



www.umag.cl www.ieb-chile.cl www.chile.unt.edu

Programa de Conservación Biocultural Subantártica
Sub-Antarctic Biocultural Conservation Program
Universidad de Magallanes, Instituto de Ecología y Biodiversidad, Chile
& University of North Texas, USA

Sub-Antarctic Biocultural Conservation Program
University of North Texas & Universidad de Magallanes

www.chile.unt.edu, www.umag.cl/williams & www.ieb-chile.cl/ltser

Tracing Darwin's Path (UNT) & Field Biocultural Conservation (UMAG-IEB)

26 December 2017 – 14 January 2018 (includes travel dates)
Program & Syllabus (Tentative)

Core Professors

Dr. Jaime E. Jiménez, *wildlife ecologist*, UNT-UMAG-IEB

Dr. James Kennedy, *stream ecologist*, UNT-UMAG

Dr. Ricardo Rozzi, *conservation biologist & environmental philosopher*, UNT-UMAG-IEB

Invited Professors

TBD

Teaching Assistants

TBD

Course coordinators

Kelli Moses, *international courses coordinator*, IEB-Omora Park, Puerto Williams

Jennifer Torres, *regional coordinator and accountant*, IEB-Omora Park, Punta Arenas

Omora Staff

Omar Barroso, *field research technician*, IEB-Omora Park, Puerto Williams

TDD

Course Catalogue Information: BIOL 4054/5054 and PHIL 4054/6781

COURSE DESCRIPTION:

Overview: The University of North Texas (UNT), study abroad course, Tracing Darwin's Path (TDP) is part of UNT's Sub-Antarctic Biocultural Conservation Program (SBCP; www.chile.unt.edu). It is taught in partnership with a masters-level class in conservation, Field Biocultural Conservation at the University of Magallanes (UMAG), Chile. Both courses are also taught as part of the Chilean Long-Term Socio-Ecological Research (LTSER) Network's program of field courses, coordinated by the Institute of Ecology and Biodiversity (IEB; www.ieb-chile.cl).

The Field Biocultural Conservation (FBC), and TDP courses will be held between the 26th December 2017 and 14th January 2018 (dates include travel days). Students participating in both courses will be involved in the same activities throughout the duration of the courses. These activities involve preparatory tasks prior to the course, post-course activities, and for those interested, continued analysis of data. The goals of the course are to provide students with an interdisciplinary research, conservation and education experience at one of the most pristine wilderness areas remaining in the world. The course will explore ways of defining, studying, communicating, and conserving biocultural diversity. These goals will be achieved by exposing students to a first-hand experience in the Omora Ethnobotanical Park (OEP), a long-term ecological study site that serves to *link society and development with biodiversity, history, and ecosystems* in the Cape Horn Biosphere Reserve (CHBR).

COURSE GENERAL OBJECTIVES:

Biocultural diversity has been defined as the "diversity of life in all its manifestations -biological, cultural, and linguistic- that are interrelated within a complex socio-ecological adaptive system." Addressing modern day environmental issues requires approaches that take into account this multi-faceted meaning of diversity. In this context, this course will provide students with an interdisciplinary research, conservation, and education experience at one of the most pristine wilderness areas remaining in the world. The course will explore ways of defining, studying, communicating, and conserving biocultural diversity. These goals will be achieved by exposing students to a first-hand experience using the case study of the creation and implementation of the OEP as a long-term ecological study site that serves to *link society and development with biodiversity, history and ecosystems* in the CHBR.

SPECIFIC OBJECTIVES:

- 1) To study various ways of approximating diversity in its multiple manifestation and scales.
- 2) To observe, describe, and investigate in a philosophically-comparative way, and ecologically-integrated way, conspicuous (e.g., birds, mammals) and less conspicuous (e.g., aquatic invertebrates, non-vascular plants) taxonomic groups.
- 3) To utilize the OEP and the CHBR as concrete examples of integrating environmental ethics and ecological sciences into biocultural conservation, using the Field Environmental Philosophy (FEP) approach developed by the SBCP research team.
- 4) Partner students from different cultures along with different academic interests, cultural issues and perspectives to provide the opportunity for an interdisciplinary experience that integrates philosophical, ecological, environmental, and conservation issues. Through these opportunities, students will discover and better understand their roles as global citizens.

