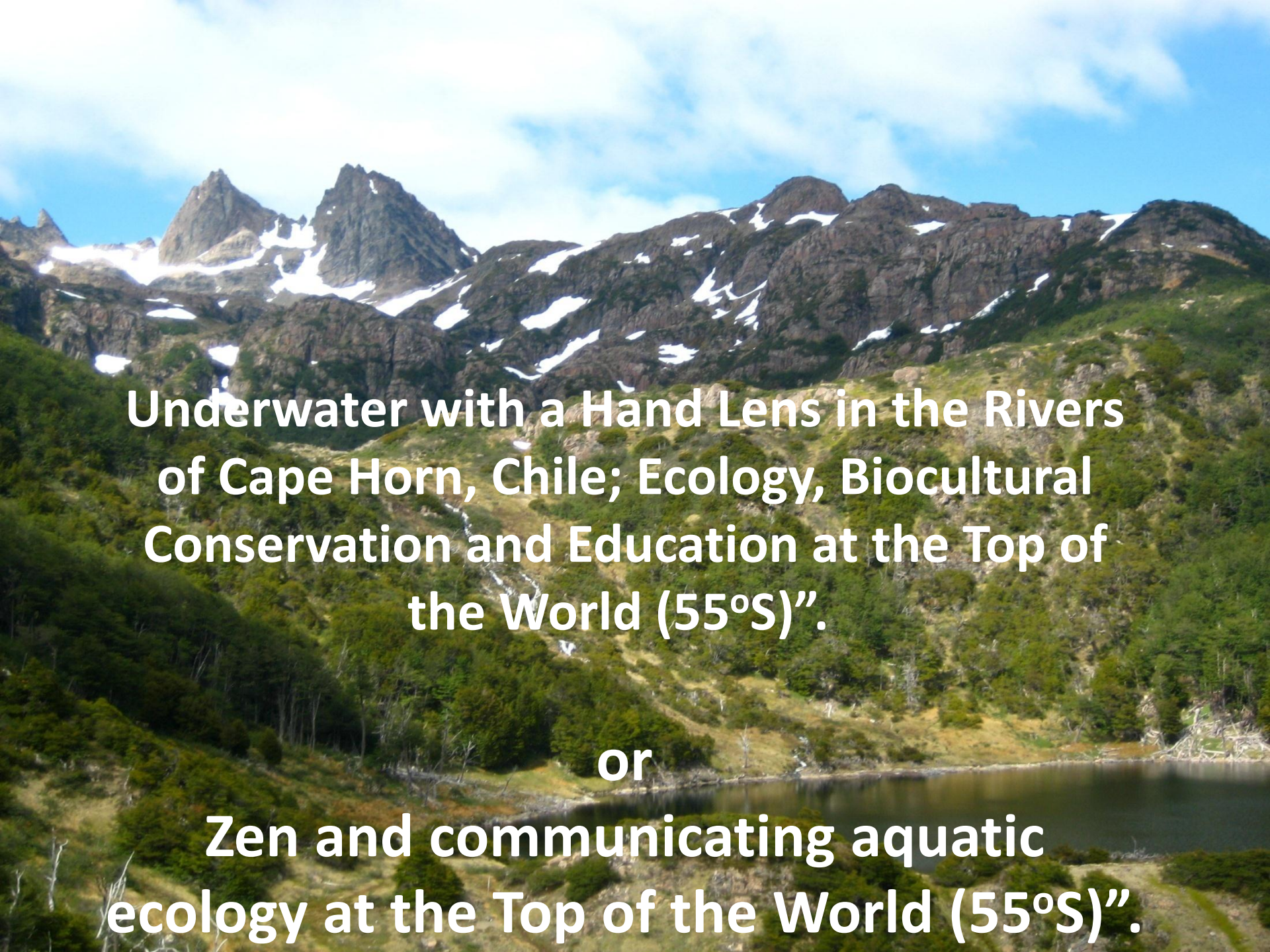

Underwater with a Hand Lens in the Rivers of Cape Horn, Chile; Ecology, Biocultural Conservation and Education at the Top of the World (55ºS)".
or
Zen and communicating aquatic ecology at the Top of the World (55ºS)".

