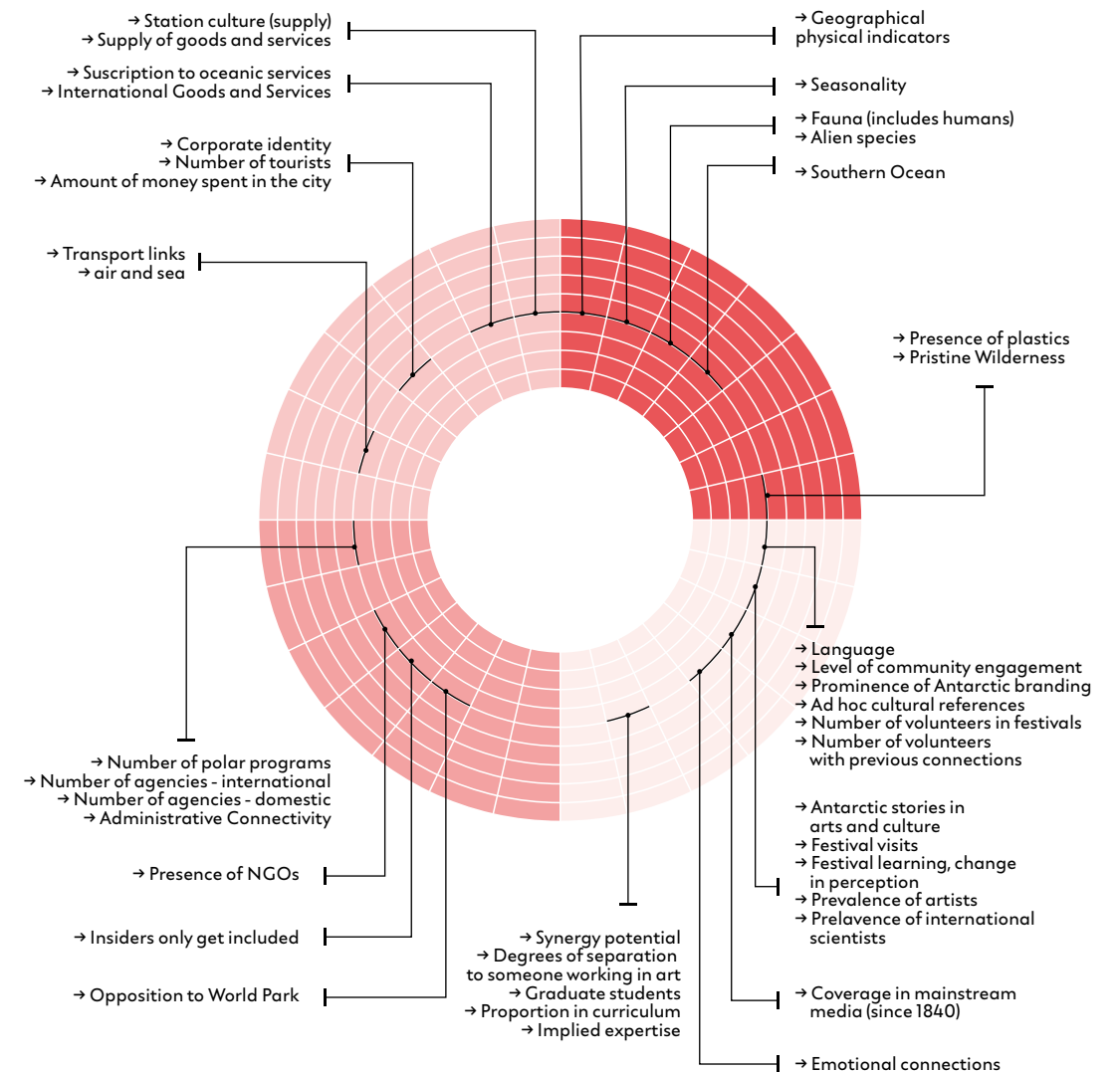


Question: How do the city's connections to the Antarctic region enhance the sustainable future of the Antarctic while also enhancing the city's own urban future?

Key Findings from the Hobart Connectivity Workshop

Participants highlighted several aspects of the index that may be useful for the city and the experts:

- ↳ **The index will help to monitor change** over time;
- ↳ **The index will provide evidence to lobby** (at different government levels) in favour of Antarctic-related policies and investment (in research, community engagement, diplomacy, etc.);
- ↳ **The index legitimizes and validates work done by Council**, such as data produced by experts working for the city (for example, in relation to climate change and the Antarctic and how this has a real impact in Hobart). It helps to move away from a parochial understanding of climate change issues;
- ↳ **The index makes visible the cultural importance of the Antarctic** in the community. 'Antarctic identity' came up in community engagement activities (community vision); and
- ↳ **The index is a useful tool to guide a shift from Antarctic gateway** to a sense of environmental custodianship. Cities have a special connection with, responsibility towards, the Antarctic.



GRAPH 6.1. Mapping critical issues for establishing Hobart's Antarctic connections. Hobart, 2017.

Key Findings from the Christchurch Connectivity Workshop

The Christchurch expert workshop on Antarctic connectivity, which was held in October 2017, emphasized the city's history of Antarctic exploration by suggesting that the components making up the index be *cultural engagement* (30 per cent), *cultural landscape* (40 per cent), and cultural authenticity (30 per cent). Here, cultural engagement is determined based on what proportion of a city's population is regularly (annually) involved in arts and cultural events related to Antarctica (including education), either as creators or consumers. Cultural landscape captures how many places of Antarctic cultural significance exist in a city, including historic monuments, and cultural authenticity indicates what proportion of a city's population have been to Antarctica.

The Christchurch experts also identified that an Indigenous voice is presently missing in the Antarctic Connectivity Index and should be added. It could capture, for instance, the number of Indigenous words and narratives related to Antarctica.



7. Informed Citizens in the Antarctic Cities

There is a growing body of literature that has examined these cities' historical, economic, touristic, cultural, and geopolitical relationships to Antarctica. These analyses have focused primarily on the perspectives and impacts of explorers, scientists, artists, and tourists moving through the cities—an approach that the label 'gateway', with its suggestion of a thoroughfare, encourages (Leane, *et al.*, 2021).

The rationale for undertaking two surveys of citizens' perceptions during the duration of this four-year project was to address a perceived gap. Citizens' views have largely been overlooked in discussions of how Antarctic connections are perceived by, and how they impact upon, the cities' residents. Therefore, through two complementary surveys, first the Circles of Social Life Survey in 2018 (n=900), conducted in Hobart, Christchurch, and Punta Arenas, and second the Antarctic Urban Identities Online Survey in 2020 (n=1,659) conducted in the five cities, we aimed to examine these cities' diverse connections to the far south, along with the opportunities and tensions these generate. The Circles of Social Life Survey placed greater emphasis on measuring citizens' attitudes towards the sustainability of their cities, mirroring the urban sustainability profiles described in chapter 5. Both surveys were designed to elicit citizens' opinions about their city's forms of connectedness to the continent to its south and therefore have parallels with the Antarctic connectivity index in the previous section (chapter 6). We sought to gauge the degree and kind of engagement that residents have with Antarctic issues, as well as their level of concern about decisions made about the city's relationship with Antarctica in a broad range of areas.

Across both surveys' results, it is evident that the city's Antarctic connections go well beyond the economic and logistical benefits that characterize the traditional idea of a gateway city (Hall, 2015). Most strikingly, citizens in Hobart, Christchurch, Punta Arenas, and Ushuaia feel a strong sense of custodianship towards the Antarctic region—a quality poorly captured by the term 'gateway' (Leane, *et al.*, 2021).

“

All five Antarctic gateway cities have similar yet distinct visions of their relation to the Antarctic region which often might signal a potential disconnect between the gateway ambitions held by state and federal government and those held by the cities' residents. In all five cities there is evidently a high level of political and economic investment in growing their Antarctic profiles, but the voices of city residents themselves usually remain largely absent from this dialogue at both a regional and national level.

Circles of Social Life Survey 2018

Three surveys comprising 50 questions about residents' perceptions and attitudes were implemented in Hobart (n=300, April–July 2018), Christchurch (n=300, October 2018), and Punta Arenas (n=300, December 2017) to investigate how citizens understand their city's relationship with Antarctica. The surveys aimed to better understand the relation that citizens of the Antarctic cities have to Antarctica.

Method and Instrument

While the same survey questionnaire was used in the three cities, responses were collected differently in each case.

In Christchurch and Hobart, quotas were set for the sample in accordance with the most recent census data to ensure statistical representativeness by age, gender, and location. In both cities the surveys were administered via computer-assisted telephone interviewing (CATI) in September 2018 and were largely delivered by phone (landline and mobile). Participants were included on the basis of self-identifying as a resident of Greater Christchurch (population 502,000) or Greater Hobart (population 226,000) and being over the age of 18. Surveys were completed anonymously for both Christchurch (n=300; female 51.3 per cent; age range 40–49 years 52.7 per cent) and Hobart (n=300; female 48.0 per cent; age range 40–49 years 63.3 per cent).

For Punta Arenas, the study area considered was the *comuna* of Punta Arenas (Punta Arenas city). Responses were collected through face-to-face interviews in November 2017 (n=380; female 51.9 per cent; age range 40–49 years 40.8 per cent). The three cities had equivalent distributions in terms of educational level and household perception of their financial status ('comfortable': Punta Arenas 78.2 per cent, Christchurch 71.3 per cent, Hobart 70.3 per cent).

The survey questionnaire was based on the Circles of Social Life methodology (James, *et al.*, 2015), which is used to measure indicators of urban sustainability, adaptability, and liveability. It included 11 items (5-point Likert scales) that measured Antarctic concerns (4), perception of connectivity (4), importance of interrelation (3), and 8 enquiring into activities linked to Antarctica (yes/no answers). Two groups of items were used in this study to assess satisfaction with the city's social life (18 items) as well as concerns relating to social life (11 items).

The results of these surveys illustrate how at the southernmost reaches of the globe, five 'Antarctic cities' are discovering a shared identity in relation to a fragile frozen continent.

Some results show that residents of these three cities are concerned about the effects of global climate change and Antarctic ice melt. Additionally, they indicate that the majority of its inhabitants engage daily in activities related to the Antarctic, such as reading or hearing something in the news pertaining to Antarctica. With some differences, the three cities indicated that they should play a significant role in the custodianship of Antarctica's future. A significant majority of respondents agreed that our treatment of Antarctica is a test of our approach to ecological sustainability (78 per cent) (something we explored through the urban sustainability profiles approach), and that strong Antarctic connections are important for the economic future of the three cities (76 per cent). It is interesting to note how across all cities, ecological custodianship and economic connections are not contradictory.

HOBARTIANS' LEVELS OF CONCERN ABOUT CLIMATE CHANGE, COMMERCIAL ACTIVITIES, AND POLITICAL TENSIONS RELATING TO ANTARCTICA.

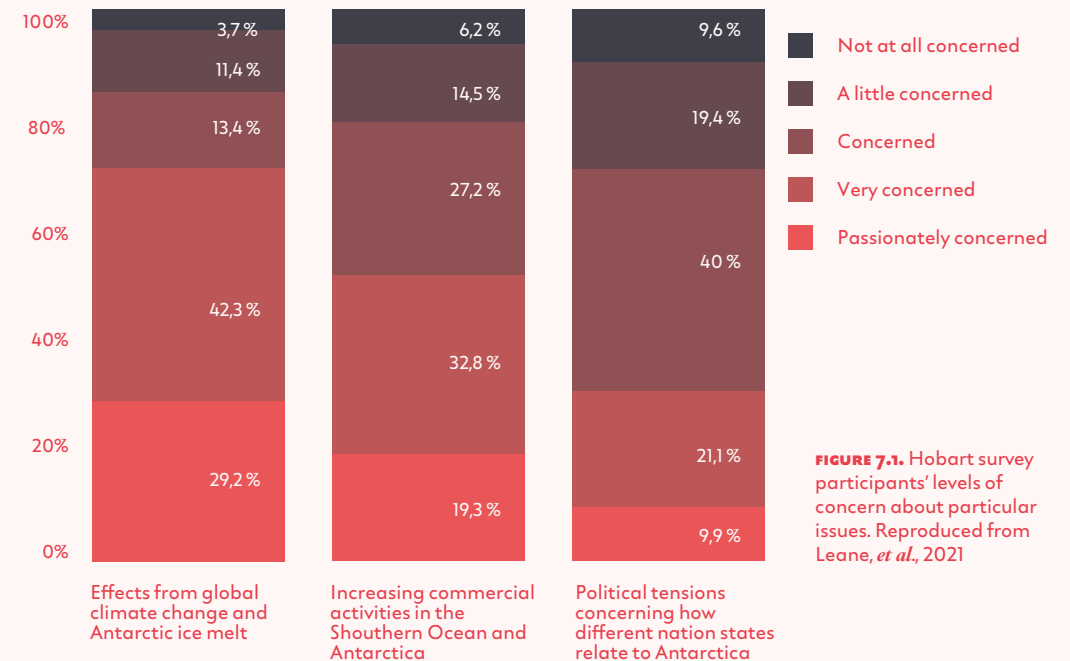
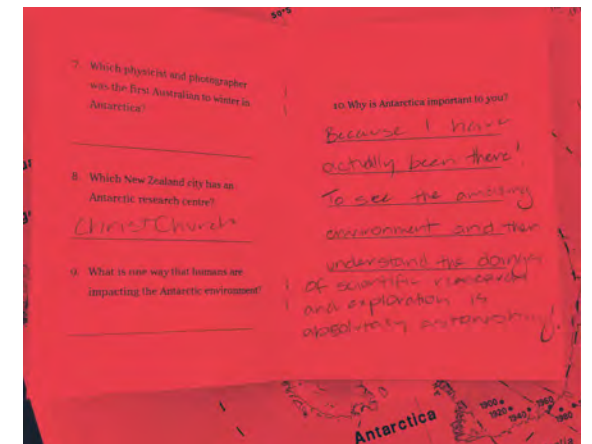


FIGURE 7.1. Hobart survey participants' levels of concern about particular issues. Reproduced from Leane, *et al.*, 2021



FIGURES 7.2 AND 7.3. School children learning about Antarctica and the project at our booth during the Australian Antarctic Festival, Hobart, 2-5 August 2018. ©Photo: J.F. Salazar.

Key Findings of the Hobart Survey

The Hobart survey was conducted entirely by CATI through a professional provider, with a randomized sample of landline and phone numbers provided by Sample Pages (a sampling company) and subject to quota sampling. A minimum of 10 female and 10 male participants were required in each of six age brackets (18–19, 20–29, 30–39, 40–49, 50–59, 60+), with even distribution across Greater Hobart postcodes. Surveys were anonymous and conducted according to University of Tasmania ethics approval, with no identifying information retained. As in the other cities surveyed, the sample included a high proportion of educated and affluent people (63 per cent with a university degree, 72 per cent describing themselves as ‘comfortable’). This is out of proportion with census data, although not unusual for optional surveys. The Hobart survey was quantitative only, so could not capture the nuances of individuals’ sense of connection with Antarctica. More detail on the methodology is available in Elizabeth Leane *et al.*’s article (2021). This summary, including figures, is based on that publication.

Survey participants reported strong levels of connection to Antarctica overall (Leane, *et al.*, 2021). While the news media was by far the most common source of engagement with Antarctica in the previous year, over a third of those surveyed had participated in a form of cultural activity related to Antarctica, over one in six had experienced an Antarctic tourism-related activity (this could include local attractions such as the Mawson’s Huts Replica Museum), and about one in eight had reported involvement in an economic activity.

Concerns related to Antarctic issues (see Figure 7.4) focused primarily on global climate change and ice melt, with 29 per cent of people ‘passionately concerned’ and 42 per cent ‘very concerned’ about the issue, and only 4 per cent reporting no concern at all. This aligns with

concern about climate change more generally, about which 86 per cent of Hobartians surveyed were ‘concerned,’ ‘very concerned,’ or ‘passionately concerned’—a higher level than that expressed by Australians in surveys conducted nationally (Leane, *et al.*, 2021). Commercial activities related to the Antarctic were the next biggest cause for concern, with over 50 per cent of people ‘passionately concerned’ or ‘very concerned’. Political tensions around different nation-states’ relationship to Antarctica were a third source of concern, although people felt less strongly about this issue, with the largest group of 40 per cent of people choosing the middle option on the Likert scale, ‘concerned.’ Hobart’s hosting of the Secretariat for the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) may have had a role in this, as the survey was undertaken during a period when debates around marine protected areas in Antarctica were current, which may have influenced local news reporting.

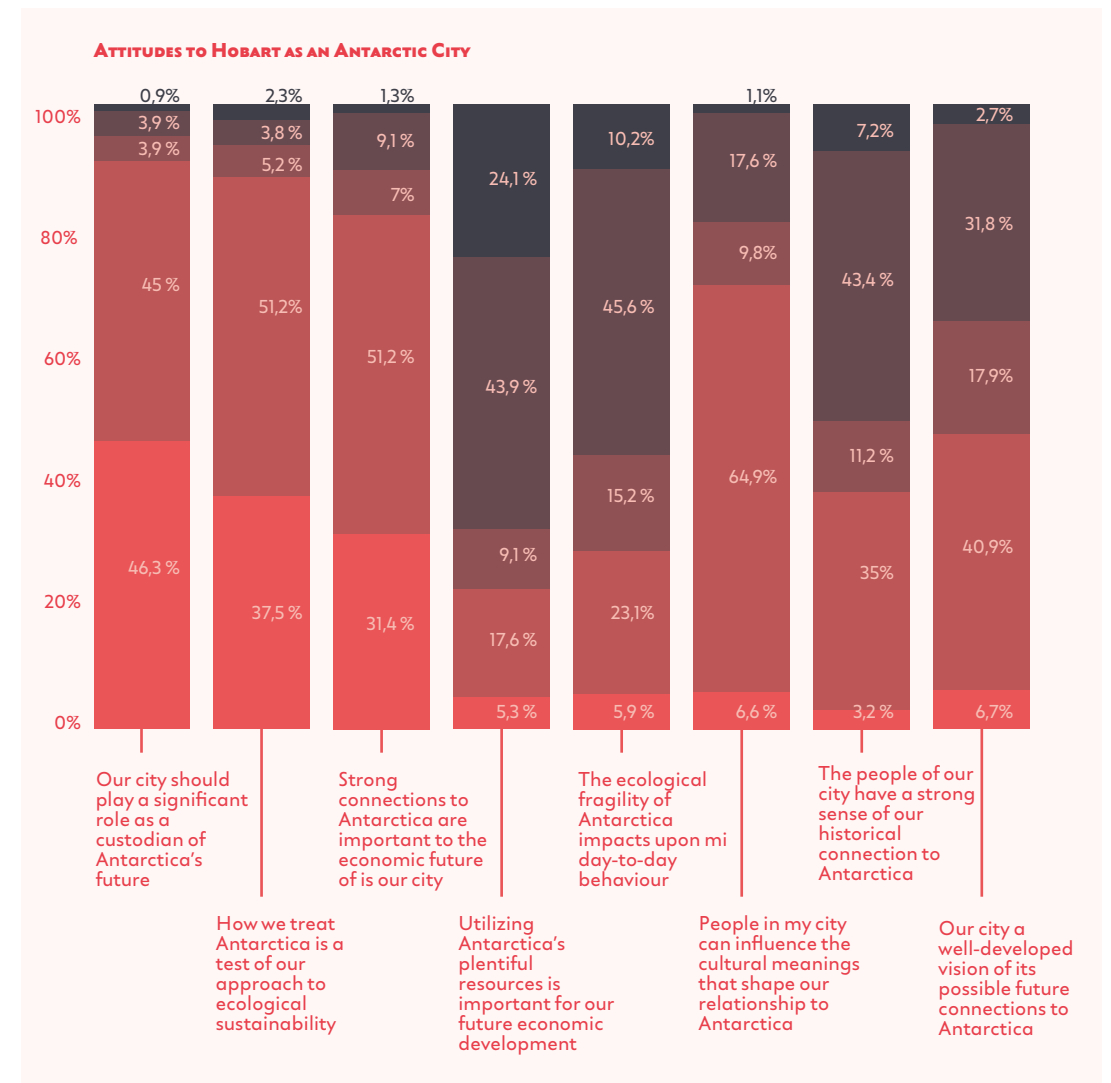
Attitudes towards Hobart as an Antarctic city formed another cluster of statements to which survey participants were asked to respond. Just over 20% (23% per cent) agreed or strongly agreed that utilizing Antarctica’s resources is important for economic development, even while a large majority, 83 per cent, considered (agreed or strongly agreed) that Antarctic connections were important to the city’s economic future. Hobartians, then, see no contradiction between protecting Antarctica’s resources while using the city’s Antarctic connection as an economic resource in itself. Citizens felt able to influence the cultural meanings shaping Hobart’s relationship with Antarctica (72 per cent agreed or strongly agreed), although results were less positive on the issue of whether citizens have a strong sense of historical connection to the continent (38 per cent). 45 per cent agreed or strongly agreed that the city has a well-

developed vision of its possible future connections to Antarctica. These results are largely unaffected by age, education, and gender.

The strongest finding in this set of statements was in relation to the question of whether ‘Our city should play a significant role as a custodian of Antarctica’s future’. Over ninety per cent of people agreed with this proposition, with nearly 50 per cent strongly agreeing. This represents the highest level of agreement with any of the

questions asked in the survey. By contrast, only 29 per cent agreed or strongly agreed that a sense of Antarctica’s ecological fragility had an impact on their day-to-day behaviour, suggesting that this sense of custodianship does not at present readily transfer into practical action within the urban setting.

FIGURE 7.4. Attitudes to Hobart as an Antarctic City. Reproduced from Leane, *et al.*, 2021



Key Findings of the Christchurch Survey

Following an approach similar to that taken in Hobart, a CATI survey was undertaken in Christchurch between 8 and 25 September 2018. The survey was largely taken by phone (landline and mobile), but a small number of face-to-face interviews were conducted to ensure representativeness. Three hundred residents of Greater Christchurch, which includes Christchurch City, Selwyn District, and Waimakariri District, all over the age of 18, were surveyed.

Originally, the survey had been intended to be run from late August to early September, but at that time the news media prominently featured the removal from office of the CEO of Antarctica New Zealand. To avoid this news unduly influencing the responses, the decision was made to delay the survey until media attention had shifted to other matters. Nonetheless, the survey results highlighted that the recent drama around the dismissal of the CEO of Antarctica New Zealand was still fresh in the memory of a number of survey participants, who specifically recounted this news in response to Question 15 of the survey, which asked 'In what context did you hear Antarctica mentioned in the news most recently?'

The latter question was only included in Christchurch. It proved to be one of the most interesting open-ended questions in the survey and gave us an indication of the level of awareness and knowledge on Antarctic issues among the interviewed residents. While about 40 per cent of the survey participants did not recall anything, they considered worth mentioning, the remaining 60 per cent provided more or less detailed responses reflecting specific news items that can be grouped into a dozen themes: science, climate change, politics, economics, arts, logistics, tourism, fishing, heritage, iconic people or organizations, personal connections, and other.

Issues around climate change, and in particular the breakup of ice shelves and declining mass balance of the Antarctic ice sheet, which goes hand in hand with the warming of the region, featured prominently in respondents' recollection of Antarctic news items. These are all issues that New Zealand's Antarctic science community is very invested in, judging by research funding awarded, for instance through the Antarctic Science Platform or the Deep South National Science Challenge, and media coverage of research supported by Antarctica New Zealand. Biological research did not receive the same attention in the survey as geophysical science and drilling projects, and the respondents' main references to the Antarctic environment recounted its unique and untouched character along with aspects related to ecosystem disruptions and pressures through, for example, pollution, 'rubbish', or plastics, and evidenced in, for instance, declining penguin populations—presumably related to regional warming and habitat shifts, although this was not specifically mentioned. Interestingly, a couple of respondents also specifically commented on the paucity of scientific knowledge in an Antarctic context, although no information was provided on why this was considered particularly noteworthy or what knowledge was being referred to.

Survey participants also seemed to have a very good recollection of news about economic uses of Antarctica, with five participants referring to plans of a Dubai engineering company to develop a system by which Antarctic icebergs could be towed to Dubai to relieve the city's pressure on drinking water. Having this rather unusual news item being picked up by participants is not a great surprise since it featured prominently in the New Zealand news media in early September (see <https://www.stuff.co.nz/world/middle-east/106941489/plan-to-tow-icebergs-from-antarctica-to-parched-dubai>).

More unusually, and incorrectly, two references were made to oil exploration and deep-sea drilling for oil in the Antarctic. The main focus of economic-related news items that research participants remembered revolved around fishing and tourism, with particular reference to the plane crash into Mt Erebus in 1979 that killed 257 people, a tragedy that is still relatively fresh in the minds of many New Zealanders, not least due to the related media coverage, memorial flights, and the then planned commemorative service for the forty-year anniversary of the disaster in 2019. News about scientific whaling expeditions organized by Japan seemed to have lingered in the memory of our research participants as well, with five respondents referring to whaling. Similarly, toothfish fisheries, the commercialization of toothfish in the USA, and illegal or unreported fishing in the Southern Ocean were mentioned as having been recently featured in the news.

The quantitative data collected in the survey indicate a shared concern for the Antarctic environment and the potential impact of climate change as well as human activities, such as fishing and tourism, on the Antarctic and the Southern Ocean. The survey participants saw a clear connection between Antarctica and the economic future of Christchurch and felt that the city should play a significant role in asserting its place as an Antarctic custodian.

The vast majority of respondents had not participated in city council planning with regard to Antarctica, which is hardly surprising since such planning processes are generally reserved for city councillors, the city's officials, and vocal stakeholder groups. A surprising number of respondents (25 per cent) had, however, been involved in tourism activities relating to Antarctica. Whilst Heritage Expeditions, a New Zealand owner-operator of Antarctic and Arctic expedition cruises, is based in Christchurch, it is likely that the existence of the International Antarctic Centre significantly contributed to the high number of survey respondents who have been involved in Antarctic tourism activities. Similarly, more than 20 per cent of participants had attended an Antarctic-focused art exhibition, festival, or cultural activity, which is also not too surprising since the Canterbury Museum houses a dedicated Antarctic history and science section, and the Christchurch Art Gallery and the city's annual Antarctic Season Opening festivities provide opportunities for the cities' residents to engage in activities celebrating the city's links to the Antarctic.

Key Findings of the Punta Arenas Survey

A total of 450 people in Punta Arenas voluntarily participated in the study, selected by accidental non-random sampling using as inclusion criteria being over 18 years of age ($M=28.7$, $SD=12.3$) and self-categorized as inhabitants of the city of Punta Arenas. Participants were contacted at their places of study and work and invited to take part in the study. The questionnaire was self-administered.

Regarding concerns about Antarctic-related issues, the results indicate that **participants are primarily interested in the effects of climate change and ice melting**, and secondly in the consensual definition of the role of the Antarctic territory as a symbol of the common future. Political tensions and trade issues are seen as less important (**SEE TABLE 7.1**).

When evaluating the relationship between the Antarctic gateway city and the Antarctic Territory, the participants point out that there is no historical connection with the Antarctic and that both the cultural infrastructure on Antarctic issues and the strategic vision of the potential future link are poorly achieved. Regarding the evaluation of connectivity, people say that the city should have a role as guardian of the Antarctic, although they also state that this relationship is important for the economic future (**SEE TABLE 7.1**).

Regarding the actions related to commitment to the Antarctic, it is evident that only the practice of reading or listening to news about Antarctica has been carried out by more than two-thirds of the participants. All the other proposed actions are carried out by less than a third of the sample, with participation in economic or planning activities related to Antarctica being the two least selected (**SEE TABLE 7.2**).

When analyzing the level of adherence to Antarctic issues globally and the evaluation of the social life of the gateway city, we see that in the case of concern for Antarctic issues, the ecological and cultural dimensions are the most important. In the case of connectivity, the economic dimension is the most important, although the other three also show high averages. In the case of the relationship with the Antarctic, all the dimensions are in the non-adherence zone, indicating that this aspect of the link with the Antarctic is perceived to be poorly developed (**SEE TABLE 7.3**). The global measurement of the quality of social life shows high averages, except for the evaluation of optimism, where only the cultural dimension is high, with an intermediate average for optimism related to the ecological dimension and low satisfaction in the political and economic dimensions.

The relationships between Antarctic concerns and satisfaction with social life indicate that there are positive relationships between the latter and concern for the Antarctic in all its dimensions. In other words, the more satisfied a person is with his or her social life, the more interested he or she is in Antarctic issues, and vice versa. This type of correlation between social life and positive attitude towards Antarctic issues is also present with lesser but significant strength (**SEE TABLE 7.4**).

TABLE 7.1: Summary of results in Punta Arenas.

ANTARCTIC THEMES	M	DS	RANGE
Concern for Antarctica			
1. Effects of climate change and Antarctic ice melt.	3.50	1.00	Very interested
2. Discrepancies about what Antarctica means as a symbol of our common future.	3.13	1.05	Very interested
3. Political tensions regarding how different nation-states relate to Antarctica.	3.00	1.15	Interested
4. The increasing growth of commercial activities in the Southern Ocean and Antarctica.	2.76	1.10	Little interested
PERCEPTION OF ANTARCTICA			
1. The people of our city have no real historical connection to Antarctica.	3.74	1.00	Agree
2. The local government makes decisions considering the connections between the city and Antarctica.	3.00	0.91	Does not agree or disagree
3. Our city has sufficient cultural infrastructure, supporting our commitment to Antarctica.	2.81	1.04	Disagree
4. Our city has a well-developed vision of its possible future ties with Antarctica.	2.72	1.05	Disagree
ANTARCTIC CONNECTIVITY			
1. Our city should have an important role as a guardian city for the future of Antarctica.	4.16	1.15	Totally agree
2. Having strong connections to Antarctica is important for the economic future of our city.	3.85	0.90	Agree
3. Utilizing Antarctica's abundance of resources is important for future economic development.	3.26	1.12	Agree

TABLE 7.2: Actions and engagement with Antarctica.