Instructors will strive to provide a characterization of scientific and philosophical research to help make distinctions between these two approaches, as well as identify complementarities between them.

Research topics of the TDP-FBC January 2018 course

The general topic of this course is biocultural conservation. It has a strong field component in which students get first-hand encounters with the diversity of people inhabiting the sub-Antarctic Magellanic ecoregion and explore together the main habitat types (including penguin colonies, watersheds dominated by *Nothofagus* forests, etc.). Course participants include handcrafters from the indigenous Yahgan community, teachers from local schools, tourist operators, as well as Chilean and Latin American students, researchers, and artists.

This year, the class will participate in four long-term studies designed to better understand the ecology of the sub-Antarctic forests of the CHBR (55°). The activities will include research on:

- 1) The ecology of forest bird species through the long-term bird-banding program.
- 2) Human-wildlife conflict: the exotic mammals of Navarino Island.
- 3) Long term studies of the diversity and life history of the water invertebrates.
- 4) Water quality of rivers with different human impacts in the Puerto Williams region.
- 5) Ecotourism and Biocultural Conservation in the Miniature Forests of Cape Horn and plant biology.

These activities will include study sites in OEP and in the Robalo Watershed on Navarino Island. A specific schedule of activities is provided in the Tentative Schedule.

Birds, Exotic Mammals, Aquatic Invertebrate, and Water Quality Studies and Ecotourism

Here are some of the questions that will be addressed in the research:

Small brown forest birds, the most conspicuous and diverse, but little known vertebrates

- A) How many species exist and how abundant are they in the forest?
- B) How long do birds live? What do they eat?
- C) How are birds affected by habitat disturbances?
- D) What food is available for birds?

There are more exotic than native mammals on the Island

- A) Which mammals were here 100 years ago and which are here now?
- B) How did exotics arrive and became established?
- C) What are their role or impacts in these ecosystems?
- D) How can we manage established exotic mammals?

Aquatic invertebrates, as a barometer for watershed and long-term climate change

- A) What are the life cycles of the major aquatic invertebrates in the rivers of the CHBR?
- B) How are life cycles of aquatic invertebrates influenced by external factors such as temperature and changes to environmental conditions in the watershed?
- C) How do aquatic insects link terrestrial and aquatic ecosystems?
- D) How do aquatic invertebrates change relative to human impacts?

Water quality in selected rivers near Puerto Williams

- A) How do key water quality characteristics change along a stream gradient?
- B) How does water quality change relative to human impacts?

Ecotourism and Biocultural Conservation

Finally, ornithological, plant, and freshwater ecology work will involve the practice of ecotourism as a tool to achieve biocultural conservation.

- A) Students will be required to take what they have learned from the course and prepare activities for tourists and other visitors to Omora Park that include an ecological and ethical orientation.
- B) Activity approaches will aim for visitors to gain not only an understanding and knowledge about the unique sub-Antarctic biodiversity, but also provide a transformative experience to cultivate an ethical and sustainable relationship with this biodiversity, both locally and globally. Experience will focus on ecotourism with a hand-lens.
- C) How do vascular and non-vascular plant diversity contrast in lower and higher elevations at Omora Park? How can the little non-vascular plants be included in ecotourism? How can you communicate the ecological, economic, aesthetic, and ethical values of bryophytes?

Grading

Pre-course assignments

(1) Comparison and Description of Avian Inhabitants/Habitats/Habits of Cape Horn and of High Northern Latitudes of the Americas (10)

Each participant should use the provided list of birds to do a complete worksheet and add pictures and descriptions of each species regarding morphological characteristics, habitat requirements, behavior, diet, or other relevant habits and information. This exercise will help you prepare by way of comparison and analogy to understand new organisms based on their relationship, similarities, and differences to other species you know. To receive credit, the completed assignment should be submitted by email (Jaime.Jimenez@unt.edu) no later than 5:00 PM on December 25th, 2017.

