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Green Infrastructure in Patagonia: Sharing the Recent Chilean Land Conservation Experience with the European Conservation Community

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Abstract

This paper attempts to capture some of the early lessons from the creation of a new National Park Network in Chilean Patagonia. We argue that the National Park Network of Patagonia constitutes green infrastructure in its own right – a connected, coherent ensemble of protected areas that provide habitat for wildlife, ensure the provisioning of ecosystem services and offer opportunities for nature-based recreation and a burgeoning sustainable tourism industry. We outline open questions and challenges concerning the Network's future governance and management and propose options for its further development.

Keywords: Chile, large landscapes, green infrastructure, conservation, sustainable tourism

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Green Infrastructure in Patagonia: Sharing the Recent Chilean Land Conservation Experience with the European Conservation Community

Summary

In January, the authors of this report were lucky to witness Chile's president Michelle Bachelet and Kris Tompkins, founder of Conservación Patagónica and Tompkins Conservation, at the signing ceremony for the creation and enlargement of several national parks in Chile made possible by the largest ever land gift from a private conservation organisation to a state. The creation of the National Park Network of Patagonia marked the culmination of a bold vision by the country's private land conservation community.

Despite the magnitude of its consequences for conservation, the event went by largely unnoticed by large parts of the global conservation community. This report attempts to capture some of the early lessons from the creation of the National Park Network, to outline open questions and challenges concerning its future governance and management, and to propose options for its further development.

We argue that the National Park Network of Patagonia is a prime example of green infrastructure in the modern sense of the term. By providing the legal and physical backbone for the economic, social and natural development of southern Chile, the park network goes far beyond the traditional definition of green infrastructure as the greening of grey infrastructure. Instead, it constitutes green infrastructure in its own right – a connected, coherent ensemble of protected areas that provide habitat for wildlife, ensure the provisioning of ecosystem services and offer opportunities for nature-based recreation and a burgeoning sustainable tourism industry.

Due to its scale, the National Park Network of Patagonia and the “Route of the Parks” that connects the parks offer nothing less than a holistic vision for Patagonia's future. To turn this vision into reality, sound governance and management structures will have to be put in place. Handing over ownership and responsibility for the network to Chile's national forestry agency can only be the first step of many towards a new development strategy in southern Chile. The challenge now is to properly manage these protected areas and create smart, low-impact visitor infrastructure. Much will depend on the cooperation of civic and public institutions in this endeavour and how private and public land conservation are able to complement each other.

Introduction

Although the unabated global decline of biodiversity is scientifically well documented and politically undisputed, for most people in developed countries it remains an abstract phenomenon, not something that affects their personal lives. For conservationists, the situation is different. The more you learn to distinguish (at least some of) the uncounted species that together make up the diversity of life on our planet, the more you sharpen your senses to the ongoing

impoverishment of species assemblages around you. Time and again, you will find yourself grieving over the losses, large and small, of members of a world that is dear to your heart.

For conservationists, such repeated painful experiences are an inevitable part of the reality of our era. Too many of our profession consequently end up bitter or depressed, and most are to some degree emotionally guarded and sceptical about the long-term prospects of their work. This pessimism is not a natural trait, but an outcome of self-protection. It takes truly extraordinary circumstances for conservationists to leave this mind-set, or to make an entire crowd of them weep in collective euphoria.

Standing on a windswept piece of Patagonian steppe outside Cochrane, Chile on the afternoon of a sunny 29 January 2018, we were honoured to witness such a historic moment. Speaking in Spanish to about 100 selected guests and an array of international journalists and their video cameras, Kris Tompkins, the former CEO of the clothing and gear company Patagonia, Inc. was about to hand over about one million acres (400,000 ha) of land from Tompkins Conservation to the Chilean state. This donation took place under the condition that an additional eight million acres (approximately 3.3 million hectares) of federally owned would be newly designated by Chile as national parks.

Gusts of wind ruffled Mrs. Tompkins' hair and tried to blow her notes from the lectern. In the background, a group of guanacos lazily blinked at the unfamiliar congregation. Two birds of prey soared along the hillside to our right. Rather than distracting from her speech, these natural elements gave her words a tangible context. Despite the language barrier that impeded us from understanding the details of what Kris Tompkins was saying, it was clear from the faces of everyone around us that for the small, resolute woman on the podium this day was the culmination of decades of her and her late husband's impassioned work. She belonged there. The place gave her purpose, and this purpose was about to be achieved. So, in a peculiar mix of sensations, being part of this gathering at the entrance gates of the future Patagonia National Park felt very natural and at the same time extraordinary.

After Kris Tompkins, the president of Chile, Michelle Bachelet, took the stage. Together with the Minister of National Assets, Nivia Palma and the Minister of the Environment, Marcelo Mena, she signed decrees expanding three existing national parks and creating five new ones that together now form the National Park Network of Patagonia ("Red de los Parques de la Patagonia"). The total area of these newly designated national parks exceeds 9 million acres (3.6 million ha).

For a European, the dimension of this endeavour is breath-taking. The expansion of the Chilean national park network dwarfs any comparable initiative that has ever taken place in the European Union (EU). Of course, Chile is a big country with a comparatively small population. With a land area of 750,000 km² it is about as big as Italy and Germany combined, and it has only 18 million inhabitants (as compared to 142 million for Italy and Germany). Still, with about 22% of its terrestrial area designated as national parks, Chile now has more land protected in this strictest protection category than all 28 EU member states combined. This demonstrates Chile's sincerity in centring the conservation of its natural heritage within its national identity and development strategy.

The event received significant global media echo in the English and Spanish-speaking parts of the world. But while major news outlets from the United States and the United Kingdom, such as the New York Times¹, the Associated Press², the San Francisco Chronicle³, the BBC⁴, and The Guardian⁵ had reporters and cameramen present, there was not a single journalist from continental Europe, Africa or Asia. Consequently, the biggest land gift ever from a conservation organisation to a state remained a non-event in most parts of the world. In Europe, even the nature conservation community remained largely unaware of it.



Image 1 Kris Tompkins speaking at the ceremony creating the National Park Network of Patagonia © Disselhoff

Our presence at the ceremony was due to sheer luck. We were visiting Chile to attend the Second Congress of the International Land Conservation Network (ILCN) in Santiago. The Congress, which we had helped organise, had ended a few days before and we had planned to spend an additional week in Chile, meeting representatives of the private land conservation community and seeing some of the existing national parks. It was then that one of the conference partners, who is associated with the Fundación Alerce 3000, offered to bring a small group of us (Tilmann Disselhoff, Tom Kirschey and Jim Levitt) by plane to Patagonia to witness the historic event.