↳ ACTIONS IN THE PAST 12 MONTHS	YES	NO
1. Reading or hearing something in the news regarding Antarctica.	78.7	21.3
2. Attending an art exhibition, festival, or cultural activity related to Antarctica.	28.7	71.3
3. Participating in a scientific conference or meeting about Antarctica.	20.3	79.7
4. Participating in a tourist activity related to Antarctica.	15.7	84.3
5. Participating in a community meeting or forum related to Antarctica.	14.7	85.3
6. Signing a petition or going to a protest regarding Antarctica.	07.0	93.0
7. Participating in an economic activity related to Antarctica.	06.3	93.7
8. Participating in a council planning process related to Antarctica.	06.0	94.0

TABLE 7.3: Analysis of adherence to Antarctic issues and social life according to dimensions of analysis.

↳ DOMAINS OF ANALYSIS												
THEMES	ECOLOGICAL			CULTURAL			POLITICAL			ECONOMIC		
	DT	P		DT	P		DT	P		DT	P	
ANTARCTIC THEMES (AT)												
1. AT Concern	3.50	1.00	.01	3.13	1.05	.04	3.00	1.15	n.s.	2.76	1.01	.04
2. AT Perception	1.21	0.41	.01	1.64	0.26	.01	1.91	0.20	.01	1.94	0.41	.01
3. AT Connectivity	3.19	0.81	.01	3.32	0.61	.01	3.28	0.62	.01	3.56	0.82	.01
SOCIAL LIFE (SL)												
1. SL Satisfaction	3.43	0.98	.01	3.45	1.01	.01	3.58	0.90	.01	3.43	0.67	.01
2. SL Optimism	3.00	0.68	n.s.	3.42	0.67	.01	2.64	0.20	.01	2.40	0.67	.01
3. SL Worries	3.65	0.84	.01	3.33	0.89	.01	3.35	0.97	.01	3.34	0.85	.01
4. SL Attitude	3.36	0.57	.01	3.65	0.55	.01	3.48	0.53	.01	3.57	0.82	.01

TABLE 7.4: Correlations between domains of Antarctic interest and social life.

	↳ ANTARCTIC CONCERN (AC)				↳ SOCIAL LIFE (SL)			
	1.1.	1.2.	1.3.	1.4.	2.1.	2.2.	2.3.	2.4.
1.1. AC Ecological	-	.56**	-.60**	-.53**	-.14**	-.01**	-.41**	-.21**
1.2. AC Cultural		-	-.63**	-.56**	-.02**	-.14**	-.44**	-.27**
1.3. AC Political			-	-.63**	-.08**	-.05**	-.50**	-.20**
1.4. AC Economic				-	-.03**	-.10**	-.41**	-.24**
2.1. SL Satisfaction					-	-.14**	-.44**	-.27**
2.2. SL Optimism						-	-.14**	-.45**
2.3. SL Worries							-	-.30**
2.4. SL Attitude								-

* Statistically significant, p < .05
 ** Statistically significant, p < .01



Comparisons Between the Three Cities

We compared all responses for 61 variables between the three cities, using a common test for statistical significance (one-way ANOVA). The default assumption in such tests is that responses do *not* differ between the cities. In most cases, this assumption held: there is remarkable similarity (statistically speaking) across the three cities. Only six variables showed statistically significant differences across this test.

The differences however are telling. Nearly the majority of Punta Arenas respondents (49 per cent) agreed that utilizing Antarctica's plentiful resources is important for a city's future economic development, while the majority of Hobart respondents disagreed (69 per cent). Christchurch respondents were more evenly divided (40 per cent agreed, while 48 per cent disagreed). This concurs with responses to levels of concern about increasing commercial activities in the Southern Ocean and Antarctica: 43 per cent of Punta Arenas respondents expressed little or no concern, compared to 29 per cent for Christchurch and 20 per cent for Hobart. These results are reversed for levels of concern about an incapacity to meet local needs for basic resources such as energy, food, or water. A minority of Christchurch (24 per cent) and Hobart (37 per cent) respondents expressed high degrees of concern, compared with 51 per cent for Punta Arenas respondents.

Conversely the majority of Christchurch and Hobart respondents agreed they had enough 'cultural infrastructure' to support Antarctic engagement (69 and 61 per cent respectively), while a significant percentage (37 per cent)

of Punta Arenas respondents did not agree. These sentiments are echoed in terms of levels of concern about 'globally transferred cultural values'—46 per cent of Punta Arenas respondents said they were very or passionately concerned. In comparison, Christchurch (18 per cent) and Hobart (16 per cent) respondents expressed less concern.

Finally, Punta Arenas respondents expressed greatest concern about the corruption of local political institutions: 51 per cent stated they were very or passionately concerned, compared with 37 per cent for Hobart and 24 per cent for Christchurch.

What is the picture that emerges from these results? It is a slightly contradictory one: on the one hand, Punta Arenas respondents seem less concerned about the environmental effects of Antarctic commercial activities, and this is perhaps explained by greater anxiety about their city's economic future. On the other, they are most concerned about the lack of local Antarctic cultural institutions, the encroachment of global culture, and local corruption. Hobart appears moderately concerned about corruption, but also the least concerned about the city's economic future and most concerned about economic exploitation of Antarctica. Christchurch in many ways appears situated between the other two cities.

These results are broadly consistent with the urban sustainability self-assessments and profiles, suggesting reasonable reliability of both methods. While our overall recommendations point toward the need to develop custodial networks in all and also between the Antarctic cities, **these results point toward the need for sensitivity and awareness about the different concerns expressed by their residents.**

Antarctic Urban Identities Online Survey 2020

This section presents the results of an international survey focusing on residents over 18 years old living in the five Antarctic cities: Punta Arenas (Chile), Ushuaia (Argentina), Cape Town (South Africa), Hobart (Australia), and Christchurch (New Zealand). More specifically, the survey focused on citizens' perceptions about critical aspects of the relations between their cities and the Antarctic. The results presented here provide useful data to inform policy-making in the gateways and advance the broader objectives established by the project, which include:

- **Multidimensional connections:** Identify opportunities and challenges linked to the conceptualization of gateway cities, in pursuit of a rethinking of the relationship that considers not only the economic and political issues but also the social, environmental, and cultural dimensions.
- **Social imaginaries:** Understand and work around the social imaginaries of the population of the five cities.
- **Public policies:** Detect opportunities for the evaluation and design of public policies of local governments linked to the role of these cities.

- **Intercity co-operation:** Identify, strengthen, and generate points of co-operation between cities with a common and unifying factor, closely linked to the values of the Antarctic Treaty: peace, co-operation, and conservation.
- **Protection and sustainability:** Deepening the relationship between the protection of Antarctica and the sustainability of the custodian cities.



FIGURE 7-5. Poster in Spanish highlighting key results of our 2020 Antarctic urban identity survey. Designed by the Chilean Antarctic Institute (INACH).

Methodology

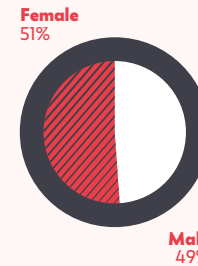
We conducted the online survey in the five cities between the 27 June and 15 July 2020. The survey was implemented by a contractor, **StatKnows**, based in Santiago, Chile, following a sample inference methodology for online surveys. The process involved applying artificial intelligence to conduct systematic research on the public information of 2,932,764 people, to identify multidimensional characteristics of the population under study. Based on this research, we defined a sample population of 1,659 people. In technical terms, we employed a stratified probabilistic sampling with allocations proportional to the size of biphasic selection.

The estimated overall sampling error reached 1.33 per cent, with a 95 per cent confidence level. By city, the maximum error was 3 per cent, also at a 95 per cent confidence level.

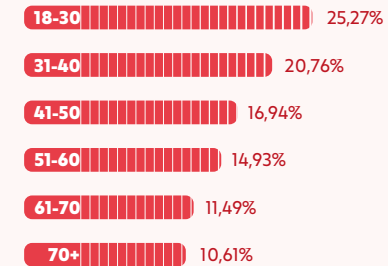
- ↳ **UNIVERSE:**
1,233,987
(search: 2,932,764)
- ↳ **SAMPLE SIZE:**
1,659
- ↳ **REFERENCE PERIOD:**
27 June to 15 July 2020
- ↳ **SAMPLING ERROR:**
1.33 per cent

TABLE 7.6. Demographics and sample population profile.

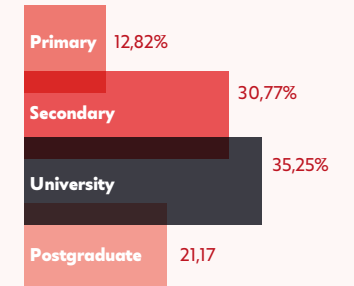
GENDER



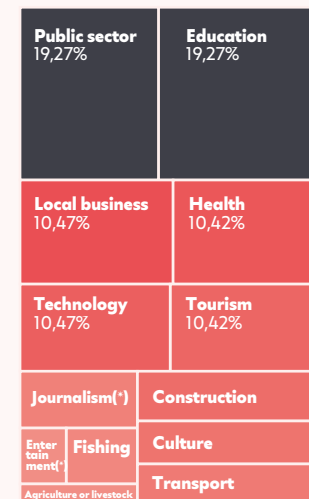
AGES RANGES



WHAT IS THE HIGHEST LEVEL OF EDUCATION YOU HAVE ACHIEVED?



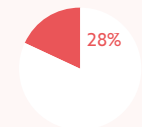
SECTOR



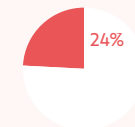
OCCUPATION



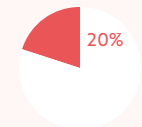
PROGRESSIVE



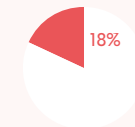
TECH-SAVVY



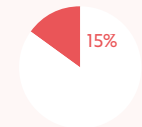
ECOLOGICALLY MINDED



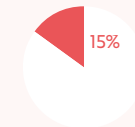
LIBERAL



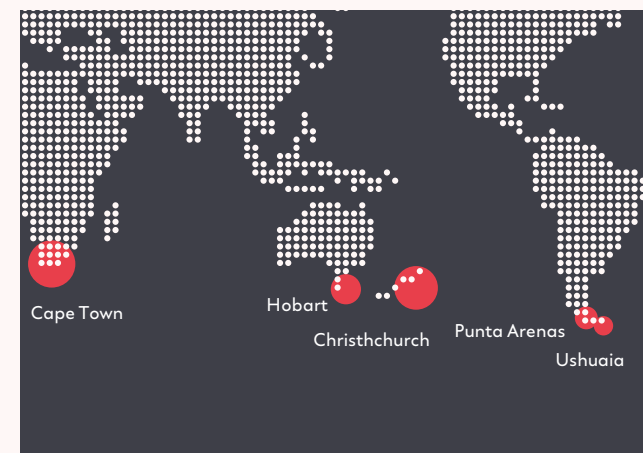
BUSINESS ORIENTED



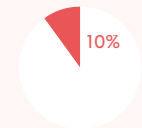
FEMINIST



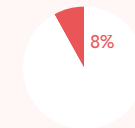
MAP



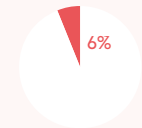
IMMIGRANT



ACTIVIST



INDIGENOUS PERSON



ANTARCTIC EXPERT

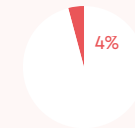


TABLE 7.5. Population and Sample Size by City.

CATEGORY:
Cape Town / 35.14%
Population: 433.661
Sample: 388 (Error 2.81%)

CATEGORY:
Christchurch / 31.48%
Population: 388.478
Sample: 297 (Error 2.97%)

CATEGORY:
Ushuaia / 6.26%
Population: 77.285
Sample: 353 (Error 2.87%)

CATEGORY:
Punta Arenas / 10.06%
Population: 124.190
Sample: 345 (Error 2.88%)

CATEGORY:
Hobart / 17.05%
Population: 210.373
Sample: 276 (Error 3.00%)

In general terms, the key insights from this survey conducted in the five Antarctic cities show that **there is widespread agreement across the five cities that the Antarctic is 'important' or 'very important' for their respective cities**. Ushuaia showed the highest percentage of respondents who attached importance to the Antarctic for their urban identity (over 80 per cent). While Cape Town was in the fifth place, almost two in three of its residents consider the Antarctic important or very important for their city's identity.

Participants from the five cities positively assessed the connection with the Antarctic continent and acknowledged its importance for their respective cities. Likewise, a high percentage of respondents expressed feeling responsible or very responsible for the future of the Antarctic. There is widespread agreement in the five cities around the Antarctic values of peace, co-operation, and conservation, which can act as unifying and inspirational values guiding intercity co-operation and policy-making.

There is a shared Antarctic identity among citizens in all cities, despite cultural and socio-economic differences.

It was not only those involved in Antarctic-related jobs or activities who expressed a commitment to the protection of the Antarctic. Only 13 per cent of respondents declared themselves to have a job related to the Antarctic, but 71 per cent considered that the Antarctic was 'important' or 'very important' for their respective cities. In general terms, women and Age Group 2 (30–39 years old) tend to attach more importance to the Antarctic than men and young people (aged 18–29).

The environment is considered as a high priority for the present and future of the Antarctic gateways. Crucially, expression of environmental priorities was not limited to 'environmental activists'.

There is an urgent need to include a gender approach in environmental and Antarctic policies. The survey results indicate that women tend to place higher priority on the environmental aspects of the relation between their cities and the Antarctic. In addition, women tended to show a higher sense of responsibility for the future of the Antarctic.

The results also indicate there is ample room for improving communication and engagement with young people (aged 18–29) in relation to Antarctic-related activities. While 66 per cent of respondents expressed feeling 'little informed' or 'not at all informed' about the Antarctic, this figure jumps to 83 per cent among people aged 18–29. In addition, a higher percentage of respondents in this segment tended to express 'pessimism' or

'indifference' towards the future of the Antarctic. However, when asked about what might help the people of their city to identify with the Antarctic, this group particularly favoured 'increasing my city's engagement with Antarctic conservation', well over other options such as creating more Antarctic-related jobs or supporting Antarctic-related cultural activities. Likewise, a relatively high percentage of people in this segment tended to identify as 'ecologically minded' and considered that a stronger connection between their city and the Antarctic 'drives us to take care of the environment'.



There is a shared Antarctic identity among citizens in all cities, despite cultural and socio-economic differences.





TABLE 7.7. The most important connections between the gateway cities and the Antarctic.

Multidimensional Connections

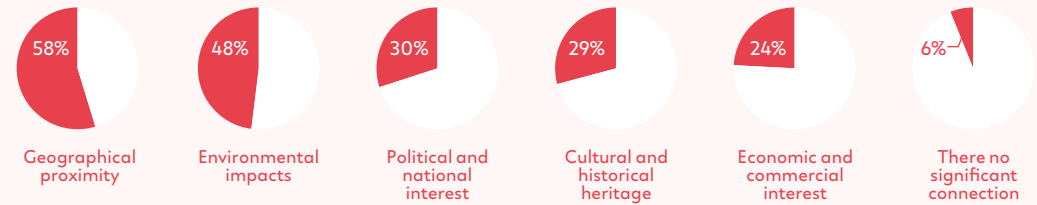
The first question asked what citizens thought the most important connections between their city and Antarctica were, with the option of choosing up to three pre-given options. In all five cities, participants considered 'geographical proximity' as the single most important connection between their city and the Antarctic continent, followed by 'environmental impacts'. In all cities, 'environmental impacts' has double the importance of 'economic and commercial interest'. At the general population level, 'political and national interest' reaches a similar percentage as 'cultural and historical heritage.' When considering these two options in each

city, 'political and national interest' prevails in all cases, except for Hobart. Crucially, only 6 per cent of the population considers 'there is no significant connection' between their city and Antarctica. In no city does this group exceed 7 per cent.

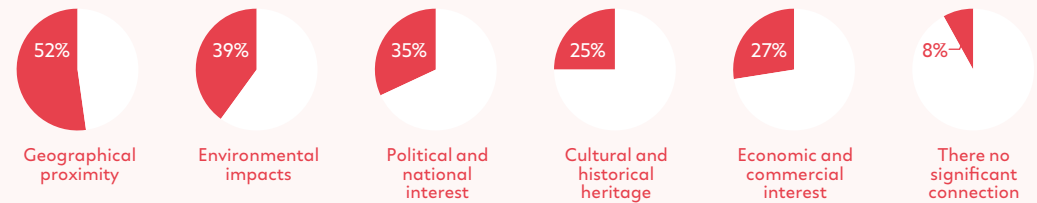
When considering specific segments of the population, the relevance of 'environmental impacts' climbs from 48 per cent to 55 per cent among Group 2 (ages 30–39) and to 57 per cent among women.

On the other hand, only 39 per cent of male respondents considered 'environmental impacts' as one of the most relevant connections with the Antarctic. Likewise, 'economic and commercial interest' jumps from 24 per cent to 27 per cent among men.

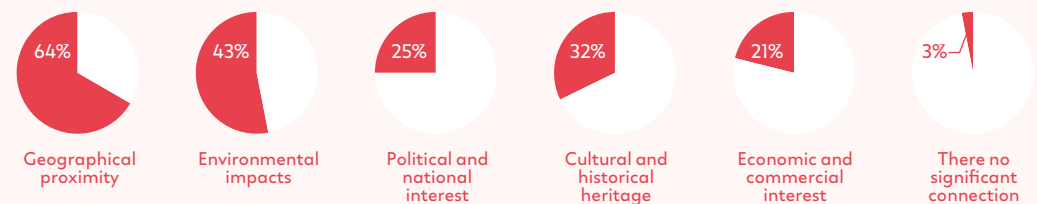
GENERAL POPULATION



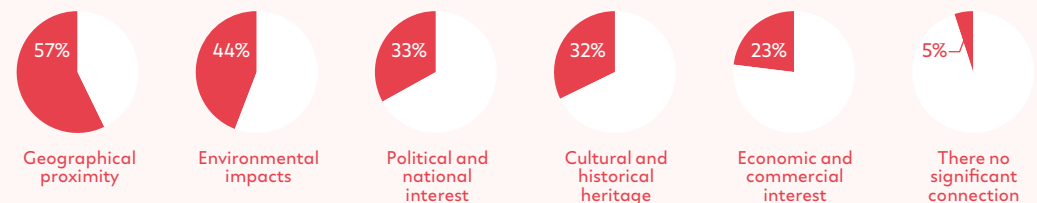
MEN



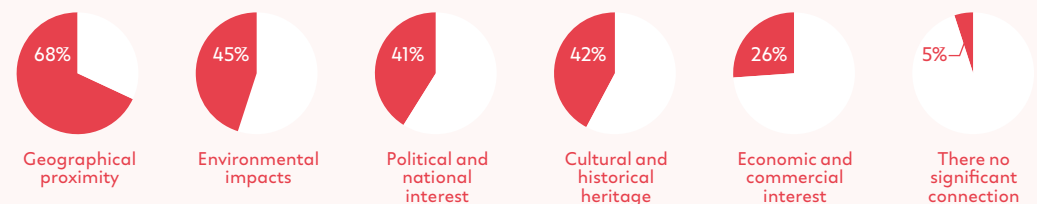
WOMEN



AGE GROUP 1 (AGES 18 → 29)



AGE GROUP 2 (AGES 30 → 39)



Information

We then asked how informed residents felt about the relationship between their city and Antarctica. At the general population level, **over 50 per cent of respondents feel they are 'little informed' about the connection between their city and the Antarctic.** Moreover, those who feel 'not at all informed' or 'little informed' are double those who feel 'fairly' and 'very informed'. Although in the minority, citizens of Christchurch feel more informed, while the citizens of Cape Town feel less informed. Women feel less informed than men.

The percentage of people who feel 'not at all informed' and 'little informed' rises considerably among the Age group 1 (ages 18–29). The difference with the Age group 2 (ages 30–39) is significant. Only people above the age of 70 feel more informed than the Youth 2 group. In addition, people over the age of 70 is the only group in which 'fairly' and 'very informed' combined (52.55 per cent) tops 'not at all informed' and 'little informed' combined (47.45 per cent).

'Internet in general' is considered the most reliable source of information across the five cities, followed by 'cultural institutions' and 'written press'. Only in Punta Arenas does 'cultural institutions' take the place, over 'Internet in general', while only in Christchurch does 'written press' come higher than 'cultural institutions'. This could be an opportunity for the Antarctic sector to promote cultural/scientific communication work which the community considers to be reliable.

TABLE 7.8. How informed people feel about their city's relationship with the Antarctic.

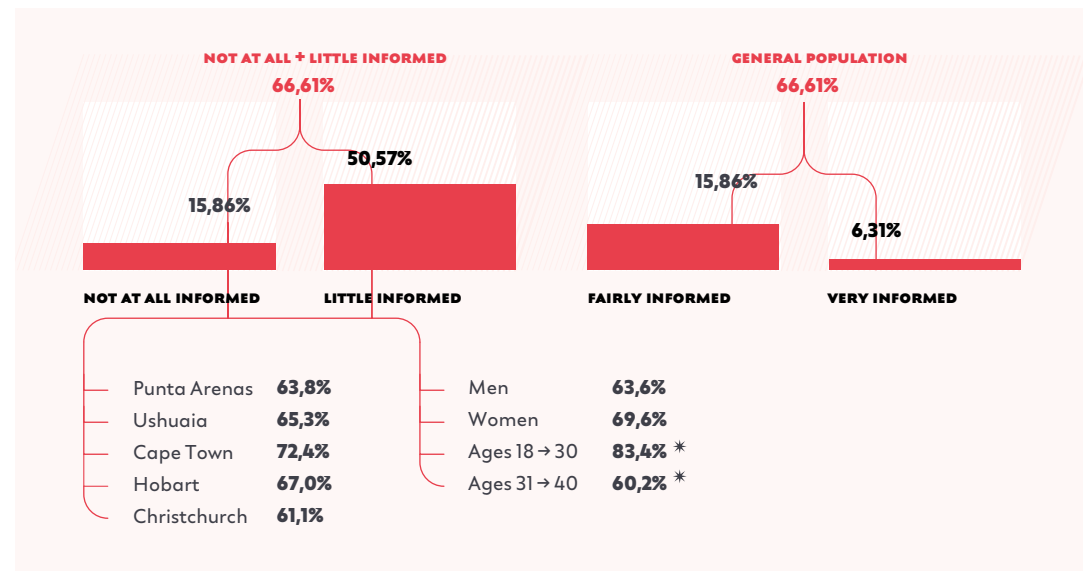


TABLE 7.9. Most trusted sources of information about the Antarctic.

Engagement

In terms of engagement in Antarctica-related activities, we asked residents to identify in which of the following they had been involved in the past three years.

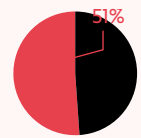
Half of the population across the five cities declares they have not participated in Antarctic-related activities in the last three years. Among those who have been involved, the explanation 'I attended an art exhibition, festival, or cultural activity' comes out on top, followed by 'My job is (or was) related to Antarctica'.

Hobart has the highest percentage of people who declared not having participated in any Antarctic-related activity and the lowest percentage of people who declared working or having worked in relation to Antarctica. In Punta Arenas the percentage of people who say they have attended an art exhibition, festival, or cultural activity is lower than in the other cities.

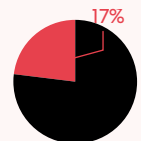
In Cape Town, the percentage of people who say they have signed a petition or public letter is higher, as is the percentage of people who say they have been part of a tourist activity linked with Antarctica.

TABLE 7.10. Participation in Antarctic-related activities across the five gateway cities.

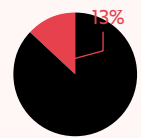
TABLE 7.11. Participation in Antarctic-related activities by city.



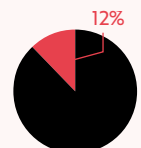
I have not participated in activities related to Antarctica



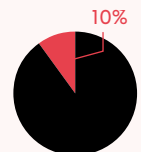
I attended an art exhibition, festival, or cultural activity



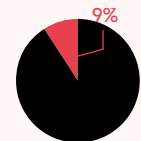
My job is (or was) related to Antarctica



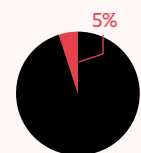
I signed a petition or public letter



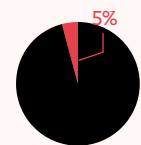
I was part of a tourism activity



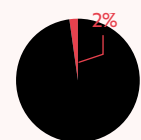
I attended a scientific conference or meeting



I attended a community meeting or forum



I went to a rally



I participated in a planning process conducted by local authorities

PUNTA ARENAS

USHUAIA

CAPE TOWN

HOBART

CHRISTCHURCH

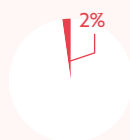
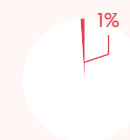
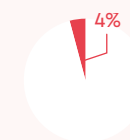
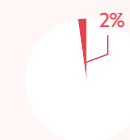
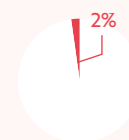
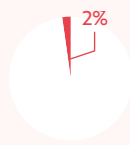
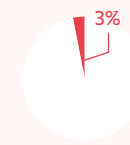
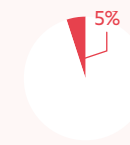
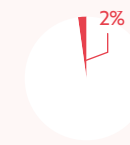
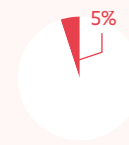
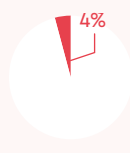
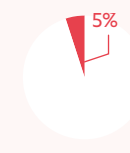
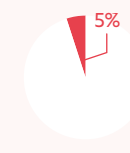
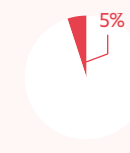
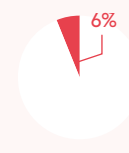
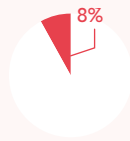
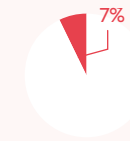
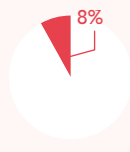
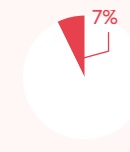
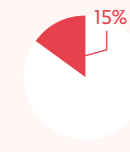
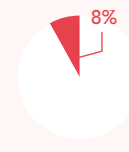
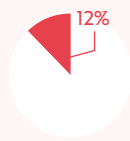
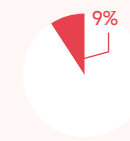
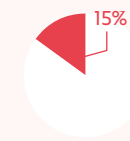
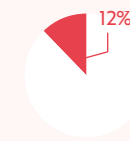
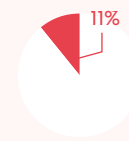
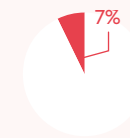
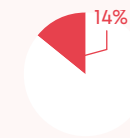
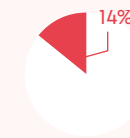
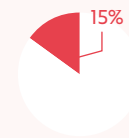
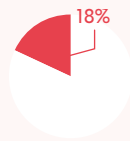
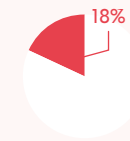
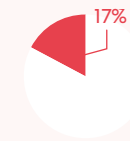
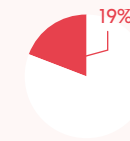
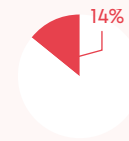
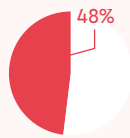
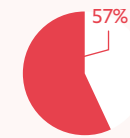
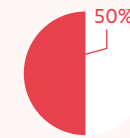
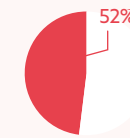
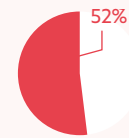
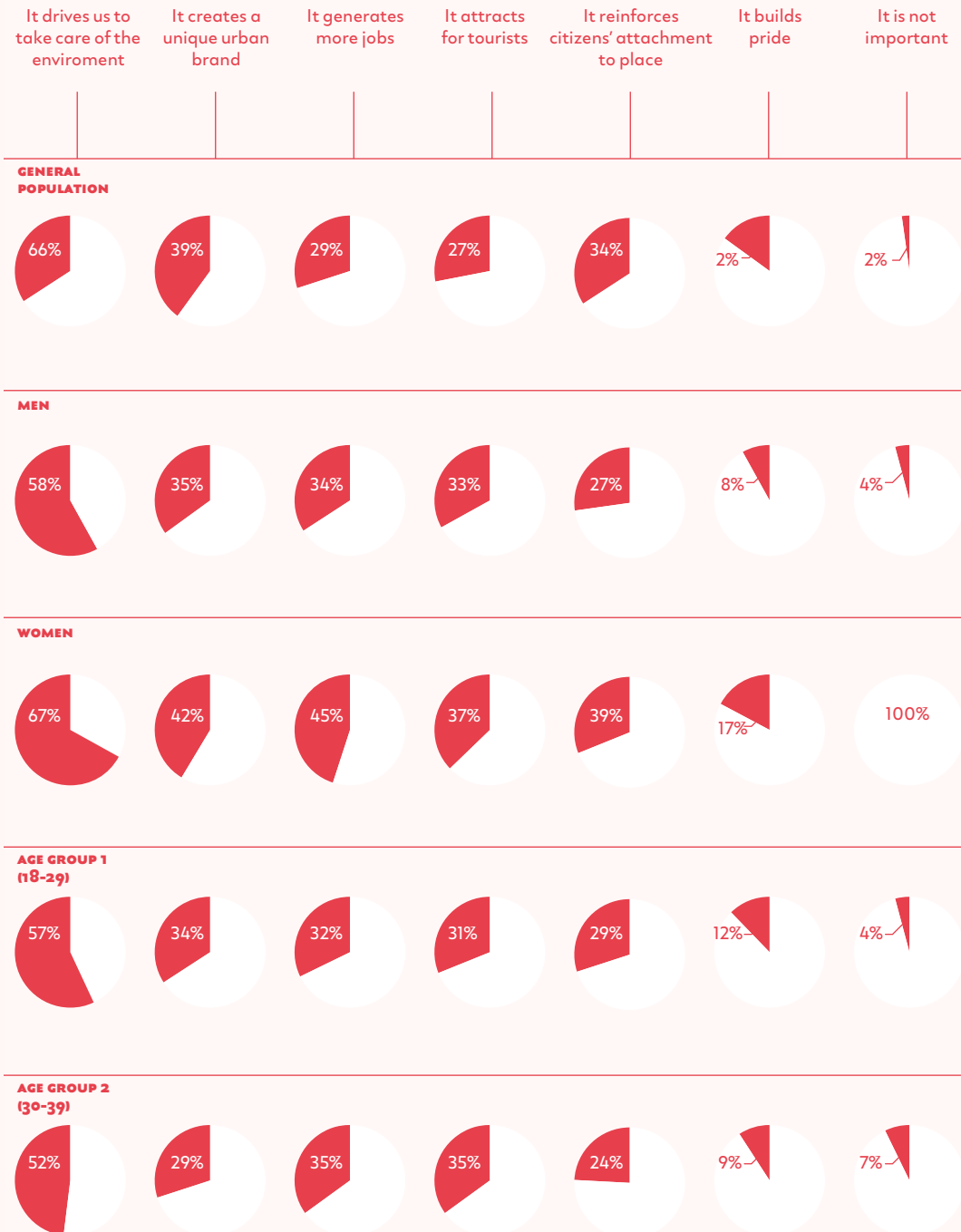


TABLE 7.12. Why is it important for the city to develop an Antarctic identity.



