Capacity building for freshwater insect studies in northern Patagonia, Argentina: DARWIN Initiative programme

BROOKS, Stephen J.*, Luis M. HERNÁNDEZ*, Julieta MASSAFERRO, Gustavo R. SPINELLI*** & Malcolm PENN***

* Department of Entomology, The Natural History Museum, London SW7 5BD, UK; e-mail: sjb@nhm.ac.uk
**INIBIOMA /CONICET, 8400 Bariloche, Argentina
***Museo de Ciencias Naturales de La Plata, Paseo del Bosque s/n, 1900 La Plata, Argentina

Biodiversidad de insectos acuáticos en Patagonia Norte, Argentina: programa Iniciativa DARWIN

■ **RESUMEN.** Este proyecto fue financiado durante un período de tres años, desde septiembre de 2006 a través de la Iniciativa Darwin del gobierno Británico. El objetivo de este trabajo es el estudio de los insectos acuáticos del Parque Nacional Nahuel Huapi (PNNHP), Patagonia, Argentina. El parque incluye una gran variedad de hábitats que comprenden arroyos, ríos y lagos los cuales se distribuyen desde el bosque siempreverde frío, hasta la zona árida de estepa. Todo el material será identificado y depositado en las colecciones del Museo La Plata y el Museo de Historia Natural de Londres. Los fondos de la Iniciativa Darwin han sido utilizados para equipar un laboratorio de biodiversidad en las oficinas del PNNHP en Bariloche y la estación de investigación en Puerto Blest. Toda la información de los insectos acuáticos y las distintas formaciones vegetales donde éstos se han encontrado, se incluirá en una base de datos (la primera de su tipo en Patagonia) que utilizará la metodología GIS para analizar patrones de distribución de las especies en el parque. En estos momentos se están produciendo varias guías de campo para identificar los insectos acuáticos del PNNHP. Es nuestro deseo que los resultados obtenidos en este proyecto, contribuyan a la conservación de los sistemas acuáticos en Argentina y América del Sur.

PALABRAS CLAVE. Iniciativa Darwin. Patagonia. Insectos Acuáticos.

■ **ABSTRACT.** This project was funded from September 2006 for three years by the British Government's Darwin Initiative programme. The focus of our project is the study of aquatic insects from Nahuel Huapi National Park (NHNP) in Patagonia, Argentina. The park includes a wide range of wetlands, including montane streams, lowland lakes and marshes, distributed within temperate rainforest and arid steppe. The material will be identified and stored in a fully referenced and accessible collection at La Plata Museum and the Natural History Museum, London. Darwin Initiative funding has been used to equip a biodiversity laboratory at National Park Headquarters in Bariloche and also a field station at Puerto Blest. Information on the insect species in NHNP will be entered into a GIS database, together with a vegetation classification and wetland characteristics, to model freshwater insect data spatially and create a biodiversity database, the first of its kind in Patagonia. We hope

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that the experiences we gain during the project, the insect collections and databases, the publications, and the many other products, will be used to further enhance wetland conservation throughout Argentina and southern South America.

KEY WORDS. Darwin Initiative. Patagonia. Aquatic Insects.

INTRODUCTION

Darwin Initiative. The Darwin Initiative programme is one of the responses by the British Government to the Rio Earth Summit in 1992 and Convention on Biodiversity. Funds are provided through the Darwin Initiative by the Department for Environment, Food and Rural Affairs (Defra) to 'assist those countries which are rich in biodiversity but poor in financial resources to implement the Convention on Biological Diversity (CBD) through the funding of collaborative projects which draw on UK biodiversity expertise'. Funds have been made available on an annual basis since 1992 and, since 2005, after the launch of Phase II of the Darwin Initiative, £7 million a year was committed to the programme.

The focus of the Darwin Initiative, as specified on the programme website (http://darwin.defra.gov.uk), has been on projects that:

- assist countries rich in biodiversity but poor in resources with the conservation of biological diversity and implementation of the Biodiversity Convention;
- draw on British expertise in the field of biodiversity;
- are collaborative, involving either local institutions or communities in the host country;
- have a real impact on the ability of the host country to meet its obligations under the Biodiversity Convention;
- are of high quality and scientific excellence.