In a way, the coincidence was ironic. Disselhoff and Kirschey, both German citizens, had spent the week before at the ILCN Congress with more than 150 conservationists from over 30 countries, talking about all aspects of private land conservation around the world, and here we were, witnessing one of the biggest achievements of private land conservation ever, as perhaps the only representatives of the global conservation community from outside the Americas. The disconnect highlighted how underdeveloped international networking still is in the world of

¹ <https://www.nytimes.com/2018/02/01/opinion/protecting-wilderness-democracy.html>

² <https://apnews.com/e800eb4eacda477ba3fa68b303d3d8b4>

³ <https://www.sfchronicle.com/world/article/Bay-Area-entrepreneurs-purchased-paradise-then-12533791.php>

⁴ <http://www.bbc.co.uk/news/world-latin-america-42868690>

⁵ <https://www.theguardian.com/environment/2018/jan/29/chile-creates-five-national-parks-in-patagonia>

private land conservation. It also reaffirmed the relevance of the newly formed ILCN and its mission to “connect organizations and people around the world that are accelerating voluntary private and civic sector action that protects and stewards land and water resources.”

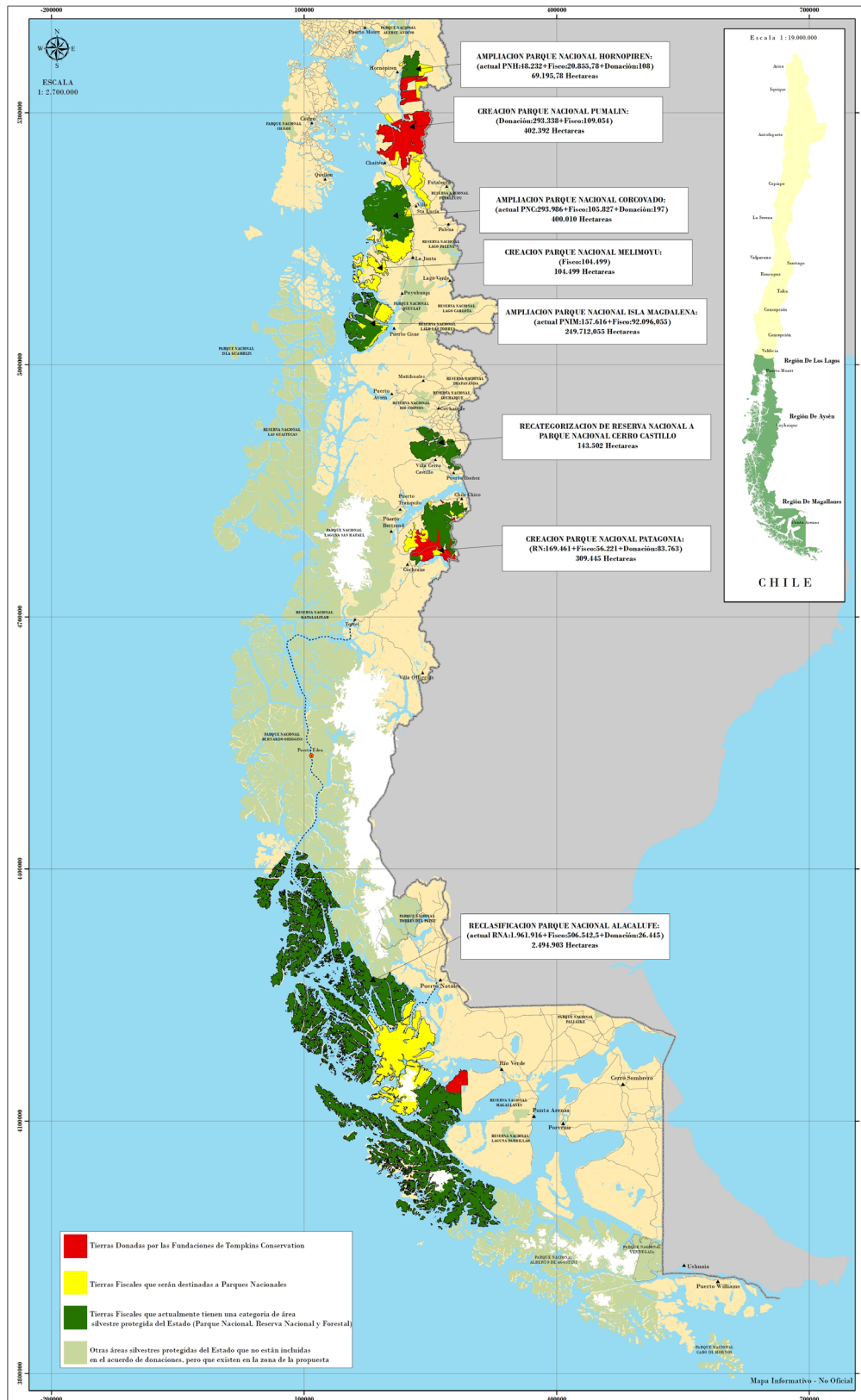


Image 2 Map of the National Park Network of Patagonia (red=land donated by Tompkins Conservation, yellow=newly designated national park land, green=reclassification of already protected land as national park), © Tompkins Conservation

A Prime Example of Green Infrastructure

Tompkins Conservation's achievements in Chile are deeply inspiring for any conservationist, not just because of their scale, but also because the National Park Network of Patagonia has the potential to become the backbone of the region's development, with the national parks as vertebrae and privately protected areas as connections and buffers in between. Together it constitutes a prime example of green infrastructure.

In the EU, the concept of green infrastructure has gained considerable attention in the policy arena over the last five years. The 2013 Communication from the European Commission, "Green Infrastructure (GI) — Enhancing Europe's Natural Capital," laid the basis for the development of an EU Strategy for Green Infrastructure. It established the concept of using a "strategically planned network of natural and semi-natural areas with other environmental features [...] to deliver a wide range of ecosystem services." Green infrastructure can provide ecological, economic and social benefits through natural solutions. It helps avoid relying on 'grey infrastructure' that is expensive to build when nature can provide cheaper, more durable alternatives.⁶

This definition acknowledges the broad potential an interconnected network of natural areas has for the protection of biodiversity, the provision of ecosystem services, and economic development. It goes beyond the traditional understanding of "green infrastructure" as the greening of grey infrastructure by elevating it from a secondary role to the centre of spatial development planning.

The question of how to best embed infrastructure in the surrounding landscape has occupied planners, (landscape) architects, engineers, and conservationists for more than a century. The challenge of reconciling infrastructure development with environmental concerns (in the broadest sense) was at the heart of early scenic highway projects in the United States, such as the roads along the Emerald Necklace in Boston, the Eastern Parkway in New York and the Blue Ridge Parkway in Virginia and North Carolina. In these early instances, embedding road infrastructure in the landscape served two purposes: it mitigated the aesthetic impact of the road on its surroundings and improved the aesthetic experience of using the road.