Social Imaginaries

The vast majority of respondents across the five cities consider Antarctica to be 'important' or 'very important' for their respective cities.

Ushuaia showed the highest percentage of respondents who attached importance to the Antarctic for their city identity (over 80 per cent). While Cape Town reached the fifth place, almost two out of three of its residents consider the Antarctic important or very important for their city's identity.

In response to a question of why it might be important for their city to develop an identity in relation to Antarctica, 'It drives us to take care of the environment' comes out on top by a significant margin and was the most selected option in the five cities. In Cape Town it reaches the highest percentage, with 65 per cent. Crucially, only 4 per cent of respondents considered that 'it is not important' for the city to develop an Antarctic identity.

It is also the most selected option in all age segments. In Youth 2 it reaches the highest percentage, with 67 per cent.

More so than other segments of the population, men favour options linked to economic and commercial activities, such as 'It generates more jobs' and 'It attracts more tourists'. More women picked the option 'It drives us to take care of the environment', and they also tended to select options which are more directly linked to identity.

All options achieved higher percentages in Age group 2 than in Age group 1, with the exception of 'It is not important.'

'Teaching more about Antarctica' is the most favoured answered at the general population level and in all specific subsets, apart from Age group 1 (ages 18-29). Interestingly enough, the highest percentage in this segment was reached by 'increasing my city's engagement

with Antarctic conservation'. This could be an opportunity to further engage with this segment. On the other hand, Age group 2 (ages 30-39) favoured the creation of Antarctic-related jobs as a way of strengthening the city's Antarctic identity.

We asked residents to evaluate how responsible they and their families and friends felt for the future of the Antarctic region.

A sense of responsibility for the future of Antarctica prevails in all five cities. Women and Age group 2 (ages 30-39) tended to more often express a sense of responsibility towards the Antarctic continent.

Public Policies

There is broad consensus that 'the local government must lead the development of a plan to integrate Antarctica into the future of my city', and that the private sector, scientific institutions, and civil society 'should play an important role' in this. The highest level of agreement is reached regarding the relevant role that scientific institutions should play: 96 per cent.

No significant differences between cities are recognized.

Twenty per cent of the population identify as 'ecologically minded', but, importantly, those who identify in this category are not the only ones to prioritize environmental issues:

- Faced with options that include other basic needs, 24 per cent choose 'Environment' among the issues that should be prioritized.
- 'Environmental impacts' reaches 48 per cent in the question about the most important connections to prioritize.
- 'It drives us to care for the environment' reaches 57 per cent for the question about the potential importance for their city of developing an identity in relation to Antarctica.

TABLE 7-13. What would help the people of your city to identify with Antarctica?

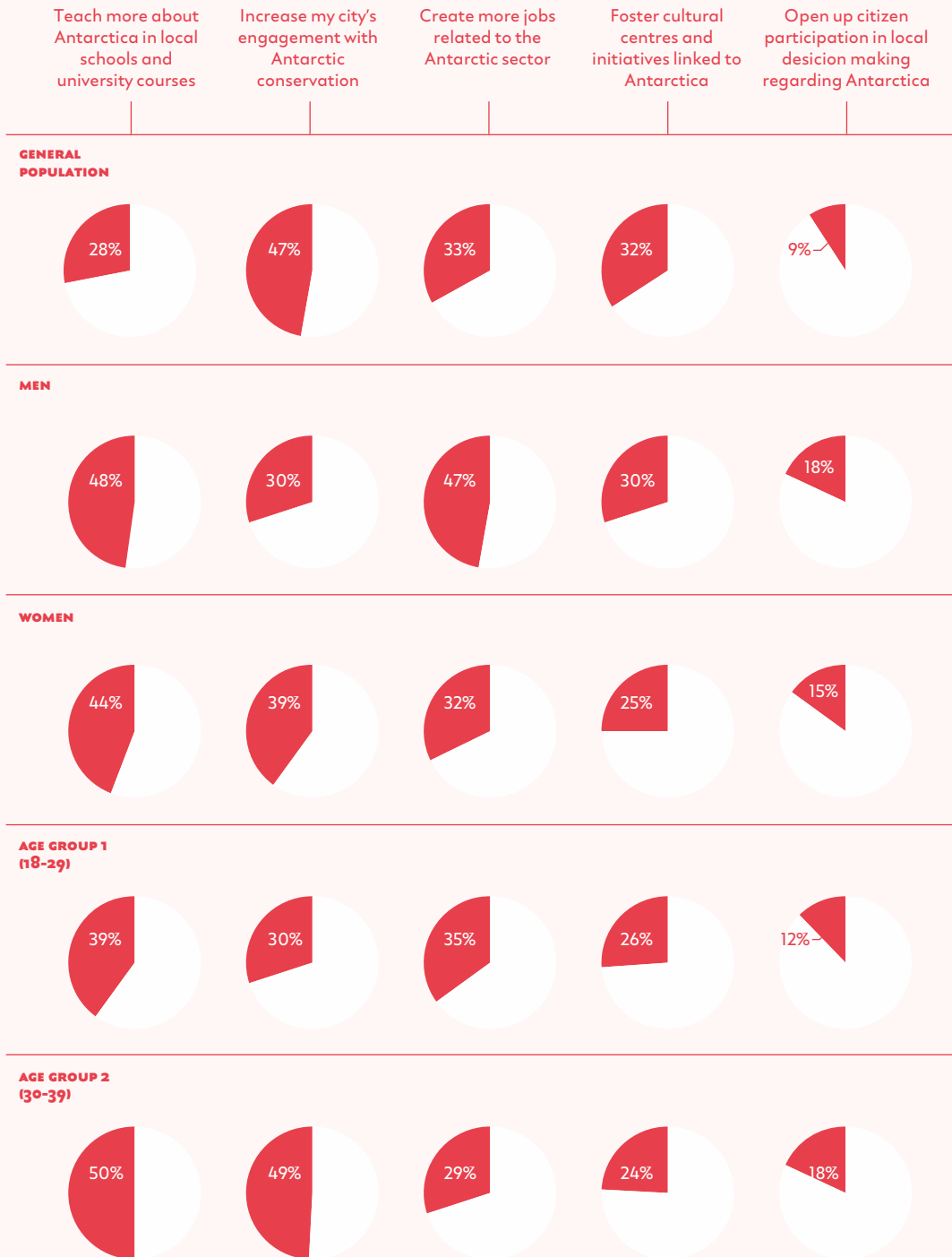


TABLE 7-14. How responsible residents feel for the future of Antarctica.

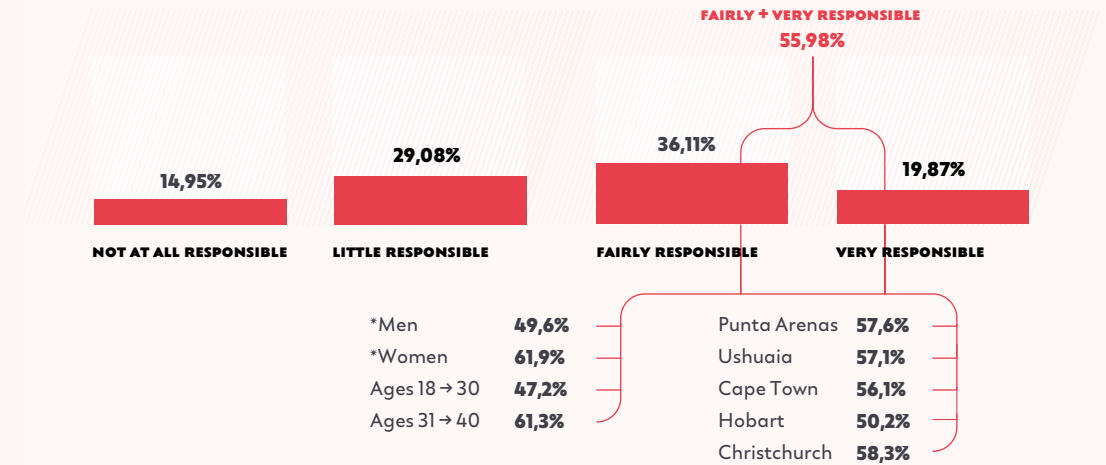


TABLE 7-15. Perceived roles in the development of Antarctic strategies for the city.

PUBLIC POLICIES

LOCAL GOVERNMENT

The local government must lead the development of a plan to integrate Antarctica into future city

PRIVATE SECTOR

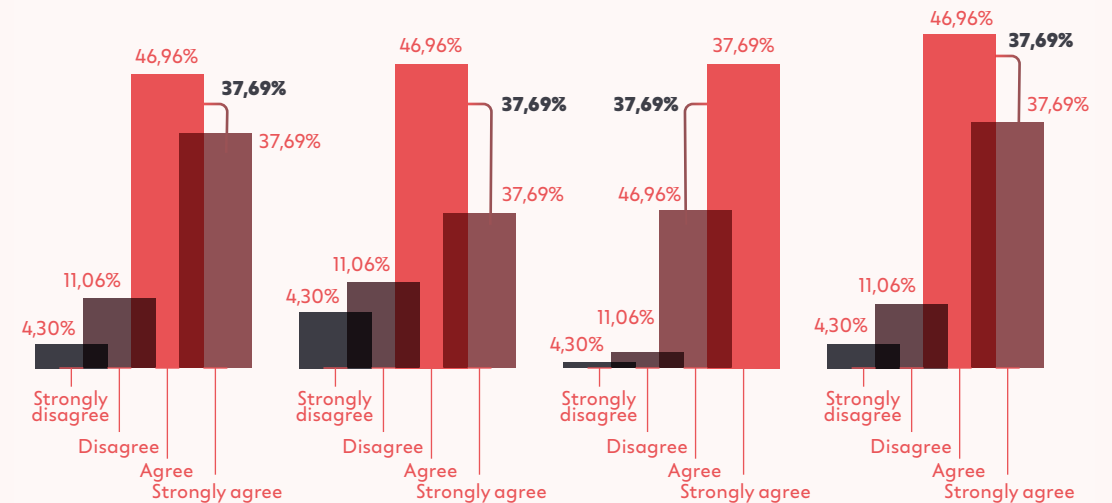
The private sector should play an important role in the development of a plan to integrate Antarctica into the future of my city

SCIENTIFIC INSTITUTIONS

Scientific institutions should play an important role in the development of a plan to integrate Antarctica into the future of my city

CIVIL SOCIETY

Civil society should play an important role in the development of a plan to integrate Antarctica into the future of my city



*I participated in a planing process conducted by local authorities 2%

Considering gender and broad age groups:

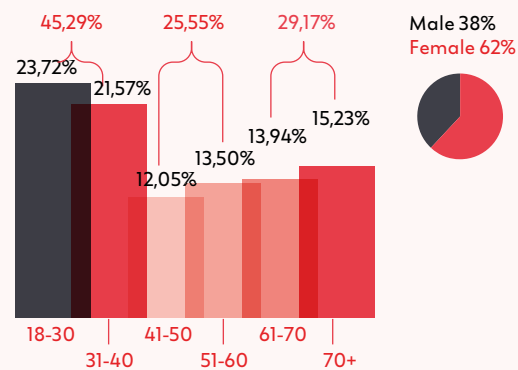
- ↳ Women identify as 'Ecologically minded' more than men.
- ↳ Most people who identify as 'Ecologically minded' are young (Youth 1+2). The young population has the same relative weight within the general population as within the population that identifies as ecologically minded.
- ↳ In contrast, adults aged 41-60 have are less likely to identify as 'Ecologically minded.'
- ↳ Relative percentages of people who identify as ecologically minded jump back up among adults aged 61 or older.

ECOLOGICALLY MINDED

Ecologically minded 20%



AGES RANGES



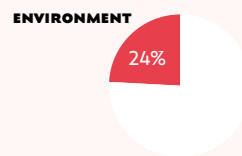
Antarctic values

There is broad consensus about Antarctic values in all five cities.

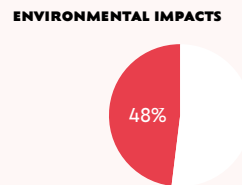
TABLE 7-16. Segments of the population that prioritize environmental issues.

GENERAL POPULATION

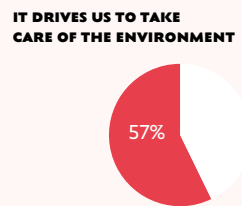
Which of these issues do you think your city should prioritise?



What do you think are the most important connections?



Why might it be important for your city to develop an identity in relation to Antarctica?



AGES RANGES

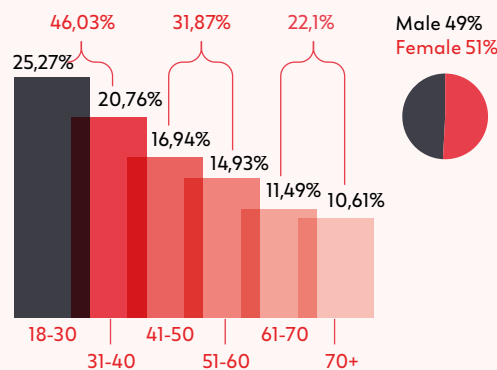


TABLE 7-17. The Antarctic values of peace, co-operation, and conservation should be present in the way of living in my city.

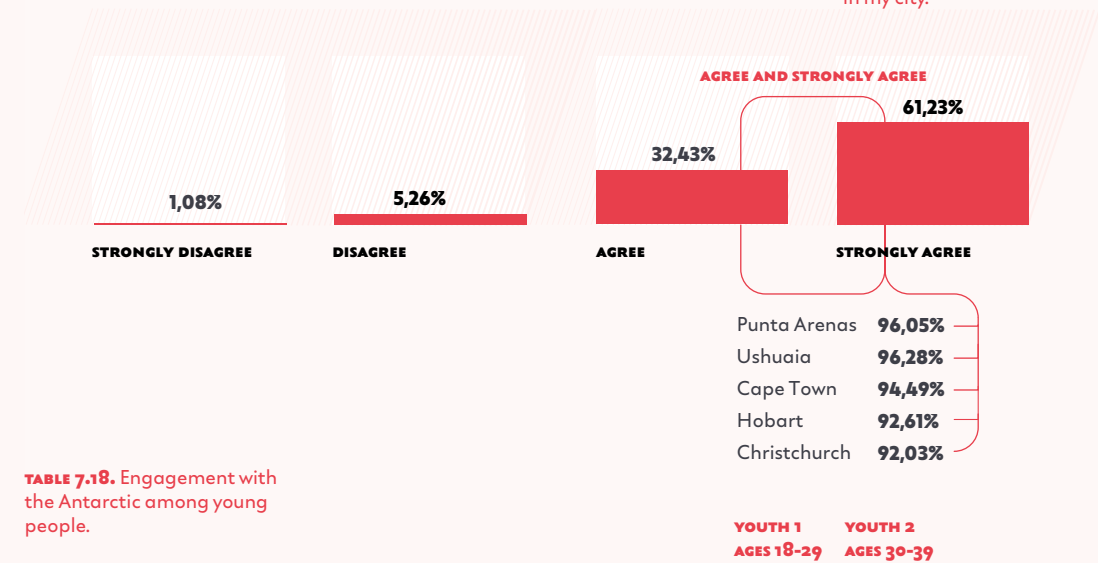


TABLE 7-18. Engagement with the Antarctic among young people.

Issue	Youth 1 (Ages 18-29)	Youth 2 (Ages 30-39)
Connections between the city and Antarctica: Environmental impacts (prioritisation)	44%	55%
Connections between the city and Antarctica: Cultural and historical heritage (prioritisation)	32%	42%
"Fairly and very informed" About Antarctica	17%	40%
Antarctica is fairly important or very important to their city's identity	66%	74%
Developing an identity in relation to Antarctica drives us to take care of the environment (prioritisation)	58%	67%
Developing an identity in relation to Antarctica creates a unique urban brand (prioritisation)	35%	42%
Developing an identity in relation to Antarctica reinforces citizens place to attachment (prioritisation)	27%	39%
Developing an identity in relation to Antarctica builds pride (prioritisation)	8%	17%
"Fairly and very responsible" for the future of Antarctica	47%	61%
"Hope" about the future of Antarctica	22%	34%
"Ecologically minded"	19%	21%
"Activist"	9%	10%
Intercities cooperation as an Antarctic value to be prioritised	7%	17%
"Indifference" about the future of Antarctica	16%	9%

HIGHER PERCENTAGES IN YOUTH 2

SINGLE HIGHER PERCENTAGE IN YOUTH 1

8. Anticipating the Future of Antarctica: The Antarctic Futures Game

The *Antarctic Futures* game was developed as a key component of the youth engagement strategy of this Australia Research Council Linkage Project. As a ‘serious game’—a game intended both for entertainment and for reflection on serious matters—it was meant to elicit a debate among urban youth about the role that gateway cities play or may in future play in relation to the Antarctic in an era of global environmental change. By translating scenario-based futures into a playable experience, the game’s goal was to foreground the centrality of Antarctic futures in such scenarios, while engaging urban youth from the five gateway cities in its design process.

The bilingual English and Spanish game was developed in-house through a process of co-design with young people from each city. Its goal was to allow players to experiment first-hand with the impacts different global policy responses to climate change would have on the world. The game was intended to entertain and to encourage reflection on serious matters. Seven workshops were run, of which three were in Hobart, with 103 young people taking part.

Antarctic Futures is now a dynamic and educational resource, one that can be used to raise issues such as climate change and environmental policy. An associated resource pack has been designed to help teachers and facilitators adapt the game to a variety of learning contexts.

Development of a serious game was decided at the very outset of the project, based on evidence that such games are a promising area of experimentation for informing, educating, and engaging with young people about the causes and consequences of environmental change.

Games help to make concrete what can be abstract and intimidating aspects of climate science. Considering possible futures of Antarctica is a common part of the making of scientific scenarios that aim to communicate the consequences of climate change to wider





FIGURE 8.1. Storyboarding the game. Scenarios workshop with young people in Christchurch, 2018.

audiences. From melting ice sheets to the disappearance of polar species and rising sea levels, Antarctica is central in scenario-based climate-change communication. However, scientists themselves have acknowledged that whilst scenarios are a staple for expressing climate change to the public, their potential for civic engagement may be limited. Importantly, scientific scenarios often maintain a distinction between producers (the scientists) and receivers (the public). Games can help break down that distinction (Pollio, Magee and Salazar, 2020; Khan, Magee, Pollio and Salazar, 2021).

The development of the *Antarctic Futures* online game involved four baseline premises:

1. Antarctic futures are a common feature of climate change scenarios.
2. Climate change scenarios are useful, but also limited, because they require a degree of expertise in climate science.
3. Serious games are promising tools in bridging the gap between different communities, including that between scientists and young people.
4. The development of a serious game can be based on co-design as a strategy to engage youth in the Antarctic gateway cities.

In the context of the development of *Antarctic Futures*, we opted for a co-design approach for four interrelated reasons: to bridge different communities that are not usually in contact; to use the design process for deeper forms of engagement with the Antarctic cities' youth; to improve the usability of the final outcome; and to use the co-design process itself as a research tool to test the assumptions, opportunities, and limitations of the research project as a whole, and of the game as an engagement tool more specifically.

FIGURE 8.2. Antarctic Futures as a boundary object.

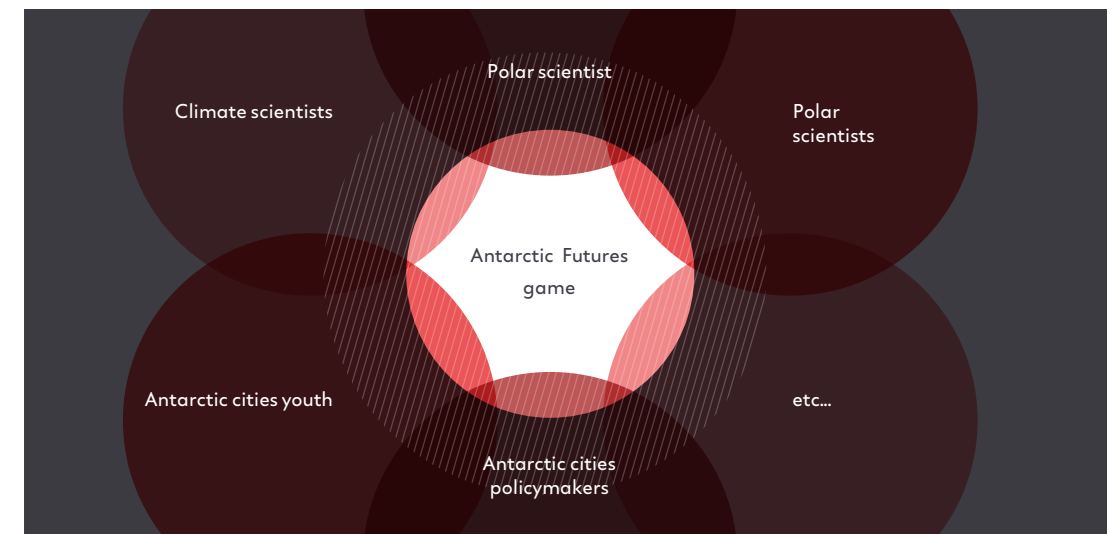


FIGURE 8.3. Timeline of Phase 1 activities.

Developing a Functioning Prototype

The first phase of game development consisted of three separate workshops over a period of 12 months (September 2017–August 2018). The aim of this phase was to develop a functioning prototype of the game based on the input of young people from Hobart, Christchurch, and Punta Arenas.

Storyboarding the Game

The purpose of the first two workshops was to storyboard the game: to develop a basic plot that would frame and outline the basic mechanics of the gameplay. The first session was held at the Antarctic Centre in Christchurch in September 2017, while the second took place at the offices of INACH (Instituto Antártico Chileno / Chilean Antarctic Institute) in Punta Arenas in November 2017.

During these first two co-design sessions, participants helped shape an overall narrative for the game and mapped out key decisions concerning game genre and platform. Participants were especially interested in making Antarctic futures central to the game experience and in combining climate science, adventure, and urban aspirations in the game plot.

Prototype Development

After the first two workshops, we examined a number of existing game options. We selected the game *Plague Inc.* as a reference point for our own game design—a successful game that made use of a minimalist and, from a design perspective, cost-effective set of interface elements. *Plague Inc.* blends simulation and strategic role-play, where the player adopts the persona of a virus or bacteria charged with spreading itself across the world and wiping out humanity. In our version, we recast this misanthropic premise to a philanthropic one, where the player must use a minimal set of resources and policy options to arrest the effects of climate change.

For the third and last workshop of the first co-design phase, we created a prototype, a playable game which intentionally lacked the polish of a finished product. The model we adopted was a highly simplified version of the simulation scenario developed by Rintoul, *et al.* (2018). By default, when the game runs, the climate slowly degrades, in line with a ‘business-as-usual’ scenario. By selecting a combination of policy options, made available as the game simulation unfolds, the player can influence the rate of degradation, leading to, if the game is played well, a best-case scenario of minimal long-term climate impact. The game was built upon Cocos2d-x, an open-source multiplatform game framework, and a web version was published on a private server for the third workshop.



FIGURES 8.4-8.7. *Antarctic Futures'* visuals and basic features.

Prototype Testing

We eventually conducted the third co-design workshop in August 2018 in Hobart, Tasmania. We recruited nine participants in total, all aged 18 to 25. Once briefed about the overall purpose of the serious game in relation to the broader engagement aims of the project, we provided a short introduction to the scenarios discussed by Rintoul, *et al.* (2018) in order to contextualize the narrative on which the game prototype was based. The main section of the workshop involved dividing the participants into three small groups, ensuring each group included people with a mix of limited and considerable gaming experience. Using a toolkit of prompts as well as coloured markers, we asked the teams to prototype on paper alternative versions of the existing game shown earlier (Figure 8.8). The objective of the activity was to validate, and eventually rethink, on the basis of the responses, two of the interface choices that underpinned the game prototype.



FIGURE 8.8. Toolkit and materials used for the prototype testing workshop, Hobart, August 2018.

Testing and Improving the Beta Version

After the first co-design phase, which ended with the testing of a prototype in August 2018, the second phase of game development involved

two main steps: the development of the game’s beta version, based on the feedback obtained over the course of Phase 1, and the testing of the beta version, which took place between July 2019 and November 2019, over three subsequent workshops.

FIGURE 8.9. Timeline of Phase 2 activities.

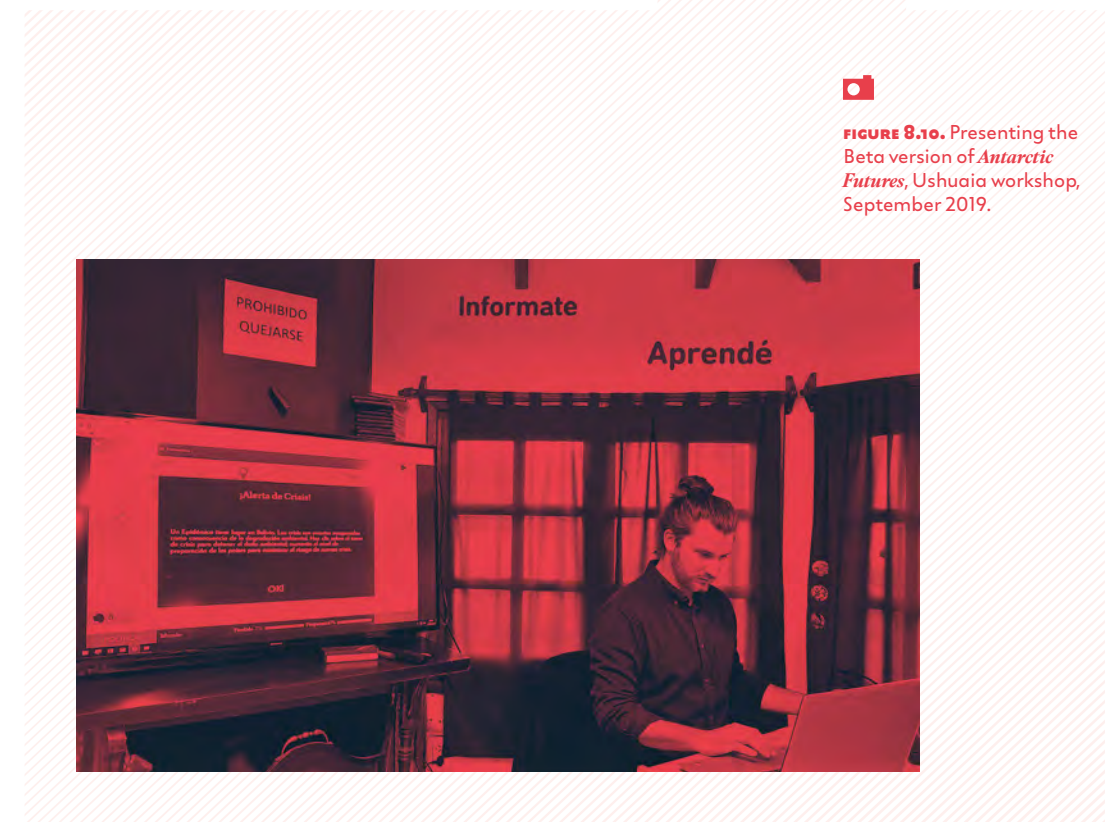
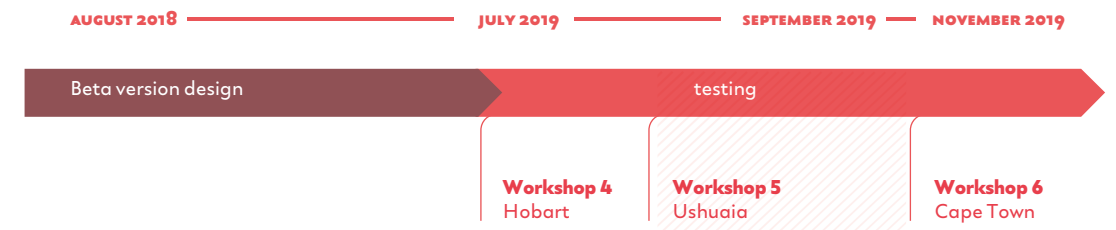


FIGURE 8.10. Presenting the Beta version of *Antarctic Futures*, Ushuaia workshop, September 2019.