Acknowledgements

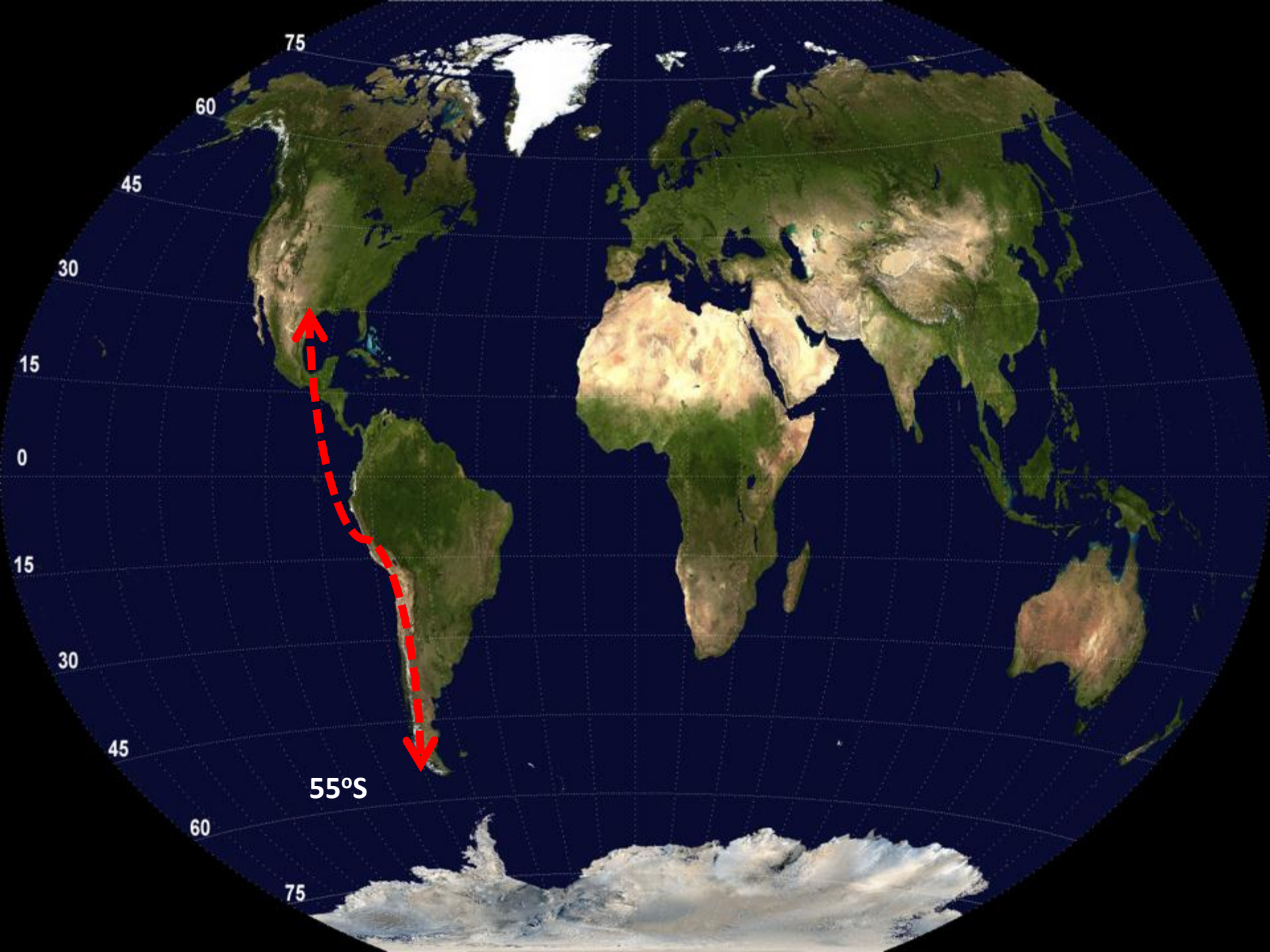
- **Dr. Tamara Contador**
- **Dr. Ricardo Rozzi**
- **Dr. Francisca Massardo**
- Jaime Ojeda
- Rodrigo Molina
- Students and faculty from around the world who have participated in the last10 years of Tracing Darwin's Path courses in the Sub-Antarctic region of Chile.

Outline

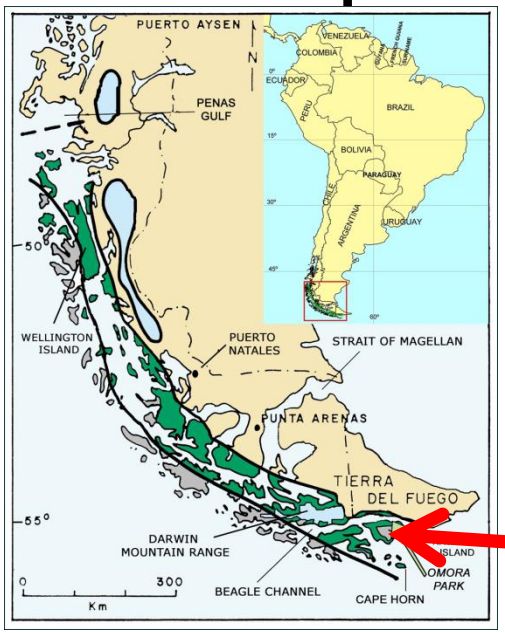
- Brief intro to myself and the UNT Chile Program,
- Research
- Why I am excited about this method of communicating
- Why this program is carried out in South America but has much broader application
- Research – Education link
- Opportunities

Where?