The idea was quickly picked up outside the United States. In Germany, the landscape architect Alwin Seifert was named the first "Counsellor for Questions of the Integration of the Landscape in Highway Construction" in 1934. He successfully implemented the idea of employing a "landscape attorney" in each of the 15 regional highway construction agencies, even as they continued their work through World War II under the Nazi regime; after the war, Seifert became a professor of landscape design at the Technical University of Munich and chairman of the NGO "Federation for Nature Conservation in Bavaria." Similarly, government agencies responsible for the construction of dams and coastal defences around the world have a long tradition of "greening" their infrastructure works from an aesthetic, if not ecological, point of view.

⁶ Trinomics B.V. 2016 Supporting the Implementation of Green Infrastructure – Final Report. European Commission, Directorate - General for the Environment: ENV.B.2/SER/2014/0012 Service Contract for "Supporting the Implementation of Green Infrastructure".

http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructures/GI%20Final%20Report.pdf

With the evolution of environmental sciences in general, and of conservation biology in particular, the detrimental consequences of grey infrastructure became apparent. Linear infrastructure projects (for example, roads, railways, pipelines and electrical transmission networks) fragment species' habitat, while hardened surfaces degrade ecological function and exacerbate climatic effects (e.g. by trapping heat, diminishing soil permeability and accelerating the volume and velocity of storm water runoff). For a long time, the term “green infrastructure” stood for the development of grey infrastructure that minimised such negative environmental impacts.

Conservation ecology has shown the importance of habitat connectivity for the survival of species and the permanence and functionality of ecosystems. This increasing body of research has informed initiatives for the development of protected area networks on a continental scale; the Natura 2000 network⁷, an EU effort, is the largest such initiative worldwide.

In comparison, the idea that natural (protected) areas can themselves serve as “infrastructure” is fairly new. This idea emphasizes the fact that “the conservation and improvement of ecosystems and their services are just as indispensable to a country's development as the maintenance and improvement of its technological infrastructure” (Mayer et al. 2017).⁸ It thus emphasises the relevance of natural area networks for social and economic well-being in a given region.

A third way to think about green infrastructure is to consider the “green” (environmental) benefits of grey infrastructure for its surroundings. From this perspective, infrastructure might be called green if it contributes to the protection and sustainable use of environmental resources that it provides access to, e.g. by providing an economic alternative to other harmful commercial activities in the same region. In chapters 5 and 6 we argue that the conversion of the “Carretera Austral”, the only highway in Patagonia, into a “Route of the Parks” could constitute such a case of green infrastructure.

Chile's Geographic Challenges to Development

Chile stretches almost 4,300 km north to south, which is 500 km more than the distance from the European North Cape in Norway to Europe's southernmost tip in Tarifa, Spain. At the same time, Chile's width averages just 177 km west to east. This dramatic geography is amplified by the fact that about 80% of the country is mountainous, which means that at any given latitude in Chile, one can find widely differing elevations, from the sea level at the coastline to the Andean peaks that reach more than 6,000 m.

Chile's unique geography poses structural challenges for its economic development. There are few viable options to connect southern Chile to the rest of the country by road or railway. There is no rail line south of Puerto Montt, the principal commercial and financial hub of Chile's Los Lagos region and Northern Patagonia-Zona Austral. The construction of the “Carretera Austral,”

⁷ http://ec.europa.eu/environment/nature/natura2000/index_en.htm

⁸ Florian Mayer and Jens Schiller 2017 Federal Green Infrastructure Concept - Nature Conservation Foundations for Plans Adopted by the German Federation. Federal Agency for Nature Conservation (BfN), Division II 4.1, Landscape Planning, Spatial Planning and Urban Development.
https://www.bfn.de/fileadmin/BfN/planung/bkgi/Dokumente/BKGI_Broschuere_englisch.pdf

the 770 mile long stretch of the Pan-American Highway running from Puerto Montt in the north to Villa O'Higgins in the south of Chile, began in 1976 at the order of Dictator Augusto Pinochet. Despite the employment of over 10,000 soldiers and costs exceeding 200 million USD, most of it still is a simple gravel road, and ferries are the only connections between several communities south of Puerto Montt (La Arena and Caleta Pulche, Hornopiren and Leptepu, Fiordo Largo and Caleta Gonzalo, Puerto Yungay and Embarcadero Barcaza Río Bravo - see Image 2).

The remoteness of southern Chile has alleviated environmental pressures from the forestry and mining sector. Logistical difficulties have prevented the installation of major saw mills or pulp factories and have limited the conversion of native forest into forestry plantations. Recent conservation threats have come in the form of plans for large-scale hydropower development. However, widespread opposition to the planned dams along the Pascua and Baker rivers has stopped electricity companies such as ENEL from implementing their plans for now.⁹ In June 2014, the Committee of Ministers for Sustainability, Chile's highest environmental resolution body, led by the Minister of the Environment, decided to unanimously reject the "HidroAysén" project, thus approving the appeals filed by citizens opposing the project.

⁹ http://www.parquepumalin.cl/en/patagonia_sin_represas.htm

Conservation Solutions: Sustainable Tourism

Chile's geography is not only a challenge for infrastructure development, but also for the conservation of its natural heritage. Due to the close sequences of different elevations, Chile's ecoregions such as the Valdivian temperate rainforests, the Magellanic subpolar forests and the Patagonian grasslands are characterised by stark local contrasts in rainfall patterns and temperature, creating a mosaic of relatively isolated microclimates, which in turn have led to a high degree of endemism in their flora and fauna. This means that most of Chile's ecosystems and wildlife are highly sensitive to impacts from grey infrastructure development.



Image 4 Carretera Austral south of Caleta Gonzalo – most parts of it are still a simple gravel road © Kirschev

This double challenge requires a careful consideration of how to reconcile the development of southern Chile with the conservation of its natural values. The existing road network, although of minor dimensions, already impacts surrounding habitats. It causes the fragmentation of wildlife corridors, limiting the free movement of iconic species such as the puma, the Huemul deer, or the Pampas cat. The roads represent routes for the proliferation of invasive alien species. They encourage the expansion of settlements, the conversion of adjacent habitat into agricultural land, and the free access of tourists to sensitive areas. Any further development will have to be carefully calibrated to maintain the ecological coherence of valuable ecosystems, ensure spatial mobility and migration corridors for wildlife and respect the continuity of meta-populations.

On the other hand, the Carretera Austral in its current state is insufficiently equipped to grant nature-loving tourists easy access to the National Park Network of Patagonia. Because of the road's partially rugged condition, most visitors resort to driving an SUV or a similar off-road car. Likewise, commercial traffic comes mostly in the form of heavy trucks or pickups. The dirt

swirled up by passing vehicles often envelops the road in a cloud of dust. These circumstances prevent precisely the type of low-impact tourism that would be suitable for a sustainable larger-scale use of the sensitive ecosystems of southern Chile. Hiking, bicycle touring, or horse-riding are rendered difficult or impossible on long stretches of the Carretera Austral.