(2) Description of the climate and freshwater (10%)

Each student, using the readings (particularly useful will be Hynes 1975 and Vannote *et al.* 1979), will be required to write a narrative describing the changes they expect to observe and measure in the Robalo River watershed from the headwaters to the river's mouth. The paper should also contrast annual climatic conditions in the Cape Horn region to those seen at similar latitude in the Northern Hemisphere. To receive credit, the completed assignment should be submitted by email (James.Kennedy@unt.edu) no later than 5:00 PM on December 25th, 2017.

In-course assignment and evaluations

(3) Ecotourism with a Hand Lens in the Miniature Forests of Cape Horn (10%)

Students will gain a general overview of bryology and identify mosses, liverworts, and lichens on different substrates (bark, soil, rock) and their ecological interactions with other plants, animals, and ecosystem functions. Students will also clearly define economic, aesthetic, ecological, and ethical values of bryophytes and biodiversity in general. They will integrate this understanding with the metaphor of the hand lens and the activity of ecotourism with a hand lens, designing their own way of guiding this activity. This will prepare for practicing the biocultural conservation approach to promote the integration of ecological sciences and environmental ethics, and the conservation of the tiny plants and animals inhabiting the Miniature Forests of Cape Horn that so often are overlooked in traditional conservation initiatives. This activity will be assigned and graded during the course.

(4) Natural History / Art Journal (15%)

When reading Charles Darwin's journal *Voyage of the Beagle* about his 5-year trip around the world, it is striking the way he blends scientific observation with reflections about the broader implications, context, and surroundings (including cultures) he was encountering. Other examples include Lewis and Clark's writings about the Western United States. We would like to

“trace Darwin’s path” and ask each student to keep a journal of the day’s reading, reflections, activities, and achievements. Entries should consist of reflections on the assigned readings and/or activities and observations made during field activities. Ideally, field notes will be made using a waterproof pen (or pencil) in a journal with waterproof paper (such as Rite in the Rain, All-Weather Journal). However, other notebooks can be used but they must be bound and should be protected in a sealable plastic bag. Maximum size for the field notebook should be approximately 8.5" x 11" when two pages are open. This size will enable the journal to be xeroxed conveniently and to carry in the field, which will be necessary, since recordings in journals are to be done on the day of the activities. In addition, an art notebook (can be the same notebook as above) will be needed with the same dimensions, but ensuring a hard cover and 180 to 240-weight paper that allows for drawing. Other art materials will be provided in Chile. Student journals will be checked randomly throughout the course. Suggestions will be made on improving the quality of the journal format. It will be expected that journal entries are, as reasonably as possible, kept up to date, legible, and well organized. This document will be key to keep your valuable records, thoughts, and experiences while in the field and may serve for your future purposes. At the end of the class, journals will be collected on January 11th, 2018, and may be copied before being returned to the student.

(5) Guided Field Activities (15%)

The course participants will conduct a guided tour for scientists and other visitors to Omora Park on January 5th. The goal of this “tour” is for students to learn the Omora Park’s existing trail systems and interpretive content, as well as synthesize their own experiences into simple narratives. As much as possible, the work groups will be structured to represent a cross section of academic interests of the course participants. This activity will be assigned and graded during the course.

(6) Participation (15%) & Presentation of Research Results (15%)

A list of mandatory, suggested, and supplemental readings is provided in the section following the list of activities. Student responsibilities are to prepare ahead of time, attend all the discussion sessions, field exercises, ask questions, and express themselves creatively and concisely in their work. Ways of earning points for participation include contributing positively to class discussion of readings and participate in field exercises. Contributing positively requires having read, and as thoroughly as possible understood, the assigned readings and at least being able to raise important questions if not providing definitive answers. Students will also prepare PowerPoint presentations after samples have been analyzed in order to present preliminary results. These presentations will be carried out during January 11th, 2018 at the Field Station.

Post-course assignment

(7) Essay (10%)

Each student will select one of the class topics (see above) and using the readings, develop a 5-7 page (12 font, double spaced) essay summarizing that theme of the course with an ending discussion. To receive credit, essays should be submitted by email (to Jaime.Jimenez@unt.edu and James.Kennedy@unt.edu) no later than 5:00 PM on February 27th 2018.