55°S
75
60
45
30
15
0
15
30
45
60
75


75
60
45
30
15
0
15
30
45
55°S
60
75

UNT Chile program
Cape Horn Biosphere Reserve



UNT Chile Program

- One of the 37 most wild, and pristine ecosystems in the World (Mittermeier, et al 2002).
- Extensive and remote area of temperate forests, the sub-Antarctic or sub-polar forests of Magellanic Province of Chile,
- Protected areas in the Magellanic Sub-Antarctic region are the largest ones in Latin America

The beginnings of this program happened in

1999 a group of environmental philosophers, artists and scientists in collaboration with local community and government created the *Omora Ethnobotanical Park*

Provided a resource for local-global collaboration to implement effective interdisciplinary actions, and international conventions and policies

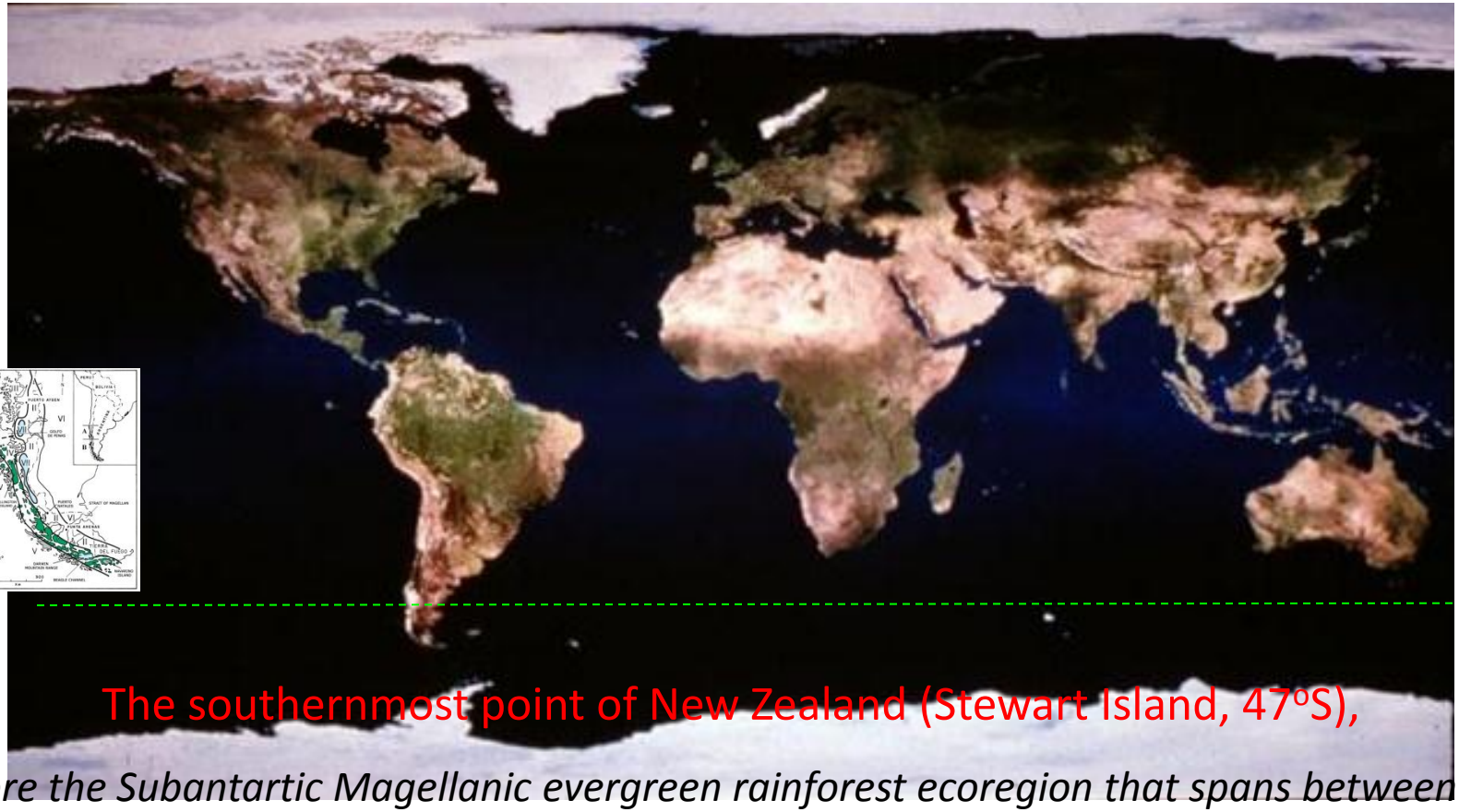
The Omora Ethnobotanical Park

protects the watershed that provides drinking water to Puerto Williams

A critical function of this reserve is to maintain an essential ecosystem service.


UNT has a long standing education and research program in this region that is Linked to our Chilean partners
IEB
University of Magallanes
Inauguration of Field Station
January 2011
UNIVERSIDAD DE MAGALLANES CHILE
Un Programa CONICYT
explora
CONICYT
COMISIÓN NACIONAL DE INVESTIGACIÓN CIENTÍFICA Y TECNOLÓGICA
GOBIERNO DE CHILE
DIVERSIDAD ECOLOGÍA SOCIEDAD
Chile
IEB
UNT
Sub-Antartic Biocultural Conservation Program
OSARA

Magellanic Sub-Antarctic region has no replica



The southernmost point of New Zealand (Stewart Island, 47°S),

therefore the Subantartic Magellanic evergreen rainforest ecoregion that spans between 48 and 56°S, has no replica in the world.

Oceanic Southern Hemisphere contrasts with *Continental Northern Hemisphere*.

