GEF Medium-Sized Project

PROJECT BRIEF
ON A

PROPOSED GRANT FROM THE
GLOBAL ENVIRONMENT FACILITY TRUST FUND

IN THE AMOUNT OF US$0.9 MILLION

TO THE

REPUBLIC OF CHILE

FOR THE

DESIGN AND IMPLEMENTATION OF A BIODIVERSITY MANAGEMENT
SYSTEM IN THE MINISTRY OF PUBLIC WORKS

March 22, 2012
MEDIUM-SIZED PROJECT PROPOSAL
REQUEST FOR FUNDING UNDER THE GEF TRUST FUND

GEFSEC PROJECT ID: 3998
IA/ExA PROJECT ID: P108740
COUNTRY: Chile
PROJECT TITLE: Chile: Design and Implementation of a Biodiversity Management System (BMS) in the Ministry of Public Works (MOP)
GEF IA/ExA: World Bank
OTHER PROJECT EXECUTING AGENCY(-IES): Ministry of Public Works and Fundación Biodiversa
DURATION: 3 years for Project implementation
GEF FOCAL AREA: Biodiversity
GEF STRATEGIC OBJECTIVES (SO): SO-2 “To Mainstream Biodiversity in Production Landscapes/Seascapes and Sectors”
GEF OPERATIONAL PROGRAM: Biodiversity-Strategic Program 4-Policy (Strengthening the Policy and Regulatory Framework for Mainstreaming Biodiversity)
IA/ExA FEE:
CONTRIBUTION TO KEY INDICATORS IDENTIFIED IN THE FOCAL AREA STRATEGIES:
- BMS incorporated into MOP Internal Standard Operating Procedures (ISOP) manuals/documents
- At least 25 million hectares valued by BMS by the end of MSP
- BMS developed, tested, and integrated in MOP’s decision-making system

FINANCING PLAN ($) (Agency Name) (Share) (Fee)

<table>
<thead>
<tr>
<th>GEF Total</th>
<th>PPG</th>
<th>Project*</th>
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<tr>
<td>GEF IA/ExA</td>
<td>1,032,000</td>
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<td>Ministry of Public Works</td>
<td>16,000</td>
<td>8,122,200</td>
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<td>Fundación Biodiversa</td>
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Financing for Associated Activities, if any:

* If Project is multi-focal, indicate agreed split between focal area allocations

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<th>FOR JOINT PARTNERSHIP**</th>
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<tr>
<td>(Agency Name) (Share) (Fee)</td>
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** Projects that are jointly implemented by more than one IA or ExA

MILESTONES DATES
PIF APPROVAL 15 September 2009
PPG APPROVAL N.A.
MSP EFFECTIVENESS 01 June 2012
MSP START 01 June 2012
MSP CLOSING 28 May 2015
TE/PC REPORT* 28 August 2015
*Terminal Evaluation/Project Completion Report

Approved on behalf of the World Bank. This proposal has been prepared in accordance with GEF policies and procedures and meets the standards of the Review Criteria for GEF Medium-sized Projects.

Karin Shepardson, Executive Coordinator, World Bank
Resubmission: -

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# LIST OF ACRONYMS

<table>
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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>BMS</td>
<td>Biodiversity Management System</td>
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<tr>
<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<tr>
<td>CI</td>
<td>Conservation International</td>
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<tr>
<td>CITIES</td>
<td>Convention on International Trade in Endangered Species of Wild Fauna and Flora</td>
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<tr>
<td>CONAF</td>
<td>Forestry National Corporation ([Corporación Forestal Nacional])</td>
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<td>CONAMA</td>
<td>National Commission for the Environment</td>
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<tr>
<td>CPS</td>
<td>Country Partnership Strategy</td>
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<td>DGA</td>
<td>General Directorate of Water ([Dirección General de Agua])</td>
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<tr>
<td>DPL</td>
<td>Development Policy Loan</td>
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<td>EA</td>
<td>Executing Agency</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>EIAS</td>
<td>Environmental Impact Assessment System</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<td>IA</td>
<td>Implementing Agency</td>
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<td>IBRD</td>
<td>International Bank for Reconstruction and Development</td>
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<td>IFC</td>
<td>International Finance Corporation</td>
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<tr>
<td>ISOP</td>
<td>Internal Standard Operating Procedures</td>
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<td>ISP</td>
<td>Institutional Strengthening Program</td>
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<td>MA</td>
<td>Ministry of Environment ([Ministerio del Ambiente])</td>
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<tr>
<td>MOP</td>
<td>Ministry of Public Works</td>
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<tr>
<td>MOU</td>
<td>Memorandum of Understanding</td>
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<td>MSP</td>
<td>Medium-Sized Project</td>
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<td>NBS</td>
<td>National Biodiversity Strategy</td>
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<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
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<td>PASMA</td>
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<tr>
<td>SAG</td>
<td>Agricultural and Livestock Service ([Servicio Agrícola y Ganadero])</td>
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<tr>
<td>SEMAT</td>
<td>Secretariat of Environment and Territory ([Secretaría Ejecutiva de Medio Ambiente y Territorio])</td>
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<tr>
<td>TAL</td>
<td>Technical Assistance Project</td>
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<tr>
<td>TIS</td>
<td>Territorial Information System</td>
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<td>WWF</td>
<td>World Wide Fund for Nature</td>
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1. PROJECT SUMMARY

A) PROJECT RATIONALE, OBJECTIVES, OUTCOMES/OUTPUTS, AND ACTIVITIES.