Key Findings

The inclusion of a game was an ambitious aspect of the project, and one which proved successful in engaging youth in both the design and eventual launch of the game (Pollio, Magee and Salazar, 2020; Khan, *et. al* 2021). Between July 2019 and August 2020, nearly 500 people played the game, and we received valuable feedback from project staff and the Antarctic Youth Coalition at two follow-up evaluation workshops in 2020. Promotion of the game took place through social media accounts—principally on Instagram, but also Twitter and Facebook—and followers grew steadily over the same period.

Despite its success as a technical output and a process of youth engagement, we noted that several aspects were less successful. We struggled to build a ‘critical mass’ of youth in cities to play the game, beyond those connected to the project through social media and connections. We also tried several times to connect the game with curriculum at the tertiary and secondary levels in Hobart. This is a matter for further work. While there remains scope for further engagement with the game through both direct promotion and organizational connections, these relative failures underline challenges in developing digital assets like games for pro-social and pro-environment purposes—and the commensurate need for adequate planning for marketing, promotion, and support.



Conclusions

- 1 **Online games are an important way of engaging youth in Antarctic custodianship. They can be developed at a comparatively low cost and can serve to build interest in wider issues. This is particularly important given our final conclusion in relation to the survey, namely the need to improve ‘communication and engagement with young people (aged 18–30) in relation to Antarctic-related activities’.**
- 2 ***Antarctic Futures* is an open-source asset, now owned by the Antarctic cities themselves. It can be employed in several ways:**
 - As learning materials in secondary and tertiary school environments. The accompanying resource pack can be used by teachers and facilitators to encourage debate about Antarctic custodianship.
 - As an ‘icebreaker’ activity in non-educational workshops and meetings—community, council, industry—to instigate discussion about Antarctic and other environmental issues.
 - As the basis for extensions or adaptations by game developers and designers in Antarctic cities.
- 3 **Co-design was employed across multiple Antarctic cities to encourage youth contribution to games and other resources. Aside from the direct benefit to the design process itself, these workshops themselves built a nascent cross-city community that fed into the Antarctic Youth Coalition and other project activities.**
- 4 **Given the differences in time zones, language, and culture between the five Antarctic cities, resources need to be allocated to marketing, promotion, and support. Facebook and other social media platforms allow for relatively low-cost targeting of communities and can be used both to sustain *Antarctic Futures* itself and to promote future initiatives in support of Antarctic custodianship.**

9. Antarctic Custodians and Youth Engagement: The Antarctic Youth Coalition

As an integral aspect of the research design of this project we contemplated an Antarctic Cities Youth Expedition through which each city might select a youth leader to represent it in a youth forum to take part in Antarctica. As part of the project, we were able to invite five young people to the Antarctic Peninsula in early February 2020, sponsored by the Chilean Antarctic Institute (INACH) as part of their 56th Antarctic Expedition in 2020. Local government, industry, and NGO sponsors generously gave either direct financial or in-kind support: in Ushuaia, the Municipality of Ushuaia; in Cape Town, the South African National Antarctic Programme (SANAP), Antarctic Legacy of South Africa (ALSA), and Department of Science and National Research Foundation (NRF); in Hobart, Qube Ports and Bookend Trust; and in Christchurch, the Christchurch Antarctic Office and the Latin America Centre of Asia-Pacific Excellence (CAPE). Their generous donations not only made the AYCE possible but also confirmed the high level of local investment in cross-city youth collaboration and custodianship in the Antarctic sector.

A central aim of the Antarctic Cities project was to foster community engagement and particularly youth engagement in Antarctic issues, on a local and global scale. The project was therefore designed to culminate in the creation of an Antarctic youth coalition that would catalyse youth-led collaboration to address the challenges facing Antarctica's future. As urban centres connected to and through Antarctica, the five gateway cities are ideal places from which to build such an initiative. Drawing on the energy and innovative thinking of young people, a youth forum or coalition could progress the idea of Antarctic custodianship—a sense of care, protection, and responsibility toward the continent—in, between, and beyond these cities.

This core component of the Antarctic Cities project was several years in the making, emerging from early discussions between Juan Francisco Salazar, who would eventually lead the project, and Elías Barticevic, then head of communications and education at



FIGURE 9.1. The founding members of the Antarctic Youth Coalition. From left to right: Florencia Garro (Ushuaia representative); Caleb Fraser (Christchurch representative); Rudzani Silima (Cape Town representative); Katia Macías (Punta Arenas representative) and Chloe Power (Hobart representative).

FIGURE 9.2.A. The youth ambassadors and members of the research team with the Director of the Chilean Antarctic Institute (INACH), Dr. Marcelo Leppe. ©Photo:INACH.



the Chilean Antarctic Institute (INACH), who would become a partner investigator in the project. Both had a long history of involvement with INACH's *Fería Antártica Escolar* (School Antarctic Festival), an initiative designed to engage the country's youth in polar research through an annual science fair and Antarctic expedition. First-hand, they had seen the transformative impacts that this work was having on young adults from across Chile. On the other side of the world, the Youth Arctic Coalition had also recently been launched, with a mission to provide a platform for youth participation in Arctic governance and decision-making. In 2014, Juan and Elías met Anna Reynolds, who was at that time an alderman for Hobart City Council and has since become mayor. The three discussed what would become one of the project's driving questions: *how can we empower a new generation of Antarctic leaders, and what role might the five Antarctic cities play in this?*

Out of these exchanges the idea of an Antarctic Youth Coalition (AYC) solidified, as a means of activating young people the five gateways and creating new connections between these cities and the continent that ties them together. Several years later, putting this idea into motion would become one of the project's key achievements.

The Antarctic Cities project proposed a very ambitious plan to seed the AYC. In each of the five cities, one young person (aged between 18 and 29) was selected via a competitive process as a 'youth ambassador'. With the generous logistical support of INACH and partners in Hobart, Ushuaia, New Zealand and South Africa, the five ambassadors then travel together, via the Antarctic city of Punta Arenas, to the Chilean Julio Escudero Station in King George Island (known in Chile as *Isla Rey Jorge* and in Argentina as *Isla 25 de Mayo*) in the Antarctic Peninsula region in February 2020. Travelling together with researchers and partners involved in the project, they spent a week gaining direct experience of the Antarctic region, visited some of the numerous international bases scattered around King George Island and absorbed the values and cultures of these bases, as well as learning more

about each other's experiences and the Antarctic Cities project. This proposed experience was the basis of the 2020 Antarctic Cities Youth Expedition (ACYE).

While in Antarctica, the initiative featured a series of strategic planning workshops, which allowed the young leaders to formulate a mission, vision, and plan for the Antarctic Youth Coalition's development. Cape Town, Christchurch, Hobart, Punta Arenas, and Ushuaia all have long histories as places where people gather to discuss Antarctic issues. The ACYE sought to provide a new perspective by flipping this model to bring together a group of people in Antarctica to workshop the development of the five cities. In this sense, the AYCE was a global first, representing an innovation in thinking about the relationship between the Antarctic, the urban centres that surround it, and the people who live in them.

How can we empower a new generation of Antarctic leaders, and what role might the five Antarctic cities play in this?



Recruitment

The recruitment of the five youth ambassadors occurred through July, August, and September of 2019. Christchurch, Hobart, Punta Arenas, and Ushuaia conducted a competitive recruitment process via public callout, video application, and/or interview, while Cape Town chose to draw upon an existing pool of young student leaders through the South African government's SEAmester Class Afloat program. The call for applicants went out far and wide, with the project seeking to recruit a team that could go beyond the traditional demographics of Antarctic science and reflect the true diversity of the gateway cities.

In total, the project received more than 80 applications, a testament to the strength of Antarctic attachment and level of talent within the younger generation in the gateway cities. Environmental concern was a significant motivating factor for many applicants, as was a sense of pride in their city's role as a gateway. These twin concepts united in an almost

universally expressed desire amongst applicants to deepen their city's connection with Antarctica as well as the connections between the five cities.

While science students and graduates were well represented, the applicants nonetheless made up a very diverse group. Artists, athletes, engineers, teachers, and many others were among those eager to represent their cities. A number of the applicants were already familiar with the project through their involvement in workshops around the *Antarctic Futures* online game. We were surprised and inspired by the number and range of ideas for connection presented by the applicants, from street art to Antarctic cafés. At the same time, we also noted several comments about the relative lack of Antarctic participation opportunities currently available within the gateway cities.

These unsolicited opinions from young people in the cities reaffirmed the need for a regionally framed and globally connected platform enabling them to lead a new ethos of care towards the Antarctic.



'I think there's been a discourse that only scientists can influence what's happening in Antarctica. I believe, though, that everyday citizens like you and I can not only appreciate its richness but also be custodians of the Antarctic.'—ACYE applicant

'When I was 12 years old, I wrote a book about Antarctica. It was called The Madrid Protocol and it was about the owner of a large corporation beginning to mine in Antarctica and he had to be stopped by a 16-year-old heroine. Obviously.'—ACYE applicant

'All of us who live in Hobart have a sense of connection and a sense of fascination with the [icebreaker] Aurora Australis because we've grown up with it. It's part of the waterfront landscape down there. But we don't ever really interact with it. It's not accessible to us.'—ACYE applicant

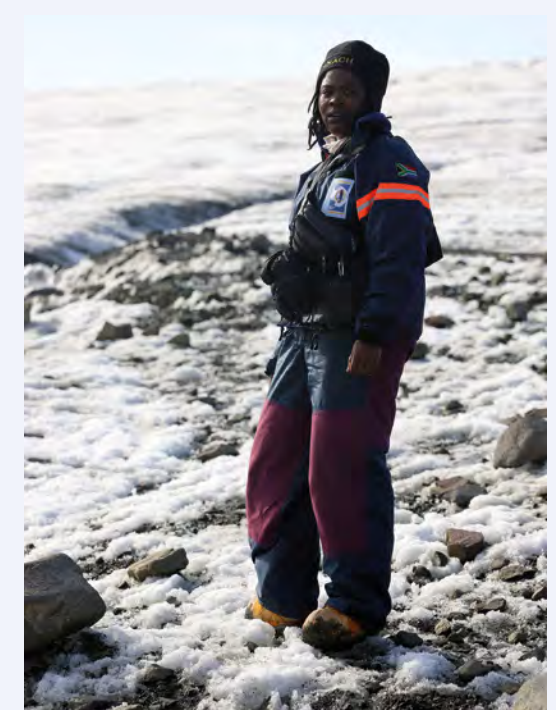
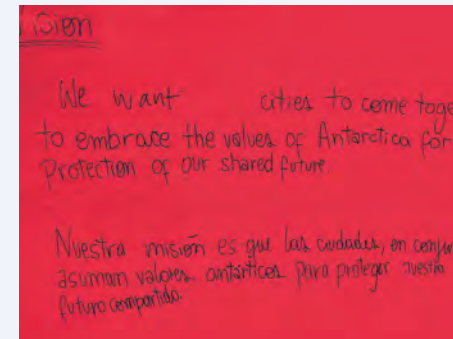


FIGURE 9.2.B. The Antarctic Cities Youth Expedition team undertaking activities at Collins Glacier and Bellingshausen Dome, King George Island, Antarctica, February 2020. ©Photos: E. Leane and J.F. Salazar

'While Christchurch has suffered, Antarctica is seriously suffering with climate change. Christchurch has a need and an appetite to address this. We should incorporate the environmental needs of Antarctica while we consider our local environments.'—ACYE applicant

The Antarctic Cities Youth Expedition

After an intensive and closely contested selection process, the five Antarctic Cities Youth Expedition members—who would become the Antarctic Youth Coalition Ambassadors—were introduced to the world in September 2019.

Attitudes towards Antarctica depend on stories, images and sounds that are circulated through culture, so it is important that we understand what ideas are being encoded in these cultural products and how they reflect and impact on other aspects of human relationships to Antarctica, including science, geopolitics and tourism



Christchurch
Caleb Fraser

**LAW/CHEMISTRY STUDENT,
UNIVERSITY OF CANTERBURY**

The Antarctic-Cities Youth Expedition that led to the launch of an Antarctic Youth Coalition is a unique example of youth participation in global political affairs and planetary stewardship.

'I hope to use this combination [of degrees] to better understand chemistry-based processes that are negatively impacting the environment and to act as an environmental diplomat that encourages the implementation of laws driven by sustainability ... I strongly believe that the youth are the future leaders of our planet and that educating them on the importance of Antarctica and inspiring them to develop sustainable practices is more important than ever.'



Cape Town
Rudzani Silima

**OCEANOGRAPHY STUDENT,
NELSON MANDELA UNIVERSITY**

'Often, Cape Town's status as a gateway city to Antarctica is only made known to scientists in polar research. The flow of information to the general public [is] stifled by scientific jargon. My role in the AYC, I hope, would be one that will help narrow the gap between Antarctic research and the global youth. One that will help spark curiosity about our polar oceans, the mechanisms that drive them, and how these have an impact on our very own livelihoods. [One that will] inspire a generation of scientists and help foster an attitude of custodianship for the white continent by young people.'



Punta Arenas
Katia Macías

**ENGLISH TEACHER,
SCOUT LEADER**

'My personal goal is teaching my students about the importance of Antarctica and spreading that message to my community. I consider myself as a natural, committed, and organized young leader who looks forward to learning more about Antarctica and promoting the Coalition not only within my city but also across the globe. I am working to create visual support for our project and for the history and culture of my city.'



Ushuaia
Florencia Garro

**PHOTOGRAPHER
AND HOSPITALITY WORKER**

'My ancestral heritage strongly ties me to Tierra del Fuego, where I enjoy skiing in the mountains and exploring the native southern beech forests. Antarctica is a place I connect with emotionally and intellectually with a sense of responsibility for its management and protection. I aspire to develop a greater knowledge of the Antarctic continent in my hometown. I'm really proud to be a founding member of the Antarctic Youth Coalition, an organization being formed with a commitment based on the three values that determine Antarctica: peace, collaboration, and science.'



Hobart
Chloe Power

**MARINE SCIENTIST,
ANTARCTIC TOUR GUIDE**

'I have an immense passion for science communication and aim to help bridge the gap between the scientific community and the wider public. I hope to inspire youth in particular to the amazing things that science entails, especially that of Antarctica. I aspire to create a strong sense of connectedness between Hobart and the icy continent and am beyond excited to be a part of this incredible coalition of like-minded Antarctic lovers!'

In the period between their selection and the departure of the expedition, the five youth ambassadors began their process of collaboration, meeting online to exchange their past experiences and hopes for the future.

While the AYCE was always ambitious, the Antarctic Cities team and the youth ambassadors had no way of anticipating the global events of late 2019 and early 2020—events that at times threatened to delay or prevent the expedition's departure. Initial plans for the ambassadors' travel to dovetail with the youth activities associated with COP25 climate talks in Santiago in late November 2019 had to be abandoned in the face of mounting civil unrest in Chile. The following month the first reports appeared of a new virus in Wuhan, China. By early in the new year, the novel coronavirus—soon to be dubbed COVID-19—was becoming a global concern. While these national and global events complicated the AYCE logistics, they also foregrounded urgent political and social issues, which the five ambassadors discussed at length, and reinforced the need for the kind of international connectedness that the AYCE was designed to produce.

After nearly six years of planning and development, and despite the growing global turmoil, the Antarctic Cities Youth Expedition was confirmed for a mid-February 2020 departure. The five youth ambassadors, along with project lead Juan Francisco Salazar and Hobart-based chief investigator Elizabeth Leane, arrived in Punta Arenas from their far-flung departure points on 9 and 10 February 2020. The sixth member of the expedition, Elías Barticevic (INACH), was already in Antarctica, where he had taken up the role of base leader at Julio Escudero Station over the summer.

Staying at a local hostel, the youth ambassadors spent two days exploring Punta Arenas' rich Antarctic connections, undertaking INACH's safety and environmental briefings, kitting out, and getting to know one another. Several Antarctic icebreakers were in port, reinforcing Punta Arenas' identity as a gateway through which many national Antarctic programs transit. The AYCE, however, would be travelling by plane with Antarctic Airways (a subsidiary of DAP), a long-established private Chilean airline that transports tourists as well as researchers with national programs.

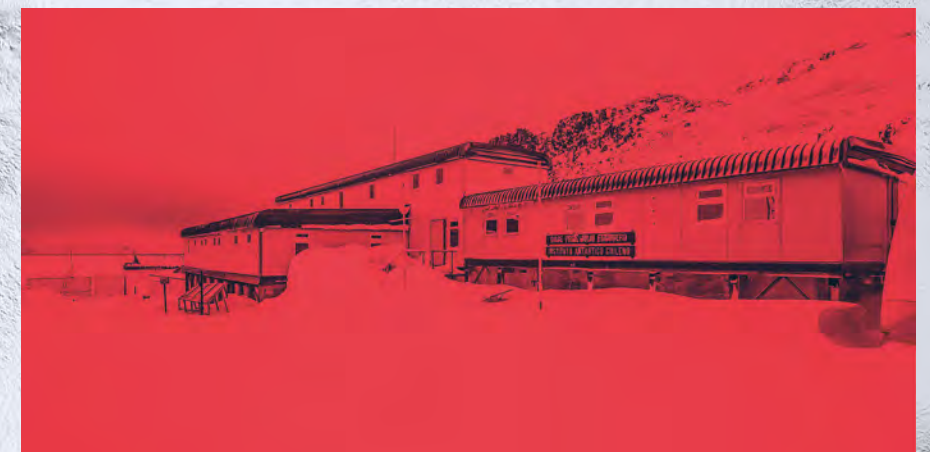
King George Island (KGI), the AYCE's destination, is an ideal location from which to think about the values of environmental protection and international collaboration. KGI is the largest of the group of islands called the South Shetlands, which lie to the northwest of the tip of the Antarctic Peninsula. Escudero Station is located on the Fildes Peninsula, at the island's southwestern end. These islands were one of the first places in Antarctica to receive human visitors, and are also, like the rest of the Antarctic Peninsula,



FIGURE 9.3A. Satellite image of the Antarctic Peninsula.

FIGURE 9.3B. The team lands at Teniente Marsh airfield, King George Island, Antarctica on 12 February 2020.

FIGURE 9.4A. Our residence in Antarctica, Julio Escudero Station (INACH), King George Island.



now bearing the brunt of human impact. In the days before the expedition departed, reports had appeared in the global media of a heatwave in the Antarctic Peninsula region, with record temperatures being set. Elías had sent the AYCE team photographs of Escudero that showed a muddy landscape very different from the snowy scenes they had imagined from images taken in previous, cooler seasons. These changes were very much in the youth ambassadors' minds as they travelled. KGI is also more densely and diversely populated than perhaps anywhere else in Antarctica: in addition to Chile, nine countries have permanent research bases there, four of them within relatively easy visiting distance of Escudero. In addition, KGI is itself considered an Antarctic gateway, given the number of tourists who fly in or out of its airport as part of fly-cruise experiences.

Flying to Antarctica is always weather dependent. The AYCE team travelled to Punta Arenas Airport on 12 February, only to return to the city again after the flight was postponed due to low visibility at King George Island. They were sharing the plane with a large group of tourists travelling with the Chilean air-cruise tourist operator Antarctica XXI, who, like them, were bused back to their accommodation. At about 5am the following morning, they boarded their aircraft, and after a smooth two-hour flight disembarked at the airfield on King George Island.

Arrival in Antarctica is often an emotional experience, even for veterans of many journeys. Of the youth ambassadors, only Chloe Power had been to Antarctica before, but she as much as anyone was overwhelmed by her initial moments in King George Island:

The team visited Ardley Island, the site of a gentoo penguin colony, Collins Glacier, part of the Arctowski Ice Cap, the Russian station Bellingshausen, the Uruguayan Artigas Base, and the South Korean King Sejong Station in Marion Bay. While at Bellingshausen Station, Russian glaciologist, Bulat Mavlyudov, kindly offered to take the team to see his research on the dome. While the formal activities of the ACYE gave the

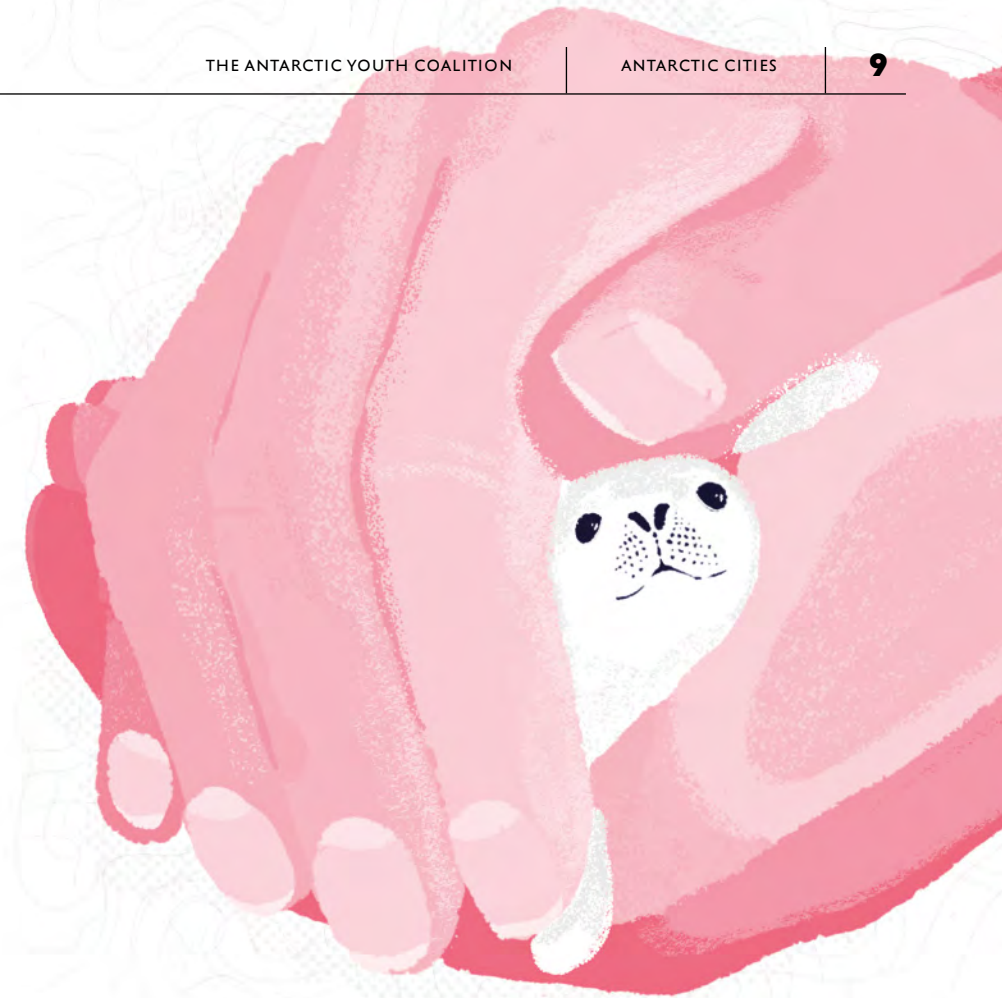
youth ambassadors unique insight into living and working in Antarctica and the values that drive these activities, these were complemented by more spontaneous experiences. Eating, sleeping, and working in a station co-occupied by scientists and tradespeople from a wide variety of nations provided many opportunities for mind-expanding conversations.



FIGURE 9-4B. Panoramic view of Julio Escudero Station and Villa Las Estrellas, Fildes Peninsula, King George Island. ©Photo: E. Barticevic.



‘Those first footsteps in Antarctica were unreal. I looked around and the rest of my team’s faces were filled with joy. We had made it! After months of planning, postponing, and waiting—we were finally here, on the most beautiful part of the planet.’—Chloe



Planning the Antarctic Youth Coalition in Antarctica

Whenever the ACYE team members were not visiting a base or learning about the research being undertaken at Escudero, they were workshopping ideas to progress the Antarctic Youth Coalition. Using a systematic process developed by Juan Salazar together with Antarctic Cities research assistant and PhD candidate Katie Marx, the youth ambassadors developed mission and vision statements, alongside a set of actions to guide their steps on their return. During this process we collaborated with Proboscis Studio in London and director Giles Lane who designed the interactive diaries that each of the five young ambassadors had to complete.

This process evolved into the Antarctic Youth Coalition strategic plan (See Appendix 3). The activities undertaken during the expedition were designed to foster first-hand awareness of the values underpinning human endeavour in the Antarctic. Each youth representative diligently kept a diary throughout their experience, and through this they were able to discern three key themes of the human–Antarctic relationship that went on to become core pillars of the strategic plan.

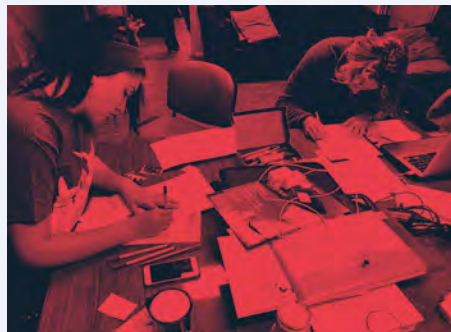


FIGURE 9.5. The AYCE team presenting the Antarctic Youth Coalition to researchers and personnel at Julio Escudero station.

FIGURE 9.6. The AYCE team at Collins Glacier in King George Island, Antarctic Peninsula.

FIGURE 9.6B. The AYCE team at Collins Glacier in King George Island, Antarctic Peninsula.

FIGURE 9.7. Caleb Fraser, Katia Macias and Rudzani Silima with Chilean scientist Jeremy Donaire at Julio Escudero Station.

FIGURE 9.8. Caleb Fraser and Katia Macias working on the AYC strategic plan at Julio Escudero Station.

FIGURE 9.9. The AYCE team Bellingshausen Station. In the background, Trinity Church.



Theme 1: International co-operation and collaboration

The Antarctic Cities Youth Expedition brought together a group of people who spoke different languages, with different nationalities on their passports. This was part of a purposeful effort to dissolve boundaries and give members the opportunity to learn from and connect with different perspectives and cultures. In particular, the chance to visit a number of international bases left a profound impression on the expeditioners.

Expeditioners also used this as a chance to reflect on issues such as diversity in polar research and the dynamics between nationalism and internationalism, sharpening their sense of what they wanted to achieve through the AYC.

‘As a black female South African visiting a Chilean base I was the only person of my hue. It was very unsettling at first ... I raised this concern with my project leader, Juan, and [he] made me feel a little at ease, although this is something that needs to be addressed.’
—Rudzani



‘Visiting each base was like peeking into the homes and culture of each of the different nationalities. And all the bases were so hospitable. It really felt like Antarctica was an international space. In the words of some wise South African, unity in diversity.’—Rudzani

*‘Algunos tienen muy arraigado el sentimiento de territorialidad. Y es chocante. Me gusta pensarlo como un paraíso de paz y ciencia— porque es lo que es! El Tratado Antártico es algo que TODOS (el mundo entero) debería tener muy en claro.’—
Florencia*

‘They [at the Uruguayan base] raised the flags of each of our countries, which was so special and humbling.’—Chloe

Theme 2: Care and protection of our environment

The ACYE application process revealed a strong current of environmental concern and connection between the five cities. This theme continued to be of critical importance on the expedition itself, with Antarctica recording record high temperatures during the team's time on KGI.

'The lack of snow was very apparent and showed that the warming of our planet is occurring even in the most remote places.'—Chloe

With three of the five AYCE youth ambassadors—Caleb, Rudzani, and Florencia—having Indigenous heritage, all of the group felt strongly about the need to incorporate Indigenous perspectives into the AYC vision. They wanted the AYC to explore how Indigenous ways of knowing, relating, and living in the environment can inform the ethos of care and custodianship for Antarctica that the group aims to foster. These ideas became incorporated into the emerging AYC strategic plan.