This wilderness area at the southern end of the Americas, however, has been protected by its remote location, by geographical barriers, and by the presence of a large military reserve

HOWEVER, this is changing rapidly … increased demands for environmental resources (lumber, water, hydroelectric and tourism

However its not all pristine

Invasive Species

- Beaver
- Mink
- Muskrat
- Salmon

Mining

- Gold
- Silver
- Coal

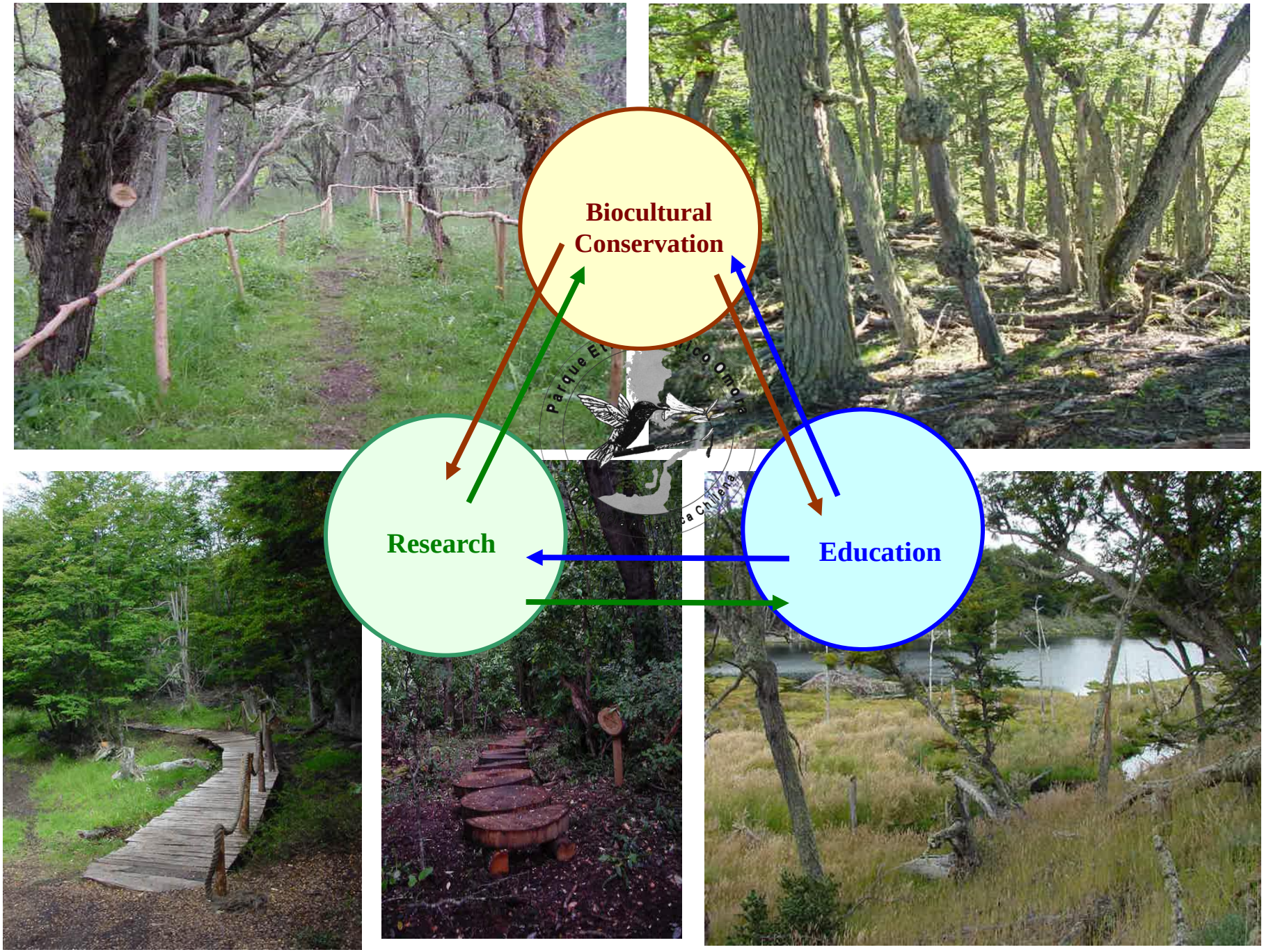
Questions

- **How to achieve the goals of conservation and sustainable development in the Cape Horn Region?**
- **Broader question is how to train the next generation of conservationists to effectively develop and implement conservation programs?**