The emphasis placed by the Darwin Initiative is on projects that improve the understanding in the host country of biodiversity through research, and promote the study of biodiversity through the initiation of training programmes for students, school children and non-specialists, through the production of specialist and non-specialist identification guides, and through media exposure. The projects are expected to leave a lasting legacy in the host country and promote sustainable use of biodiversity resources.

Focus and aims of the project. The location of the project under consideration in this paper is the Nahuel Huapi National Park (NHNP), in northern Patagonia, which surrounds the Argentinean resort town of Bariloche. The focus of the project is on the biodiversity of freshwater insects in NHNP. The primary aims of the project are to a) compile an inventory of freshwater insects that occur in NHNP and map this onto vegetation zones using GIS; b) assemble a curated and accessible reference collection of freshwater insects from NHNP at the Museo de Ciencias Naturales de La Plata (UNLP); c) facilitate scientific study of the freshwater insect fauna of NHNP by equipping a field station and laboratory in NHNP; d) promote the understanding of freshwater insects in Patagonia by providing specialist papers and identification guides; e) encourage the next generation of freshwater ecologists by providing taxonomic, ecological and field courses to post graduate students; f) promote greater awareness of the importance and sustainable use of wetlands in the region by the provision of non-specialist field guides, posters and courses.

We hope that the approach we have taken in this project to promote awareness and greater understanding of wetland biodiversity will be used as a model in other parts of South America and we will welcome the opportunity to collaborate with colleagues and share our experiences. Funding for the project is available between September

2006 and August 2009, but we hope that this will be just the start of a long-lasting legacy of wetlands research, conservation and awareness in the region.

Project background. At present, the freshwater insect fauna in northern Patagonia is poorly known and knowledge and interest is constrained by a lack of adequate identification guides and reference collections. In addition, there is poor public understanding of the importance of wetlands for biodiversity and in providing basic human needs. Freshwater insect biodiversity in Argentina is threatened by human impacts, especially nutrient enrichment and habitat modification. Even in National Parks, increasing pressure from tourism poses a threat. Our project will address these issues by: (a) building infrastructure in the Nahuel Huapi National Park, which has been identified as one of the most important conservation areas in Argentinean Patagonia; (b) providing a wetland interpretation centre where tourists, sport fishermen, students and researchers will be able to study freshwater insects and understand their role in freshwater ecosystems; (c) developing identification guides, reference collections and an inventory of freshwater insects for the National Park.

The Nahuel Huapi National Park (NHNP) is a biodiversity hotspot in northern Patagonia (Fig. 1) where Sub-Antarctic rainforest meets Valdivian rainforest. These forests are isolated from other similar forests within South America by orographic and climatic barriers. As a consequence, they have evolved a rich and largely endemic biota. In addition, NHNP includes the ecotone between temperate montane rainforest and arid steppe, which further increases the biodiversity of the region. Consequently, NHNP contains a wide diversity of wetland habitats. This pristine area is ideal for biodiversity and conservation studies. The area attracts many national and international tourists including eco-tourists, sport fishermen and skiers and the National Park Authority (APN) is concerned about the impacts of increased tourist pressure and climate change on these ecosystems. There have already been some studies of the terrestrial elements of the biota but little is known about the freshwater insects, so baseline data is essential against which any future changes can be compared. The Puerto Blest field station, situated in the heart of the Andean forest near Bariloche, was built by Universidad del Comahue in 2005 but needs equipping to be fully functional. It is one goal of this project to develop Puerto Blest field station into a centre for the study of freshwater ecosystems and the interpretation of wetland ecosystems.

There is currently poor knowledge of the regional fauna and flora of NHNP and the area is inadequately mapped so the full extent of wetlands is unknown. The project will provide an infrastructure for the collection of freshwater insect biodiversity data and vegetation associations. This baseline data, against which future changes can be assessed, is essential because of the increasing pressure of tourism and fishing in the NHNP area and because of the possible impacts of climate change. The current lack of awareness of conservation issues in local communities will be addressed by training programmes and interpretive material that will be available at Puerto Blest. These are prerequisites for the conservation of Patagonian wetlands.

