



SUPPLEMENTARY MATERIAL

PARR (2010) *Revista Chilena de Historia Natural* 83: 13-16.

Prologue
International Long-term Ecological Research Network:
Its scope and future directions in relation to Chile

Prefacio
Red Internacional de Investigación Ecológica a Largo Plazo:
Alcances y direcciones futuras en Chile

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At national and global levels, concerns continue to grow over long-term environmental and socio-ecological problems such as climate change, water scarcity, biodiversity loss, and sustainable development. In response to these concerns, policymakers, scientists, and the public increasingly seek high quality information about the environment at local, national and global levels. In particular, there is increasing interest in how such environmental issues affect human welfare. Equally important is the need to understand how human activities can be adjusted to protect essential ecosystem services. This special feature of the *Revista Chilena de Historia Natural* (RChHN) brings together examples of research that can help to meet these needs. It focuses on concrete cases of long-term ecological research (LTER) and long-term socio-ecological research (LTSER) in Chile and sets this in the context of related work on the international scene, particularly that of the International Long-term Ecological Research Network (ILTER).

ILTER's mission (<http://www.ilternet.edu>) is to improve understanding of global ecological systems and provide relevant information to solve known and future environmental problems. ILTER was founded in 1993, during the United States' Long-term Ecological Research (U.S.-LTER) All Scientists Meeting at Estes Park, Colorado. ILTER was formed to meet the growing need for global communication and collaboration among long-term ecological researchers. Thirty-nine scientists and administrators representing sixteen countries participated in this meeting. Since then, long-term ecological research programs have expanded rapidly, reflecting the increased appreciation of the importance of long-term research in assessing and resolving complex environmental issues. By August 2009, ILTER's membership included 41 member networks in five regional networks including sites in the East-Asian

Pacific, Europe, Southern Africa, North America and Central/South America. Still key ecoregions of the world are underrepresented or absent. However, several countries in these regions are actively pursuing the establishment of member networks. As such, this volume provides a valuable synthesis of work from a preliminary Chilean LTSER networking effort and a clear basis for its incorporation into ILTER. This nascent Chilean network has an extensive latitudinal range from the northernmost outposts of South American temperate forests found in semi-arid ecosystems at Fray Jorge National Park (30° S), to the Valdivian and North Patagonian rain forests and peatbogs at Senda Darwin Biological Station on Chiloé Island (42° S), and ending in the subantarctic Magellanic rainforests at the Omora Ethnobotanical Park (55° S) in the Cape Horn Biosphere Reserve that hosts the world's southernmost forests (Anderson et al. 2008).

At the global scale, ILTER's goals are to: (1) foster collaboration and coordination among researchers, and improve comparability of long-term ecological and socio-economic data from sites around the world; (2) facilitate exchange and integration of, access to, and preservation of long-term, site-based data; (3) deliver non-biased information to scientists, policymakers, and the public to meet the needs of decision makers at multiple levels; and (4) facilitate education of the next generation of long-term scientists.

A central part of ILTER's mission is to inform choices, solutions, and decisions pertaining to environmental problems by providing scientific data and information relevant to many of the key environmental problems faced by society today. A few examples of how ILTER is contributing in these areas are given below and many others are described in this special feature of the RChHN.

Climate change

ILTER and its members have an opportunity to play a key role in the mitigation and management of the risks posed by climate change. By integrating the findings of local research sites that examine a range of ecological systems, ILTER may help detect distinct climate-induced alterations in biodiversity and ecosystems and the services they support. For example, it is contributing to the United Nations Environment Programme (UNEP) initiative to develop a Global Climate Change Adaptation Network, which aims to improve the capacity to meet the increasing needs of all countries to adapt data, knowledge, technology and policy support. As part of this network, ILTER may contribute to a network of ground stations that will help build the adaptive capacity of local communities and support decision-making at various levels of governance by assessing the impacts of climate change, assessing adaptation options and assisting technology transfer.