Undertaking the challenges of 21st century ecology

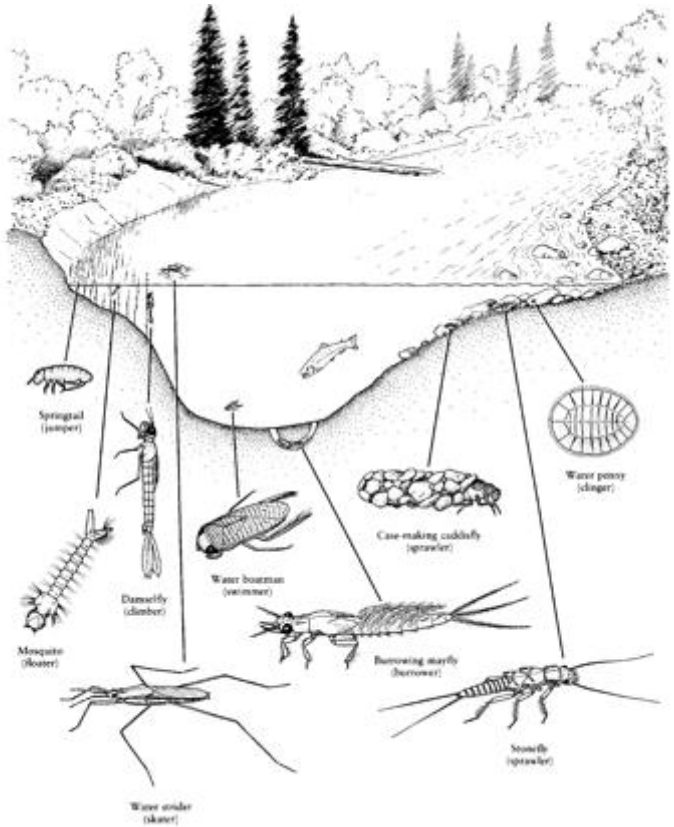
- Ecological knowledge used to **inform decisions**
- Advancing innovative, anticipatory ecological research **across conventional disciplinary boundaries**
- Stimulate cultural changes for forward-looking, **inter-cultural** ecology
- The integration of these concepts across all levels of education

Chiloe Workshop, March 2007


Biocultural
Conservation
Research
Education

Benthic Macroinvertebrates

- Associated to surfaces of the channel's bottom
- Ubiquitous in freshwater systems of the world
- Include arthropods, mollusks, annelids, nematodes, flatworms
- Fundamental link in the food web between organic matter resources and fish



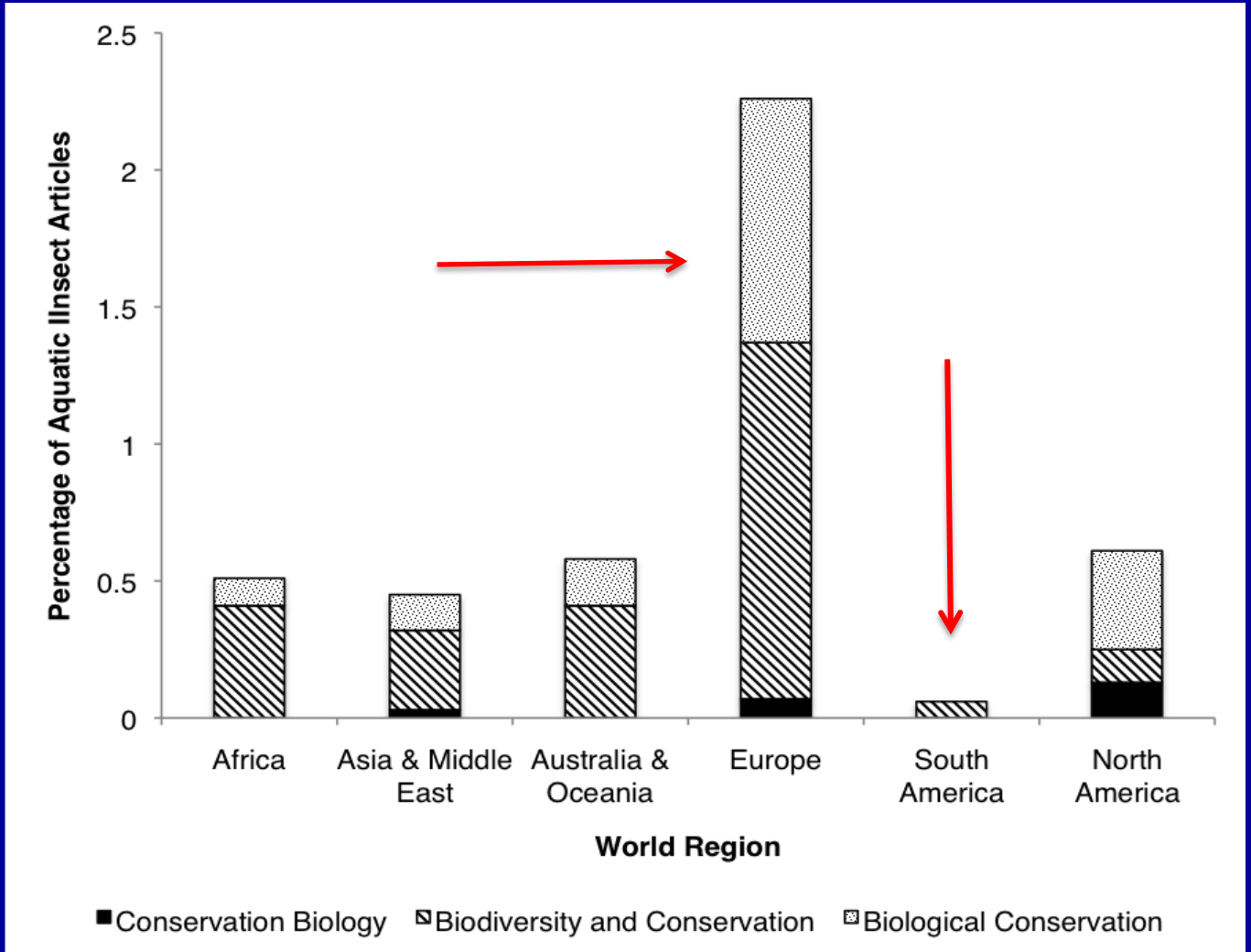



Knowledge about biology and conservation of aquatic insects on a global scale -why Chile