The project will provide a detailed database of freshwater insects from NHNP. The species distribution data will be linked to a vegetation classification using GIS and digital imaging to model freshwater insect data spatially and create a biodiversity data repository, the first of its kind in Patagonia. A fully curated synoptic reference collection of freshwater insects from NHNP will be established at the Puerto Blest field station for use by student classes. The remaining material will be deposited in the Natural History Museum, London (NHM) and Museo de Ciencias Naturales de La Plata (UNLP) and will be used to develop identification guides to freshwater insects of the region. These guides will be multi-tiered from technical keys to simple identification charts for use by visitors to the park, sport fishermen and community groups. These latter products

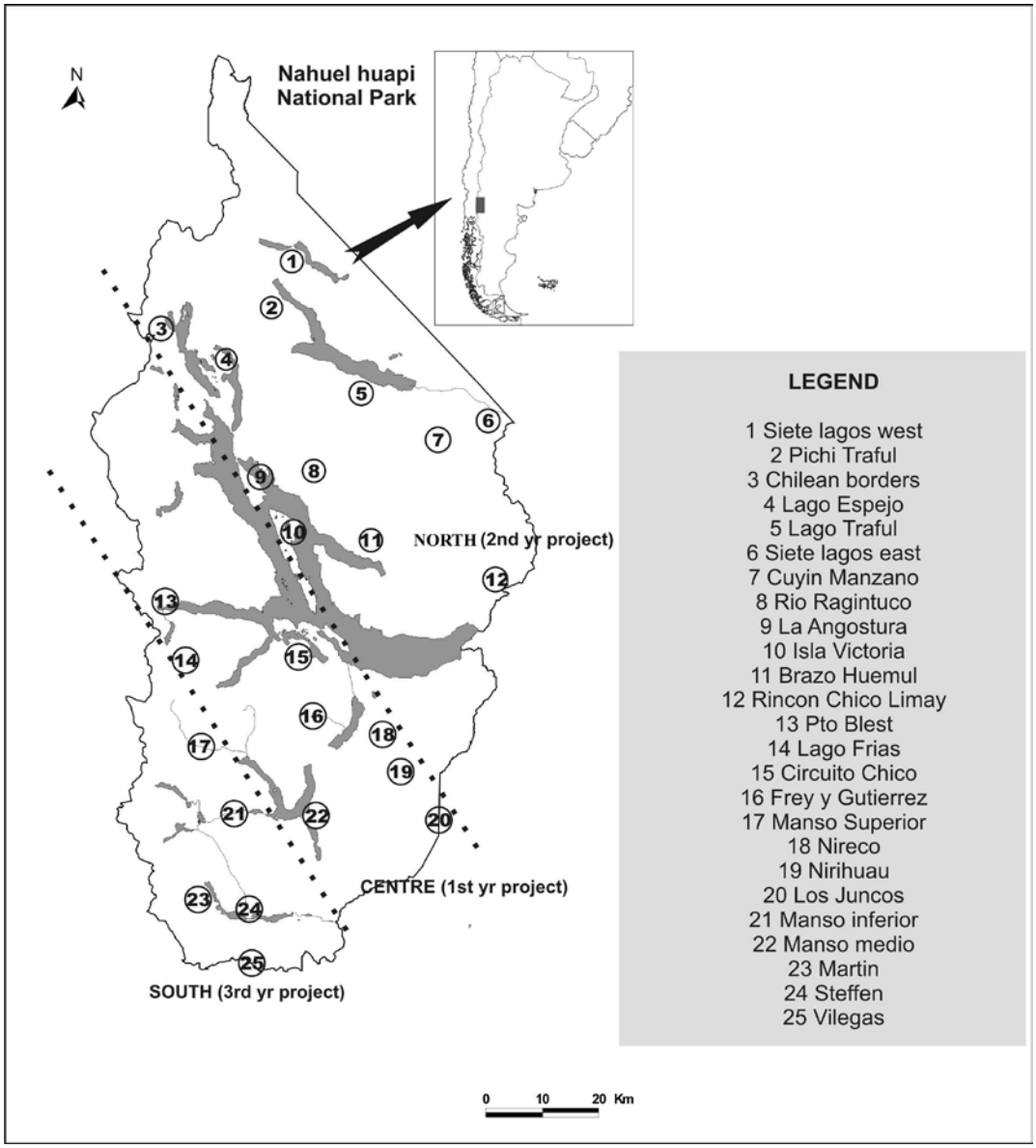

Fig. 1. Map showing the Nahuel Huapi National Park area. 83 sites were sampled in the North, 182 sites in the Centre and in 2009, new sites (23, 24 and 25) will be sampled in the southern part of the NHNP.

will be used to generate interest in wetland conservation in local communities. The field station will be developed for use as an interpretive centre for wetlands promoting the value and sustainable use of wetlands to non-specialist visitors to the park. The centre will be equipped with microscopes, PCs and necessary infrastructure for its use by students from schools and universities to carry out research projects and learn about wetland biodiversity. Results will be disseminated through scientific publications, a dedicated website, posters and simple identification charts, as well as local and national media.

Project Partnerships. The project involves the close collaboration and cooperation of biologists and conservationists

drawn from several institutions in Britain and Argentina, who bring complementary skills and expertise. The lead UK institution is the Natural History Museum, London (NHM) which is the base for Stephen Brooks (project leader, and specialist in Chironomidae, Odonata, Ephemeroptera and Plecoptera), Luis M. Hernández (specialist in Simuliidae) and Malcolm Penn (specialist in GIS and forest botany). The lead institute in Argentina is Museo de Ciencias Naturales de La Plata (UNLP), which is the base for Gustavo Spinelli (in-country leader, Ceratopogonidae specialist) and Mariano Donato (specialist in Chironomidae). Others actively engaged in the project are Miguel Archangelsky (specialist in