Park Access

The choice of transportation has significant effects on the amount and distribution of money spent at a tourism destination. Contrary to myths about the “budget traveller,” various studies have shown that on average bicycling tourists are older and wealthier than other tourist groups.¹⁰ Since they tend to travel more slowly, they are more likely to linger, make spur-of-the-moment decisions and purchases, and spend more money at bars, restaurants, cafés, and convenience stores in comparison with their car-driving counterparts.¹¹ The resulting revenue pattern is very different from that of car-based tourism: instead of renting a vehicle and buying supplies outside the tourism destination (Puerto Montt in the case of the National Park Network of Patagonia), bicycle tourists spend their vacation money more evenly at local communities along their itinerary, thereby bringing resources into the region. This allows gateway communities located near national parks to capture a larger share of benefits from tourists by developing local tourism infrastructure such as bike rental services, bike camps, restaurants, local markets, repair shops, and guesthouses.¹²

There is high potential for bicycle tourism in Patagonia. A study commissioned by the European Parliament in 2012 estimated that the economic impact of bicycle touring in Europe totals almost \$50 billion USD annually.¹³ In the US, a study by the Outdoor Industry Association found that bicycling participants spend \$83 billion USD on 'trip-related' sales (bicycle tourism).¹⁴ Even a fraction of this amount would represent a substantial revenue stream for southern Chile¹⁵ and generate sufficient income for the maintenance and further development of the National Park Network of Patagonia. However, to tap into this potential, Chile will have to significantly improve the current state of the Carretera Austral.

Parts of the Carretera Austral have already been paved, for example sections in the Los Lagos Region between Puerto Montt and La Arena, from Puelche to south of Contao, and from Río Negro (Hornopirén) towards the entrance of Hornopirén National Park. Other sections are currently being paved.¹⁶ The road between Hornopirén and the national park is an excellent example of how cycling tourists could use the Carretera Austral. In this section, the road has a separate bike lane (or at least a breakdown lane that can be used by bicycle tourists), which

¹⁰ <http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2015/11/30/bicycling-tourists-are-older-wealthier-and-in-demand>

¹¹ <https://momentummag.com/wallets-wheels-tourists-bikes-spend-money/>

¹² <http://dirtragemag.com/the-spend-cycle-how-bicycle-tourism-impacts-small-communities/>

¹³ Richard Weston, Nick Davies, Les Lumsdon, Peter McGrath, Paul Peeters, Eke Eijgelaar, Peter Piket 2012 The European Cycle Route Network Eurovelo. European Parliament, Directorate General for Internal Policies, Policy Department B: Structural and Cohesion Policies.

[http://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL-TRAN_ET\(2012\)474569](http://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL-TRAN_ET(2012)474569)

¹⁴ Outdoor Industry Association 2017 The Outdoor Recreation Economy. https://outdoorindustry.org/wp-content/uploads/2017/04/OIA_RecEconomy_FINAL_Single.pdf

¹⁵ Total tourism income for Chile in 2016 it was about US\$ 3 billion. (Hernán Mladinic pers. Comm. 2018)

¹⁶ <https://www.camara.cl/pdf.aspx?prmID=45941&prmTIPO=DOCUMENTOCOMISION>

unfortunately has not been included at other paved sections. Although the paved road at Hornopirén does not lead all the way to the entrance of the national park, the last three miles of dirt road connecting the Carretera Austral and the park entrance are in sufficient condition to allow travellers to comfortably reach the park by bike. The Hornopirén road offers an idea as to how low-impact tourism based on the National Park Network could be developed. Obviously, not all bicycle tourists would want to travel the entire 770 miles of the Carretera Austral. Secondly, tourists from abroad may choose not to bring their own bicycles when flying to Chile. It would thus be necessary – but potentially sufficient – to create regional hubs of bike-friendly infrastructure which encompass:

- 1) paved stretches of the Carretera Austral with a paved bike lane alongside the road,
- 2) public transport in between these stretches in the form of busses with bicycle racks that allow visitors to bring their bicycles¹⁷, and
- 3) bicycle rentals for those visitors travelling without their own bicycle.



Image 5 Carretera Austral between Río Negro (Hornopirén) and Hornopirén National Park – perfect for an easy bike ride from the gateway community to the national park entrance © Disselhoff

These hubs would allow bicycle tourists to comfortably travel to their region of interest and use the gateway communities as base camps for bicycle tours to national parks in their vicinity. Similar to existing public bus service for hiking tourists, it would allow tourists to reach the national park of their choosing by bus and bicycle, which in turn reduces the need for car infrastructure at the park entrances. The development of such biker-and-hiker-friendly infrastructure could partially be financed through a toll system charging those tourists that travel to Patagonia by car and thus have a higher impact on the regional infrastructure. Likewise, it can

¹⁷ Public bus service already exists along the Carretera Austral. However, the busses do not include bike racks.

be assumed that the environmental impact of the newly paved roads or bicycle paths may be partly mitigated by the fact that car traffic might decrease because a higher share of tourists may choose to combine public transport with cycling, hiking (or even exploring the region on horseback).



Image 6 Info kiosk at one of the entrances to Hornopirén National Park © Disselhoff



Image 7 Signs informing visitors that 7 km of private property have to be crossed to reach the park boundary © Disselhoff



Image 8 Pedestrian bridge across the Río León at Hornopirén National Park © Disselhoff

Visitor Infrastructure

While the improvement of the Carretera Austral is key for the accessibility of the national parks in the region, attention must also be given to the visitor infrastructure within the parks. Similarly to the heterogeneous conditions of the highway, the national parks currently offer sharply contrasting quality levels of infrastructure. Taking the entrance to Hornopirén National Park as an example, the visitor is first greeted by a derelict information kiosk and signs noting that the official park boundary is still another 7 kilometres (4.3 miles) walk away. The hiking trail to the park boundary begins in optimal condition, with a beautiful wooden bridge spanning across Río León, but soon thereafter, the trail deteriorates considerably, making it all but impossible for elderly or physically challenged people to continue.

Other parks, such as Alerce Andino National Park, are better equipped to host visitors who are used to less demanding trail conditions. The entrances, which include a parking lot and a ticket booth, are guarded by staff of the National Forest Corporation. The entrance fee is 4,000 Chilean pesos (ca. \$ 6) for foreigners and half that for Chileans. Trails are in excellent condition, with handrails at challenging locations and wooden stairs in steep terrain.

Interestingly, some of the formerly private conservation properties currently offer the highest quality public visitor infrastructure. At the entrance of the new Patagonia National Park, Tompkins Conservation has built an iconic and luxurious lodge including a restaurant and a bar. Integrated into a park-like ensemble of lawns and steppe grasslands are a small, secluded graveyard (where Doug Tompkins is buried), a parking lot and a garden with greenhouses where fresh vegetables are grown for the restaurant.