- Nearly all ecological knowledge of Aquatic Insects is based on North American and European studies.
- at a global scale, Europe presents the higher percentage of publications related to the conservation of aquatic insects (2.3%), while the percentage of publications for South America is the lowest (0.1%) in the world. (Contador, Kennedy, and Rozzi 2012)

Why Southern Chile

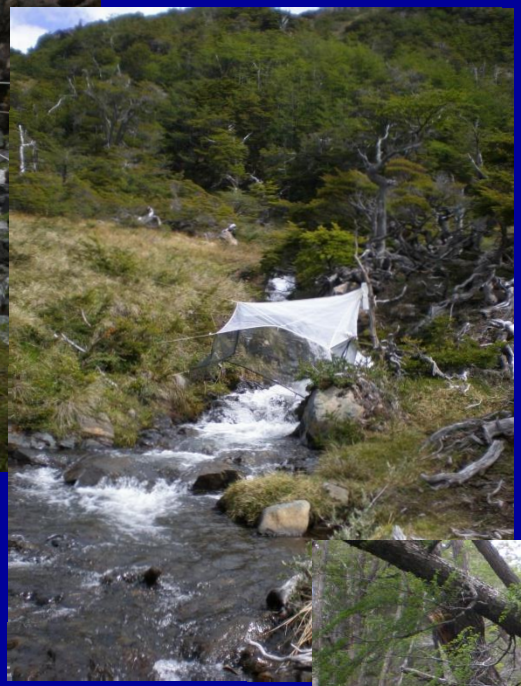
Contador, Kennedy and Rozzi et al 2011



Headwater
577 meters above sea level

486 meters above sea level

386 meters above sea level



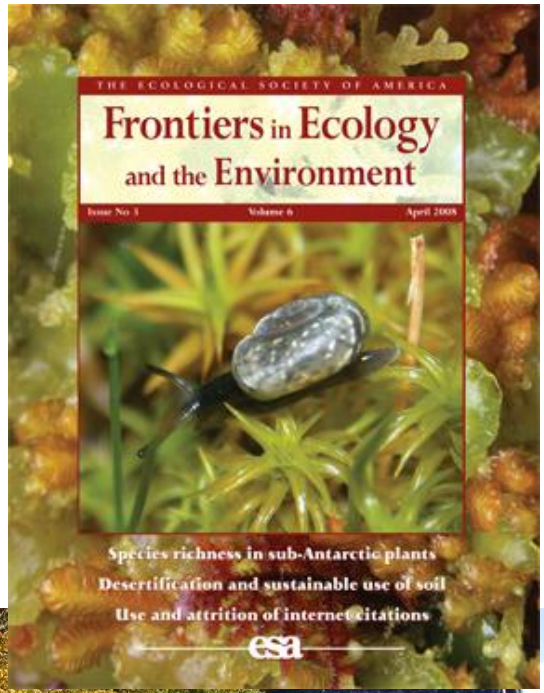
120 meters above sea level

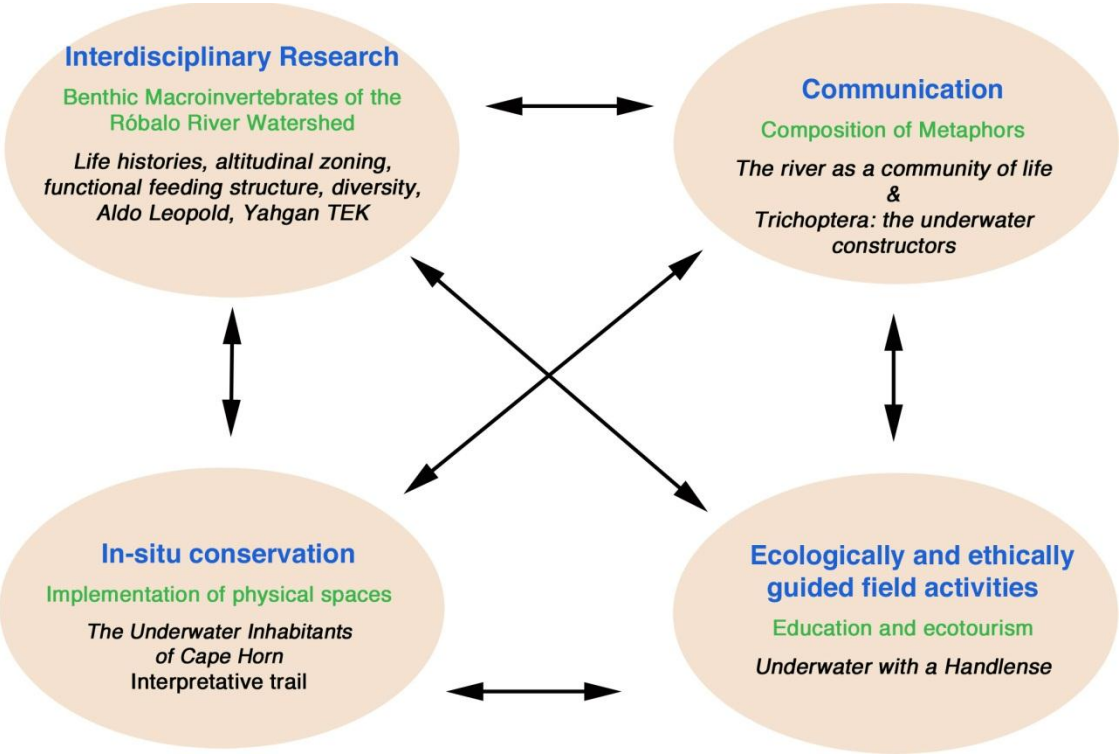
Róbalo River

How to better understand and communicate the intrinsic and instrumental values of freshwater invertebrates of the Róbalo and the Cape Horn Biosphere Reserve?