Coleoptera) and Pablo Pessacq (specialist in Ephemeroptera and Plecoptera) from Universidad de la Patagonia, Esquel, Chubut (UNP), and Javier Muzón (specialist in Heteroptera and Odonata) from Instituto de Limnologia, La Plata (ILPLA). Administración Parques Nacionales (APN) is another key partner, where the lead contact is Susana Seijas, who provide essential logistical support for fieldwork, including access to sites, use of vehicles and support from Rangers, and provision of meetings rooms and the space in which we have set up the Biodiversity Laboratory. The final main partner is Centro Regional Universitario Bariloche (CRUB/UNC), from where Julieta Massaferro coordinates the project on the ground and Karin Heinemann, who manages the Puerto Blest field station. Two staff are employed directly by the project, Fernanda Montes de Oca and Analia Garré. In addition, several post-graduate students based at the cooperating Argentinean institutes, are working on research directly involved with the project.

STUDY AREA

The Nahuel Huapi National Park - basic details. The characterisation of climate, drainage, geology, topography, and vegetation follows the publications of Martin & Mermoz (2005) and Monjeau (2006). However, here we have only summed up the most relevant information from those papers, therefore the reader should consult them for more details.

Location. The NHNP and the National Reserve Nahuel Huapi are located between the latitude 40°8′ and 41°35′ south and longitude 71°2′ and 71°57′ west. It occupies approximately 710,000 ha and was the first national park to be declared as such in Argentina, when it was donated to the country by Dr. Francisco P. Moreno in 1903 (Fig. 1). The park is part of a continuous series of protected areas that extend for more than one million hectares including Lanin National Park in the north and Puyehue National park towards the west in Chile. Towards the south, it is limited by the Rio Manso Inferior and to the east by the rivers Villegas, Ñirihuau, and Limay. Within the park are located the towns of San Carlos de Bariloche (22.000 ha), Villa La Angostura (8000 ha), and Villa Mascardi and Traful (600 ha), making it one of the most complex in Argentina from the point of view of conservation and management. Within the park there are three distinct ecological units that are representatives of one the most extreme ecological gradients in the world: High-Andean, Andean-Patagonic Forests (which also includes sectors of Valdivian Forests), and Patagonia Steppe (see Table I).