Image 9 and image 10 Different trail conditions outside Hornopirén National Park © Disselhoff



Image 11 View of the entrance to Alerce Andino National Park © Disselhoff



Image 12 Handrail along the trail in Alerce Andino National Park © Disselhoff



Image 13 Stairs crossing steep terrain in Alerce Andino National Park © Disselhoff

Moreover, three beautifully situated campgrounds with bathrooms and cooking shelters welcome visitors at other parts of the park. These sites are connected by a growing network of trails inside the park. Although hikers are encouraged to hire a guide, they can as well explore the park or climb one of its many peaks on their own. Overnight stays however are only permitted on the established campgrounds, and the number of people who can use the trails at the same time is limited due to safety and fire precautions. One road through the park is open for scenic driving and for mountain biking. The second flagship project of Tompkins Conservation, Pumalín National Park, also offers an extensive, well-kept trail network and several campsites. Beyond the park's borders, the “Pumalín Project” includes a network of organic farms restored from ecological degradation, and social initiatives that promote healthy livelihoods and conservation values in surrounding communities.



Image 14 Organic garden with greenhouses at the entrance of Patagonia National Park – the fences keep out the Guanacos that abundantly frequent the nearby lawns © Disselhoff



Image 15 and 16 Guanacos roam the lawns outside the cemetery at the entrance of Patagonia National Park © Disselhoff

Governance Options

The future of these formerly private parks now lies in the hands of the Chilean government. Chile's national parks are managed by the National Forest Corporation (the Spanish acronym is "CONAF"), a private, non-profit organization overseen by Chile's Ministry of Agriculture. Created in 1970 and tasked with promoting sustainable forest management as well as the management of national natural resources and parks, the branch of CONAF responsible for park management has been chronically underfunded and insufficiently staffed to effectively carry out its tasks.¹⁸ Most national parks rely on a workforce of less than five CONAF employees, whose inadequate training, lack of guidance, unclear mission, improper equipment and low salaries leave them unable to carry out even the basic tasks of park supervision and upkeep. Moreover, as

¹⁸ David R. Tecklin and Claudia Sepulveda 2014 The Diverse Properties of Private Land Conservation in Chile: Growth and Barriers to Private Protected Areas in a Market-friendly Context. http://www.academia.edu/download/43427152/The_Diverse_Properties_of_Private_Land_C20160306-28186-q4d87l.pdf

proceeds from the parks go to CONAF's general budget, individual park management teams have little incentive to build and maintain adequate infrastructure for park visitors.

CONAF thus seems to have a mixed track record with the maintenance of Chile's national parks. Many Chilean conservationists question whether the agency will be able to take good care of the enlarged network. Tompkins Conservation is aware of these challenges. To support the development of the necessary capacities for an effective Chilean national park service, it helped in the creation of a new non-profit organization called "Friends of the Parks of Patagonia" that would promote a culture of appreciation and support for Chile's national parks among the country's citizens and improve their financial and technical governance.¹⁹ This concept is similar to the US-based National Park Foundation, which was chartered by congress in 1967 as the official charitable partner of the National Park Service with the mission to "enrich America's national parks and programs through the support of private citizens, park lovers, stewards of nature, history enthusiasts, and wilderness adventurers."²⁰

Such an institution is the logical continuation of previous efforts, given that a public-private partnership created the new park network. It may need an even bigger public-private partnership to manage and develop the parks. Whether it will be through an NGO such as the "Friends of the Parks of Patagonia" or through another institution bringing together the various stakeholders for each park, the civic sector has an important role to play in the future management of Chile's national park system.

Chile's interest in continuing cooperation with the civic sector is evident. After the creation of the National Park Network of Patagonia, Chile announced the idea to rename the Carretera Austral the "Route of the Parks", 20 years after the idea was first presented to Ministry of Public Works by the Pumalin Foundation. Recently, the Ministry issued a national directive on scenic roads.²¹ It now plans to improve accessibility to the 17 existing and new national parks south of Puerto Montt for visitors, thereby supporting the growing tourism industry in the region. Tompkins Conservation's land donation to the Chilean government and the dramatic expansion of Chile's national park system were the first steps towards a new development strategy in southern Chile.

Above all, the communities located near the parks (gateway communities) have a genuine interest in being involved in the development of a nature-based tourism industry. As the profitability of traditional industries such as agriculture, forestry, mining and fishing (except for salmon farming) in Patagonia has declined over the last decades, tourism is becoming an increasingly important source of income for these communities. However, tourism, as all economic development strategies, comes with advantages and disadvantages for the communities that are affected by it. Tourists use public infrastructure and environmental resources at least as much as residents, but do not necessarily pay for their upkeep.²² Second-home buyers (high-income middle-age or older couples, who have no children living at home) tend to be markedly more affluent than permanent

¹⁹ <http://www.amigosdelosparques.cl>

²⁰ <https://www.nationalparks.org/about-foundation>

²¹ "The Route of Parks" encompasses not only the Carretera Austral, but also the Patagonian Channels (from Tortel to Puerto Natales) and the so-called "Road of the End of the World" (from Natales to Puerto Williams). Together, these three sections make up 1700 miles from Puerto Montt to Cape Horn. (Hernán Mladinic pers. Comm. 2018)

²² Peter W. Williams and Ian F. Ponsford 2009 Confronting tourism's environmental paradox: Transitioning for sustainable tourism. *Futures* 41 (6), 396-404.

residents, which may create social tensions in the community.²³ Both short-term visitors and second-home owners drive rising amenity values and increasing real estate costs, making it harder for long-time residents to afford housing.²⁴

With the increase in tourism in Patagonia, the parks' gateway communities need to address the issue of who will pay for the investments needed to accommodate visitors and who will benefit from the revenue entering the communities.

Some local elected officials remain deeply sceptical about the park network. The mayor of Cochrane, the gateway community outside the newly designated Patagonia National Park, boycotted the signing ceremony for its creation, saying: "They have erased our history and there is no pardoning that. That's what we who were born and raised in this land of pioneers feel. They have never shown any evaluation that truly shows how this is going to benefit the community."²⁵ Others, such as the mayor of Chile Chico, want to give priority to new mining projects and explorations in the former Jeinimeni National Reserve.²⁶

Similarly, many inhabitants of Patagonia have complained about the impact that the new conservation vision for the region has had on their local identity and culture. The idea of "rewilding" large areas by prohibiting former land uses such as logging and grazing goes counter to the self-understanding of Patagonian settlers as ranchers and gauchos, which triggers fears of losing local culture and land use traditions. Resistance to the lifestyle changes that come with refocusing the regional economy on sustainable tourism will only cease if local communities sufficiently benefit from the new economic opportunities. CONAF's policy of engaging volunteers from outside the region (either from Santiago or from abroad) to demolish grazing and logging infrastructure, plant native vegetation and build tourism facilities only helps cement the perception of locals that the future of their region is being built without their involvement.²⁷ Ensuring the participation of local communities in the development of southern Chile for sustainable tourism will require participatory processes and a willingness to listen to the voices of local stakeholders. Whether it consists of inviting gauchos to lead tourists instead of cattle on horseback trips into the mountains, offering guidance on new land use practices (such as conservation farming, rotational grazing, and organic gardening), or advocating for public transport systems and internet access – the management of the National Park Network will have to focus equally on social issues as the optimisation of the parks' biodiversity if the natural park network is to endure.