UNIVERSITY OBLIGATIONS AND POLICIES

BEHAVIOR

Study abroad trips require considerable flexibility, maturity, and cultural sensitivity. The culture and the political system you will be exposed to in this class will be different than the US and may provoke strong emotional responses. We expect that you will strive to understand the culture and learn to reason through any uncomfortable, but productive, experiences.

HEALTH, SAFETY, LEGAL ISSUES ABROAD

UNT's study abroad program will provide guidance regarding legal issues associated with travel to Chile. They will also provide travel health insurance information via the study abroad application link.

Academic Dishonesty Policy: Students are responsible for reading, understanding, and knowing UNT's Academic Dishonesty Policy that can be found at: http://www.vpaa.unt.edu/academic_integrity.htm. Academic dishonesty in this class is unacceptable and will not be tolerated in any form.

Disability Accommodation Statement: The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. *Students are strongly encouraged to deliver letters of accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student.* For additional information see the Office of Disability Accommodation website at <http://www.unt.edu/oda>. You may also contact them by phone at 940.565.4323.

Drop/Withdrawal Information: Drop/Withdrawal Information and other important Academic Dates can be found at www.essc.unt.edu/registrar/schedule/scheduleclass.html

READINGS

Most readings can be found on-line and downloaded as PDFs documents from:

UNT library site (UNT student credentials required; Password: chile2018)
<http://guides.library.unt.edu/c.php?g=415168&p=2828887>

UMAG-Omora site (Password: biocultural)
http://www.umag.cl/facultades/williams/?page_id=4212

Required Textbooks

- Goffinet, B., R. Rozzi, L. Lewis, W. Buck & F. Massardo. 2012. *The Miniature Forests of Cape Horn: Eco-Tourism with a Hand-Lens* ("Los Bosques en Miniatura del Cabo de Hornos: Ecoturismo con Lupa"). Bilingual English-Spanish edition. UNT Press-Ediciones Universidad de Magallanes, Denton, TX and Punta Arenas, Chile. 448 pp. ISBN 978-1-57441-282-6.
- Rozzi, R. & J.E. Jiménez (eds.). 2014. *Magellanic Sub-Antarctic Ornithology. First decade of long-term bird studies at the Omora Ethnobotanical Park, Cape Horn Biosphere Reserve, Chile*. University of North Texas Press-Universidad de Magallanes, Denton, TX and Punta Arenas, Chile. 364 pp. ISBN-13: 978-1-57441-531-5.

Rozzi, R., F. Massardo, C. Anderson, S. McGehee, G. Clark, G. Egli, E. Ramilo, U. Calderón, C. Calderón, L. Aillapan & C. Zárraga. 2010a. *Multi-Ethnic Bird Guide of the Sub-Antarctic Forests of South America*. University of North Texas Press-Ediciones Universidad de Magallanes, Denton, TX and Punta Arenas, Chile. 235 pp. ISBN-13: 978-57441-282-6.