Climate. The main characteristics of the Nahuel Huapi landscape are defined by climatic changes dating from the Tertiary and Quaternary periods. The last ice mass started retreating around 13000 yrs and the transition between the different environmental units have not changed much to the present day. The temperature and precipitation varies within the three main ecological units within the Park.

In NHNP the annual precipitations decrease markedly from west (4000 mm in Puerto Blest) to east (500 mm Rio Limay) in less than 100 km. This is due to the steep relief of the mountain range in this area. This phenomenon is also known as “sombra de lluvia” [rain shadow] with 60% of the rainfall occurring mainly between May-August. The average temperature ranges from 8ºC in the lowlands and 3ºC in the higlands in winter.

TABLE I. Main ecological units in Nahuel Huapi National Park following Monejau (2006).

Ecological Units	Environment	Surface (Km^2)	% of the Park
High-Andean		1400	19
Forests (including Valdivian Forest)	Humid Forests	4600	60 (14 % is covered by lakes)
	Transition Forests	1070	15
Steppe	Low reliefed Steppe*	208	2.74
	High reliefed Steppe*	248	3.26

* Low reliefed steppe and high reliefed steppe was classified based on topography and not vegetation.

In summer the temperature varies between 33ºC during the day to 15ºC at night.

The High-Andean unit has a cold and humid climate, and precipitation varies between 1200 to 2000 mm mainly in the winter months. Within this unit areas of permafrost are found above 2200 m altitude; these tend to disappear towards the east because of the low altitude of the Andes. Here the mean temperature is 2.4ºC with temperature reaching 0ºC between July and September. In the rainforest subunit the climate is temperate and humid with temperatures of 8ºC in low areas and 5.5ºC at high altitude. In the area of transitional forests (ecotones) the temperature is similar to the rainforest unit. However, precipitations are scarce only reaching 1200 to 800 mm a year. The climate in the Steppe is temperate and semi-arid with annual temperatures of 8ºC and precipitations of 1000 to 600 mm.

Drainage. One of the main characteristics of the drainage in NHNP is that the rivers reach the Pacific Ocean via the Manso River Basin, and the Atlantic Ocean via Limay River Basin, the latter being the most important river in the park, which also includes the Nahuel Huapi Lake. This lake is one of the largest in Argentina expanding over 560 km^2. The Rio Limay, which originates at the east of the lake, joins the Neuquén River to form the Negro River reaching the Atlantic coast. There are many other lakes in NHNP for example Traful (the second largest with 76 km^2), Espejo, Correntoso, Gallardo and Gutiérrez. It is at the end of Lake Gutiérrez that the division between the Atlantic and the Pacific is located.

The Manso River Basin is located to the south of the Park, and it is formed by streams of glacial origin. This system originates at the point where three of the four glacier branches merge at Cerro Tronador. The basin is divided in Manso Superior, Manso Medio and Manso Inferior, which delimit the extreme south of the Park. The waters of Manso Superior open into Lake Mascardi, reaching via the Manso Medio the Guillelmo, Fonck, Roca, Felipe and Martin Lakes. The Manso Inferior River joins the Villegas River, which crosses the Andes to Chile through Portillo de Cochamó. In Chile it joins the Puelo River, opening into the Pacific Ocean.

Geology. The North Patagonia geological province is located between latitude 39º to 43º south. The topography is mainly mountanous and glacial origin. The most extreme altitudinal gradients within the park are located in the valleys of the Rio Manso Inferior (500 m) and the Cerro Tronador (3,554 m). However, most of the area of the park is situated between 700 and 800 m. In general, the soils are not well developed and have originated from volcanic ashes (Andisol

Table II. Classification of the vegetation in the Nahuel Huapi National Park by Martin & Mermoz (2005).

