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Omora Ethnobotanical Park and the UNESCO Cape Horn Biosphere Reserve

[Eugene C. Hargrove](#)¹, [Mary T. K. Arroyo](#)², [Peter H. Raven](#)³, and [Harold Mooney](#)⁴

ABSTRACT. The biocultural conservation and research initiative of Omora Ethnobotanical Park and the UNESCO Cape Horn Biosphere Reserve was born in a remote part of South America and has rapidly expanded to attain regional, national, and international relevance. The park and the biosphere reserve, led by Ricardo Rozzi and his team, have made significant progress in demonstrating the way academic research supports local cultures, social processes, decision making, and conservation. It is a dynamic hive of investigators, artists, writers, students, volunteers, and friends, all exploring ways to better integrate academia and society. The initiative involves an informal consortium of institutions and organizations; in Chile, these include the University of Magallanes, the Omora Foundation, and the Institute of Ecology and Biodiversity, and in the United States, the University of North Texas, the Omora Sub-Antarctic Research Alliance, and the Center for Environmental Philosophy at the University of North Texas. The consortium intends to function as a hub through which other institutions and organizations can be involved in research, education, and biocultural conservation. The park constitutes one of three long-term socio-ecological research sites in Chile of the Institute of Ecology and Biodiversity.

Key Words: *Biodiversity conservation; sustainable development; environmental ethics; philosophy; Chile; Cape Horn*

THE PARK AND THE BIOSPHERE RESERVE

Since 2005, the Cape Horn archipelago at the southern tip of South America has been protected by the UNESCO Cape Horn Biosphere Reserve. This region contains the southernmost piece of forest in the Southern Hemisphere and the southernmost piece of alpine vegetation in the South American Andes, and sits on the doorstep of the continent of Antarctica, an area of the world that will be heavily affected by climate change and thus a focus of world attention and concern. As a region, it is also rich in history, particularly the history of science, because of the role it played in the shaping of Darwin's views on evolution in general, including human evolution. The biosphere reserve, with 49,000 km² or 19,000 square miles roughly the size of Vermont and New Hampshire combined, is part of one of the 24 most pristine ecoregions in the world (Mittermeier et al. 2003). The archipelago is one of the few groups of islands in the world that has remained free of extensive human impact until

now (Alvarez et al. 2004). The region contains extensive areas of temperate forest, the sub-Antarctic or subpolar forest of Magellanic Chile. The terrestrial ecosystems include evergreen broadleaf forests, deciduous forests, alpine habitats with formations of cushion plants and lichens, and a complex of tundra formations ranging from wetlands to peat bogs and glaciers in the middle of an intricate system of fjords, channels, estuaries, and bays. Darwin aptly described the region as a group of mountains in which the valleys are often underwater.

Within the biosphere reserve on Navarino Island is the Omora Ethnobotanical Park, the key to environmental research and formal and informal environmental education in the region. The park itself consists of a 620-ha lease from the Chilean government's Ministry of National Lands. The 25-year lease was the first in the Magallanes Region that recognized research, education, and conservation as productive uses of national property, a model that has since been replicated in other projects in the

¹University of North Texas, ²Institute of Ecology and Biodiversity, ³Missouri Botanical Garden, ⁴Stanford University

region. The park is a major attraction for tour boats providing tours of the sub-Antarctic region. Open to visitors, it provides experiences at both the macro and micro levels. In addition to its spectacular mountain vistas, it focuses the attention of visitors on microfauna such as moss and lichens, plants that contribute significantly to the biodiversity of the region. This approach is called “tourism with a hand lens.” In terms of formal education, study abroad classes focused on both the sciences and the humanities are now being offered through the University of North Texas. These classes include some students from South America.

DARWIN AND THE FUEGIANS

Like other Latin American nations, Chile became independent from Spain early in the 19th century. In this context, the UK sent an expedition led by Captain Phillip Parker King to look for natural resources and prepare navigation cartography of the Magellanic region at the southern tip of the Americas. Captain King commanded the *Adventure*, accompanied by H.M.S. *Beagle* commanded by Captain Pringle Stokes. Overwhelmed by the rigorous conditions of the voyage, the latter committed suicide in Port Famine at the Magellan Strait, and the command of H.M.S. *Beagle* was assumed by Captain Robert FitzRoy, who undertook the responsibility of preparing the cartography of the area south of the Magellan Strait. One of the first incidents that the young FitzRoy had to face involved the stealing of a boat by a group of Fuegians. This delayed and disturbed FitzRoy’s work plan to complete the cartography of the area, and the episode ended with the taking of two young men (York Minster and Boat Memory), a girl (Fuegia Basket), and a Yahgan boy who was given the name of Jemmy Button because it is told that he was traded for a button. FitzRoy took these four native Fuegians with him on board H.M.S. *Beagle* to the UK. Although Boat Memory died of smallpox on arrival in England in October 1830, the other three Fuegians survived and stayed in England until December 1831. During this stay of more than 12 months, the three Fuegians learned English, received some British education, and had an audience with King William IV and Queen Adelaide. After some difficulties, FitzRoy obtained funding for his second expedition and departed back for Cape Horn with the Fuegians and the naturalist Charles Darwin on board. The presence of the Fuegians provided Darwin with the opportunity to