²³ Chris Martin 2010 Affluence, Mobility and Second Home Ownership.

²⁴ Eric Frauman and Sarah Banks 2011 Gateway community resident perceptions of tourism development. *Tourism Management* 32 (1), 128-140.

²⁵ <https://www.theguardian.com/environment/2018/jan/29/chile-creates-five-national-parks-in-patagonia>

²⁶ Hernán Mladinic pers. Comm. 2018

²⁷ Bethany Hughes 2017 The Tompkins Land Donation: Shedding Light on Chile's Conservation Conundrum. <https://her-odyssey.org/2017/07/09/the-tompkins-conundrum/>

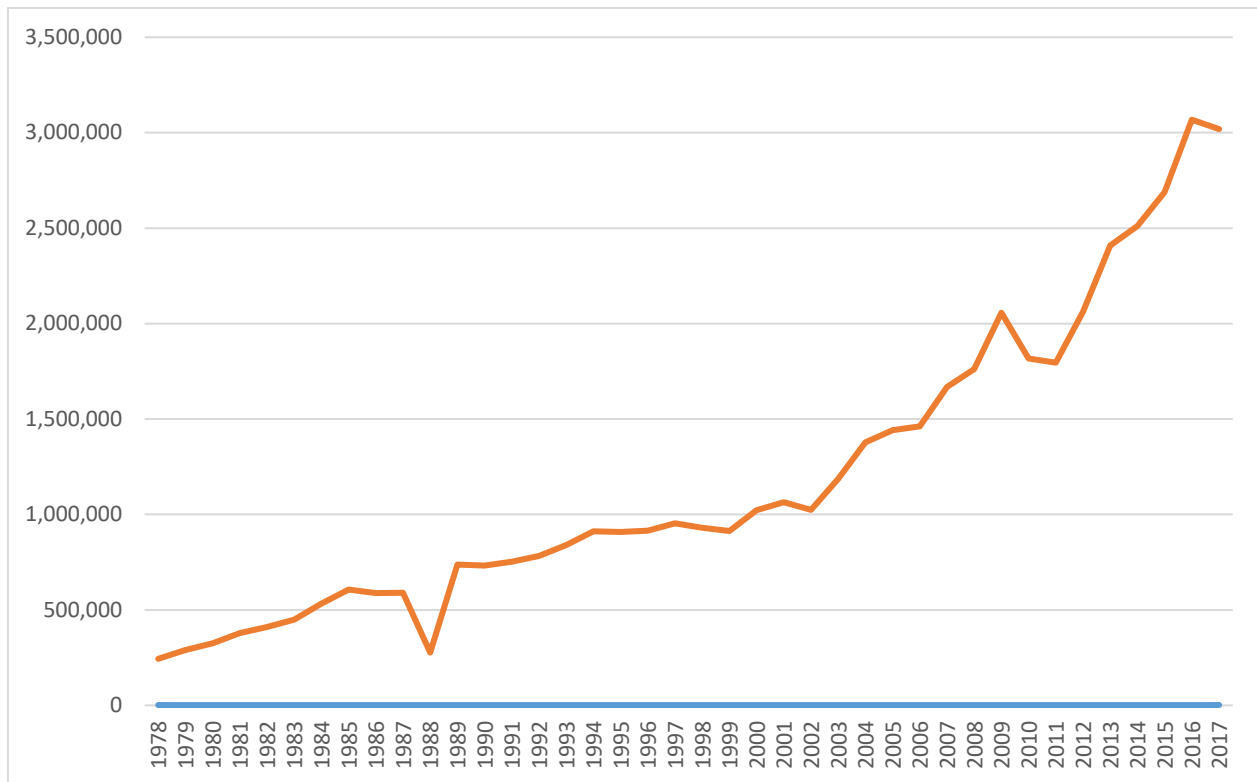


Diagram 1 Number of yearly visits to Chile's national parks 1978-2017²⁸

The number of visitors to Chile's national parks has increased steadily over the last 40 years (see Diagram 1). The civic sector community that was instrumental in the creation of the park network (US and Chilean philanthropists and foundations, private landowners) now has the chance to play a vital role in helping gateway communities deal with the rising influx of tourists.²⁹ It can lobby the federal administration to involve local communities in park management. It can help communicate the advantages of nature-based tourism for the region, accompany planning processes and actively participate in the oversight and implementation of management plans.

By advancing the vision of a National Park Network, Tompkins Conservation followed the famous advice of architect Daniel Burnham to “make no little plans, as they have no magic to stir men's blood.”³⁰ Kris and Doug Tompkins led the way for private land conservation on an unprecedented scale. Their visionary work has created the spatial foundation for a development of southern Chile centred on large landscape conservation.

But the creation of the National Park Network is only the beginning. It will now require a common vision for how to realise the parks' economic potential. This concerns governance of these protected areas, their management, and the development of their surroundings. The promises implicit in the vision of the National Park Network – the protection and sustainable use of entire ecoregions – will continue to raise questions about social justice, accountability, equitable access and benefit sharing. This includes questions about the creation of the right

²⁸ <http://www.conaf.cl/parques-nacionales/visitanos/estadisticas-de-visitacion/>

²⁹ Christopher Serenari et al. 2017 Private protected areas, ecotourism development and impacts on local people's well-being: a review from case studies in Southern Chile. *Journal of Sustainable Tourism* 25 (12), 1792-1810.

³⁰ Burnham 1907 quoted Charles Moore 1921 Daniel H. Burnham, *Architect, Planner of Cities*. Volume 2, p. 147.

incentives for the proper maintenance of the parks, the continued development of socially just fee systems (including financial support for poor citizens³¹), the administration of concessions for touristic services linked to the parks and public participation in the planning processes among others. Hernán Mladinic, Executive Director of Proyecto Pumalín and Pumalín Park at Tompkins Conservation points out that in the last years, the number of Chileans visiting the national parks has grown more quickly than that of international visitors, which is also due to a growing “outdoor culture” among Chilean millennials.³²

Green infrastructure is a useful way to shape discussions about these issues. The National Park Network of Patagonia is such a seminal, landscape-scale conservation vision that it can act as a guiding star for the future of the entire region. The Route of the Parks has the potential to become the backbone for regional development, providing livelihoods for the inhabitants of southern Chile without destroying the natural basis of its wealth. Instead of exploiting finite resources, it offers Chile a way to profit from the potentially infinite supply of its natural attractions. By placing tourism, not timber, mining or wool, at the centre of Patagonia’s economic future, the National Park Network offers an alternative model for prosperity of the region. The example which Chile has set in creating this new green infrastructure, combining natural assets with low-impact development, will hopefully inspire and inform similar projects in the future, for example the ambitious Rewilding initiatives in Europe or the idea to designate the Great Wall of China as National Park.