Sustainable development and the sustainable use of resources and ecosystems

Human health, education, and economic opportunities are linked to environmental conditions in complex ways. By bringing together scientists from all over the world, ILTER can improve the understanding of how humans interact with the natural environment, how ecosystems affect the human condition, and how human well-being and ecosystem's health are linked (Millennium Ecosystem Assessment 2005). Many of ILTER's national networks, for example, have a direct role as demonstration sites for technology transfer (e.g., the Chinese Ecosystem Research Network), and ILTER sites are well placed to contribute benefits to local or regional stakeholders, as well as to provide essential information for making decisions at the global scale

Sustainable use of biodiversity and ecosystem services

The diversity of life on earth (biodiversity) is one of the key natural resources on which human societies depend. LTER sites and networks provide infrastructure, experimental facilities, databases, information and knowledge required for effective management and sustainable use of biodiversity and the ecosystem services it provides. LTER is required to monitor biodiversity changes, identify main drivers and pressures on biodiversity and evaluate the effects of biodiversity losses on ecosystem processes and ecosystem services. In all ecosystems, including those heavily modified by human activities, these processes can be complicated and slow. Therefore long-term approaches are essential to provide data and knowledge needed to manage and reverse current trends of biodiversity loss and ecosystem degradation at regional and global scales. To help address this need ILTER is involved in the Group on Earth Observations System of Systems (GEOSS), which aims at meeting the need for

global information "to support decision making in an increasingly complex and environmentally stressed world" (http://www.earthobservations.org/about_geo.s.html). Through GEOSS, ILTER is already heavily involved in the development of the Global Biodiversity Observation Network (<http://earthobservations.org/geobon.shtml>).

ILTER and its sites are also contributing to initiatives related to the Millennium Ecosystem Assessment (MA) work; an assessment that looked at the benefits people obtain from ecosystems, and how changes in these ecosystem services have affected human well-being. ILTER is currently synthesising information about how ecosystem services are changing at its sites and the causes and consequences of these changes. This information will feed into new regional ecosystem assessments and into global assessments and related initiatives such as "The Economics of Ecosystems and Biodiversity" (TEEB).

Environmental hazards and disasters

ILTER sites are not immune from the hazards and disasters (droughts, floods, pest and disease outbreaks and typhoons) that regularly hit the news headlines. But the long-term nature of the work and our ability to undertake comparative studies over several sites enables ILTER to put these events into their spatial and temporal contexts and provide a basis for understanding and adopting actions to respond to these events. A good example of this is the comparative studies undertaken on the impacts of typhoons and hurricanes in different parts of the world and the investigation of disease outbreaks and their causes, such as the work on the role of rodent populations in the spread of hantavirus in New Mexico (Yates et al. 2002).

In all of these areas, ILTER has recognized the need to include the human dimension of environmental change and is increasingly working with social scientists, economists and science communicators to do this. In some countries, urban LTER sites have been developed, while in others larger sites, incorporating social and economic processes and the active engagement of stakeholders in research are now common (e.g., Finnish Long-Term Socio-Ecological Research Network: FinLTSER, <http://www.environment.fi/syke/lter>, the Baltimore Ecosystem Study <http://www.beslter.org>).

STILL PRESSING NEEDS

A key part of ILTER's current strategy is to build new LTER capacity through training, the development of strategic partnerships and the addition of new sites and member networks. Although ILTER now has over 40 member networks its coverage of the globe is far from complete, and ILTER is committed to a targeted expansion by adding sites and networks that add value and help answer critical scientific, research-driven

questions. Of particular importance is the need to improve the coverage of sites in the Southern Hemisphere, particularly in Africa and South America.

Clearly, an LTSER network in Chile would provide a valuable addition to the global capability of ILTER. As stated before, Chile is a remarkable country which spans a vast latitudinal and altitudinal range and a corresponding diversity of habitats and ecosystem services (Armesto et al. 1998). This special edition of the RChHN provides excellent examples of LTSER initiatives in Chile and describes the motivation for the establishment of a new national long-term research network. In addition to accumulating high quality, continuous environmental data (e.g., Gutiérrez & Meserve 2003, Meserve et al. 2003), the Chilean LTSER network will provide infrastructure to conduct international and interdisciplinary research and innovative field courses integrating ecology, environmental philosophy and other disciplines (Rozzi et al. 2008). It is expected that the Chilean LTSER network also will strengthen the links between academics and local and regional stakeholders, and facilitate the integration of science and society. As we see from a number of papers in this special edition of RChHN, Chile provides yet another example of putting the social component (the "S") into LT(S)ER in order to make sure that the research becomes increasingly relevant to societal issues. The emerging Chilean LTSER Network and associated sites deserve every success, and it will certainly make a valuable addition to the growing family of sites and scientists that make up ILTER.

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