get to know “civilized” Fuegians before meeting the “uncivilized” ones in their natural habitat.

FitzRoy spent so much time trying to recover the boat stolen by the Fuegians that he did not complete his cartography, thereby creating the need for a second voyage. If the second voyage had not taken place, Darwin might never have had the opportunity to go on a voyage around the world and had the experiences that led to his formulation of the theory of evolution. Moreover, the training of the three Fuegians in English permitted Darwin to have more contact with the Fuegians than with any other indigenous group that he met during his travels. Also, the experience of the Fuegians in England and their adaptation to British life permitted Darwin to obtain comparative information about the abilities and capabilities of indigenous peoples.

THE EARLY ROAD TO BIOCULTURAL CONSERVATION

Although many people and institutions were involved in the creation of the Omora Ethnobotanical Park and the UNESCO Cape Horn Biosphere Reserve, the central figure undoubtedly has been Ricardo Rozzi, now an Associate Professor in the Department of Philosophy and Religion Studies at the University of North Texas and an Investigator at the Institute of Ecology and Biodiversity (IEB) in Chile, supported by the Chilean Ministry of Planning and the Chilean National Science Foundation. After several years of study in preparation for a career in medicine, Rozzi switched to biology with a minor in philosophy and graduated from the Pontifical Catholic University of Chile in Santiago with a B.S. in biological sciences in 1985. As an undergraduate, he thought about doing research in the Cape Horn archipelago, but was unable to do so because of the risk of war between Argentina and Chile. His research for his master’s degree in the biological sciences, which he obtained from the University of Chile in Santiago in 1990 with Mary T. Kalin Arroyo and Juan J. Armesto, was in the Andes, where he showed that small changes in temperature, as seen on opposite-facing slopes, can restrict gene flow between adjacent populations. At this point, Rozzi took a turn in his career choices away from biology and conservation to consider music. He had always been interested in music and had been studying music in parallel with his scientific studies throughout his life. For the next five years, he worked at the

Pontifical Catholic University of Valparaíso, teaching music composition and writing music. However, two events redirected Rozzi back to biology and conservation. The first was the death of his grandfather, Silvio Rozzi, who had been a specialist in research on natural medicine. When asked to prepare a talk for an event paying homage to his grandfather's career, he studied his grandfather's work and concluded that, if it were possible to approach science in general as his grandfather had done, i.e., by taking into account indigenous knowledge in a way that is compatible, for example, with the tradition of St. Francis, it would be worth returning to work in biology and conservation.

The second was an invitation to tour the southern temperate forests of South America with Mary Willson of the U.S. Forest Service. During the tour, Willson, Rozzi, and Juan J. Armesto came up with the idea of setting up a biological station on Chiloé Island, a place in which Darwin had spent considerable time. Willson, who had received a small inheritance, used this money to purchase land on Chiloé for the station. Rozzi participated in the building of the facility, which was named the Senda Darwin or "Trail of Darwin" Biological Station. It was decided that the station would focus on three areas: (1) ecosystem studies under the purview of Armesto, (2) forest fragmentation and bird studies under the purview of Willson, and (3) education and small landowner relations under the purview of Rozzi. Once he got started, however, Rozzi quickly expanded his focus on small landowners to include indigenous peoples, an adjustment that would become particularly important for him in the Cape Horn archipelago. In addition, he expanded his conception of education to include ethics and began drawing connections between his work in biology and his earlier training in philosophy.

BIOCULTURAL CONSERVATION IN THE CAPE HORN ARCHIPELAGO

While working at the Senda Darwin Biological Station, Rozzi began thinking about the implications of *The sustainable biosphere initiative* (Lubchenco et al. 1991), a report from the Ecological Society of America's Committee for a Research Agenda for the 1990s. Rozzi decided that the agenda, which had been translated into Spanish, should be implemented in South America and made a presentation calling for its implementation at the

annual meeting of the Ecological Society of Chile in 1994. In this presentation, he made one change in the initiative. The original initiative was focused on research, education, and decision making. Rozzi changed decision making to conservation to make the initiative for South America more focused.