'We arrived around 7:30 with a bag full of dreams and expectations, yet first thing I saw—NO SNOW AT ALL! It was quite sad to see this place like that.'—Katia

'We finally reached the glacier, and according to Juan, who was here six years ago, the glacier has retreated significantly. Evidence that Antarctica is warming.'—Rudzani

'We finally reached the glacier, and according to Juan, who was here six years ago, the glacier has retreated significantly. Evidence that Antarctica is warming.'—Rudzani

Theme 3: Science and learning

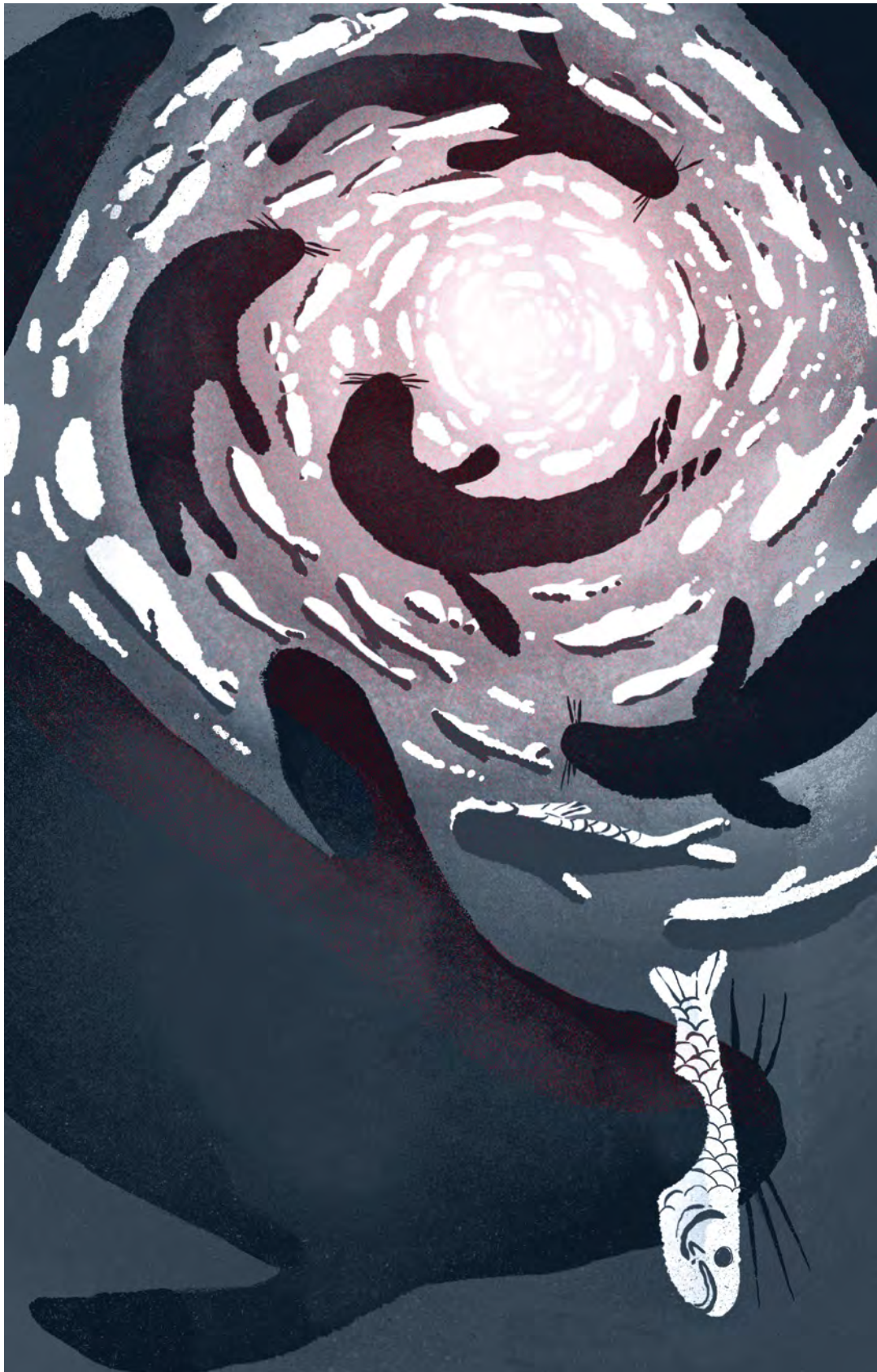
The expeditioners' observations around scientific research and the exchange of knowledge in Antarctica acted as the final strand to tie their experiences together. Through the processes and values enshrined in the Antarctic Treaty, science provides a platform for international collaboration. Sitting at the forefront of climate science, research in Antarctica also plays a crucial role in our response to the world's mounting environmental challenges.

On their visits to various international bases, expeditioners had the chance to observe Antarctic science in situ and gain some hands-on experience in areas like glaciology and soil chemistry analysis. For the expeditioners, this opportunity highlighted both the importance of this work and the need for more accessibility and diversity within Antarctic research.



'Bulat [Russian glaciologist] taught us how he measures the glacier; he uses a bur (a tool) to do the holes.'—Katia

'Despite so many different cultures and nationalities, it feels like a big Antarctic family. A network of people using their passion and knowledge to contribute to Antarctica's protection and science. Exactly what I want to do with my team as part of the exciting Antarctic Youth Coalition. Watch this space!!!'—Chloe



A transformative experience

After six days on the island, the Antarctic Cities Youth Expedition came to an end. Although the youth ambassadors were hoping for snow, fog, or any other conditions that might keep them in Antarctica for longer, the weather was clear for their departure on 19 February. Back in Punta Arenas they spent a further two days continuing to develop the AYC strategic plan, meeting with the Chilean Antarctic Institute and the Magallanes regional government, and participating in interviews with the Chilean media—an experience that would be repeated locally as each youth ambassador returned to their home city. To date, the team has featured in more than 60 media stories in Argentina, Australia, Chile, New Zealand, and South Africa, demonstrating a high level of public interest in both the expedition and what comes next.

For their part, the five youth representatives have emerged with new knowledge, stronger connections, and a determination to contribute to the future of Antarctica and the cities that surround it.



FIGURE 9.11. Detail from Chloe Power's travel journal.



'Mi corazón abierto para recibir toda esa experiencia y mi interés y respeto por todos los proyectos científicos que nos mostraron. Ahora nos toca trabajar duro para difundirlo.'—Florencia

'It's like a jigsaw puzzle. All the pieces are slowly coming together. Now we've experienced a bit of Antarctica—we know a little bit about what life is like on a research station, the science that is happening, the wildlife that is found here, and how warming can affect the environment; we can use this knowledge and our first-hand experiences to help promote the importance of Antarctica to our home cities. To hopefully create a movement of people to not only protect the future of Antarctica but the future of our gateway cities and generations to come.'—Chloe

The Antarctic Cities Youth Expedition provided a unique experience for five young people from the gateway cities—an experience that has acted as a catalyst in their development as future Antarctic leaders. They now face the challenge of harnessing the momentum from the expedition to create a platform for ongoing youth engagement in the Antarctic cities—the Antarctic Youth Coalition (AYC). The planning workshops held during the expedition resulted in the development of mission and vision statements to define what the AYC aims to achieve, along with a series of actions and goals that were further refined in the subsequent months through consultation with key project partners. Through this process, the project team has worked with the expedition members to create a strategic plan that will drive the development of the AYC (see below).

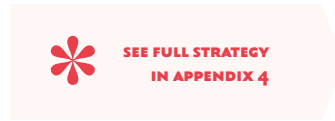
With many nations going into lockdown only weeks after the ACYE’s return, the youth ambassadors and their mentors had to adapt



‘Definimos acciones para poner en marcha a nuestro regreso. Va a ser un gran desafío. Implica mucha responsabilidad y tiempo a dedicarlo. Pero tengo la seguridad que vamos a lograr algo amazing.’—Florencia

‘Even though our cities are all so different, I think we really have some great ideas to help connect them better.’—Chloe

‘Now the real project begins... ANTARCTIC YOUTH COALITION.’—Katia



quickly to the new situation. Planned face-to-face events with young people in their cities had to be postponed while the COVID-19 emergency progressed, and lockdowns took place across the world. Regular Zoom meetings between the ambassadors, and with the larger Antarctic Cities group, were instigated. Although the pandemic meant that the initial development of the coalition looked different from what the ambassadors had imagined while in Antarctica, the changes and delays also provided time for them to think carefully about their next steps and strengthened their adaptability as a group.

In late July, by which time Hobart and Christchurch had passed through the worst of the initial COVID-19 emergency, the youth ambassadors were able to present their AYC mission and vision to the mayor of Hobart

alongside senior representatives from the Christchurch City Council, Antarctica New Zealand, Antarctic Tasmania, and the Australian Antarctic Division as well as the Antarctic Cities project team. The presentation was extremely well received, with all the representatives expressing their strong support and willingness to be approached for further resourcing and expertise. In order to thrive the coalition will indeed need the continuing goodwill of these as well as other partners who can work with the youth in the five cities to bring its goals to fruition.

The Antarctic Cities Youth Expedition gave the AYC its impetus, providing a bonding and life-changing experience for the five youth ambassadors. The coalition is now moving into the next phase of growing its numbers and bringing on board a diverse group of young people and older allies to progress its vision of an enduring network of Antarctic custodians encompassing the five cities.



FIGURE 9.12 AYC representative from Ushuaia Florencia Garro presenting at the Youth Panel Forum for the United Nations’ 75th anniversary celebrations.



FIGURE 9.13 Rudzani Silima interviewed by Chilean media in Punta Arenas while Katia Macías translates.

FIGURE 9.14. Chloe Power at a ABC Hobart radio talking about AYCE and her experience in Antarctica .

10. From Gateways to Custodial Cities

On the first day of December each year, Antarctica Day recognizes and celebrates the icy continent and its unique governance system. Marking the anniversary of the Antarctic Treaty's adoption on 1 December 1959, it is a day for reflecting on our relationship to a place most have never visited.

The treaty is framed by a spirit of global co-operation. Antarctica is the one region where the international community has sought to look beyond national and corporate self-interest. Article IV of the Antarctic Treaty acknowledges that Antarctica does not belong to any one country, stating that 'no acts or activities taking place while the present treaty is in force shall constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in Antarctica or create any rights of sovereignty in Antarctica'. Nonetheless, in practice the Antarctic region is the subject of intense commercial and geopolitical interest.

Up until recently, cities have rarely been considered in relation to Antarctica, other than as ports of entry or egress. Yet five cities standing on the Southern Oceanic Rim—Cape Town, Christchurch, Hobart, Punta Arenas, and Ushuaia—together have a unique opportunity to change the future of Antarctica.

A statement of intent to bring the cities together and promote peaceful co-operation was signed in Christchurch in 2009. Though it expired 18 months later, in the period since then the 'Antarctic gateway' status of several of the cities has continued to be reinforced by various city and national government policies. These cities have also put forward visions for enhancing and capitalizing on their Antarctic identities, a key part of their relationship to the world. As partners in the present Antarctic Cities project, they have been part of a process to strengthen Antarctic connections and a sense of guardianship and caring for Antarctica in and across these cities. The framework encompasses the cities' own urban sustainability strategies within a wider concern for the planet.

The rationale of this report has been to rethink the political, cultural, economic, and ecological positions of these cities from an Antarctic perspective by inverting the map and connecting these Southern Oceanic Rim cities. One practical outcome is the coming together of these cities to form an interlinked network that can learn from and benefit each other. The network of local



government, national Antarctic programs, youth groups, and polar organizations has so far produced *Antarctic Futures*, an educational online serious game, and founded the Antarctic Youth Coalition, launched in February 2020 during an expedition to Antarctica, and now steered by five young leaders each representing one of the five cities.

Together we have also been drafting a charter of principles for Antarctic connectivity to instigate dialogue and co-operation. Drawing from both Christchurch's Antarctic Gateway Strategy' and the Tasmanian Antarctic Gateway Strategy, this charter sets down principles to guide sustainable and custodial urban practice. It recognizes Antarctica's significance for the economies of these cities and charts ways forward for future sustainable development. It celebrates the unique polar heritage of these cities and emphasizes the crucial role of youth organizations for engaging with the future of Antarctica. And it acknowledges that human connections with Antarctica extend well beyond the last two centuries, embracing Indigenous conceptions of caring for country, land, and water.

At a local level, the City of Christchurch has begun to move towards a custodianship model by basing their 2018 Antarctic strategy on two key principles:

- ↳ Embracing the Māori principle of *kaitiakitanga*—meaning guardianship, protection, preservation, or sheltering, and a customary way of managing the environment based on the traditional Māori worldview—to guide the city's involvement in the Antarctic region by caring for and respecting the environment.
- ↳ Championing sustainability by taking a leadership role in sustainable actions for the benefit of the Antarctic region and the city.



FIGURE 10.1 Antarctica Day 2020 Poster designed by Hobart City Council.

FIGURE 10.2 Bernardo O'Higgins Base (Chile), Antarctic Peninsula 2011. Image Juan Francisco Salazar

A Charter of Principles for Antarctic Cities

The Principles for Antarctic Cities take as their foundation the values associated with the Antarctic Treaty System in the context of the UN Sustainable Development Goals. It is an initiative to bring together cities together in ways that outline a common vision, narrative, and priorities.

Preamble

Recognizing that Antarctica is governed internationally by the Antarctic Treaty System, and that, under this Treaty, Antarctica is recognized by the Protocol on Environmental Protection as ‘a natural reserve, devoted to peace and science’.

Recognizing that Antarctica, as one of four recognized global commons under the principle of the **common heritage of humankind**, is a key to the future of our planet.

Recognizing that the United Nations has set 17 goals to change our world. Goal 11 concerns cities explicitly—‘**Make cities inclusive, safe, resilient and sustainable**’—but all 17 goals pertain to cities in some way.

Recognizing that five cities—Cape Town, Christchurch, Hobart, Punta Arenas, and Ushuaia—**together play a vital role in humanity’s engagement with the South Polar Region.** Most travel to the Antarctic region is funnelled through these five formally recognized international ‘gateways’. Each of these cities are in zones with intense interconnectivity to the Antarctic, and they co-ordinate all significant engagement with the region. Each of these cities is formed by long and complex histories of engagement with the Antarctic going back to the nineteenth century.

Recognizing the spirit of the Statement of Intent signed in 2009 between the Southern Oceanic Rim gateway cities to the Antarctic: Cape Town, Christchurch, Hobart, Punta Arenas, and Ushuaia.

Recognising that **young people in these cities need to be supported as custodians** and innovators to secure the future of Antarctica.

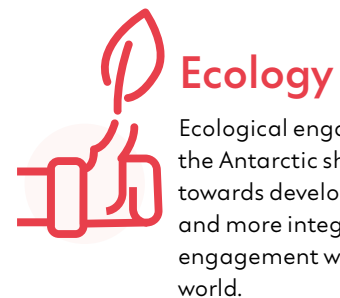
Recognising the significance of Antarctica to the economies of our cities, our urban heritage, tourism, scientific capability and education.

Now, therefore, we the undersigned cities proclaim these Principles for Antarctic Cities as providing guidance for practical action.

The Principles in Summary

The Principles for Antarctic Cities are intended to work for cities, institutions, and even individuals, as a guide for engaging with the Antarctic region, whether in Antarctica or anywhere else in the world. At the top level, the principles are expressed as simply as possible in terms of the four domains of ecology, economics, politics, and culture. Going deeper, the second level of principles elaborates the first.

These principles are opportunities for the cities to realize greater ecological, economic, political, and cultural value through custodial responsibilities as caring cities with a privileged position as global Southern Oceanic Rim cities.



References

- Assendelft, E. (2017) The Antarctic City Strategy *Antarctic*, vol.35, no. 3. pp27-28
- Australian Bureau of Statistics (2018), 'National Health Survey: First results, 2017–18', <https://www.abs.gov.au/statistics/health/health-conditions-and-risks/national-health-survey-first-results/latest-release>. Viewed 28.04.21.
- Bay, J.H.P., and Lehmann, S. (eds) (2017), *Growing Compact: Urban Form, Density and Sustainability*, London, Routledge.
- Brehegyi, M.J. (1992), 'Sustainable Development and Urban Form: An Introduction', in M.J. Brehegyi (ed.), *Sustainable Development and Urban Form*, London, Pion pp. 160-181.
- Burghardt, A.F. (1971), 'A Hypothesis about Gateway Cities', *Annals of the Association of American Geographers*, vol. 61, no. 2, pp. 269–85.
- Canterbury Wellbeing Index (2018), Canterbury District Health Board, <<https://www.canterburywellbeing.org.nz/>>.
- Chan, C.B., and Ryan, D.A. (2009), 'Assessing the Effects of Weather Conditions on Physical Activity Participation Using Objective Measures', *International Journal of Environmental Research and Public Health*, vol. 6, no. 1, pp. 2639–54.
- Chapin, F.S., III, and Knapp, C.N. (2015), 'Sense of Place: A Process for Identifying and Negotiating Potentially Contested Visions of Sustainability', *Environmental Science and Policy*, vol. 53, pp. 38–46.
- Christchurch City Council (2018), *Christchurch's Antarctic Gateway Strategy*, Christchurch, New Zealand.
- City of Hobart (2017), *Managing Hobart's Carbon Footprint: Background Paper 2017*, Hobart, Tasmania.
- City of Hobart (2019), *Capital City Strategic Plan*, Hobart, Tasmania.
- Crabtree, L. (2019), 'Unsettling Research Impact', *Foundational Essays*, Institute for Culture and Society, Western Sydney University, <https://logincms.westernsydney.edu.au/_data/assets/pdf_file/0003/1282179/Unsettling_Research_Impact_Essay.pdf>. Accessed 28.04.21.
- Dodds, K. (2017), "'Awkward Antarctic nationalism': Bodies, Ice Cores and Gateways In and Beyond Australian Antarctic Territory/East Antarctica', *Polar Record*, vol. 53, no. 1, pp. 16–30.
- Dodds, K., and Salazar, J.F. (2021), 'Gateway Geopolitics: Assembling Infrastructure, Policies and Tourism in Hobart and Australian Antarctic Territory/East Antarctica', in M. Córdoba Azcárate, M. Mostafanezhad, and R. Norum, eds, *The Geopolitics of Tourism: Assemblages of Power, Mobility and the State*, Phoenix, University of Arizona Press.
- Dodds, K., and Hemmings, A. D. (2020), 'Antarctic Diplomacy in a time of Pandemic', *The Hague Journal of Diplomacy*, 15, pp. 530–541.
- Elzinga, A. (2013), 'Punta Arenas and Ushuaia: Early Explorers and the Politics of Memory in Constructing Antarctic Gateway Cities', *Polar Journal*, vol. 3, no. 1, pp. 227–56.
- Frauman, E., and Banks, S. (2011), 'Gateway Community Resident Perceptions of Tourism Development: Incorporating Importance-Performance Analysis into a Limits of Acceptable Change Framework', *Tourism Management*, vol. 32, no. 1, pp. 128–40.
- García-Martin, M., Plieninger, T., and Bieling, C. (2018), 'Dimensions of Landscape Stewardship across Europe: Landscape Values, Place Attachment, Awareness, and Personal Responsibility', *Sustainability*, vol. 10, no. 1, article 263.
- Geschke, A., James, S., Bennett, A.F., and Nimmo, D.G. (2018), 'Compact Cities or Sprawling Suburbs? Optimising the Distribution of People in Cities to Maximise Species Diversity', *Journal of Applied Ecology*, vol. 55, no. 5, pp. 2320–31.
- Giles-Corti, B., Gunn, L., Hooper, P., Boulange, C., Diomed, B.Z., Pettit, C., and Foster, S. (2019), 'Built Environment and Physical Activity', in M. Nieuwenhuijsen and H. Khreis, eds, *Integrating Human Health into Urban and Transport Planning*, Cham, Springer (pp. 347–81).
- Hall, C.M. (2000), 'The Tourist and Economic Significance of Antarctic Travel in Australian and New Zealand Antarctic Gateway Cities', *Tourism and Hospitality Research*, vol. 2, no. 2, pp. 157–69.
- Hall, C.M. (2015), 'Polar Gateways: Approaches, Issues and Review', *Polar Journal*, vol 5, no. 2, pp. 257–77.
- Halliwell, P.M. (2019), *National Park Citizen Science Participation: Exploring Place Attachment and Stewardship*, PhD dissertation, Prescott College, Prescott, Arizona.
- Herbert, A. (2014), *Making Place at the End of the World*, PhD dissertation, University of Canterbury, Christchurch.
- Herbert, A., Liggett, D., and Frame, B. (2020), 'Polarising Ushuaia: Informal Settlements and Tourism in an Antarctic Gateway City', *Local Environment*, vol. 25, no. 11–12, pp. 849–71.
- Holden, M. (2013), 'Sustainability Indicator Systems within Urban Governance: Usability Analysis of Sustainability Indicator Systems as Boundary Objects', *Ecological Indicators*, vol. 32, pp. 89–96.
- Huff, G. (2012), 'Export-Led Growth, Gateway Cities and Urban Systems Development in Pre-World War II Southeast Asia', *Journal of Development Studies*, vol. 48, no. 10, pp. 1431–52.
- James, P. with Magee L., Scerri, A., and Steger, M.B. (2015), *Urban Sustainability in Theory and Practice: Circles of Sustainability*, London, Routledge.
- James, P. (2019), 'Engaged Research', *Foundational Essays*, Institute for Culture and Society, Western Sydney University, <https://www.westernsydney.edu.au/_data/assets/pdf_file/0009/1149876/Engaged_Research.pdf>. Accessed 28.04.21.
- James, P., Holden, M., Lewin, L., Neilson, L., Oakley, C., Truter, A., and Wilmoth, D. (2013), 'Managing Metropolises by Negotiating Mega-Urban Growth', in H. Mieg and K. Töpfer, eds, *Institutional and Social Innovation for Sustainable Urban Development*, London, Routledge.
- Keitumetse, S.O., and Pampiri, M.G. (2016), 'Community Cultural Identity in Nature-Tourism Gateway Areas: Maun Village, Okavango Delta World Heritage Site, Botswana', *Journal of Community Archaeology & Heritage*, vol. 3, no. 2, pp. 99–117.
- Khan, M., Magee, L., Pollio, A., and Salazar, J.F. (2021), 'Counter-fun, Scholarly Legitimacy, and Environmental Engagement—or Why Academics should Code Games', *First Monday*, vol. 26, no. 2, <<https://doi.org/10.5210/fm.v26i2.11427>>.
- Klopp, J.M., and Petretta, D.L. (2017), 'The Urban Sustainable Development Goal: Indicators, Complexity and the Politics of Measuring Cities', *Cities*, vol. 63, pp. 92–97.
- Knapp, A., and Vojnovic, I. (2016), 'Ethnicity in an Immigrant Gateway City: The Asian Condition in Houston', *Journal of Urban Affairs*, vol. 38, no. 3, pp. 344–69.
- Kyttä, M., Broberg, A., Haybatollahi, S.M., and Schmidt-Thomé, K. (2016), 'Urban Happiness: Context-Sensitive Study of the Social Sustainability of Urban Settings', *Environment and Planning B Planning and Design*, vol. 47, no. 1, pp. 34–57.
- Leane, E. (2016), 'Tasmania from Below: Antarctic Travellers' Accounts of a Southern "Gateway"', *Studies in Travel Writing*, vol. 20, no. 1, pp. 34–48.
- Leane, E., Lucas, C., Nielsen, H., Datta, D., Marx, K., and Salazar, J.F. (forthcoming 2021), 'The Sense of Connectedness to Antarctica in 'Gateway' Residents: From Thoroughfare to Custodian City', *Geographical Research*.
- Leane, E., Winter, T., and Salazar, J.F. (2016), 'Caught between Nationalism and Internationalism: Replicating Histories of Antarctica in Hobart', *International Journal of Heritage Studies*, vol. 22, no. 3, pp. 214–27.
- Lin, B.B., and Fuller, R.A. (2013), 'Sharing or Sparing? How Should We Grow the World's Cities?', *Journal of Applied Ecology*, vol. 50, no. 5, pp. 1161–68.
- Line, N.D., and Costen, W.M. (2017), 'Nature-Based Tourism Destinations: A Dyadic Approach', *Journal of Hospitality & Tourism Research*, vol. 41, no. 3, pp. 278–300.
- Magee, L. (2015), *Interwoven Cities*, Basingstoke, Palgrave Macmillan.
- Ministerio de Salud, Gobierno de Chile (2016), *Obesidad y sobrepeso: Un reto creciente a la salud pública en Chile*, Ministerio de Salud, Santiago.
- Moreno Pires, S., Magee, L., and Holden, M. (2017), 'Learning from Community Indicators Movements: Towards a Citizen-powered Urban Data Revolution', *Environment and Planning C: Politics and Space*, vol. 35, no. 7, pp. 1304–1323.
- Muir, S., Jabour, J., and Carlsen, J. (2007), 'Antarctic Gateway Ports: Opening Tourism to Macquarie Island and the East Antarctic from Hobart', *Tourism in Marine Environments*, vol. 4, no. 2–3, pp. 135–50.
- Mulligan, M., James, P., Humphery, K., Scanlon, C., Smith, P., and Welch, N. (2007), *Creating Community: Celebrations, Arts and Wellbeing within and across Local Communities*, VicHealth, Melbourne.
- Nature Sustainability (2018), 'Tracking Progress on the SDGs', vol. 1, no. 8, p. 377.
- Neuman, M. (2005), 'The Compact City Fallacy', *Journal of Planning Education and Research*, vol. 25, no. 1, pp. 11–26.
- Nielsen, H.E., Lucas, C., and Leane, E. (2019), 'Rethinking Tasmania's Regionality from an Antarctic Perspective: Flipping the Map', *M/C Journal*, vol. 22, no. 3, <<https://journal.media-culture.org.au/index.php/mcjournal/article/view/1528>>.
- Pollio, A., Magee, L., and Salazar, J.F. (2021), 'The Making of Antarctic Futures: Participatory Game Design at the Interface between Science and Policy', *Futures*, vol. 125, <<https://doi.org/10.1016/j.futures.2020.102662>>.
- Rickards, L., Steele, W., Kokshagina, O., and Morales, O. (2020), *Research Impact as Ethos*, RMIT University, Melbourne, <<http://www.cur.org.au/project/rethinking-research-impact>>.
- Rintoul, S.R., Chown, S.L., DeConto, R.M., England, M.H., Fricker, H.A., Masson-Delmotte, V., Naish, T.R., Sieger, M.J., and Xavier, J.C. (2018), 'Choosing the Future of Antarctica', *Nature*, vol. 558, no. 7709, pp. 233–41.
- Rogers, B.C., Dunn, G., Hammer, K., Novalia, W., de Haan, F.J., Brown, L., Brown, R.R., Lloyd, S., Urlich, C., Wong, T.H.F., and Chesterfield, C. (2020), 'Water Sensitive Cities Index: A Diagnostic Tool to Assess Water Sensitivity and Guide Management Action', *Water Research*, vol. 186, article 116411, <<https://doi.org/10.1016/j.watres.2020.116411>>.
- Roldán, G. (2015). A door to the ice? The significance of the Antarctic gateway cities today. *Journal of Antarctic Affairs*, 2, 57-70.
- Roldán, G. (2017) Custodians of Antarctica: Rethinking the Role of the Antarctic Gateway Cities *Antarctic*, vol.35, no. 3. pp 34-35.

Roldán, G. (2020), *Searching for an Antarctic Identity at the Antarctic Gateway Cities of Cape Town (South Africa), Christchurch (New Zealand), Hobart (Australia), Punta Arenas (Chile), and Ushuaia (Argentina)*, PhD dissertation, University of Canterbury, Christchurch.

Sylvester, Z.T., and Brooks, C. M. (2020), 'Protecting Antarctica through Co-Production of Actionable Science: Lessons from the CCAMLR Marine Protected Area Process', *Marine Policy*, 111. <https://doi.org/10.1016/j.marpol.2019.103720>

Salazar, J.F. (2013), 'Perceptions and Opinions of Antarctic Values in Chile', in D. Liggett and A.D. Hemmings, eds, *Exploring Antarctic Values*, Christchurch, Gateway Antarctica Special Publication Series 1301 (pp. 48-67).

Sciurano, F., Cárcamo, V.M., Parker, B., Valentine, R. and Zille, H., 2009. Statement of

Intent between the Southern Rim Gateway Cities to the Antarctic. Available at: <http://archived.ccc.govt.nz/Council/proceedings/2009/September/CnclCover24th/Clause8Attachment.pdf> [Accessed 28.04.21].

Sommer, N., Welch, J., and Goess, H. (2018), 'Visitor Accommodation and Housing Affordability: Tasmanian Policy Update', *Planning News*, vol. 44, no. 6, pp. 16-17.

Sushinsky, J.R., Rhodes, J.R., Possingham, H.P., Gill, T.K., and Fuller, R.A. (2013), 'How Should We Grow Cities to Minimize Their Biodiversity Impacts?', *Global Change Biology*, vol. 19, no. 2, pp. 401-10.

Tucker, P., and Gilliland, J. (2007), 'The Effect of Season and Weather on Physical Activity: A Systematic Review', *Public Health*, vol. 121, no. 12, pp. 909-22.

United Nations Independent Expert Advisory Group on a Data Revolution for Sustainable Development (2014), *A World That Counts: Mobilizing the Data Revolution for Sustainable Development*, New York, United Nations.

United Nations (2015a), *Paris Agreement to the United Nations Framework Convention on Climate Change*, Paris, United Nations.

United Nations (2015b), *Transforming Our World: The 2030 Agenda for Sustainable Development*, New York, United Nations.

Williams, K., Burton, E., and Jenks, M. (2000), *Achieving Sustainable Urban Form*, New York, Routledge.



Commissioned Essay The Secret Weapon Against the Climate Crisis: Indigenous Sovereignty

By Jamie Graham-Blair

Jamie Graham-Blair is a Trawlwoolway pakana man, marine and Antarctic scientist, visual artist, climate activist and traditional dancer from Hobart. He was a runner-up in the Antarctic Cities Youth Expedition and was subsequently invited in early 2020 to write an essay for the Antarctic Cities project. We reproduce this essay for this project report as it was submitted. All photographs in this essay belong to Jamie Graham-Blair. Do not use without permission from the author.



The anthropogenic climate crisis is here, and it has the potential to be one of the most rapid periods of transformation in human history (Nolan *et al.*, 2018). It's likely that you already know that it is the greenhouse gases released into the air from our growing hunger for energy and resources that is trapping extra heat on planet Earth at rates not seen in our species existence (Wuebbles and Jain, 2001). But did you know that that added heat is already changing the oceans (Barnett, T., 2001), the chemistry of our atmosphere (Isaksen *et al.*, 2009), our biological systems (Rosenzweig *et al.*, 2008), ocean chemistry and productivity (Rost, Zondervan and Wolf-Gladrow, 2008) and global food production (Ray *et al.*, 2019). We are beginning to see an immense amount of change around the world due to atmospheric pollution amongst many other human induced changes, and one place which has the lowest human activity on the planet, Antarctica, is showing these changes very clearly (Turner *et al.*, 2009).



A cultural living site, eroded by rising sea waters

Five cities, Cape Town (South Africa), Christchurch (New Zealand), Hobart (Australia), Punta Arenas (Chile) and Ushuaia (Argentina) all serve as gateways to the Antarctic, hubs for scientific research and the Southern Oceans tourism industry and fisheries. These cities have many things in common, but one commonality is that they are home to strong communities of resilient Indigenous cultures and peoples as well as colonial histories rife with environmental vandalism. These First Nations communities have all held a sustainable and ancient connection to the Southern Ocean and indeed the Antarctic for millennia and as such have much to offer in modern climate change discussions and decision-making processes should these gateway cities choose to listen to them. Of the global population, Indigenous people make up about 5%, yet are protectors of roughly 80% of the world's remaining biodiversity (Raygorodetsky, 2020). Not only are they some of the world's staunchest protectors of natural ecosystems but have also navigated through periods of natural climate change in the past and as such should be included in all conversations surrounding modern climate justice, Antarctic custodianship and governance. This essay at its core will venture towards highlighting the connections between these observed and predicted changes, the dispossession of Indigenous people and their knowledge systems, conservation methodologies and philosophies, and how empowering the return of these practices across local and global scales will help protect not only the Antarctic, but the world from the impacts of Anthropogenic climate change.