The Complementarity of Private and Public Land Conservation

Land conservation in Chile has historically been driven by representatives of the country’s economic elite as well as affluent foreigners.³³ Although land purchases for conservation have been carried out by a variety of people and organisations, large acquisitions by philanthropists and NGOs (and to a lesser extent by eco-tourism enterprises) make up the lion’s share of the area conserved. International conservation NGOs such as the World Wildlife Fund, The Nature Conservancy, the Conservation Land Trust and the Wildlife Conservation Society pioneered conservation acquisitions in Chile. From the private sector, Doug and Kris Tompkins were among the first to realise the potential of land acquisition for conservation in South America. They invested most of their considerable personal wealth in the purchase of vast properties in Chile and Argentina. Other billionaires, such as Ted Turner and Warren Adams, as well as Chilean businessmen such as current president Sebastián Piñera, Nicolás Ibáñez, Víctor Peterman, Andrónico Luksic and Gabriel Ruiz-Tagle have also purchased large tracts of land for conservation in the central-south and southern regions of Chile, either personally, or through their corporations or foundations. In recent years, middle class families from Chile and abroad have increasingly invested in properties for conservation. Assessing the total surface of land purchased for conservation in Chile is difficult, as at present there no legal status for privately protected

³¹ The price for travelling to most of the national parks in the south of is prohibitively high for most of Chile’s population. Entrance and camping fees further exacerbate this situation, making it impossible for many Chileans to enter their national parks. This problem however is not limited to Chile. The national park system in the US faces similar issues.

³² Hernán Mladinic pers. Comm. 2018

³³ See FN 17.

areas or official statistics on private conservation land. Various authors have estimated that there are around 500 privately protected areas totalling at least 4 million acres in Chile.³⁴

The distribution of both public and privately protected areas in Chile is highly uneven. Although public reserves far outnumber private ones, various studies have shown that privately protected areas tend to be complementary to areas protected by the state and represent important additions for different eco-regions.³⁵ 84% of the land protected by the state is in the far south, where development pressures are comparatively small. The distribution of privately protected areas is less skewed. Private conservation land thus contributes significantly to the protection of vegetation formations suffering from the highest levels of land use intensity (Matorral and other vegetation forms of Chile's central Mediterranean region and deciduous and broad-leaved forests of the temperate region).

However, the complementarity of public and private conservation efforts is not a result of planning or coordination. Both public and private land conservation have mostly occurred in areas with little opportunities for alternative profitable land uses. While public protected areas were often established in the most remote and least accessible regions, private acquisitions of recent decades focused on large tracts of land in areas with (temporary) economic difficulties, such as sheep grazing land in the south after the crash of global wool prices or second growth forests owned by timber companies in financial difficulties. Private land purchases for conservation have thus been particularly responsive to availability, price, and owners' willingness. Aesthetic, cultural and biodiversity considerations also played a role, but to a lesser extent. Strategic, targeted land acquisition has been added to the toolbox of conservation NGOs and philanthropists comparatively recently.

The National Park System of Patagonia hence also represents a unique opportunity to better coordinate private and public land conservation in Chile. While the national parks form the nodes in the network, privately protected land will play an important role in connecting these core areas of conservation. Although the distribution of some large privately protected areas in Chile has been mapped,³⁶ to date there has been no attempt to systematically map all existing private conservation properties or to identify strategic parcels for future conservation.

The potential of private land conservation for sustainable land management in Chile has been increasingly recognised over the last decades, starting with the first land purchases by Doug for the future Parque Pumalín in 1991, which inspired numerous other initiatives. A second wave of private land conservation, which is still gaining momentum, was triggered in the early 2000s by the efforts of a group of Chilean and US conservationists to create legal tools for private land conservation comparable to the "conservation easement" model in the United States. Despite their extent, until recently Chile did not legally recognise privately protected areas as a distinct protection category. The Environmental Framework Law of 1994 encouraged private

³⁴ Laura Meza 2009 Mapuche Struggles for Land and the Role of Private Protected Areas in Chile, *Journal of Latin American Geography*, Vol. 8, No. 1 (2009), pp. 149-163; Holmes 2013 Private protected areas and land grabbing in Southern Chile. School of Earth and Environment, University of Leeds.

https://www.povertyandconservation.info/sites/default/files/Holmes%20-%20Private%20protected%20areas%20and%20land%20grabbing%20in%20Southern%20Chile_0.pdf

³⁵ Holmes 2013

³⁶ Antonia Lara and Roció Urrutia 2010 The Growing Significance of Conservation – The Chilean Experience. In: James N. Levitt *Conservation Capital in the Americas*. Lincoln Institute of Land Policy, p. 5-14.

conservation initiatives in broad terms, but did not create the legal tools for supporting private land conservation or offering incentives for their application.

This changed with the adoption of Law 20.930 which established the “Derecho Real de Conservación Medioambiental” (real right of environmental conservation) as part of the Chilean Civil Code. This tool allows landowners to perpetually dedicate private properties for conservation, as conservation easements do in the US. The next step for the large-scale use of this tool will be the creation of related financial incentives in the form of tax benefits for landowners willing to place such a restriction on their property.³⁷ The same parties who were instrumental in the creation of the “Derecho Real de Conservación” are now lobbying the Chilean government to implement tax reform proposals introducing such incentives.

The “Derecho Real de Conservación” has the potential to play an important role in safeguarding privately-owned areas connecting the national parks, creating buffer zones around them and securing migratory corridors for various endangered species. While the implementation of this new tool is still in its infancy and many practical legal questions still need to be resolved (e.g. its relationship to other property interests and land use rights, such as water and mining rights, or indigenous communities land and resource rights), it is already clear that the role of private land conservation did not end with the land gift of Tompkins Conservation to the Chilean government.

Another aspect that will require careful consideration is the circumstances in which properties protected through the “Derecho Real” should be accessible to the public. For existing privately protected areas in Chile owned in fee title, the situation is highly variable. While Tompkins Conservation opened its park to the public at the earliest possible stage, other conservation landowners have followed a different approach. For example, the German immigrant Víctor Peterman purchased large tracts of state-owned forest around the Lago Pihueico during the end of the Pinochet Regime under obscure circumstances. He later converted the forest into a “private for-profit natural reserve” (without official protection status), whose access gates are now permanently manned to limit access to paying guests of the luxury resorts on the property. Against the backdrop of this type of private land conservation, it not surprising that local inhabitants were sceptical about the early land acquisitions by Tompkins Conservation.