Rozzi's approach was also influenced by a presentation by two ecologists speaking to local people in Chile. As it turned out, the ecologists were unable to recognize the plants that they were speaking about in their talk. Remembering his grandfather's focus on indigenous knowledge in natural medicine, he decided that it was important for someone to show that there was a role for indigenous knowledge in science.

Realizing that he needed a Ph.D. in biology to be effective, he applied for and received a Fulbright Fellowship and began study toward a Ph.D. in Biology at the University of Connecticut. His dissertation was to be a study of indigenous knowledge of plants and birds. Because the military situation was at long last resolved at the southern tip of South America, Rozzi was finally able to do research in the Cape Horn archipelago, where he could work with the Yahgans, the indigenous people with whom Darwin had been most extensively involved.

For local support, Rozzi developed a relationship with the University of Magallanes at Punta Arenas, the most southern university in the Western Hemisphere, and the Millennium Science Nucleus, Center for Advanced Studies in Ecology and Biodiversity in Chile, the forerunner of the actual Institute of Ecology and Biodiversity (IEB) founded by his two former major professors at the University of Chile. The base for his research was Puerto Williams on Navarino Island, on the south side of the Beagle Channel just south of Tierra del Fuego. The town is the home of the Yahgan community and also the capitol of the Chilean Antarctic Province. Once in Puerto Williams, Rozzi soon made contact with the governor of the province, who became interested in Rozzi's work and ideas. Rozzi demonstrated to the governor the value of biocultural knowledge, pointing out that some bridges on Navarino Island had not collapsed because it had rained too much, but rather because of the absence of trees that had been cut down nearby. With the help of the governor, land just outside of Puerto Williams, leased to the University of Magallanes, was made available for the creation

of the Omora Ethnobotanical Park, to be run by the University of Magallanes and a new nonprofit organization, the Omora Foundation. A few years later, thanks to a huge effort led by Rozzi, the UNESCO Cape Horn Biosphere Reserve was also established, protecting the entire archipelago.

After receiving his Ph.D. from the University of Connecticut, Rozzi was hired by the Department of Philosophy and Religion Studies at the University of North Texas, which has a leading program in environmental philosophy and environmental ethics. The department was interested in establishing better contact with environmental philosophers in South America. The department was also part of an environmental science program at the University of North Texas. Rozzi fit in well in the department, especially because he had also acquired an M.A. in philosophy with a specialty in environmental ethics while at the University of Connecticut. Rozzi's arrival at the University of North Texas together with the creation of the park and the biosphere reserve set the stage for a cooperative agreement between the University of North Texas and the University of Magallanes for research and instruction in the park and the biosphere reserve. The consortium is made up of the two universities plus, in South America, the Omora Foundation, a nonprofit associated with the park, and the IEB, and, in North America, the Omora Sub-Antarctic Research Alliance and the Center for Environmental Philosophy. This consortium is not intended as an exclusive group, but rather is expected to serve as a hub through which other universities in North and South America can participate. For example, arrangements can be made for students from other universities to participate in the Omora Study Abroad Program; currently, a course called "Tracing Darwin's Path" focuses on both the sciences and the humanities.

An innovative program integrating theory and practice with roots in Cape Horn

The concept of the Omora Ethnobotanical Park began in 2000 at the local level in Puerto Williams with a diverse group led by Ricardo Rozzi. The group included a lawyer, a writer, a musician, a philosopher, an agronomist, biologists, a politician, and students, all of whom were interested in changing the way conservation science was conducted. Since that time, the Omora Ethnobotanical Park's primary goal has been to link

scholarly work with a long-term commitment to a place, thereby allowing academics to become engaged citizens as well as researchers. In addition, the park's founders wanted to conduct socially relevant science that focuses on research, education, and conservation, as embodied in the park's mission statement: "Integrating biocultural conservation with social well-being from the end of the earth." This public-private venture has now evolved into a broader partnership. In 2002, through the Omora Ethnobotanical Park, the University of Magallanes was able to establish a Puerto Williams headquarters (<http://www.umag.cl/williams/>). The Omora Ethnobotanical Park has become part of the IEB's Long-Term Socio-Ecological Research Network (<http://www.ieb-chile.cl/about/stations.php>). Furthermore, it inspired the creation of a United States-based sister NGO called the Omora Sub-Antarctic Research Alliance (<http://www.osara.org>), which helps coordinate international activities in the Cape Horn Biosphere Reserve. Finally, the Center for Environmental Philosophy and the Department of Philosophy and Religion Studies at the University of North Texas have developed a "field philosophy" program carried out at the Omora Ethnobotanical Park in conjunction with the IEB. There is now a Chile Program at the University of North Texas through the cooperative efforts of the Environmental Science Program of the Institute of Applied Sciences and the Department of Philosophy and Religion Studies.