Four Step Cycle Incorporating Ecology, Field Philosophy

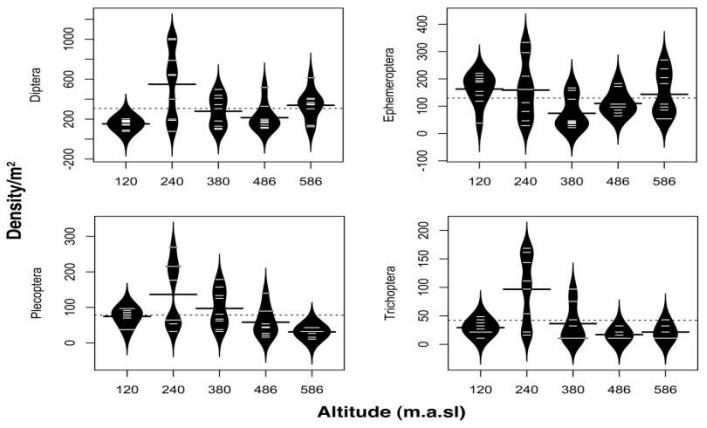
- Emphasis on ecologically and ethically guided field experiences in local habitats, socio-cultural communities, and regional institutions
  - To stimulate valuation about biological and cultural diversity (Rozzi et al 2008)





Interdisciplinary Research

Ecological Research



Interdisciplinary Research

Environmental Philosophy Research

The Green Pasture, **Aldo Leopold (1949)**

"Some paintings become famous because, being durable, they are viewed by ***successive generations****, in each of which are likely to be found a few appreciative eyes.*

I know a painting so evanescent ***that it is seldom viewed at all****, except by some wandering deer.* ***It is a river*** *who wields the brush, and it is the same river who, before I can bring my friends to view his work, erases it forever from human view. After that it exists only in my mind's eye".*

- Integrates both, terrestrial and aquatic components of the river and its valley
- Emphasis on the dynamic and seasonal character of the Wisconsin River

Wisconsin River, Aldo Leopold Shack, Photograph by T. Contador

Interdisciplinary Research

Ethno-ecological Research Traditional ecological Knowledge

- **Yahgan traditional ecological knowledge (TEK)**
  - Story of Omora
    - Helped create the rivers and streams of the Cape Horn Region
    - Yahgan view concurs with this study's scientific findings
      - The river as a biotic community
        - » Emphasizes interactions among terrestrial and freshwater components
      - Also concurs with Leopold's perspectives by highlighting the dynamic (seasonal) character of the the river ecosystem
- Our research integrates and relates to both, Leopold and Omora, but it adds freshwater invertebrates, as part of the community of life in the river and its valley.

Omora photograph: www.avesdechile.cl

Composition of metaphors

- *Trichoptera: The Underwater Builders of the Cape Horn Biosphere Reserve*
  - promotion of intrinsic value through the discovery of their case-making behavior
  - similitude with human behavior of building and designing our homes
- *The River as a Community of Life*
  - The river is not just water and rocks

Pizarro, J.C., Ojeda., **Contador, T.A.,** Bugallo, A. 2010. Complejidad epistemológica, filosófica, ecológica y práctica;
Un programa de conservación biocultural en la cumbre austral de América. La emergencia de los enfoques de la complejidad en América Latina: Desafíos, contribuciones y compromisos para abordar los problemas complejos del siglo XXI. *In press*

Jaime Ojeda**, Tamara Contador**, Yanet Medina, J. Cristóbal Pizarro, Andrés Mansilla, James H. Kennedy, Francisca Massardo & Ricardo Rozzi.
Filosofía Ambiental de Campo: Abriendo paso a nuevas metodologías para la conservación de la diversidad biocultural en la ecorregión subantártica de Magallanes. Revista Austro. *In press*

Guia para la Identificación de los Invertebrados Marinos y Dulceacuícolas de la Reserva de Biosfera Cabo de Hornos

Jaime Ojeda, Tamara Contador, Sebastián Rosenfeld,
Christopher B. Anderson, Andrés Mansilla & James H. Kennedy