Before the secrets of Indigenous land care are revealed however, the physical and ecological impacts of climate change on Antarctica must be understood, even if only at the most basic level.

The Antarctic and its Global Influence Under a Warming Climate

Antarctica is one of the world's most remote continents and is presenting the impacts of climate change in many unique and complex ways (Holland, P. *et al.* 2019, Lee, J. *et al.*, 2017 & Melbourne-Thomas J. *et al.* 2016). The Antarctic has seemingly slipped out of public consciousness amongst the chaotic noise of our modern lives so you may think that it is some far away, inconsequential place that does not affect us, an almost alien icy world detached from our own, but you couldn't be further from the truth. On average, it is the coldest, driest and highest place on Earth, with enormous mountain ranges and billions of tonnes of ice covering most of the land all year round. The meteorological and ecological patterns in the Southern Ocean have massive influence on our global climate (Mikolajewicz, 1998) and biosphere. The brilliant bright sea-ice that grows with the plummeting temperatures each winter helps to bounce solar radiation back into space (Wendler *et al.*, 2004) keeping the planet cool. Thousands of different animals, whales (Kasamatsu, 2000), birds and seals (Ainley and DeMaster,

1990) migrate to the Antarctic every year to feed on phytoplankton and invertebrates (Garrison, 1991 & Michels *et al.*, 2011) that bloom each spring as that same sea ice melts (Lizotte, 2001 & Smith and Nelson, 1985) as well as in hyper productive polynyas (Smith and Gordon, 1997).

Some of these animals, namely krill and some fish species, are consumed by humans and as such contribute to the instrumental and economic value of the region (Croxall and Nicol, 2004). Some Antarctic creatures are not found anywhere else on the planet and are

highly specialised to polar conditions, so rely on the health and function of Antarctica for their own wellbeing and survival. Many of these organisms perform important ecosystem functions, such as nutrient cycling, oxygen and primary production as well as carbon sequestration, which ensure balance within the local ecosystems (Reid, Croxall, Briggs and Murphy, 2005, Reid and Croxall, 2001) and climate (Hoppe *et al.*, 2017 & Falkowski, 1998). It is an incredible place full of mystery and wonder, that keeps our planet healthy so we ourselves can be healthy from afar (Nicol and Foster, 2016).

Another key function of the Southern Ocean and Antarctica is the momentum it lends to the thermohaline circulation of the global ocean (Mikolajewicz, 1998) via the formation of the globally significant Antarctic Bottom Water (AABW) (Johnson, 2008, Orsi, Johnson and Bullister, 1999 & Marshall and Speer, 2012). Each austral winter freezing of sea water goes through an incredibly important chemical process called brine rejection, where heavy and highly saline water is pushed out of newly forming ice crystals. This process is observed to be strongest in polynyas (Morales Maqueda, 2004) in coastal regions of Antarctica and is chemically distinctive depending on where it forms. These AABW production zones however are faltering under warmer temperatures (Silvano *et al.*, 2018). As this super dense water mass falls out of the surface waters it forms a super cold-water mass which is high in oxygen and dense enough to draw down dissolved atmospheric CO₂ (Stephens and Keeling, 2000) as it sinks. This AABW is one of the reasons we have global circulation of oceanic water (Bindoff, Rintoul and Massom, 2000 & Jacobs, 2004) and it is a massively important form of global heat redistribution and climate regulation (Purkey and Johnson, 2010 & Levitus *et al.* 2005). It should now be obvious that an increase of greenhouse gases like CO₂ and subsequent rising temperatures of the atmosphere and oceans would wreak havoc on these incredibly important climate and ecosystem processes (Silvano *et al.*, 2018 & Tavares and De Melo, 2004).

To summarise, the Antarctic region is full of endemic life, complex biogeochemical cycles and its naturally wild seasonal variations have global consequences that support us and the trophic systems we depend



A view of the Southern Ocean from Ship Stern Bluff in Southern Tasmania, common spot to sight Orcas migrating from Antarctica

on from afar. Antarctica itself cares for the global marine system and as beings that depend on a healthy ocean (Rice and Garcia, 2011), we must take our relationship with Antarctica more seriously. Our relationship with industry, non-renewable energy and carbon intensive food production is damaging the Antarctic, which as a regulator of our planet will result in negative consequences for us as a global community.

Growing Global Connection to Country: How Indigenous Sovereignty can combat Climate Change and Protect Antarctica

I will not speak on behalf of other cultures as that would be to colonise the voices and experiences of other Indigenous peoples who have much to add to this conversation themselves. However, in my culture as a trawlwoolway pakana, a Tasmanian Aboriginal person from the North-East of Tasmania (lutruwita), we hold our own set of responsibilities and relationships. We carry duties to our native environments, both land and sea (colloquially called “country” or milaythina in palawa kani) that are based on our ancient systems of kinship. As custodians of multigenerational relationships within the natural world based on reverence, reciprocation and responsibility to those who came before us we act as caretakers and custodians of our traditional homelands. These connections have helped us to not just survive but thrive for over 42,000 years. Through at least two glacial maximums and subsequent interglacial periods we have adapted and been active in the management and farming of the land and surrounding marine ecosystems with minimal negative consequences given our cultural longevity. Yet within 200 years of British invasion and control of our land we have seen an immeasurable amount of death and destruction visit our land (Woinarski, Burbidge and Harrison, 2015), with numerous culturally significant species now extinct due to over-exploitation, introduced species competition, urbanisation and the outlawing of cultural practices carefully designed over millennia to care for milaythina. Our very way of life was threatened with the arrival of the Europeans and the damage done to our community was so swift and severe that for over a century it was a common misconception that we were an extinct race of people (Lehman, 2000). The usurpation of our sustainable and natural lifestyles has led to a great ecological upheaval and every continent on planet earth holds a similar story. This environmental degradation however, given the right management is not irreversible (Marsden-Smedley and Kirkpatrick, 2000), at least not yet.



Understanding, the difference between Indigenous and colonial ethics and knowledge systems can truly help us to see how industrialisation, colonialism, and environmental degradation are inextricably linked and how Indigenous sovereignty can be weaponised in the global fight to protect Antarctica and the world from anthropogenic climate change.

Firstly, the modern Euro-centric culture which my people have been forced to study and abide by for generations (Harman, 2013), works by social conventions that limit harm to other rational and autonomous beings based on an empathic system of rights and values.

Human rights exist based on the idea that as a species we are highest on a hierarchical scale of “importance” due to our apparent rationality, self-awareness, and empathic natures. We don’t like to hurt others because we can (for the most part) relate to and understand that hurt. But in doing so we allow ourselves to view other non-human beings as less valuable, absolving us of guilt when we harm these “others” in our quest to make our personal lives easier, fairer and fuller. In our western worldview we designate personhood as the ultimate reasoning



Dolerite structures at the summit of kunanyi/Mt. Wellington in the south of Tasmania. Geological remnants of the separation of Antarctica and Australia nearly 40 ma.

to treat others well. It can be argued that during the invasion of Tasmania, Darwin’s theory of evolution was weaponised against us, where academics and anthropologists labelled us as the missing link, a less evolved form of homo sapien and as such inferior to the white man. This is an obvious example of denial of personhood in order to absolve the colonisers of guilt when attempting genocide and large scale dispossession (Ryan, 2013), and an example that still continues today in various forms.

Compare that to Indigenous systems of ethics where we see country and the connections within it, as most important.

Our cultural longevity here on this island of lutruwita is largely attributed to community- wide responsibility for ecological health while conforming to the needs of the environments we occupied as self-aware and active parts within it. We named the land our mother and assigned it not just intrinsic value but familial value as well, giving her a form of personhood even higher than our own. We cared for country because we knew she would care for us in return, and it was our responsibility to do so as we were part of a system that depended on her. This included understanding its natural cycles, seasons and moods in order to best care for her.

This puts us, as humans, on the same level as all other beings that also depend on country for survival. The trees, the birds, the snakes, the insects, the fungi, the kangaroos, marine life, seasonal visitors and long-term residents, everything. We all had a right to exist freely, we all had a part to play within milaythina and were respected as complex components of the same system, coexisting and supporting each other for an incredibly long period of time. To protect these beings from ourselves and greedy individuals, we engaged in a system of totems, law, and seasonal migrations. Most plants and animals that enacted important ecosystem functions had a tribal group or entire nation/ language group assigning them personhood and kinship, who were charged with protecting them. Meaning that across not just the island of lutruwita but the entire continent existed a complex and precise network of thousands of tribal groups working together to conserve and protect all beings and cycles of country.

Knowledge of material uses of resources, ecological significance of animals and plants and spiritual connections were carried along geographical pathways, trade routes, and ancient songlines by ceremonies. Rituals tied to ecology, language and morality, enacted at seasonal gatherings which explained the importance of kin and country to younger generations. These ceremonies, with music, dance, family gathering, celebration and feasting were our “school” lessons, they held all the knowledge and resources necessary to provide life and

productivity to country and ourselves in perpetuity, passed not only between generations but between tribes as needed.

So, when the British arrived and began forcefully eliminating and outlawing our ancient practices, the entire continent-wide cultural structure suffered. The whole system of kinship was put out of balance and so was the ecological relationships of the non-human environment. Not only was there attempted genocide, but ecocide as well, which we view as one and the same. This ecocide packaged and sold to the masses as settlement, economic growth and human progress not only continues to unfold around us today but has touched every landmass on planet earth and is now being labelled as the sixth mass extinction (Ceballos *et al.*, 2015).

This ecocide of course reached Antarctica in the 1800's.

If you are familiar with Antarctica's short human history you would know that, not unlike Tasmania's British history, some of the earliest visitors were commercial whalers and sealers. The expansion of these commercial ventures to the global south at the expense of Indigenous beings was treated as an international competition between colonial states. Many of these exploited species are still recovering from this competition nearly two centuries later (Trathan and Reid, 2009) and some may never recover.

While the pakana women of lutruwita were expert sealers themselves (to the point of being prized possessions of the European sealers who arrived in the early 1800's (McMahon, 1976)), they adhered to strict seasonal catch limit regulations fine-tuned over millennia and avoided over-exploitation of natural marine resources, as any efficient and sustainable

consumer would. As did the men in their maintained hunting for land mammals such as Kangaroo and Emu. Another method of ensuring sustainable usage of local resources was to move about the island with the seasons, methodically following native roads. During these seasonal migrations sacred sites were maintained and varying methods of sustainable agriculture was practiced as the weather and environmental indicators dictated. However, our methods of sustainability didn't simply apply to catch limits and mobility to reduce our impact, we utilised one of the most powerful tools known to man to do a lot of the hard work for us.

The implementation of Indigenous fire regimes to care for landscapes is now a growing topic of conversation and research regarding climate adaption, and rightly so. The ancient practice of shaping landscapes and farming a range of ecotypes and crop species with the use of

fire has been observed across the entire continent of Australia, and a growing number of studies are identifying its role in increasing biodiversity (Bliege Bird *et al.*, 2008), associated water quality (Cardinale, 2011) reduction of bushfire risk, intensity and frequency (Bowman *et al.*, 2011) and carbon sequestration (Robinson *et al.*, 2016, Walsh, Russell-Smith and Cowley, 2014 & Jackson, Palmer, McDonald and Bumpus, 2017). Our movement through country was often guided by what needed to be burnt, what food sources were available, astronomical events and ecological indicators within the environment. All of which was contained within stories and ceremony passed down for more than thousands of generations. This to me highlights how western academic systems are still attempting to catch up to the power of ancient Indigenous knowledge in caring for country, and how in tune to our environments we truly were.



King Maireenner shells, collected to create traditional necklaces. Have come under threat from invasive species shifting due to warmer climate and higher ocean acidity.



Moving Forward Towards Climate Justice and Antarctic Preservation with Indigenous Guidance

Climate change is surely here and set to be the greatest challenge the human race will ever face. Industrial processes and expansion of consumerist behaviours and philosophies around the globe are pushing us further and further towards a number of tipping points, which if we reach will be irreversible (Lenton, 2011). Had First Nations communities retained sovereignty and control of their own landscapes and ecosystems over the past handful of centuries, there would be a drastically lower level of environmental degradation compared to the world we live in today. While this is an interesting thought to entertain, it isn't our reality. Given the dire circumstances we face however, it is time to seriously consider our options when moving forward into planetary uncertainty.

Our current system of human dominance and infinite economic growth at the expense of our life support services is not sustainable.

We truly need policy, economic, social and spiritual change to mitigate and adapt to the incoming changes laid before us, not only that but we need innovative and new ideas to face these new and unprecedented times. Antarctica, an isolated continent, due to its climate and ecology will bear the brunt of a wide range of anthropogenic influences, including warming, melting, lower productivity, a decreased ability to reflect solar energy and reduced thermohaline circulation, which will all form a feedback system to perpetuate these negative changes even further. While we may not be able to enact every aspect of traditional culture, we can draw from the principles behind the practices, for example it would be an incredible feat to turn an entire sedentary urban population into a nomadic community, but returning to seasonal indicators for land management purposes may be a more attainable goal.

Perhaps returning to traditional burning regimes based on weather and botanical indicators, or seasonal based pollution regulations in order to encourage health of migrating Antarctic species (Whales and birds) as they pass by the gateway cities. Another potential idea could be a push to give Antarctica the same legal rights as a human similar to Whanganui River in

Aotearoa/New Zealand or The Ganga and Yamuna Rivers in India, in order to enshrine its intrinsic and instrumental value in our modern law system. If we wish to avoid the worst of the damage to this relatively untouched global treasure, we must act now and in creative and groundbreaking ways to reduce carbon emissions, protect remaining biodiversity, and think more holistically when it comes to our place in the world like many Indigenous peoples around the world. A global shift in perspective is no mean feat but should the five Antarctic gateway cities team up and advocate for such a philosophical and spiritual movement, for the protection of the Antarctic that they find themselves inextricably connected to then we will be one step closer to avoiding the worst of the climate catastrophe and the First Nations people whose land these cities are built upon may find some justice, recognition and peace in the process.

Indigenous people are resilient, and the world must relearn to walk in tune with the natural world as we have for millennia, if not to heal our shared and damaged past, but so that we can weather the coming storm together.



References

- Ainley, D. G., and D. P. DeMaster. 1990. The upper trophic levels in polar marine ecosystems. In W. O. Smith, Jr. (ed.), *Polar oceanography, Part B: Chemistry, biology, and geology*, pp. 599–630. Academic Press, San Diego, California.
- Barnett, T. (2001) "Detection of Anthropogenic Climate Change in the World's Oceans", *Science*, 292(5515), pp. 270-274. doi: 10.1126/science.1058304.
- Bliege Bird, R., Bird, D., Coddling, B., Parker, C. and Jones, J., 2008. The "fire stick farming" hypothesis: Australian Aboriginal foraging strategies, biodiversity, and anthropogenic fire mosaics. *Proceedings of the National Academy of Sciences*, 105(39), pp.14796-14801.
- Bowman, D., Balch, J., Artaxo, P., Bond, W., Cochrane, M., D'Antonio, C., DeFries, R., Johnston, F., Keeley, J., Krawchuk, M., Kull, C., Mack, M., Moritz, M., Pyne, S., Roos, C., Scott, A., Sodhi, N. and Swetnam, T., 2011. The human dimension of fire regimes on Earth. *Journal of Biogeography*, 38(12), pp.2223-2236.
- Cardinale, B., 2011. Biodiversity improves water quality through niche partitioning. *Nature*, 472(7341), pp.86-89.
- Ceballos, G., Ehrlich, P., Barnosky, A., García, A., Pringle, R. and Palmer, T., 2015. Accelerated modern human-induced species losses: Entering the sixth mass extinction. *Science Advances*, 1(5), p.e1400253.
- Croxall, J. and Nicol, S., 2004. Management of Southern Ocean fisheries: global forces and future sustainability. *Antarctic Science*, 16(4), pp.569-584.
- Falkowski, P., 1998. Biogeochemical Controls and Feedbacks on Ocean Primary Production. *Science*, 281(5374), pp.200-206.
- Garrison, D., 1991. Antarctic Sea Ice Biota. *American Zoologist*, 31(1), pp.17-34.
- Harman, K., 2013. Protecting Tasmanian Aborigines: American and Queensland Influences on the Cape Barren Island Reserve Act, 1912. *The Journal of Imperial and Commonwealth History*, 41(5), pp.744-764.
- Holland, P. *et al.* (2019) "West Antarctic ice loss influenced by internal climate variability and anthropogenic forcing", *Nature Geoscience*, 12(9), pp. 718-724. doi: 10.1038/s41561-019-0420-9.
- Hoppe, C., Klaas, C., Ossebaer, S., Soppa, M., Cheah, W., Laglera, L., Santos-Echeandia, J., Rost, B., Wolf-Gladrow, D., Bracher, A., Hoppema, M., Strass, V. and Trimborn, S., 2017. Controls of primary production in two phytoplankton blooms in the Antarctic Circumpolar Current. *Deep Sea Research Part II: Topical Studies in Oceanography*, 138, pp.63-73.
- Isaksen, I., Granier, C., Myhre, G., Berntsen, T., Dalsøren, S., Gauss, M., Klimont, Z., Benestad, R., Bousquet, P., Collins, W., Cox, T., Eyring, V., Fowler, D., Fuzzi, S., Jöckel, P., Laj, P., Lohmann, U., Maione, M., Monks, P., Prevo, A., Raes, F., Richter, A., Rognerud, B., Schulz, M., Shindell, D., Kasamatsu, F., 2000. Species diversity of the whale community in the Antarctic. *Marine Ecology Progress Series*, 200, pp.297-301.
- Jacobs, S., 2004. Bottom water production and its links with the thermohaline circulation. *Antarctic Science*, 16(4), pp.427-437.
- Johnson, G., 2008. Quantifying Antarctic Bottom Water and North Atlantic Deep Water volumes. *Journal of Geophysical Research*, 113(C5).
- Lee, J. *et al.* (2017) "Climate change drives expansion of Antarctic ice-free habitat", *Nature*, 547(7661), pp. 49-54. doi: 10.1038/nature22996.
- Lehman, G., 2000. Turning Back the Clock: Fire, Biodiversity and Indigenous Community Development in Tasmania. *Links between Cultures and Biodiversity: Proceedings of the Cultures and Biodiversity Congress*.
- Lizotte, M., 2001. The Contributions of Sea Ice Algae to Antarctic Marine Primary Production. *American Zoologist*, 41(1), pp.57-73.
- Levitus, S., J. Antonov, and T. Boyer, 2005: Warming of the world ocean, 1955–2003. *Geophys. Res. Lett.*, 32, L02604, doi:10.1029/2004GL021592.
- Marsden-Smedley, J. and Kirkpatrick, J., 2000. Fire management in Tasmania's Wilderness World Heritage Area: Ecosystem restoration using Indigenous-style fire regimes?. *Ecological Management and Restoration*, 1(3), pp.195-203.
- Marshall, J. and Speer, K., 2012. Closure of the meridional overturning circulation through Southern Ocean upwelling. *Nature Geoscience*, 5(3), pp.171-180.
- McMahon, Anne. Tasmanian Aboriginal women as slaves [online]. *Papers and Proceedings: Tasmanian Historical Research Association*, Vol. 23, No. 2, 1976: 44-49. Availability: <https://search.informit.com.au/documentSummary;dn=81114277566;res=IELAPA> IS SN: 0039-9809. [cited 27 May 20]
- Melbourne-Thomas, J. *et al.* (2016) "Under ice habitats for Antarctic krill larvae: Could less mean more under climate warming?", *Geophysical Research Letters*, 43(19), pp. 10,322-10,327. doi: 10.1002/2016gl070846.
- Michels, J., Schnack-Schiel, S., Pasternak, A., Mizdalski, E., Isla, E. and Gerdes, D., 2011. Abundance, population structure and vertical distribution of dominant calanoid copepods on the eastern Weddell Sea shelf during a spring phytoplankton bloom. *Polar Biology*, 35(3), pp.369-386.
- Mikolajewicz, U., 1998. Effect of meltwater input from the Antarctic ice sheet on the thermohaline circulation. *Annals of Glaciology*, 27, pp.311-315.
- Nicol, S. and Foster, J., 2016. The Fishery for Antarctic Krill: Its Current Status and Management Regime. *Biology and Ecology of Antarctic Krill*, pp.387-421.
- Nolan, C. *et al.* (2018) "Past and future global transformation of terrestrial ecosystems under climate change", *Science*, 361(6405), pp. 920-923. doi: 10.1126/science.aan5360.
- Orsi, A., Johnson, G. and Bullister, J., 1999. Circulation, mixing, and production of Antarctic Bottom Water. *Progress in Oceanography*, 43(1), pp.55-109.
- Ray, D., West, P., Clark, M., Gerber, J., Prishchepov, A. and Chatterjee, S., 2019. Climate change has likely already affected global food production. *PLOS ONE*, 14(5), p.e0217148.
- Reid, K., Croxall, J., Briggs, D. and Murphy, E., 2005. Antarctic ecosystem monitoring: quantifying the response of ecosystem indicators to variability in Antarctic krill. *ICES Journal of Marine Science*, 62(3), pp.366-373.
- Robinson, C., Renwick, A., May, T., Gerrard, E., Foley, R., Battaglia, M., Possingham, H., Griggs, D. and Walker, D., 2016. Indigenous benefits and carbon offset schemes: An Australian case study. *Environmental Science & Policy*, 56, pp.129-134.
- Ryan, L., 2013. The Black Line in Van Diemen's Land: success or failure?. *Journal of Australian Studies*, 37(1), pp.3-18.
- Rosenzweig, C. *et al.* (2008) "Attributing physical and biological impacts to anthropogenic climate change", *Nature*, 453(7193), pp. 353-357. doi: 10.1038/nature06937.
- Rost, B., Zondervan, I. and Wolf-Gladrow, D., 2008. Sensitivity of phytoplankton to future changes in ocean carbonate chemistry: current knowledge, contradictions and research directions. *Marine Ecology Progress Series*, 373, pp.227-237.
- Raygorodetsky, G., 2020. Can Indigenous Land Stewardship Protect Biodiversity?. [online] *National Geographic.com*. Available at: <https://www.nationalgeographic.com/environment/2018/11/can-indigenous-land-stewardship-protect-biodiversity-/> [Accessed 6 February 2020].
- Silvano, A., Rintoul, S., Peña-Molino, B., Hobbs, W., van Wijk, E., Aoki, S., Tamura, T. and Williams, G., 2018. Freshening by glacial meltwater enhances melting of ice shelves and reduces formation of Antarctic Bottom Water. *Science Advances*, 4(4), p.eap9467.
- Smith, W. and Gordon, L., 1997. Hyperproductivity of the Ross Sea (Antarctica) polynya during austral spring. *Geophysical Research Letters*, 24(3), pp.233-236.
- Smith, W. and Nelson, D., 1985. Phytoplankton Bloom Produced by a Receding Ice Edge in the Ross Sea: Spatial Coherence with the Density Field. *Science*, 227(4683), pp.163-166.
- Stephens, B. and Keeling, R., 2000. The influence of Antarctic sea ice on glacial-interglacial CO₂ variations. *Nature*, 404(6774), pp.171-174.
- Stevenson, D., Storelmo, T., Wang, W., van Weele, M., Wild, M. and Wuebbles, D., 2009. Atmospheric composition change: Climate–Chemistry interactions. *Atmospheric Environment*, 43(33), pp.5138-5192.
- Tavares, M. and De Melo, G., 2004. Discovery of the first known benthic invasive species in the Southern Ocean: the North Atlantic spider crab *Hyas araneus* found in the Antarctic Peninsula. *Antarctic Science*, 16(2), pp.129-131.
- Trathan, P. and Reid, K., 2009. Exploitation of the marine ecosystem in the sub-Antarctic: historical impacts. *Papers and Proceedings of the Royal Society of Tasmania*, 143(1), pp.9-14.
- Turner, J., Bindshadler, R., Convey, P., di Prisco, G., Fahrbach, E., Gutt, J., Hodgson, D., Mayewski, P. and Summerhayes, C., 2009. Antarctic Climate Change and the Environment. Scientific Committee on Antarctic Research, [online] Available at: <https://epic.awi.de/12227/1/Tur2009a.pdf>.
- Walsh, D., Russell-Smith, J. and Cowley, R., 2014. Fire and carbon management in a diversified rangelands economy: research, policy and implementation challenges for northern Australia. *The Rangeland Journal*, 36(4), p.313.
- Wendler, G., Moore, B., Hartmann, B., Stuefer, M. and Flint, R., 2004. Effects of multiple reflection and albedo on the net radiation in the pack ice zones of Antarctica. *Journal of Geophysical Research: Atmospheres*, 109(D6), p.n/a-n/a.
- Woinarski, J., Burbidge, A. and Harrison, P. (2015) "Ongoing unraveling of a continental fauna: Decline and extinction of Australian mammals since European settlement", *Proceedings of the National Academy of Sciences*, 112(15), pp. 4531-4540. doi: 10.1073/pnas.1417301112.
- Wuebbles, D. and Jain, A., 2001. Concerns about climate change and the role of fossil fuel use. *Fuel Processing Technology*, 71(1-3), pp.99-119.



Appendix 1. Academic Publications and Presentations

Books

Salazar JF, E, Leane, P James and L Magee.
Antarctic Cities. University of Nebraska Press
(contracted, forthcoming late 2022).

Book Chapters

Dodds, K, and J.F Salazar 2021. **"Gateway Geopolitics: Assembling Infrastructure, Policies and Tourism in Hobart and Australian Antarctic Territory/East Antarctica"**. In Córdoba Azcárate, Matilde, Mostafanezhad, Mary and Norum, Roger (Eds.). *The Geopolitics of Tourism: Assemblages of Power, Mobility and the State*. Phoenix: University of Arizona Press.

Leane, E, and Nielsen, H. 2019. **"Gateway Tourism': Exploring Antarctica in Tasmania."** *The State and Future of Tourism in Tasmania*. Ed. Anne Hardy and Can Seng Ooi. Hobart: 40 South.

Journal Articles

Salazar JF, E Leane, E Barticevic, G. Roldán, C Fraser, C Power, K Macias, F, Garro and R Silima. (forthcoming 2022) **The Antarctic Youth Coalition: Experiments in cultural polar diplomacy.** *The Polar Journal*. Vol 12 No. 2.

Leane, E, C Lucas, H Nielsen, D Datta, K Marx, J F Salazar (In Press 2021) **From gateway to custodian city: Understanding urban residents' sense of connectedness to Antarctica."** *Geographical Research*.

Khan, M., Magee, L., Pollio, A., & Salazar, J. F. (2021). **Counter-fun, scholarly legitimacy, and environmental engagement – or why academics should code games.** *First Monday*, 26(2). <https://doi.org/10.5210/fm.v26i2.11427>

Pollio, A., Magee, L., and Salazar, J. F. 2021 **The making of Antarctic futures: Participatory game design at the interface between science and policy.** *Futures*, 125, 102662.

Nielsen, H, Lucas, C and Leane, E. 2019. **"Rethinking Tasmania's regionality from an Antarctic perspective: flipping the map",** *M/C Journal*, 22 (3) pp. 1-7. Available at <http://journal.media-culture.org.au/index.php/mcjournal/article/view/1528>

Non-academic publications

Salazar, J.F, E Leane, K Marx, Liam Magee, Marina Khan, Paul James 2020 **'Custodians of Antarctica: how 5 Gateway Cities are embracing the icy continent'** *The Conversation* 1 December. Available at <https://theconversation.com/custodians-of-antarctica-how-5-gateway-cities-are-embracing-the-icy-continent-148006>

Salazar, J.F and E. Barticevic **Reimagining Antarctic 'Gateway' Cities. 2020. *Ilaia* No. 6 pp. 22-24.**

Roldan, G. 2017. **Custodians of Antarctica: Rethinking the Role of the Antarctic Gateway Cities** *Antarctic*, vol.35, no. 3. pp 34-35.

Salazar, J.F., P. James, E. Leane, L.Magee. 2016. **Five cities that could change the future of Antarctica.** *The Conversation* 16 October. Available at <https://theconversation.com/five-cities-that-could-change-the-future-of-antarctica-66259>

Academic Conference Papers

Claudia Estrada **"Identidad Regional Ecológica (IRE) en Magallanes". Knowledge/Culture/ Ecologies International Conference. Santiago, Chile 15-18 November 2017.**

Elizabeth Leane **"Antarctic Cities and the Global Commons: Rethinking the Gateways," ACHRC Humanities in the Region symposium, 10-11 May 2018, Launceston (part of the 'Antarctic Cultures and Collaborations' presentation that also included Rebecca Hingley)**

Elizabeth Leane **"Antarctic Cities: Rethinking the Gateways" SCAR Open Science Conference, 15-26 July 2018, Davos. Co-authored with Juan Salazar and others.**

Liam Magee **"Games of Life: Simulating the City and the Anthropocene with Ludic Media" Knowledge/Culture/Ecologies International Conference. Santiago, Chile 15-18 November 2017.**

Paul James **"Developing an Urban Sustainability Profile" Knowledge/Culture/Ecologies International Conference. Santiago, Chile 15-18 November 2017.**

Juan Francisco Salazar **"Antarctic Cities and the Global Commons: Rethinking the Gateways". SCAR Standing Committee on Humanities and Social Sciences Conference. Ushuaia, Argentina, 3-5 April 2019. Co-authored with Elizabeth Leane and others.**

Juan Francisco Salazar **"Antarctic Cities and the Global Commons". Knowledge/Culture/Ecologies International Conference. Santiago, Chile 15-18 November 2017.**

Public presentations

Elizabeth Leane and Juan Salazar, **"Gateway Citizens: What Hobartians think about Antarctica."** Australian Antarctic Festival, 2-5 Aug. 2018, Hobart. Co-delivered.