Required Readings

- Contador, T.A., J.H. Kennedy, R. Rozzi & J. Ojeda. 2015. Sharp altitudinal gradients in Magellanic sub-Antarctic streams: patterns along a fluvial system in the Cape Horn Biosphere Reserve (55°S). *Polar Biology* DOI 10.1007/s00300-015-1746-4
- Darwin, C. 1838. Tierra del Fuego. Pp. 204-231, in *The Voyage of the Beagle*. Reprint, London: Everyman's Library, 1975.
- Elphick, C.S., J.E. Jiménez, R. Reyes & R. Rozzi. 2014. Seasonal dynamics of the Sub-Antarctic bird community in different habitats of the Cape Horn Biosphere Reserve. Introduction to Section 2, pp. 185-187, in Rozzi, R. & J.E. Jiménez (eds.), *Sub-Antarctic Magellanic Ornithology, First Decade of Bird Studies at Omora Ethnobotanical Park: Cape Horn Biosphere Reserve*. UNT Press-Ediciones Universidad de Magallanes, Denton TX, USA - Punta Arenas, Chile.
- Hynes, H.B.N. 1975. The stream and its valley. Edgardo Baldi Memorial Lecture. *Verhandlungen des Internationalen Verein Limnologie* 19: 1-15.
- Ippi, S., C. Anderson, R. Rozzi & C. Elphick. 2009. Annual variation of abundance and composition in forest bird assemblages on Navarino Island, Cape Horn Biosphere Reserve, Chile. *Ornitología Neotropical* 20: 231-245
- Leopold, A. 1949. Foreword (pp. vii-ix), 65290 (pp. 87-92), Thinking like a Mountain (pp. 129-133), The Land Ethic (pp. 201-226), in *A Sand County Almanac and sketches here and there*. Oxford University Press, New York.
- Miller, K.K., E.G. Ritchie & M.A. Weston. 2014. The human dimensions of dog-wildlife interactions. Pp. 286-303, in M.E. Gompper (ed.), *Free-ranging dogs & wildlife conservation*. Oxford University Press, Oxford, U.K.
- Ojeda, J., T. Contador, S. Rosenfeld, C.B. Anderson, A. Mansilla & J. Kennedy. 2010. *Guía para la identificación de los invertebrados marinos y dulceacuícolas de la Reserva de Biosfera Cabo de Hornos*. Ed. Universidad de Magallanes, Punta Arenas.
- Ralph, C.J. 2005. The body grasp technique: a rapid method of removing birds from mist nets. *North American Bird Bander* Apr-Jun: 65-70.
- Rozzi, R., X. Arango, F. Massardo, C. Anderson, K. Heidinger & K. Moses. 2008a. Field Environmental Philosophy and Biocultural Conservation: The Omora Ethnobotanical Park Educational Program. *Environmental Ethics* 30: 325-336.
- Rozzi, R., C. Anderson, C. Pizarro, F. Massardo, Y. Medina, A. Mansilla, J. Kennedy, et al. 2010b. Field environmental philosophy and biocultural conservation at the Omora Ethnobotanical Park: Methodological approaches to broaden the ways of integrating the social component ("S") in Long-Term Socio-Ecological Research (LTSER) Sites. *Revista Chilena de Historia Natural* 83: SM19-SM28 (27-68).
- Steinbeck, J. & E.F. Ricketts. 1941. *Sea of Cortez: A Leisurely Journal of Travel and Research*. Viking Press. Chapters 4 and 21.
- Sutherland, W.J. 2003. Parallel extinction risk and global distribution of languages and species. *Nature* 423: 276-279.
- Vannote, R.L., G.W. Minshall, K.W. Cummins, J.R. Sedell & C.E. Cushing. 1980. The river continuum concept. *Canadian Journal Fisheries and Aquatic Sciences* 37: 130-137.
- White, L., Jr. 1967. The historical roots of our ecological crisis. *Science* 155: 1203-1207.

Supplementary Textbooks

- Contador, T.A. & J.H. Kennedy. 2014. *Habitantes sumergidos bajo los ríos del Cabo de Hornos/Underwater inhabitants of the rivers of Cape Horn*. Ediciones Universidad de Magallanes, Punta Arenas, Chile. 96 pp. ISBN: 978-956- 358-063-1
- Jaramillo, A. 2003. *Birds of Chile*. Princeton University Press, Princeton.
- Rozzi, R., L. Lewis, F. Massardo, Y. Medina, K. Moses, M. Méndez, L. Sancho, P. Vezzani, S. Russell & B. Goffinet. 2012a. *Ecotourism with a Hand-Lens at Omora Park*. It includes the documentary

"The Invisible Journey" by Jaime Sepúlveda, and photography by Adam Wilson. Ediciones Universidad de Magallanes, Punta Arenas, Chile. (190 pp.) ISBN 978-956-9160-00-4.