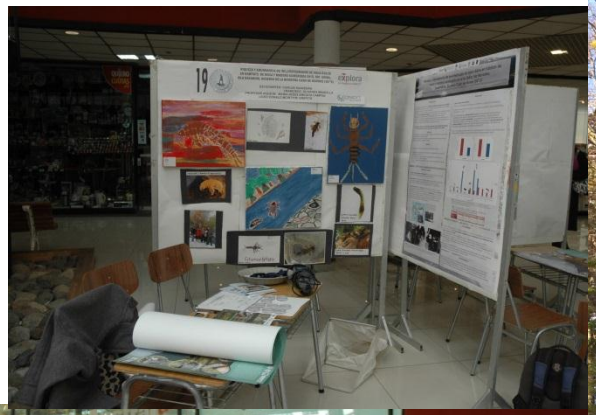
Programa de Conservación Biocultural Subantártica
EDICIONES UNIVERSIDAD DE MAGALLANES

MACROINVERTEBRADOS DULCEACUÍCOLAS

RESERVA DE BIOSFERA CABO DE HORNOS · CHILE

Underwater with a hand lens

- Education
  - Workshops
    - Local school, teachers, ecotourism operators



Underwater with a hand lens

Underwater with a Hand Lens

OEP and Puerto William's school work together since the year 2000 in a workshop with students from 5th to 8th grade. During 2010, the workshop focused on the diversity and richness of the freshwater invertebrates of the CHBR, developing ***Underwater with a Hand Lens***. ***During the activity, participants:***

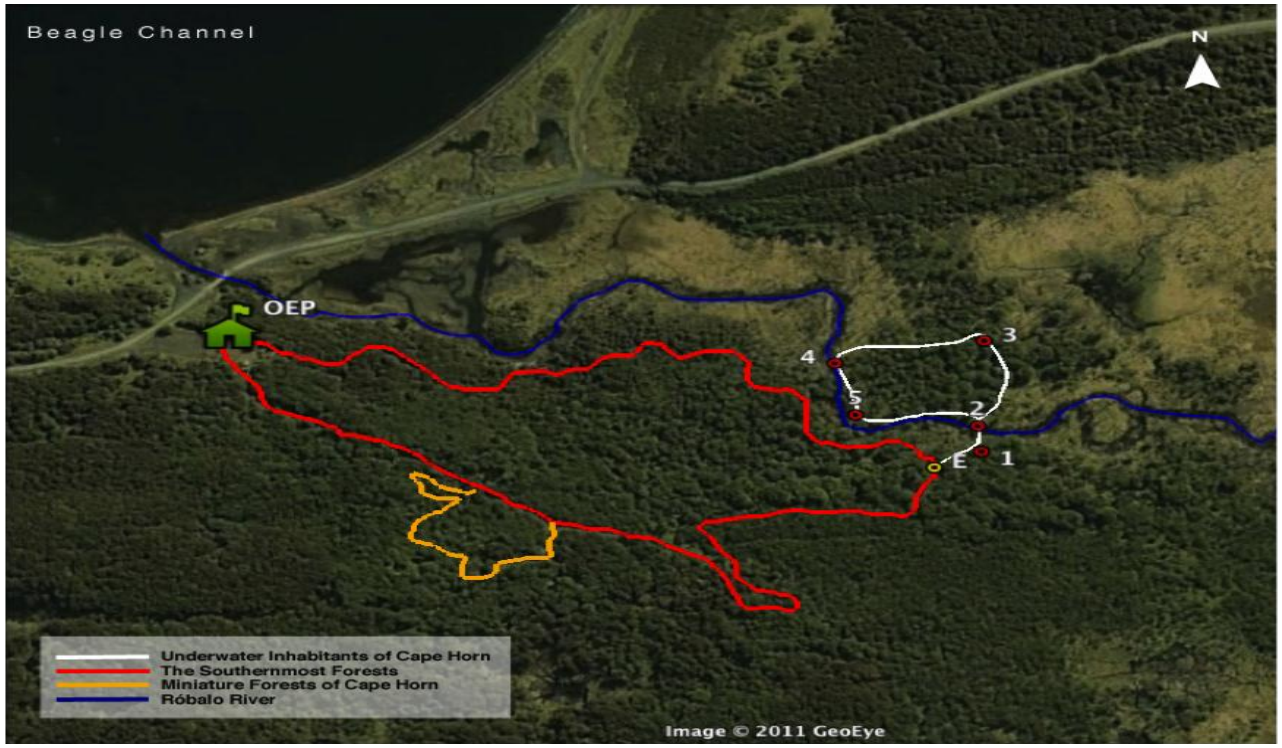
1) Observe the river and identify the different micro-habitats

2) Go to the river's shore and **pick up a submerged rock** to observe and learn about the invertebrates who live on them

3) After observing the invertebrates, participants **leave the rock on the exact same spot in which they found it.**

Ethical Transformation

The underwater inhabitants of Cape Horn – included in an interpretative trail



Acknowledgments

Cristóbal Pizarro
Jaime Ojeda
Luna Marticorena
Yanet Medina
Paula Caballero
Rodrigo Molina
TDP
Dr. Francisca Massardo
Liceo Donald Mc Intyre G.

A Stream and its Valley

We may conclude then that in every respect the valley rules the stream. Its rock determines the availability of ions, its soil, its clay, even its slope. The soil and climate determine the vegetation, and the vegetation rules the supply of organic matter. The organic matter reacts with the soil to control the release of ions, and the ions, particularly nitrate and phosphate, control the decay of the litter, and hence lie right at the root of the food cycle.

H.B.N. Hynes