Elizabeth Leane **"Antarctic Cities and the Global Commons: Rethinking the Gateways," presentation to the Tasmanian Polar Network, 6 June 2019, Hobart. Co-authored with Juan Salazar and others.**

Appendix 2. List of Participating Stakeholders and Engagement Activities (2017-2020)

↳ HOBART 2017 AND 2018

CENTRAL AND LOCAL GOVERNMENT	Department of State Growth Guy Green Former Governor of Tasmania Hobart City Council	
ANTARCTIC STAKEHOLDERS	Antarctic Science Foundation Australian Antarctic Division CCAMLR Tasmanian Polar Network	
EDUCATION, AND RESEARCH	ACE CRC Institute for Marine and Antarctic Studies University of Tasmania ABC Radio Australian Antarctic Festival	Bookend Trust Mawson's Huts Foundation MONA Tasmanian Museum and Art Gallery Tourism Tasmania
INDUSTRY/ECONOMIC DEVELOPMENT	EDO Tasmania EPA Tasmania Icetrek Icewall Macquarie Point Development Corporation	Pure Antarctica Qube Ports RED Sustainability TasPort

↳ CHRISTCHURCH 2017

CENTRAL AND LOCAL GOVERNMENT	Christchurch City Council Christchurch Antarctic Office Mayor Leanne Dalziel	Deputy Mayor Andrew Turner Cr Sara Templeton Cr Vicki Buck
ANTARCTIC STAKEHOLDERS	Gateway Antarctica International Antarctic Centre Antarctica NZ	
EDUCATION, AND RESEARCH	Landcare Research Lincoln University University of Canterbury	SAFER - Subantarctic Foundation for Ecosystems Research
TOURISM AND CULTURE	Botanic Gardens Christchurch Art Gallery Curious Minds	Heritage Expeditions Ltd
INDUSTRY/ECONOMIC DEVELOPMENT	Canterbury Development Corp Canterbury Employers' Chambers of Commerce CIAL Constantia Consulting Earth Sea Sky Healthy Families Canterbury	Innovation & Sustainability Initiative Trust Fund Latin America Centre for Asia Pacific Excellence (LatAm CAPE) (Wellington, NZ) Ngai Tahu Otakaro Ltd

↳ PUNTA ARENAS 2017

CENTRAL AND LOCAL GOVERNMENT	CORFO Jorge Flies Former Premier of Magallanes	Ministerio de Cultura Ministerio de Vivienda y Urbanismo
ANTARCTIC STAKEHOLDERS	Departamento Antártico Ejército de Chile INACH	
EDUCATION, AND RESEARCH	Centro de Estudios Hemisfericos y Polares Centro IDEAL- UACH Escuela Manuel Bulnes	Fundación CEQUA GAIA Antártica Universidad de Magallanes
TOURISM AND CULTURE	Museo Nao Victoria Fundación AMA Torres del Paine INIA Kampenaike	
INDUSTRY/ECONOMIC DEVELOPMENT	AGROPAT Antarctica XXI Centro de Rehabilitación Cruz del Sur Salfa Austral	

↳ USHUAIA 2019

CENTRAL AND LOCAL GOVERNMENT	Dirección Provincial de Puertos Gobierno Tierra del Fuego Municipalidad de Ushuaia	
EDUCATION, AND RESEARCH	CADIC- CONICET Universidad Nacional de Tierra del Fuego	
TOURISM AND CULTURE	Asociación Profesionales de Turismo Cámara de Turismo Ushuaia Cámara Hotelera y Gastronómica de TdF	Dirección de Museos de la Provincia INFUETUR Oficina Antártica Museo Provincial del Fin del Mundo Tierra Arte
INDUSTRY/ECONOMIC DEVELOPMENT	ANTARTUR Asociación Bahía Encerrada Asociación Maneken	

School Engagement (Hobart)

In mid-2018, the Hobart Antarctic Cities team collaborated with Bookend Trust to co-develop an exhibition that would encourage local high-school students in Hobart to reflect on the relationship between their city and Antarctica in creative ways.

Working primarily with Year 8 (13-14-year-old) students at Tarooma High School, we asked students to tell us in photo-stories how they experience the connection between the Hobart and the far south. Eight of the submissions were displayed at the Australian Antarctic Festival in August 2018 and at the Opening of the Season event in October 2018. Two of the students also addressed the attendees of the latter event. A sample of the work displayed is below. A similar youth engagement process could be used in any or all cities via social media such as Instagram.

ANTARCTICA DOMAIN

Image and words by Henry Watchorn

The Domain

Making kids go insane

Cold, windy or warm

Children will swarm

Athletics, soccer, football all the same.

The weather does not change Tasmanians,

it's the puffer jackets that came

MacPac, Kathmandu, North Face.

Tasmanian citizens are amongst the same race.

The Domain, people all over the place.

Coffee in their hand, hot and warm, starting their day

Some days its Antarctic;

Cold, windy, placing my mind in the artic

Sometimes it's not, it's hot, sweaty with no top

But at the end of the day,

It's cold in a way

Mainlanders would not understand - they say,

We are Antarctica.

→ List of key project engagement activities (by city)

LOCATION	ACTIVITY	DATE	PARTICIPANT NUMBERS
Antarctica	Antarctic Youth Expedition (AYCE)	Feb 2020	5
Cape Town	Youth workshop (online game)	Oct 2019	11 (aged 18-26)
Cape Town	Survey of residents' perceptions of Antarctica	July 2020	388
Christchurch	Urban and Antarctic experts' workshop (urban profiles + connectivity index)	Oct 2017	44
Christchurch	Youth workshop (scenarios planning and online game)	Oct 2017	17 (aged 18-26)
Christchurch	Survey 1 on residents' perceptions of Antarctica	Sept 2018	300
Christchurch	Presentation of interim report to Christchurch City Council Innovation and Sustainable Development Committee	Sept 2018	9 Councillors including Deputy Mayor
Christchurch	Launch of ACYE competition	Aug 2019	N/A
Christchurch	Presentation of interim report at University of Canterbury	Feb 2020	N/A
Christchurch	Survey 2 of residents' perceptions of Antarctica	July 2020	297
Hobart	Urban and Antarctic experts' workshop 1 (urban profiles + connectivity index)	July 2017	39
Hobart	Urban and Antarctic experts' workshop 2 (urban profiles + connectivity index)	Oct 2017	17
Hobart	Youth workshop 1 (scenarios planning and online game)	April 2018	18 (aged 18-26)
Hobart	Survey 1 on residents' perceptions of Antarctica	April– May 2018	300
Hobart	Launch of children's photo exhibition	June 2018	12
Hobart	Youth workshop 2 (online game co-design)	Aug 2018	13 (aged 18-26)
Hobart	Australian Antarctic Festival (stand and presentations)	Aug 2018	100
Hobart	Presentation of interim report to Tasmanian Polar Network	June 2019	2
Hobart	Connectivity index workshop with City of Hobart and Department of State Growth	July 2019	7
Hobart	Youth workshop 3 (online game co-design)	July 2019	16 (aged 18-26)
Hobart	Launch of ACYE competition	Aug 2019	N/A
Hobart	Survey 2 on residents' perceptions of Antarctica	July 2020	276
Punta Arenas	Urban and Antarctic experts' workshop (urban profiles + connectivity index) Event was opened by the Australian Ambassador to Chile and the Premier of the Region of Magallanes.	Nov 2017	34
Punta Arenas	Youth workshop (scenarios planning and online game)	Nov 2017	17 (aged 16-26)
Punta Arenas	Survey 1 on residents' perceptions of Antarctica	Dec 2017	300
Punta Arenas	Presentation of interim report at Universidad de Magallanes	June 2019	N/A
Punta Arenas	Launch of ACYE competition	Aug 2019	5
Punta Arenas	Survey 2 on residents' perceptions of Antarctica	July 2020	345
Ushuaia	Urban and Antarctic experts' workshop (urban profiles + connectivity index)	Sept 2019	37
Ushuaia	Launch of ACYE competition	Sept 2019	8
Ushuaia	Youth workshop 1 (online game)	Sept 2019	11 (aged 18-26)
Ushuaia	Survey on residents' perceptions of Antarctica	July 2020	353
Total			409

→ Research participant numbers at a glance

Activity	Participant Numbers
Youth workshops	
Cape Town (Oct 2019)	11
Christchurch (Oct 2017)	17
Hobart (April 2018, Aug 2018, July 2019)	47
Punta Arenas (Nov 2017)	17
Ushuaia (Sept 2019)	11
Subtotal	103
Urban and Antarctic expert workshops	
Christchurch (Oct 2017)	44
Hobart (July 2017, Oct 2017)	57
Punta Arenas (Nov 2017)	34
Ushuaia (Sept 2019)	11
Subtotal	146
Surveys on residents' perceptions of Antarctica	
Cape Town (2020)	388
Christchurch (2018 + 2020)	597
Hobart (2018 + 2020)	576
Punta Arenas (2017 + 2020)	645
Ushuaia (2020)	353
Subtotal	2559
Total	2808

→ Research participant numbers at a glance

Activity	Participant Numbers
Youth workshops	
Cape Town (Oct 2019)	11
Christchurch (Oct 2017)	17
Hobart (April 2018, Aug 2018, July 2019)	47
Punta Arenas (Nov 2017)	17
Ushuaia (Sept 2019)	11
Subtotal	103
Urban and Antarctic expert workshops	
Christchurch (Oct 2017)	44
Hobart (July 2017, Oct 2017)	56
Punta Arenas (Nov 2017)	34
Ushuaia (Sept 2019)	15
Subtotal	149
Surveys on residents' perceptions of Antarctica	
Cape Town (2020)	300
Christchurch (2018 + 2020)	600
Hobart (2018 + 2020)	600
Punta Arenas (2018 + 2020)	600
Ushuaia (2020)	300
Subtotal	2400
Total	2652

→ Overall number of participants in the project through workshops, surveys, competitions and expedition.

LOCATION	ACTIVITY	DATE	PARTICIPANT NUMBERS
Antarctica	Antarctic Youth Expedition (AYCE)	Feb 2020	N/A
Cape Town	Launch of AYCE competition	Aug 2019	N/A
Cape Town	Youth workshop (online game)	Oct 2019	11 (aged 18-26)
Cape Town	Survey of residents' perceptions of Antarctica	July 2020	300
Christchurch	Urban and Antarctic experts' workshop (urban profiles + connectivity index)	Oct 2017	44
Christchurch	Youth workshop (scenarios planning and online game)	Oct 2017	17 (aged 18-26)
Christchurch	Survey 1 on residents' perceptions of Antarctica	Apr- May 2018	300
Christchurch	Presentation of interim report to Christchurch City Council	Sept 2018	N/A
Christchurch	Launch of ACYE competition	Aug 2019	N/A
Christchurch	Presentation of interim report at University of Canterbury	Feb 2020	N/A
Christchurch	Survey 2 of residents' perceptions of Antarctica	July 2020	300
Hobart	Urban and Antarctic experts' workshop 1 (urban profiles + connectivity index)	July 2017	40
Hobart	Urban and Antarctic experts' workshop 2 (urban profiles + connectivity index)	Oct 2017	17
Hobart	Youth workshop 1 (scenarios planning and online game)	April 2018	18 (aged 18-26)
Hobart	Survey 1 on residents' perceptions of Antarctica	Apr- May 2018	300
Hobart	Launch of children's photo exhibition	June 2018	N/A
Hobart	Youth workshop 2 (online game co-design)	Aug 2018	13 (aged 18-26)
Hobart	Australian Antarctic Festival (stand and presentations)	Aug 2018	N/A
Hobart	Presentation of interim report to Tasmanian Polar Network	June 2019	N/A
Hobart	Connectivity index workshop with City of Hobart and Department of State Growth	July 2019	7
Hobart	Youth workshop 3 (online game co-design)	July 2019	16 (aged 18-26)
Hobart	Launch of ACYE competition	Aug 2019	N/A
Hobart	Survey 2 on residents' perceptions of Antarctica	July 2020	300
Punta Arenas	Urban and Antarctic experts' workshop (urban profiles + connectivity index). Event was opened by the Australian Ambassador to Chile and the Premier of the Region of Magallanes.	Nov 2017	34
Punta Arenas	Youth workshop (scenarios planning and online game)	Nov 2017	17 (aged 16-26)
Punta Arenas	Survey 1 on residents' perceptions of Antarctica	Dec 2017	300
Punta Arenas	Presentation of interim report at Universidad de Magallanes	June 2019	N/A
Punta Arenas	Launch of ACYE competition	Aug 2019	N/A
Punta Arenas	Survey 2 on residents' perceptions of Antarctica	July 2020	300
Ushuaia	Urban and Antarctic experts' workshop (urban profiles + connectivity index)	Sept 2019	15
Ushuaia	Launch of ACYE competition	Sept 2019	N/A
Ushuaia	Youth workshop 1 (online game)	Sept 2019	11 (aged 18-26)
Ushuaia	Survey on residents' perceptions of Antarctica	July 2020	300
	Total		2653

Appendix 3. Media Strategy

In 2018 we developed the project website and a Twitter account which as of today has 500 followers. A discussion forum was developed on the project website in August 2019 during the testing stage, where workshop participants were invited to discuss and provide feedback on the game. This was followed by a draft social media strategy where aspects of the project were divided into four groups for posts:

The Antarctic Cities Youth Expedition (ACYE)

Images and updates from The Antarctic Cities Youth Expedition (ACYE) and updates on the formation of The Antarctic Youth Coalition (AYC). The posts included images of the selected representatives, their video applications, live updates from the expedition, and an Instagram live series called AYC Live Sessions. A specific Instagram Account and Facebook page was subsequently created by the AYC, which is being moderated and managed by the five ACYE representatives.

The Antarctic Cities Youth Expedition to Antarctica from 12-19 February, led by Juan Francisco Salazar and Elizabeth Leane (University of Tasmania) as part of the Antarctic Cities and the Global Commons: Rethinking

the Gateways ARC Linkage Project, received widespread coverage within Australia and internationally including multiple interviews for Hobart representative Chloe Power on ABC Radio upon her return from the trip. The 2020 coverage of the research concluded with an article in The Conversation on 1 December, Antarctica Day, sharing findings from the project.

The Game: Images and interactive media from the Antarctic Futures game in the form of screenshots, Instagram stories and mini quizzes.

2. General Antarctic 2. Project Updates

The key platforms used were Twitter and Instagram based on popularity and the project's focus on youth engagement. While a weekly postiWWng schedule was designed initially, most content was posted in an organic fashion as new events or updates took place.

A Discord server was also set up for the Antarctic Futures game.

Media Coverage 2017 to 2020

There was wide media coverage of the project with many of the interviews handled by Juan Francisco Salazar, with Elizabeth Leane, Liam Magee, Paul James, Elías Barticevic, Daniela Liggett, Chloe Lucas, and Gabriela Roldán contributing, along with the Youth Ambassadors: Chloe Power, Katia Macías, Caleb Fraser, Florencia Garro, and Rudzani Silima.

→ Detailed coverage of the Antarctic Cities Youth Expedition 2020

LOCATION	MEDIA	DATE
Australia national	Press, the Conversation, Five cities that could change the future of Antarctica, https://theconversation.com/five-cities-that-could-change-the-future-of-antarctica-	October 2016
Hobart	Press, University of Tasmania, Antarctic Cities project underway, https://www.media.utas.edu.au/general-news/all-news/antarctic-cities-project-underway	July 2017
Tasmania	Broadcast, Southern Cross Tasmania, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Sydney	Broadcast, ABC news Sydney—News, The World and Evenings programs, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Melbourne	Broadcast, ABC news - Melbourne, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Regional NSW	Broadcast, ABC news—regional NSW, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Brisbane	Broadcast, ABC news - Brisbane, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Adelaide	Broadcast, ABC news - Adelaide, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Perth	Broadcast, ABC news - Perth, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Regional Queensland	Broadcast, ABC news—Regional QLD, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Hobart	Broadcast, ABC news - Hobart, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Canberra	Broadcast, ABC news - Canberra, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Regional Victoria	Broadcast, ABC news—Regional Victoria, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017
Regional West Australia	Broadcast, ABC news—Regional WA, interview about the launch of the Antarctic Cities ARC project investigating the role of gateway cities to Antarctica	July 2017

LOCATION	MEDIA	DATE
Australia national	Press, ABC, How does Hobart fare in battle to be 'gateway to Antarctica?' https://www.abc.net.au/news/2017-07-05/international-competition-to-be-gateway-to-antarctica/8679924	July 2017
UAE national	Press, Dotemirates: How does Hobart fare in battle to be 'gateway to Antarctica?'	July 2017
Virgin Island national	Press, Angle Press: How does Hobart fare in battle to be 'gateway to Antarctica?'	July 2017
Vietnam national	Press, OIA News: How does Hobart fare in battle to be 'gateway to Antarctica?'	July 2017
USA national	Press, Capital Bay: How does Hobart fare in battle to be 'gateway to Antarctica?'	July 2017
Hobart	Radio, ABC Radio Hobart, How does Hobart compare as a gateway city to Antarctica? Transport lets us down, https://www.abc.net.au/radio/hobart/programs/breakfast/hobart-gateway-city/8675848	July 2017
Hobart	Press, The Mercury, New-found Antarctic Appreciation,	July 2017
Hobart	Press, Hobart Observer, Opening the gate to the Antarctic,	August 2017
Dunedin	Press, Campus Review, Pan continental project seeks to break Antarctic ice, https://www.dropbox.com/home/Antarctic per cent20Cities	November 2017
Punta Arenas	Press, La Prensa Austral, Investigan el desafío de reimaginar el rol de las ciudades puertas de entrada a la Antártica / Investigating the challenge of reimagining the role of the Antarctic gateway cities, https://laprensaaustral.cl/ciencia/investigan-el-desafio-de-reimaginar-el-rol-de-las-ciudades-puertas-de-entrada-a-la-antartica/	November 2017
Punta Arenas	Press, La Prensa Austral "Aquí existe una alta conciencia de la Antártica" / "A high consciousness of Antarctica exists here", https://laprensaaustral.cl/cronica/aqui-existe-una-alta-conciencia-de-la-antartica/	November 2017
Viña del Mar	Press, Centro de estudios hemisfericos y polares newsletter, Antarctic gateway cities workshops	December 2017
Hobart	Radio, ABC Radio Hobart, Associate Professor Juan Francisco was interviewed on ABC Radio Hobart's 'Breakfast' program about the Antarctic Cities and the Global Commons project—which is reimagining gateways to the Antarctic,	April 2018
Australia national	Press, Crikey, Professor Juan Francisco Salazar will present "Life in Antarctica: mediations, speculations, ethnographies" at the University of Sydney, https://www.crikey.com.au/2018/09/14/worm-wentworth-dave-sharma/	September 2018
Australia national	Radio, ABC Radio National, ABC Radio National interviewed Professor Paul James who discussed a research project supporting the stewardship of the Antarctic region by five key stakeholders,	January 2019
Canada national	Radio, CBC Radio One 1230AM (CFFB), CBC Radio One 88.5FM (CBME), CBC Radio One 91.5FM (CBO), CBC Radio One 1140AM (CBI) and CBC Radio One 1400AM (CBG), syndication of ABC radio interview with Professor Paul James who discussed a research project supporting the stewardship of the Antarctic region by five key stakeholders	January 2019
Punta Arenas	Press, El Mostrador, Antropología de los hielos: investigadora estudiará por primera vez si existe una identidad antártica / Anthropologist of the ice: researcher studies for the first time whether an Antarctic identity exists, https://www.elmostrador.cl/cultura/2019/05/28/antropologia-de-los-hielos-investigadora-estudiara-por-primera-vez-si-existe-una-identidad-antartica/	May 2019

LOCATION	MEDIA	DATE
Chile national	Press, Chilean Antarctic Institute, "Mi interés es saber si existe una identidad antártica" / "My interest is to know if an Antarctic identity exists", http://www.inach.cl/inach/?p=26702	May 2019
Hobart	Radio, ABC Radio Hobart, https://www.abc.net.au/radio/hobart/programs/breakfast/are-you-18-to-29-live-in-hobart-and-want-to-go-to-antarctica/11365178	July 2019
Chile national	Press, Chilean Antarctic Institute, "Creo que las ciencias sociales tienen un rol muy importante que hacer al estudio de la Antártica" / "I believe that the social sciences have a very important role to play in the study of Antarctica", http://www.inach.cl/inach/?p=26968	July 2019
San Antonio	Press, Canal 2, Proyecto liderado por un antropólogo chileno está replanteando el rol que cumplen las ciudades más cercanas al Continente Blanco / Project led by a Chilean anthropologist is rethinking the role played by the cities closest to the white continent, http://www.cablenoticias.cl/2019/07/15/proyecto-liderado-por-un-antropologo-chileno-esta-replanteando-el-rol-que-cumplen-las-ciudades-mas-cercanas-al-continente-blanco/	July 2019
Punta Arenas	Press, Radio Magallanes, "Creo que las ciencias sociales tienen un rol muy importante que hacer al estudio de la Antártica" / "I believe that the social sciences have a very important role to play in the study of Antarctica", http://www.radiomagallanes.cl/noticia.php?id_not=87120	July 2019
Punta Arenas	Press, Radio Polar, "Creo que las ciencias sociales tienen un rol muy importante que hacer al estudio de la Antártica" / "I believe that the social sciences have a very important role to play in the study of Antarctica", http://www.radiopolar.com/noticia_151321.html	July 2019
Chile national	Press, Chilean Library of Congress, Gabriela Roldán: "En Nueva Zelandia hay una fuerte actividad de educación antártica" / Gabriela Roldan: "In New Zealand there is strong Antarctic education", https://www.bcn.cl/observatorio/asiapacifico/noticias/gabriela-roldan-ciudades-antarticas-christchurch	July 2019
South Africa national	Press, Antarctic Legacy of South Africa, South African to join Antarctic Cities Youth Expedition 2019, https://blogs.sun.ac.za/antarcticlegacy/2019/08/30/south-african-to-join-antarctic-cities-youth-expedition-2019/	August 2019
Ushuaia	Press, Sur54.com, Sur54 reports on the Antarctic Cities Youth Expedition which will take one young person from each gateway city to Antarctica in December 2019 as part of the Institute for Culture and Society's Antarctic Cities and the Global Commons ARC project	August 2019
Hobart	Press, University of Tasmania, Hobart woman wins once in a lifetime trip, https://www.imas.utas.edu.au/news/news-items/hobart-woman-wins-once-in-a-lifetime-antarctic-trip	July 2019
Hobart	Press, The Mercury, Chloe on an ice date to Antarctica, https://www.themercury.com.au/subscribe/news/young-imas-scientist-chloe-power-one-of-five-globally-to-advocate-for-antarctica-as-part-of-the-antarctic-cities-youth-expedition	September 2019
Melbourne	Press, The Herald Sun, Chloe on an ice date to Antarctica, https://www.themercury.com.au/subscribe/news/young-imas-scientist-chloe-power-one-of-five-globally-to-advocate-for-antarctica-as-part-of-the-antarctic-cities-youth-expedition	September 2019
Brisbane	Press, The Courier Mail, Chloe on an ice date to Antarctica, https://www.themercury.com.au/subscribe/news/young-imas-scientist-chloe-power-one-of-five-globally-to-advocate-for-antarctica-as-part-of-the-antarctic-cities-youth-expedition	September 2019
Geelong	Press, The Geelong Advertiser, Chloe on an ice date to Antarctica, https://www.themercury.com.au/subscribe/news/young-imas-scientist-chloe-power-one-of-five-globally-to-advocate-for-antarctica-as-part-of-the-antarctic-cities-youth-expedition	September 2019
Darwin	Press, The NT News, Chloe on an ice date to Antarctica, https://www.themercury.com.au/subscribe/news/young-imas-scientist-chloe-power-one-of-five-globally-to-advocate-for-antarctica-as-part-of-the-antarctic-cities-youth-expedition	September 2019

LOCATION	MEDIA	DATE
Adelaide	Press, The Advertiser, Chloe on an ice date to Antarctica, https://www.themercury.com.au/subscribe/news/young-imas-scientist-chloe-power-one-of-five-globally-to-advocate-for-antarctica-as-part-of-the-antarctic-cities-youth-expedition	September 2019
Sydney	Press, The Daily Telegraph, Chloe on an ice date to Antarctica, https://www.themercury.com.au/subscribe/news/young-imas-scientist-chloe-power-one-of-five-globally-to-advocate-for-antarctica-as-part-of-the-antarctic-cities-youth-expedition	September 2019
Cairns	Press, Cairns Post, Chloe on an ice date to Antarctica, https://www.themercury.com.au/subscribe/news/young-imas-scientist-chloe-power-one-of-five-globally-to-advocate-for-antarctica-as-part-of-the-antarctic-cities-youth-expedition	September 2019
Ushuaia	Press, El Diario del Fin de Mundo, Se realizan en Ushuaia talleres sobre el rol de las ciudades antárticas / Workshops are held in Ushuaia about the role of Antarctic cities, https://www.eldiariodelfindelmundo.com/noticias/2019/09/20/83730-se-realizan-en-ushuaia-talleres-sobre-el-rol-de-las-ciudades-antarticas	September 2019
Ushuaia	Press, La Contratapa, Se realizan en Ushuaia talleres sobre el rol de las ciudades antárticas / Workshops are held in Ushuaia about the role of Antarctic cities, https://lacontratapatdf.com/nota/665/se-realizan-en-ushuaia-talleres-sobre-el-rol-de-las-ciudades-antarticas/	September 2019
Ushuaia	Press, Critica Sur, Vuoto recibió a la investigadora especialista en ciudades puerta de entrada a la Antártida / Vuoto receives specialist researcher in Antarctic gateway cities, https://criticasur.com.ar/nota/21119/vuoto-recibio-a-la-investigadora-especialista-en-ciudades-puerta-de-entrada-a-la-antartida/	September 2019
Christchurch	Press, University of Canterbury, Canterbury student heads to Chile, Antarctica to join Youth Expedition, https://www.canterbury.ac.nz/news/2019/canterbury-student-heads-to-chile-antarctica-to-join-youth-expedition.html	October 2019
Christchurch	Press, Scoop Independent News, Canterbury student heads to Chile, Antarctica, https://www.scoop.co.nz/stories/ED1910/S00009/canterbury-student-heads-to-chile-antarctica.htm	October 2019
Ushuaia	Press, Critica Sur, Florencia Garro, la fueguina elegida para un proyecto internacional en la Antártida / Florencia Garro, the Fuegian chosen for an international project in Antarctica, https://criticasur.com.ar/nota/23151/florencia-garro-la-fueguina-elegida-para-un-proyecto-internacional-en-la-antartida	January 2020
Ushuaia	Press, Critica Sur, Elegida para proyecto en la Antártida: funcionarios municipales recibieron a Florencia Garro / Chosen for a project in Antarctica: council workers received Florencia Garro, https://criticasur.com.ar/nota/23228/elegida-para-proyecto-en-la-antartida-funcionarios-municipales-recibieron-a-florencia-garro/	January 2020
Sydney	Press, Western Sydney university, Research sends five young people on expedition to care for Antarctica's future, https://www.westernsydney.edu.au/newscentre/news_centre/more_news_stories/research_sends_five_young_people_on_expedition_to_care_for_antarcticas_future	February 2020
Chile national	Press, Chilean Ministry of Foreign Affairs, Jóvenes de ciudades antárticas culminan exitosa experiencia en el continente blanco / Youth from the Antarctic Cities conclude a successful experience in the white continent, https://minrel.gob.cl/jovenes-de-ciudades-antarticas-culminan-exitosa-experiencia-en-el-minrel/2020-02-21/114406.html	February 2020
Punta Arenas	Press, Overjero Noticias, Impregnados del «espíritu antártico» retornan jóvenes líderes de las cinco ciudades puertas de entrada a la Antártica / Young leaders from the five gateway cities return full of Antarctic spirit, https://www.ovejeronoticias.cl/2020/02/impregnados-del-espirtu-antartico-retornan-jovenes-lideres-de-las-cinco-ciudades-puertas-de-entrada-a-la-antartica/	February 2020