Supplementary Readings

- Anderson, C.B., R. Rozzi, J.C. Torres-Mura, S.M. McGehee, M.F. Sherriffs, E. Schüttler & A.D. Rosemond. 2006. Exotic vertebrate fauna in the remote and pristine sub-Antarctic Cape Horn Archipelago, Chile. *Biodiversity and Conservation* 15: 3295-3313.
- Bonnet, X., R. Shine & O. Lourdais. 2002. Taxinomic chauvinism. *Trends in Ecology and Evolution* 17:1-3.
- Contador, T.A., J. Kennedy & R. Rozzi. 2012. The conservation status of southern South American aquatic insects in the literature. *Biodiversity and Conservation* 21: 2095-2107.
- Contador, T., J. Kennedy, J. Ojeda, P. Feinsinger & R. Rozzi. 2014. Ciclos de vida de insectos dulceacuícolas y cambio climático global en la ecorregión subantártica de Magallanes: investigaciones ecológicas a largo plazo en el Parque Etnobotánico Omora, Reserva de Biosfera Cabo de Hornos (55°S). *Bosque* 34: 429-437.
- Crego, R.D., J.E. Jiménez & R. Rozzi. 2016. A synergic trio of invasive mammals? Facilitative interactions among beavers, muskrats, and mink at the southern end of the Americas. *Biological Invasions* 18:1923-1938. DOI 10.1007/s10530-016-1135-0
- Darwin, C. 1838. *The Voyage of the Beagle*. Reprint, London: Everyman's Library, 1975.
- Jiménez, J.E., R. Crego, G.E. Soto, I. Román, R. Rozzi & P.M. Vergara. 2014. Potential impact of the alien American mink (*Neovison vison*) on Magellanic woodpeckers (*Campephilus magellanicus*) in Navarino Island, southern Chile. *Biological Invasions* 16: 961-966.
- Jiménez, J.E., A.E. Jahn, R. Rozzi & N.E. Seavy. 2016. First documented migration of individual White-crested Elaenias (*Elaenia albiceps chilensis*) in South America. *Wilson Journal of Ornithology* 128: 413-419.
- Leopold, A. 1949. *A Sand County Almanac and sketches here and there*. Oxford University Press, New York.
- McEwan, C., L.A. Borrero & A. Prieto (eds.). 1997. Excerpts from *Patagonia: Natural History, Prehistory and Ethnography at the Uttermost End of the Earth*, Princeton University Press.
- Naess, A. 1973. The shallow and the deep, long-range ecology movements. *Inquiry* 16: 95-100.
- Pyle, P., S.N. Howell, R.P. Yunick & D.F. DeSante. 1987. *Identification guide to North American Passerines*. Slate Creek Press, Bolinas, California.
- Rozzi, R. & F. Massardo. 2011. The road to biocultural ethics. *Frontiers in Ecology* 9: 246-247.
- Rozzi, R., F. Massardo, C. Anderson, K. Heidinger & J. Silander, Jr. 2006. Ten principles for biocultural conservation at the southern tip of the Americas: The Approach of the Omora Ethnobotanical Park. *Ecology & Society* 11(1): 43. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art43/>
- Rozzi, R., J.J. Armesto, B. Goffinet, W. Buck., F. Massardo, J. Silander, Jr., M.T.K. Arroyo, S. Russell, C.B. Anderson, L.A. Cavieres, & J.B. Callicott. 2008b. Changing lenses to assess biodiversity: patterns of species richness in sub-Antarctic plants and implications for global conservation. *Frontiers in Ecology* 6: 131-137.
- Rozzi, R., J. Armesto, J. Gutierrez, C. Anderson, F. Massardo, G. Likens, A. Poole, K. Moses, E. Hargrove, A. Mansilla, J. Kennedy, M. Willson, K. Jax, C. Jones, J.B. Callicott & M. Arroyo. 2012b. Integrating ecology and environmental ethics: Earth stewardship in the southern end of the Americas. *BioScience* 62: 226-236.
- Schüttler, E., R. Rozzi & K. Jax. 2011. Towards a societal discourse on invasive species management: A case study of public perceptions of mink and beavers in Cape Horn. *Journal for Nature Conservation* 19: 175-184.
- Vuilleumier, F. 1985. Forest birds of Patagonia: Ecological geography, speciation, endemism and faunal history. *Ornithological Monographs* 36: 255-304.