Vegetation types	Dominant species	Height (m) at which dominant are found
Colihue Forest	*Nothofagus dombeyi*	1000-1100 m
Ciprés Forest	*Austrocedrus chilsensis*	1100 m
Lenga Forest	*Nothofagus pumilio*	1000-1500 m
Nire forest, and tall forest of Nire	*Nothofagus antarctica*	Below 1200 m
Small forests of Nire and/or Caña	*Nothofagus antarctica, Chusquea culeou*	Between 1100-1400 m
Low forest of Lenga	*Nothofagus pumilio*	1600-1700 m
Semidesert at high altitude	*Poa tristigmatica, Festuca montiola, Senecio sp., Nassuavia sp.*	1500-1600 m
Herbaceous Steppe	*Stipa speciosa, Mulinum spinossum, Festuca pallecens*	750-800 m till 1400m
Low reliefed Steppe	*Discaria articulata, Berberis buxifolia*	Below 1100 m
Low reliefed Steppe with disperse trees	*Discaria articulata, Berberis buxifolia, Lomatia hirsuta, Maytenus boaria, Austrocedrus chilensis*	-
Savannahs of High Altitude	Mostly herbaceous plants	1000-1400 m
Areas modified by rural and urban settlements	*Plantago, Holcus, Rumex, Poa, Trifolium*	-

soils) with a high content of allophane.

This province is composed of metamorphic and magma rocks of several ages. On top of these rocks volcanic sediments were deposited during the Mesozoic and Tertiary. At the same time, other sediments of volcanic origins were deposited by the end of the Tertiary and Quaternary together with elements of glacial origin. The formation of the Andino-Patagonia mountain range was completed in the Miocene approximately 15 millions years ago. More recently, volcanic activity gave rise to the domes of Tertiary basaltic sediments of high altitude, such as the Cerro Tronador, the highest point in NHNP. By the end of the Tertiary and throughout the Quaternary dramatic fluctuations of the climate occurred bringing about glacial and interglacial periods that modified the landscape and the drainage of the region. Volcanic and seismic activity is still common in NHNP.

In the High Andean zone, at 1600 m there is an "archipelago" of steep mountains that extended beyond the frozen cover of the mountain during the period of glacial maxima. It is here that most streams and rivers originate, starting mainly with a small lake or lagoon of high altitude. The ecological unit of humid forest was covered by ice less than 10,000 years ago, which gave rise to different types of soil. At the ecotone forest-steppe, the modifying forces are more due to the action of water than to glaciers. This can be seen by the change of valley profiles from the classic "U" to "V" shape. In the steppe several process of sedimentation coexist, and two geoforms can be recognized, the low reliefed steppe and high reliefed steppe.

Vegetation. The dominant landscape in the NHNP is the Patagonia Forest that has a close phylogenetic relationship with eastern Australia, New Zealand, New Guinea and other areas in the Oriental Region. Martin & Mermoz (2005) stated that there are 14 types of vegetation zones in the park, of which the forests of Coihue (*Nothofagus dombeyi*), Ciprés (*Austrocedrus chilensis*), Lenga (*N. pumilio*), Ñire (*N. antarctica*), and the Caña Colihue (*Chusquea coleou*) are predominant (see Table II). However, a new characterization of the vegetation of the park is being carried out at present by Malcolm Penn, one of the authors of this study.

In the High-Andean ecological unit the vegetation is of semi-desert with species such as *Poa tritigmatica, Luzula chilensis, Senecio sp*. and *Nassuvia sp*. There are also hydrophilic species near water bodies, *e.g. Abrotanella diemii, Senecio carbonensis and Menovillea hirsute*. Below this unit, the "forest line" is formed by a monospecific forest of

Lenga, which changes in height with altitude. It varies from a small bush near rocks at 1700 m to trees of more than 20 m at 1000 m of altitude. The understorey of the Lenga forest is formed by species such as *Drimys winteri, Maytenus disticha* and *Chusquea coleou*. At the level of 1100 m species of Colihue with an understorey of Caña Colihue can be found. The area surrounding Puerto Blest is the main representative of the Valdivian Forest in the park, and here it is common to find Alerce (*Fitzroya cuppresoides)* and Cipres de las Guayteca (*Pilgerodendron uviferum*) in the mallines [=swamplands], as they are locally known. The vegetation of the mallines is mainly herbaceous, which is densely distributed. Another type of forest in this area is the Ñire forests, which can grow from 2 to 10 m.