LOCATION	MEDIA	DATE
Puerto Varas	Press, Grafelbergnoticias, Empapados del espíritu antártico retornan jóvenes líderes de las cinco ciudades puertas de entrada al Continente Blanco / Young leaders from the five gateway cities return saturated in Antarctic spirit, http://grafelbergnoticias.blogspot.com/2020/02/empapados-del-espiritu-antartico.html	February 2020
Santiago/Puerto Montt	Press, Aqua, Jóvenes de ciudades antárticas culminan exitosa experiencia en el continente blanco / Youth from the Antarctic cities conclude a successful experience in the white continent, https://www.aqua.cl/2020/02/21/jovenes-de-ciudades-antarticas-culminan-exitosa-experiencia-en-el-continente-blanco/#	February 2020
Punta Arenas	Press, La Prensa Austral, Cinco jóvenes de las “ciudades puerta de entrada a la Antártica” llegaron a Punta Arenas tras su expedición al continente helado / Five youth from the “Antarctic gateway cities” arrive in Punta Arenas after their expedition to the frozen continent, https://laprensaaustral.cl/cronica/cinco-jovenes-de-las-ciudades-puerta-de-entrada-a-la-antartica-llegaron-a-punta-arenas-tras-su-expedicion-al-continente-helado/	February 2020
Punta Arenas	Press, El Pingüino, Jóvenes buscan crear un Foro Juvenil Antártico Internacional / Youth seek to create an international Antarctic Youth Forum, https://elpinguino.com/noticia/2020/02/21/jovenes-buscan-crear-un-foro-juvenil-antartico-internacional	February 2020
Punta Arenas	Press, Radio Magallanes, Empapados del espíritu antártico retornan jóvenes líderes de las cinco ciudades puertas de entrada al Continente Blanco / Young leaders from the five gateway cities return saturated in Antarctic spirit, http://www.radiomagallanes.cl/noticia.php?id_not=89780	February 2020
Viña del Mar	Press, Radio Festival, Empapados del espíritu antártico retornan jóvenes líderes de las cinco ciudades puertas de entrada al Continente Blanco / Young leaders from the five gateway cities return saturated in Antarctic spirit, https://www.radiofestival.cl/empapados-del-espiritu-antartico-retornan-jovenes-lideres-de-las-cinco-ciudades-puertas-de-entrada-al-continente-blanco/	February 2020
Chile national	Press, Ciencia en Chile, Empapados del espíritu antártico retornan jóvenes líderes de las cinco ciudades puertas de entrada al Continente Blanco / Young leaders from the five gateway cities return saturated in Antarctic spirit, http://www.cienciaenchile.cl/empapados-del-espiritu-antartico-retornan-jovenes-lideres-de-las-cinco-ciudades-puertas-de-entrada-al-continente-blanco/	February 2020
Chile national	Press, Diario TV, Jóvenes de ciudades antárticas culminan exitosa experiencia en el continente blanco / Youth from the Antarctic cities conclude a successful experience in the white continent, http://diariotv.cl/jovenes-de-ciudades-antarticas-culminan-exitosa-experiencia-en-el-continente-blanco/	February 2020
Punta Arenas	Press, Radio Polar, Empapados del espíritu antártico retornan jóvenes líderes de las cinco ciudades puertas de entrada al Continente Blanco / Young leaders from the five gateway cities return saturated in Antarctic spirit, http://radiopolar.com/noticia_155659.html	February 2020
Punta Arenas	Press, PatagoniaD, Jóvenes de ciudades antárticas culminan exitosa experiencia en el continente blanco / Youth from the Antarctic cities conclude a successful experience in the white continent, http://patagoniad.com/2020/02/23/retornan-jovenes-lideres-de-las-cinco-ciudades-puertas-de-entrada-al-continente-blanco/	February 2020
Chile national	Press, EPA News, Empapados del espíritu antártico retornan jóvenes líderes de las cinco ciudades puertas de entrada al Continente Blanco / Young leaders from the five gateway cities return saturated in Antarctic spirit, https://epanews.cl/magallanes-empapados-del-espiritu-antartico-retornan-jovenes-lideres-de-las-cinco-ciudades-puertas-de-entrada-al-continente-blanco/	February 2020
Chile national	Press, Diario Sustentable, Empapados del espíritu antártico retornan jóvenes líderes de las cinco ciudades puertas de entrada al Continente Blanco / Young leaders from the five gateway cities return saturated in Antarctic spirit, https://www.diariosustentable.com/2020/02/empapados-del-espiritu-antartico-retornan-jovenes-lideres-de-las-cinco-ciudades-puertas-de-entrada-al-continente-blanco/	February 2020

LOCATION	MEDIA	DATE
Punta Arenas	Broadcast, TVN Red Austral, https://www.facebook.com/redaustral/videos/485516468803608/?v=485516468803608 (at 20:20)	February 2020
Punta Arenas	Broadcast, ITV Patagonia, https://www.youtube.com/watch?v=4egtEY8jzPsandfeature=youtu.be	February 2020
Punta Arenas	Broadcast, El Pingüino TV, https://www.youtube.com/watch?v=4GecXvnLIUandfeature=youtu.be (at 9:04)	February 2020
Punta Arenas	Broadcast, social media page—the Intendencia Región de Magallanes y Antártica Chilena, https://www.facebook.com/watch/?v=248095752875528	February 2020
Sydney	Radio, 2SER Radio, 2SER radio interviews Professor Juan Francisco Salazar on the Antarctic Cities Youth Expedition and current challenges faced by Antarctica, including warming of the continent, https://2ser.com/sending-5-young-people-to-antarctica-antarctic-cities-youth-expedition/	February 2020
Sydney	Radio, 2SER Radio, 2SER radio interviews Chloe Power, the young leader from Hobart, about the Antarctic Cities Youth Expedition and the plans for the project to develop an Antarctic Youth Coalition, https://2ser.com/young-hobart-scientist-returns-from-antarctic-expedition/	February 2020
Australia national	Radio, SBS Spanish Radio, https://www.sbs.com.au/language/spanish/audio/proyecto-envia-a-5-jovenes-a-la-antartida	February 2020
Newcastle	Radio, ABC 1223 Newcastle	February 2020
Australia national	Radio, ABC Radio National, ABC Radio National Life Matters interviews Chloe Power, the young leader from Hobart, about the Antarctic Cities Youth Expedition and the plans for the project to develop an Antarctic Youth Coalition, https://www.abc.net.au/radionational/programs/lifematters/taking-care-of-antarctica-one-city-at-a-time/11998446	February 2020
Launceston	Press, The Examiner, Five young people on research expedition to Antarctica to discuss its future, https://www.examiner.com.au/story/6611141/young-people-on-research-expedition-to-antarctica/	February 2020
Punta Arenas	Press, La Prensa Austral, Profesora de Inglés representará a Magallanes en Foro Juvenil de Ciudades Antárticas / English teacher will represent the Magallanes in Youth Antarctic Cities Forum, https://laprensaaustral.cl/cronica/profesora-de-ingles-representara-a-magallanes-en-foro-juvenil-de-ciudades-antarticas/	February 2020
Ushuaia	Press, Critica Sur, La fueguina Florencia Garro completó su paso por la expedición juvenil a la Antártida / Fuegian Florencia Garro completed her step for the youth expedition to Antarctica, https://criticasur.com.ar/nota/23626/la_fueguina_florencia_garro_completo_su_paso_por_la_expedicion_juvenil_a_la_antartida/	February 2020
Punta Arenas	Press, social media - MiraLop, https://www.facebook.com/miralop.cl/posts/2524024634537477/	February 2020
Christchurch	Press, Off Ice—Christchurch Antarctic Office, Gateway cities youth expedition to Antarctica,	March 2020
Hobart	Radio, ABC Radio Hobart, 936 ABC Hobart interviews young Hobart representative, Chloe Power, about the recent Antarctic Cities Youth Expedition	March 2020
Christchurch	Press, ChristchurchNZ, From Bali to Antarctica, https://www.christchurchnz.com/news/from-bali-to-antarctica	May 2020
Hobart	Podcast, Cambridge Science and Policy (University of Cambridge), Science & Policy for Antarctica, Space, and the Deep Ocean: Human Experience. Available via Google Podcasts	April 2021

→ Detailed coverage of the Antarctic Cities Youth Expedition 2020

DATE	MEDIA	DETAILS	ESTIMATED POTENTIAL REACH
3 February	The Examiner—online and print	Article: 'Five young people on research expedition to Antarctica to discuss its future' Juan Francisco Salazar and Elizabeth Leane are quoted	48,000 (print) 97,364 (online)
7 February	SBS Spanish Radio	Interview with Juan Francisco Salazar	Unknown
8 February	2SER	Interview with Juan Francisco Salazar	10,176
25-29 February and 20 March		Interviews with Chloe Power	Newcastle: 15,000 Life Matters: 409,990 for online version (broadcast unknown) 2SER: 10,176 Hobart: 44,200
3-25 February	Chilean coverage: online by The Ministry of Foreign Affairs, Ovejero Noticias, Grafelbergnoticias, Aqua, La Prensa Austral, Radio Magallanes, El Pinguino, Radio Festival, Ciencia en Chile, Diario TV, Radio Polar, Patagonia D, EPA News, Diario Sustentable, and broadcast by TVN Red Austral, ITV Patagonia, El Pingüino TV, Redes Sociales Intendencia Región de Magallanes y Antártica Chilena	Coverage of the expedition and research	La Prensa Austral: 156,535 Radio Magallanes: 8,568 El Pinguino: 80,948 Aqua: 53,067 Grafelbergnoticias: 1,538
17 September	The Daily Telegraph. syndicated to The Advertiser, The Mercury, Ntnews.com.au, Herald Sun, The Courier-Mail, Geelong	Coverage on the findings	The Daily Telegraph: 3,263,485 7 syndications: 7,623,582
3 February	The Examiner—online and print	Article: 'Five young people on research expedition to Antarctica to discuss its future' Juan Francisco Salazar and Elizabeth Leane are quoted	48,000 (print) 97,364 (online)
7 February	SBS Spanish Radio	Interview with Juan Francisco Salazar	Unknown
8 February	2SER	Interview with Juan Francisco Salazar	10,176
25-29 February and 20 March	Four separate radio interviews: 1233 ABC Newcastle, ABC Radio National Life Matters, 2SER, 936 ABC Hobart. Syndicated nationally to ABC stations.	Interviews with Chloe Power	Newcastle: 15,000 Life Matters: 409,990 for online version (broadcast unknown) 2SER: 10,176 Hobart: 44,200

DATE	MEDIA	DETAILS	ESTIMATED POTENTIAL REACH
3-25 February	Chilean coverage: online by The Ministry of Foreign Affairs, Ovejero Noticias, Grafelbergnoticias, Aqua, La Prensa Austral, Radio Magallanes, El Pinguino, Radio Festival, Ciencia en Chile, Diario TV, Radio Polar, Patagonia D, EPA News, Diario Sustentable, and broadcast by TVN Red Austral, ITV Patagonia, El Pingüino TV, Redes Sociales Intendencia Región de Magallanes y Antártica Chilena	Coverage of the expedition and research	La Prensa Austral: 156,535 Radio Magallanes: 8,568 El Pinguino: 80,948 Aqua: 53,067 Grafelbergnoticias: 1,538
17 September	The Daily Telegraph. Syndicated to The Advertiser, The Mercury, Ntnews.com.au, Herald Sun, The Courier-Mail, Geelong	Coverage on the findings	The Daily Telegraph: 3,263,485 7 syndications: 7,623,582
		Advertiser, Cairns Post	
19-26 November	Chilean coverage: La Prensa Austral, El Pinguino, Radio Polar	Coverage of the youth coalition and research	La Prensa Austral: 201,365 El Pinguino: 138,524 Radio Polar: 71,896
1 December	The Conversation	'Custodians of Antarctica: how 5 Gateway Cities are embracing the icy continent' by Juan Francisco Salazar, Elizabeth Leane and Katie Marx (University of Tasmania), Liam Magee, Marina Khan, Paul James	Actual reads: 5,100 (as at 30 April 2021—via The Conversation)

Appendix 3.

Antarctic Youth Coalition Strategy

AUTHORS: KATIE MARX, CALEB FRASER, KATIA MACÍAS, CHLOE POWER, FLORENCIA GARRO, RUDZANI SILIMA, ELIZABETH LEANE, JUAN FRANCISCO SALAZAR

Antarctic youth coalition cities connecting through Antarctica

Strategic Overview

We are a membership-based organisation for people living in the Antarctic gateway cities of Cape Town (South Africa), Christchurch (New Zealand), Hobart (Australia), Punta Arenas (Chile) and Ushuaia (Argentina). The Antarctic Youth Coalition is youth-led and youth-focused; however, we welcome support from people of all ages.

Our Vision

We want cities to come together to embrace the values of Antarctica for the protection of our shared futures.

Our Mission

To build a network of young custodians across the five Antarctic gateway cities, advocating for Antarctica's future by promoting sustainable communities and connected urban identities.

Our focus

Our focus is the five Antarctic cities and the young people who live within them. We believe that by activating and empowering Antarctic youth we can create a sustainable future for Antarctica and the southern parts of the world.

Antarctic values

1 → International Cooperation and Collaboration

King George Island is a clear example of people from different cities and countries coming together to work towards a common goal - understanding Antarctica and the role it plays in our planet. We visited, participated in scientific work, and learnt from people at a Chilean, Russian, Korean and Uruguayan base. Science between these bases was shared, allowing their work to contribute to a better understanding of Antarctica and a better future for the continent.

We want to bring this value back to our cities, maintaining communication between the gateways and sharing ideas on how together, we can act as custodians for Antarctica to protect the future that we share.



“We want cities to come together to embrace the values of Antarctica for the protection of our shared futures.” Below are some values that we observed on our founding expedition to King George Island/ Isla 25 de Mayo and that capture the overall spirit of the Antarctic. We believe our cities can learn from these values and apply them to create a more connected, sustainable future.



2 → Care and Protection of our Environment

'Take only memories, leave nothing but footprints' is a mantra that applies strongly to Antarctica, the most pristine and fragile environment on planet Earth. Being respectful to the environment around us was critical. However, our world is connected; our actions in our home cities can, and do impact the condition of the Antarctic environment. In order to effectively care for and protect Antarctic ecosystems, sustainable practices need to extend beyond what we do in Antarctica and into what we do in our everyday lives.

3 → Science and Learning

Since the signing of the Antarctic Treaty in 1959, Antarctica has been a continent dedicated to scientific research. This science has led to many breakthroughs in the understanding of our planet and our changing climate. However, the purpose and benefits of valuing science in Antarctica can only be maintained through effective science communication and education in our cities. We want to make sure this science is clear, informative and accessible. Sometimes science and thus the importance of our connection to Antarctica, can be filled with jargon and overwhelming amounts of words on a page. We hope to encapsulate the scientific values of the Antarctic by ensuring that science, our connections to Antarctica, and the role we play as custodians are effectively shared with our cities and youth.



Strategic goals and objectives

→ Strategic goals

SG1 → BUILD YOUTH ENGAGEMENT NETWORKS IN THE FIVE GATEWAY CITIES

SG2 → CREATE NEW CONNECTIONS BETWEEN THESE ANTARCTIC CITIES

SG3 → FOSTER A SENSE OF ANTARCTIC CUSTODIANSHIP IN THESE CITIES

The following strategic goals and objectives have been designed to guide our coalition through the first 3 years of its mission.

OBJECTIVE 1A

Grow membership, source funding and develop organisational structure.

OBJECTIVE 1B

Form an online community in which members can interact and information can be shared.

SUCCESS INDICATOR 1

A) Formation of developed and effectively functioning, city-based memberships that are overseen by an international leadership team.

B) Evidence that the Antarctic Youth Coalition is recognised and supported by stakeholders and youth in the gateway cities.

OBJECTIVE 2A

Host international events across the cities.

OBJECTIVE 2B

Design a common visual identity across cities.

OBJECTIVE 2C

Create a series of online short stories on Antarctic cities and Antarctic values.

SUCCESS INDICATOR 2

Evidence of any strengthened social, cultural, ecological or political links established and acknowledged in the gateway cities.

OBJECTIVE 3A

Incorporate Indigenous stories, knowledges and draw from principles of caring for land/territory/ country.

OBJECTIVE 3B

Encourage sustainable urban practices in our cities.

OBJECTIVE 3C

Design an education and communication strategy including bilingual materials for engaging a range of communities.

SUCCESS INDICATOR 3

Interaction with our membership indicating an increased understanding of what it means to be a custodian and an increase in their sustainable practices.

Appendix 4. Antarctic Futures Resource Pack

AUTHORS: MARINA KHAN AND ANDREA POLLIO

Introduction

Antarctic Futures is a serious game developed as a part of the Antarctic Cities project.

The game is an educational research output of the project. It translates the complexity of understanding future climate scenarios for Antarctica and the world into a playable experience.

The development of the game through participatory co-design served as an important methodological tool for engaging young people as key actors in issues surrounding environmental change. The scenarios players encounter in the game allow them to experience first-hand how different policy responses to climate issues affect the future of our planet.

The game is web-based and designed for relatively short group or individual player experiences. It is loosely modelled on a successful game, Plague Inc., but focuses on short, casual play - ideal for classrooms or workshops, where it can act as a stimulus to discussion, debate and reflection.

Overview

The aim of Antarctic Futures is to communicate the complexity of global climate issues and their responses to the wider audience by encouraging players to reflecting upon the following key aspects:

Policy: Players develop a policy platform based on global economic, political, cultural and ecological interests. Some of these interests' conflict, and players will need to think about what a coherent policy platform looks like.

Crisis Management: Players respond to global environmental crises and increase the world's preparedness to minimise the risk and impact of further crises.

Decision-making: Players make critical policy investment decisions based on environmental events and track their effects on the world.

Theoretical Underpinnings

Antarctic Futures and its development through participatory co-design has been conceived as a “boundary object” (Van Pelt, et al., 2015), in that it engages multiple stakeholders, disciplines, institutions and fields. In allowing knowledge translation and public communication through gameplay, Antarctic Futures connects multiple social worlds and facilitates a space for critical discourse between a variety of stakeholders, including researchers, youth, industry partners and policy makers.

Antarctic Futures draws upon the work of Rintoul, et al. (2018) that uses climate scenarios to consider and discuss plausible alternative futures for Antarctica and resulting effects on the world over the next 50 years. The timescale of the game allows players to consider and reflect upon how choices made today will play out over a 50-year trajectory. While the outcome is shaped by the perspective of a single player, the game acknowledges and incorporates diverse play approaches keeping in mind the diversity in human experiences and values. The organisation of policies is adapted from a model of social sustainability put forward in *Urban Sustainability: From Theory to Practice* (James, et al., 2015).

Methodology

Antarctic futures is embedded in the Circles of Sustainability approach as an overarching methodology which offers an integrated method for practically responding to complex issues of sustainability, resilience, adaptation, and liveability.

In situating its position as a boundary object, Antarctic Futures was developed through participatory co-design and community consultations with scientists, policy-makers, practitioners, and young people from Antarctic Cities. Between 2017 and 2019 the project team ran a series of workshops in Hobart, Christchurch, Punta Arenas, Ushuaia and Cape Town. The co-design process also allowed us to test game design and usability across various stages of its development (ideation, prototyping, beta testing) in a variety of cultural, social and political contexts.

Learning Objectives

The goal of Antarctic Futures is to support the development of skills and capabilities ranging from scientific knowledge to critical thinking and reflexivity in diverse educational settings. These may include university or online courses, research methods workshops or team building activities to name a few. Some specific learning outcomes are outlined below.

Ecological Understanding

Antarctic Futures builds the player’s ability to communicate and apply key ecological concepts focusing on individuals, institutions, society, species and ecosystems. It also develops players’ understanding of how natural systems interface with social systems. The scenarios embedded in the game seek to evoke players’ environmental sensitivity in terms of responsible attitudes towards policy and environmental action. Players actively participate in environmental action through considering, recognizing and choosing between different value perspectives to resolve global problems.

Socio-Political Knowledge

Antarctic Futures develops players’ understanding and awareness of the interconnectedness between social, political, economic and ecological issues in shaping our environmental future. Players can experience first-hand how human cultural activities and societal systems are intertwined with and influence our environment.

Reflexivity

Reflexivity refers to the relationship between cause and effect, particularly in relation to human belief and value systems. Antarctic Futures provides players an opportunity to reflect and consider the consequences of their decisions not only throughout the game but also also post play when players can see a snapshot of the policies and strategies they adopted.

Critical and Creative Thinking

Critical and creative thinking involves the ability to recognize, establish and support decisions alongside generating new ideas and approaches to solve problems. Antarctic Futures requires players to constantly respond to the changing global environment. Players have to strategize and reason about complex situations and decisions that they are faced with. Players can also apply critical and creative thinking to achieve particular goals, or to embody specific personas within the game. See Section x for more details.

Environmentally Responsible Behaviours

The core mission of Antarctic Futures is to ‘save the world from an environmental catastrophe’. This requires players to practise environmentally responsible behaviours (REB) in policy selection, crisis management and decision making in the game. The locus is also placed on players personal ethics and social responsibility to bring change through their individual behaviours.

Aspects of the Game

Antarctic Futures engages players to consider and reflect upon four interconnected aspects that need to be managed simultaneously throughout the game. These include resource accumulation, policy selection, managing progress, and decision making.

Resource Accumulation

In order to build a successful policy platform, players must accumulate resources. Resources can be accumulated through effective crisis management. Crises are unexpected global events, occurring due to environmental loss. Throughout the game, players are faced with global crises that need urgent response. For every positive response to emerging crises, players will obtain resources that may be used to invest in future policies.

Decision making

Antarctic Futures prompts players to make critical decisions at various levels. Throughout the game, players will have to decide how to use limited resources towards competing policy goals. Players will also be faced with options for crisis management and will have to choose the most suitable solution for arising problems. These challenges encourage players to consider the consequences of their decisions and reflect on ethical action in a range of complex scenarios.

Policy

Following the Circles of Sustainability approach, the policy platform in Antarctic Futures guides the process of responding to complex problems and challenges associated with building long-term global sustainability. Here, sustainability is understood in relation to global economic, political, cultural, and ecological policies (Fig. 1). Players must accumulate and allocate sufficient resources to invest in effective policies based on the overall progress of the world.

Tracking progress

Beginning in 2019, the aim of Antarctic Futures is to build the right global policy platform to survive until the year 2070. Throughout the game, players will have the opportunity to monitor and track world progress and respond through investing in policies accordingly (Fig 3). Statistics on global progress will provide players an overview of remaining years, environmental loss, and global preparedness at any given point of time in the game. Players will also be able to view how specific countries are responding to selected policies and review global trends on loss and preparedness.

FIGURE 1: Antarctic Futures policy platform



Instructions

Aim of the game

The future of Antarctica and the future of the world are deeply connected. Players have to devise a policy strategy that will halt climate change and save Antarctica from environmental destruction. The aim of the game is to build the right policy platform to survive until the year 2070.

The Antarctic Futures interface appears as an interactive world map. The flickering green dots represent the Antarctic gateway cities of Hobart, Christchurch, Punta Arenas, Ushuaia and Cape town (Fig. 3).

In 2019, the global policy mission begins in Chile. Players have until 2070 to save the Antarctic continent. The aim is to invest in policies that will reduce the effect of climate change, arrest environmental loss, and increase resilience and preparedness of each country.



FIGURE 2: Welcome to Antarctic Futures



FIGURE 3: Antarctic Futures Interface

Tutorial

The tutorial provides a virtual overview of the interface and functionalities of Antarctic Futures. For first time players, we recommend beginning the game by selecting the tutorial option (Fig 2).

Collect Resources

The lilac icons below represent resources that can be used to build a policy platform. Click on them when they appear on the screen, and the resources will be added to your wallet. You can check the amount of resources you have on the bottom left side of your screen.



Invest in Policies

The Policy tab on the bottom left opens the policy menu (Fig 3). Here you can invest resources and build your strategy. Click on the different policy options to see how they will affect the world. Remember that not all policies are equally effective in each country. Your aim is to build a suite of policies that complement each other for the most effective outcome.



FIGURE 4: Build a policy platform – Economy

FIGURE 5: Track how the world is doing

Track how the world is doing

The Stats tab on the bottom right corner of the screen provides a global view of your progress and the effectiveness of your policy platform (Fig. 4). At any point in the game, you can click on Stats to check how much time has passed, the rate of environmental loss, and the extent of the world's preparedness. You can also check stats on loss and preparedness for each country and track global trends.



Keep an eye on the message bar at the top to be aware of unexpected events and adapt your policy strategy.

As the game progresses, red/green dots will start appearing on the world map. Red dots denote environmental loss and green dots represent preparedness.

Crisis Alert

Throughout the game, players will have to respond to crises arising around the world. Crises are unexpected events that occur due to environmental loss. Click on the red crisis icons shown below to slow the loss and increase the preparedness of the country to minimise the risk of further crises.

Some crises are more specific and are designed as quizzes (Fig. 5). Players have to choose between two options for the most effective solution. You can click on the embedded hyperlinks to learn more about these issues and support your choice. Click on the Antarctica icon to select your option. The game is automatically paused during crisis alerts so you can read about them, learn more through the embedded hyperlinks, and make a decision.



 **FIGURE 6:** Crisis Alert quiz

 **FIGURE 7:** Game Over screen

Game Over

The Game Over screen at the end of the game will provide information on how your policy platform performed over the years, significant events that occurred, and whether or not crises were managed effectively (Fig. 6). You can also review key indicators and trends, and a summary of the policies you chose. You will also have options to play again and try out a different policy strategy, provide feedback, and get involved in real world Antarctic issues by visiting the Antarctic Youth Coalition.



Settings

Start Game

The Start Game screen (Fig. 8) provides options for language (English/Español) level of difficulty (Easy/Medium/Difficult) to be selected at the start of the game. For first time players, we recommend starting with "Easy".



 **FIGURE 8:** Start Game screen

Sound

Use the  and  on the top left corner of the game interface to turn music on/off (Fig. 4).



Snapshot


The camera icon on the top left menu can be used to capture a snapshot of the game at any point. The image will be downloaded into your computer (Fig. 4).



Pace

You can pause or control the speed of the game by clicking on these buttons on the top right corner of your screen. The game is automatically paused during crisis alerts so you can read about them, learn more through the embedded hyperlinks, and make a decision (Fig. 4).



At any point in the game use the  button on the top left corner of the screen to adjust background colour, change language (English and Spanish) and choose your preferred country fill option.



Learn with Antarctic Futures

The collaborative nature of Antarctic Futures makes it a valuable educational resource that can be used in a variety of settings including but not limited to climate change, environmental policy and ecological sustainability.

Here are some examples of how the game can be used in different learning contexts:

Scenario 1 → Classroom

Students participate in guided play sessions facilitated by the teacher/tutor/instructor. The facilitator may begin the session by providing a quick tutorial through the game interface and choosing a level for the game. Depending on the size of the class, students may be divided into groups with a lead player or play the game individually on their own device for 10-15 minutes. Students may take notes on the following questions. Some of this information will appear on the game over screen.

- Which policies were selected or prioritised and why?
- Which policies were rejected and why?
- What was your % of preparedness at the halfway mark around 2045?
- At what point in the timeline did you reach 90% preparedness?
- What were the most challenging decisions you had to make?
- What were your loss/preparedness indicators at the end of the game?

Some points for a broader classroom discussion may include:

A discussion of key terms, concepts and documents such as 'moratorium', 'Antarctic treaty' and 'marine protected areas'.
A discussion of each of the policy groups and implications of individual policies
How digital simulation games like Antarctic Futures may/may not be useful in influencing human behaviours on issues of environment and climate change. How human cultural activity impacts our global environment. A discussion on the feedback form for future development of the game.

Further activities

Students can get involved in real world Antarctic issues by joining the Antarctic Youth Coalition. Students can provide feedback on the development of the game.

Assignments

Students may write a reflection on their play experience.
Students may write an essay incorporating one or multiple aspects of the game.
Students may design/develop their own version of the game

Scenario 2 → Ice-breaking session

Participants are divided into teams. The facilitator may begin the session by providing a quick tutorial through the game interface and choosing a level for the game. The teams nominate a lead player and engage in structured role play sessions, and make decisions in the game based on the role they are

→ Team building activity: types of targets and agendas that can be set. For example, the goal is to reach 80% preparedness to take action against climate change.

→ The facilitator explains that each team has to define a strategy in advance. To make a decision, the lead player pauses that game. Each team discusses what action/quiz answer to take. After the game, results are shared with the other teams.

Another possible ice-breaking activity is a role-playing session.

Each team is assigned a persona (e.g. climate change sceptic, environmentalist, etc.) and the lead player plays the game according to how the character would play. For example, a climate change sceptic will try to maximize resources, whilst an environmentalist would try to invest in climate friendly policies. The personas are decided upon by the facilitator. Game cards can be created accordingly.
Each team develops a gaming strategy depending on the persona assigned to them. During the game, to make a decision, the lead player pauses that game. Each team discusses what action/quiz answer to take. After the game, results are shared with the other teams.

Further activities

Participants can get involved in real world Antarctic issues by joining the Antarctic Youth Coalition.
Participants can provide feedback on the development of the game.

Scenario 3 → Team building activity

Participants may be divided into teams depending on the size of the group. The facilitator may begin the session by providing a quick tutorial through the game interface and choosing a level for the game. The facilitator also assigns a particular goal or sets a target for the play session. This may include, but is not limited to:

→ Achieving a certain % preparedness to take action against climate change

→ Minimising environmental loss to a certain %

→ Achieving an assigned preparedness goal by a certain time

Team members may take notes during the play session. At the end of the play session, the group engages in a facilitated discussion on the types of strategies adopted to reach the assigned goals, and the challenges they faced, and whether these strategies supported them in winning the game.

Further activities

The group can get involved in real world Antarctic issues by joining the Antarctic Youth Coalition. Participants can provide feedback on the development of the game.



¶
This report
was imagined
for people with an
Antarctic Spirit. It was
fully designed in the Antarctic
City of Punta Arenas, Chile by Pablo
Ruiz Teneb - @Pablopax - and illustrated
with Procreate (Hobart). This first edition
was printed in Sydney, Australia in June 2021 at
Dark Digital www.darkstardigital.com.au/ Fonts used
such as "Hermann" were developed by Latin American authors
by [@foundy](#) and "LeTrinidad" by [Compañía Tipográfica de Chile](#).
You can get a free digital copy from → <http://www.antarctic-cities.org/>

ANTARCTIC CITIES

FROM GATEWAYS TO CUSTODIAL CITIES

The notion of custodianship that we present in this report aims to underpin the principles that could guide these five cities' engagement with the Antarctic region. The notion draws from First Nations' knowledge systems which for hundreds of generations have engaged with a diversity of embedded, reciprocal, and holistic social-ecological practices of care and management of land, sea and sky.

The Antarctic region faces unprecedented challenges and these Southern Oceanic Rim cities, as they rethink their urban sustainability, are called to play a leading role as a network of cities that might shape how Antarctica is imagined, engaged with, and experienced by the Antarctic citizens of these cities.

**WESTERN SYDNEY
UNIVERSITY**



In association with university and local government partners in Hobart, Christchurch, and Punta Arenas, we have aimed to work through the many issues that would enable the potential for the five Antarctic gateway cities to act collectively as global custodians of Antarctica.



INACH



City of **HOBART**



The
Antarctic
Office