Besides being a research site for long-term research on migratory birds, forests, and marine ecology, the Omora Ethnobotanical Park serves the function of protecting the watershed of the Róbalo River, the drinking water source of Puerto Williams, and it constitutes an outdoor classroom for students from preschool to university. As such, it also allows for a direct-contact learning experience for visitors of all types via an interpretive trail with signs and information in Yahgan, Spanish, scientific Latin, and English.

The practice of integrating theory in the field

As stated above, the Omora Ethnobotanical Park's approach includes research, education, and conservation. These three facets are linked throughout all phases of academic work and its subsequent application. For example, the interconnection between scholarly pursuits and societal outcomes is exemplified in the case of the

miniature forests of Cape Horn. In this project, international bryologists working with the Omora Ethnobotanical Park and funded by the UK Darwin Initiative, the U.S. National Science Foundation, National Geographic, and the IEB made the discovery that the Magallanes region hosts the highest diversity of bryophytes in Chile and even constitutes a global biodiversity hotspot for mosses and liverworts. This result refuted previous diversity assessments based on vertebrates and woody plants, which had led conservationists to minimize the importance of the Magallanes region for national and global biodiversity priorities. At that point, Chile lacked professional bryologists, and the University of Magallanes used the opportunity to train a new cadre of graduate students in this subject with international collaborators. Significantly, from these efforts also came a series of ecotourism guide books, funded by the regional government, to provide high-quality content information for a nascent sustainable tourism enterprise.

Based on these early academic successes, the Omora Ethnobotanical Park received a grant to provide training courses for local and regional tourism operators. These innovative courses were unique in Chile. As a result, the Omora Ethnobotanical Park was asked to host representatives from the Inter-American Development Bank and the National Director of the Chilean Tourism Service to display this new sustainable development alternative, dubbed “tourism with a hand lens” (see http://en.wikipedia.org/wiki/Tourism_with_a_Hand_Lens), which looks to value native biodiversity, even if we have to change the lens through which we view the world.

This scientific research undertaken with strong support from the IEB in the form of postdoctoral fellows, graduate fellowships, outreach personnel, and research funding has now been highlighted in a leading ecology journal (Rozzi et al. 2008), and was also featured as the April 2008 cover story and podcast of *Frontiers in Ecology and the Environment* (<http://www.esa.org/podcast/?p=13>). Taking advantage of the *Frontiers* article, the Omora Ethnobotanical Park also secured a full-page article in Chile’s leading newspaper about these miniature forests, and the concept was highlighted in the country’s leading Sunday magazine about up-and-coming ecotourism destinations that reported on operators in Puerto Williams trained by the Omora Ethnobotanical Park in tourism with a hand lens.

The latest achievement of this program under the leadership of Rozzi has been the inauguration of the Miniature Forest Garden trail in the Omora Ethnobotanical Park, which took place as part of the celebration of the third anniversary of the Cape Horn Biosphere Reserve in June 2008 and the inauguration of the IEB’s Long-Term Socio-Ecological Research Network, presided over by the Governor of Magallanes, Eugenia Mancilla, and other local and regional authorities. To date, the list of dignitaries who have visited the miniature forests of Cape Horn includes actor Richard Gere, two Chilean presidents, various ambassadors, and countless tourists and schoolchildren.

A second initiative that highlights the Omora Ethnobotanical Park’s emphasis on transferring scientific information to broader social outcomes is found in a four-year project that aims to establish the Magellanic woodpecker (*Campephilus magellanicus*), the largest woodpecker in South America, as a charismatic “flagship” species for the Cape Horn Biosphere Reserve. The effort began as a general research project about the forest birds of the sub-Antarctic forests in 2000. Subsequently, basic information was then transformed into a social and conservation program by Rozzi and his team to position this species as a part of the Puerto Williams local identity and put into perspective and value the biodiversity housed in old-growth forested ecosystems. Today, the woodpecker can be found throughout town on posters, clocks, and calendars in venues as varied as the Internet cafe, town hall, and local bar. This initiative even gained the attention of the admiral of the Chilean Navy, and now the woodpecker will also be used as the logo for the Navy supermarket’s new cloth bags. Similarly, the National Petroleum Company financed the publication of a series of educational posters about the woodpecker.