In the ecotone forest-steppe (the transition forest) the distribution of the forests is limited due to a dryer climate that appears to make this forest more isolated. The forests of Lenga are only found in pockets to the south and to the east of the park. The forest of Ñire has a wider ecological range forming small pockets together with *Schinus patagoniucs, Berberis spp., Colettia spinossima* and maitenes (*Maytenus boaria*). Other bushes appear in the steppe, where precipitations are less than 600 mm, *e.g. Discaria articulata, Berberis buxifolia* and *Fabiana imbricata.*

ACTIVITIES AND OUTPUTS OF THE PROJECT

The specific results of the project will be described in deeper detail in some of the accompanying papers. The intention here is to illustrate the scope of the project by outlining our approach and major outputs.

Field work. Insects are being sampled from a representative range of wetland biotopes throughout NHNP. These include montane and lowland streams, lakes and marshes, distributed within temperate rainforest and arid steppe. Both adult and larval stages of the freshwater insects are being sampled using the appropriate methods including kick sampling, sweep netting and flotsam sampling the aquatic biotopes; and light trapping, flight interception trapping and sweep netting the terrestrial vegetation adjacent to the wetlands.

The fieldwork seasons are between November and March in each of the three years of the project. During the first season, wetlands in the central part of the park were sampled. Sites in the north of the park were sampled during the second field season and sites in the south will be sampled in the final field season. Specimens collected by hand from the aquatic biotopes are preserved in 80% ethanol in the field. Specimens of larval and pupal Simuliidae and Chironomidae are also collected alive for rearing in the laboratory so that immature stages can be associated with the adult stages. A full list of the environmental data and other details and photographs were collected at each sampling site. Malaise traps are positioned in suitable locations and serviced every 15 days. Light traps are run for one night. Trap-collected specimens are sorted into order or family level in the laboratory.

Reference collection and database. Specimens identified by the specialist taxonomists are curated, referenced and stored at UNLP. A supplementary collection will be deposited at NHM, but all primary type material will be permanently deposited at UNLP. All the specimens and environmental information are being databased and cross-referenced into a GIS, which also includes a vegetation classification system, and this is being used to model freshwater insect data spatially and create the first biodiversity database of its kind in Patagonia.

Infrastructure. Darwin Initiative funding has been used to purchase furniture, laboratory and IT equipment for the Puerto Blest field station and a biodiversity laboratory in Bariloche. The Puerto Blest field station includes a laboratory, meetings room, kitchen and two small dormitories. The Biodiversity Laboratory is currently being used for processing the material collected during the project. Both facilities will be available for use beyond the end of

the project and provide a valuable legacy for biodiversity studies in NHNP for the future. Project funds have also been used to provide facilities in UNLP for the long-term storage of material collected during the project. In addition, a digital imaging system has been purchased and installed at ILPLA. The system uses high quality microscopy and software that compiles a montage of a series of images taken sequentially through the focal plane to produce a crisply focused whole specimen image.

Outreach, training and education. An important element of the project is to promote awareness of the sustainable use and understanding of wetland ecosystems. Conservation of this fragile environment will not be possible unless this and the next generation of adults value it. To achieve this we have been visiting local schools to introduce children to the insects that live in freshwaters by giving them the opportunity to use nets to collect them from ponds and streams, and examine the animals under microscopes. We have also run introductory courses for APN Rangers and sport fishermen on freshwater insect identification and ecology. Adults and children alike find these intimate views into the vastly different worlds of freshwater insects awe-inspiring and it is then relatively easy to enthuse them to develop this interest. APN Rangers have also been taught how freshwater insects can be used to biomonitor rivers and detect pollution incidents that may not otherwise be apparent simply by chemical analysis of the water. Seeing the differences in abundance and diversity of freshwater insects in adjacent stretches of polluted and unpolluted river is a graphic illustration of the impact that pollution can make. We have also run several workshops on freshwater insect identification and ecology for graduate and under-graduate students. Both project field assistant staff members are registered for higher degrees research material collected by the project. The material is also forming the basis of four additional PhD theses under supervision by project partners.