If privately protected areas connecting the National Park Network remain closed to the public, their value for the Chilean society and to foreign visitors may be smaller than that of publicly accessible properties. One way to address this issue is the idea of creating a trail connecting Patagonia’s national parks. The idea for a set of hiking trails crossing the entire territory of Chile (“Sendero de Chile”) was first promulgated by President Ricardo Lagos Escobar in 2000 as part of the preparations for the celebration of Chile’s 2010 bicentennial. A technical committee and later a foundation (“Fundación Sendero de Chile”) were established under the auspices of the Ministry of the Environment to create an 8,500 km long trail network.³⁸ However, the initiative was impeded early on by the fact that 65% of the projected routes passed through private properties, which created legal uncertainties with regard to liability, maintenance, funding and access rights. As the funds invested in the project dried up without producing the expected results, so did the enthusiasm that initially accompanied the project.

³⁷ Henry Tepper and Victoria Alonso 2010 The Private Lands Conservation Initiative in Chile. In: James N. Levitt Conservation Capital in the Americas. Lincoln Institute of Land Policy, p. 49-62.

³⁸ <https://www.fundacionsenderodechile.org/losorigenes>

After this drastic decrease in public support (and subsequently a loss of influence and status), the foundation has recently started looking into options to revitalize itself by creating local micro-enterprises in cooperation with CONAF and to offer tourism services in protected areas (trekking, environmental education, entertainment). Some of the pilot sites for these activities lie at the northern end of the National Park Network of Patagonia (e.g. in Puerto Varas). Connecting the idea of the Sendero de Chile to the National Park Network of Patagonia could breathe new life into the initiative. The question of public access to private properties conserved through a “Derecho Real” as part of the trail network may have to be re-examined when discussing the eligibility criteria for tax deductions linked to the “Derecho Real”.

Finances

Notably, the gift of 1 million acres of land from Tompkins Conservation to the Chilean government came without an endowment for its management. Nevertheless, there is reason to believe that the national park system can create sufficient revenue to pay for itself. National parks and other protected areas provide multiple socio-economic benefits. Although these benefits are rarely assessed and thus remain unappreciated by stakeholders and the public, studies have shown that the return on investment in national parks is considerable. Well-known examples how national parks and other protected areas boost the economy on a national level include Namibia, where the return on investment rate was 23 % over 20 years³⁹ and Finland, where an estimated 10 Euros of revenue are created for every Euro invested by the Finnish taxpayer through the Finnish Forestry Service Metsähallitus.⁴⁰ In Germany, park-based tourism has resulted in considerable income growth in adjacent gateway communities.⁴¹ These studies all leave aside additional benefits in the form of various ecosystem services which are much harder to quantify economically.⁴²

Operating costs per hectare of public protected areas in Patagonia have been estimated at \$0.27-\$1.88.⁴³ Based on these figures, the minimum annual budget for the National Park Network would be a modest \$430,000. However, this estimate does not include the need for structural improvements, increased staffing of the parks⁴⁴ and the establishment of a network of privately protected areas between them. Nevertheless, there is reason to believe that investments in the National Park Network as green infrastructure will amply pay off.

³⁹ Wolf Krug, Helen Suich and Ndeutalala Haimbodi 2002 Park pricing and economic efficiency in Namibia. DEA Research Discussion Paper Number 45. <http://www.the-eis.com/data/RDPs/RDP45.pdf>

⁴⁰ <http://www.metsa.fi/documents/10739/3335805/Localeconomyimpacts2017.pdf/8925efbd-2305-4c34-9d9a-3ed57515c3ae>

⁴¹ Marius Mayer et al. 2010 The economic impact of tourism in six German national parks. *Landscape and Urban Planning* 97, 73–82.

⁴² Jaime Ricardo García Márquez et al. 2017 Effectiveness of conservation areas for protecting biodiversity and ecosystem services: a multi-criteria approach. *International Journal of Biodiversity Science, Ecosystem Services & Management* 13-1; Antonio J. Castro et al. 2015 Do protected areas networks ensure the supply of ecosystem services? Spatial patterns of two nature reserve systems in semi-arid Spain. *Applied Geography* 60, 1-9.

⁴³ See footnote 36.

⁴⁴ The CONAF’s budget for protected area management in 2017 was US\$ 27 million, with 70% spent on wages. For its approximately 500 employees. (Hernán Mladinic pers. Comm. 2018)

Conclusions

The creation of Patagonia's National Park Network is a conservation initiative of truly breathtaking scale. It would not have been possible without the persistent push and support by the private land conservation community, in particular that of Tompkins Conservation. By offering a holistic vision for southern Chile, the network has impacts far beyond the conservation of Chile's biodiversity. The network can already be considered a prime example of green infrastructure. The value of the network will increase further if the road connecting the parks, the Carretera Austral, can be gently developed into a multifunctional artery for sustainable tourism. This improvement of grey infrastructure should be accompanied by a completion of the green infrastructure, focusing on the connectivity, accessibility, and coherence of the park network. Private land conservation will play an important role in providing stepping stones between the parks for animals, plants and visiting humans, and for expanding buffer zones around protected areas sensitive to external impacts.

The two biggest challenges for the future of the network lie in the governance and management of the parks. Despite its remarkable institutional stability⁴⁵, Chile's forestry service seems to be utterly underequipped, understaffed and underfunded to take on this task.⁴⁶ Private land conservation organisations should continue to play a vital role in the development of the park network. They will have a twofold function: as facilitators for additional private land conservation by holding, monitoring and enforcing land use restrictions for conservation on private property (in the form of the "Derecho Real"), and by representing civil society in those governance institutions that will hopefully continue to form for the management of the network ("Friends of the Parks").

Other nations should closely follow how Chile tackles these challenges. This is particularly true in Europe, where for more than 25 years the EU has been busy building the world's largest network of protected areas, Natura 2000, and is now facing similar challenges regarding its governance and management. It is to be hoped that going forward, the global land conservation community will give Chile the attention its conservation vision deserves, so that the next step in the development of this audacious green infrastructure project does not go as little noticed as the last one.

⁴⁵ The legal framework for protected areas in Chile has remained largely the same for almost 100 years. This institutional continuity convinced Doug Tompkins that the best way to conserve nature forever is to donate the land to the state and designated it as national parks. (Hernán Mladinic pers. Comm. 2018)

⁴⁶ Guillermo Espinoza 2010 Evaluación Ambiental Estratégica de Apoyo al Diseño del Sistema Nacional de Áreas Protegidas. http://bdrnap.mma.gob.cl/recursos/privados/Recursos/CNAP/GEF-SNAP/Espinoza_2010.pdf