Numerous similar achievements under the leadership of Ricardo Rozzi demonstrate the Omora Ethnobotanical Park’s ability to link scholarly research with social benefits, such as the publication of the *Multi-Ethnic Bird Guide to Austral Temperate Forests of South America* (Rozzi et al. 2003), the culmination of 10 years of ornithological work and ethnographical interviews, and a trilingual (Yahgan-Spanish-English) *Children’s Illustrated Dictionary of the Yahgan World* (Zárraga et al. 2006), which itself sprang from an art course conducted with young people from the local

indigenous community. These and other materials are integrated into the curriculum of a permanent environmental education course known as the Omora Workshop, which is taught by Omora Ethnobotanical Park graduate students each year. In this way, the town's elementary school students are able to participate in the annual regional science fair, even winning this competition in 2006. Also, three books published since 2006 integrate culture and ethno-ecology; they deal with Yahgan traditional ecological knowledge, the importance of Cape Horn to Darwin in the formulation of the theory of natural selection, and the habitats and inhabitants of the Róbaló River watershed (e.g., Goffinet et al. 2006, Massardo and Rozzi 2006). These publications help place the sub-Antarctic archipelago into perspective, not just as a meaningful component of Chilean ecological heritage but a place whose environment, culture, and history merit global consideration.

Expanding the approach to the regional, national, and international levels

Recently, to attain greater relevance at broader scales, Omora Ethnobotanical Park scholars formalized their strategy of integrating research, education, and conservation in an article in *Ecology and Society* (Rozzi et al. 2006, see also Callicott et al. 2007). The article has helped publicize the Omora Ethnobotanical Park's efforts, which can be replicated, adapted, or tested in other areas. Furthermore, to help institutionalize this approach within academia, the Omora Ethnobotanical Park helped the University of Magallanes create a new academic program titled Masters in Science with Mention in Conservation and Management of Subantarctic Ecosystems, and the effort has been further systematized via the IEB's triennial course in a Latin American Postgraduate Course on Biocultural Conservation, an international workshop sponsored by the National Science Foundation on the Integration of Environmental Philosophy and Ecological Sciences, and study abroad opportunities for U.S. and Latin American students. Finally, as one of the IEB's field sites, the Omora Ethnobotanical Park is now part of a national program to integrate research and social development known as the Basal Financing Program of the Chilean Science and Research Commission.

A novel approach requires a novel team

The challenge to not just initiate but maintain transdisciplinary research, especially in a remote field location, is generating the physical, financial, and human infrastructure necessary to conduct long-term, constant, and rigorous scholarly work in a relevant dialogue with society. For this reason, the Omora Ethnobotanical Park has made it a priority to work within a partnership of institutions, including the IEB, other institutions of higher learning such as the University of Magallanes (<http://www.umag.cl/williams/>) and the University of North Texas (<http://www.phil.unt.edu>). However, it is also imperative to engage local authorities such as the Cape Horn Municipality, the Antarctic Provincial Government, and the Puerto Williams School; regional/national institutions, e.g., the Institute of Patagonia, the Chilean Antarctic Institute, and the Chilean Natural History Museum; and international programs such as the Darwin Initiative, AVINA, the Latin American Biosphere Reserve Network, and Audubon-Ecología en El Patio de la Escuela. At the same time, while interacting with other members of the consortium to re-enforce its work, the Omora Ethnobotanical Park has maintained its own character, which has permitted its academics and students to integrate their socially relevant research agenda into these larger structures, rather than be subsumed by them.

Besides numerous national and international collaborators from the public, private, academic, and governmental sectors and a cadre of volunteers and students, two critical individuals during the first phase of the development of the Omora Ethnobotanical Park undoubtedly are Christopher Anderson, Postdoctoral Fellow, IEB, and founder of OSARA, and Francisca Massardo, University of Magallanes.

THE FUTURE

The Omora Ethnobotanical Park, led by Ricardo Rozzi and his partners, is well situated to become one of the most important centers for the intellectual development of biocultural conservation and scientific research and a shining example of sustainable development in the Southern Hemisphere. The pieces have gradually begun to fall into place, but there is still much to be done. The main challenge lies in further integrating the local inhabitants of the Cape Horn region into sustainable economic

activities associated with the park and the biosphere reserve. This will require the strong leadership already shown by Ricardo Rozzi as well as special organizational skills. The park, the archipelago, and the biosphere reserve will likely increasingly play a role comparable to and complementary with that of another park, archipelago, and biosphere reserve in South America, i.e., the Galapagos.

Responses to this article can be read online at:
<http://www.ecologyandsociety.org/vol13/iss2/art49/responses/>

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