To further encourage an interest in freshwater insects, freshwater ecology and wetlands conservation, we are producing a series of scientific papers, popular and specialist books, pamphlets and posters on the freshwater insects of the region. Two popular publications (Massaferro & Rojas, 2007; Darwin Initiative *et al.*, 2007) are already available in local book shops, APN offices and have also been distributed through local schools. We are currently preparing a wetlands interpretive display at the APN information centre at Puerto Blest which will introduce the work of the project and illustrate the biodiversity, ecology and range of wetlands to be found in NHNP. The project has generated a lot of media interest and has been the focus of several articles in the national and local press, and members of the project team have been interviewed on local and national television and radio. We hope that this exposure will inform people about the objectives and achievements of the project, help to raise interest in freshwater insects and also in the importance and urgency of wetlands conservation and what they can do to contribute to this.

Transfer of biodiversity knowledge. The Argentinean scientists working on the project have visited the Natural History Museum, London (NHM), on several occasions. This has provided them with the opportunity of examining reference material and consulting literature that may not be easily to obtain in Argentina. Of particular importance are the type specimens in NHM collections which are essential to confirm the identity of material collected in the field in Argentina, and to verify the names of specimens from UNLP. The NHM collections are especially rich in Diptera types collected by F.W. Edwards (e.g., Edwards, 1931; Ingram & Macfie, 1931) in the Bariloche region early in the 20th Century.

The project scientists from NHM have also made return visits to Argentina in order to participate in field work and familiarise themselves with the various wetland habitats in NHNP, collect data for GIS, train the assistants employed on the project in field work and curation techniques, visit UNLP to

examine the collections of freshwater insects, discuss logistic support from ANP and hold project meetings with all the participants to discuss progress and future developments and plan strategy.

CONCLUSIONS

The Darwin Initiative project has already achieved some of its goals in the first 18 months of the project. An important reason for this is the excellent *esprit de corps* that has developed between the project partners who have been supporting each other and working closely together towards aims that were mutually agreed at the beginning of the project.

The project partnership has already succeeded in its goals to support Argentinean institutions to build capacity to meet CBD commitments by: 1) providing resources to equip and furnish the Puerto Blest field station as a wetlands study and interpretive centre; 2) furnishing and equipping a room as a biodiversity research laboratory in ANP headquarters; 3) training students and park rangers to collect and identify freshwater insects and in biomonitoring techniques; 4) providing baseline information about the distribution of freshwater insects in NHNP to ANP; 5) providing courses to specialist and non-specialist audiences on freshwater insects and the importance of wetlands for biodiversity; 6) publishing field guides, manuals and papers for the identification of freshwater insects.

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LITERATURE CITED

1. DARWIN INITIATIVE. Nahuel Huapi National Park and University of Comahue members. 2007. *Fauna Nativa*: *Invertebrados*. Leaflet.
2. EDWARDS, F. W. 1931. Simuliidae. *In*: *Diptera of Patagonia and South Chile*. British Museum (Natural History), London 2: 121-154.
3. INGRAM, A. & J. W. MACFIE. 1931. Ceratopogonidae. *In*: *Diptera of Patagonia and South Chile*. British Museum (Natural History), London 2, 121-154.
4. MARTIN, C. E. & M. MERMOZ. 2005. Mapa de vegetación del Parque y la Reserva Nacional Nahuel Huapi. *An. Parques Nacionales* 27, 51-62.
5. MASSAFERRO, J & F. ROJAS. 2007. *Guía para la identificación de macroinvertebrados acuáticos de Patagonia*. Freshwater Biological Association. Leaflet.
6. MONJEAU, A. 2006. Perfil de área protegida Argentina, Parque Nacional Nahuel Huapi. *Parks* Watch, *Fortaleciendo las Areas Protegidas para Conservar la Biodiversidad*. ParksWatch [pdf unnumbered pages report].