1. Chile’s economy is the most stable and competitive in South America. This competitiveness has traditionally stemmed from a strong focus on extremely efficient roads and irrigation systems. The country has rapidly recovered from the economic slowdown and financial crisis of the late 1990s, doubled per capita gross domestic product (GDP) since 1990, and cut poverty by more than half. A cornerstone of this trend is the country’s commitment to prudent economic management, sound, consensual governance, and proactive social investments. The Chilean Government has pursued a coherent development program built around equality of opportunity, which is aimed at accelerating growth, expanding global commercial linkages, improving education, safeguarding natural resources, and strengthening competitiveness while addressing acute and longstanding social problems.

2. The Chilean Government has placed great importance on the decision of the Organization for Economic Co-operation and Development (OECD) to accept the country as an official member. The World Bank, through its IBRD-IFC Country Partnership Strategy (CPS), is supporting the Government to meet its goal of attaining OECD income levels as well as achieving living and environmental standards that would put it on a path to growth and social equity.

3. At the same time, Chile depends significantly on the use of its natural resources, including its extractive industries. Chilean GDP still relies heavily on copper production, which accounts for approximately 20 percent, followed by fishing and aquaculture, forestry, and agricultural industries. Recently, economic activity relating to tourism has grown exponentially. In particular, tourism focusing on pristine environments is generating significant demand for access and related services. Copper extraction activities are concentrated in the north, and forestry and agriculture primarily in the south. In the central areas of the country, the Mediterranean climate and proximity of natural areas to population centers continues to attract settlements and infrastructure development.

4. Given its latitudinal extension and sharp altitudinal gradients, continental Chile contains a wide variety of climates and geographies that comprise seven ecoregions.¹ Owing to geographical isolation created by deserts in the north, mountains in the east, water in the west, and ice in the south, the physical environment has been subject to evolutionary processes that resulted in extraordinarily unique biodiversity.

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¹ These are (from north to south): Atacama Desert, Central Andean Dry Puna, Southern Andean Steppe, Chilean Matorral, Valdivian Temperate Forests, Magellanic Subpolar Forests, and Patagonian Steppe in the sense of WWF through the National Geographic webpage: http://www.nationalgeographic.com/wildworld/terrestrial.html.
Biological Importance

5. Chile has a valuable ecological heritage characterized by high levels of endemism that reach 70 to 90 percent for certain taxa. For this reason, international organizations have recognized the global importance of the country’s natural wealth:

- The World Wide Fund for Nature (WWF) Global 200\(^2\) assessed the irreplaceability and distinctiveness of ecoregions to select 200 that hold the most outstanding and representative habitats on the planet. Chilean ecoregions that are part of Global 200 are the Atacama Desert, Central Andean Dry Puna, Chilean Matorral, Valdivian Temperate Forest, and Patagonian Steppe.

- Conservation International (CI)\(^3\) identified 34 biodiversity hotspots that hold 50 percent of the world’s plant species and 42 percent of terrestrial vertebrate species in only 2.3 percent of the Earth’s land surface. Each of these hotspots faces extreme threats. The “hotspot” located in Chilean territory falls between 23º and 47º South latitude, covering 397,142 square kilometers; it comprises all the Chilean Matorral and part of the Valdivian Temperate Forest ecoregions (as defined by WWF). CI calculated that the native vegetation remaining in this area is only 30 percent of the original cover. Yet, it holds nearly 2,000 endemic plant species and at least 26 endemic threatened animals.

- The Nature Conservancy\(^4\) prioritized ecoregions in South America to guide conservation efforts based on existing levels of protection, threat levels, and the irreplaceability of sites within ecoregions. Using these criteria, the Chilean Matorral was shown to be one of the highest priorities in South America.

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\(^3\) [http://www.conservation.org/explore/priority_areas/hotspots/Pages/hotspots_main.aspx](http://www.conservation.org/explore/priority_areas/hotspots/Pages/hotspots_main.aspx)

\(^4\) Personal communication, Jerome Touval, Science Director, Latin America Conservation Region, The Nature Conservancy.
6. The map on Figure 1 above depicts the ecoregions in Chile. It excludes Sechura Desert and the Central Andean Puna ecoregions because they cover just a small part of the country in the extreme north.

**Ecoregions Included in the Project and Their Global Biological Importance**

7. This Project will focus on the following ecoregions, which have the most valuable global attributes in terms of uniqueness and global environmental services (see Annex 3 for more details):

- **Chilean Matorral**: endemism levels up to 90 percent, considered globally unique.
- **Valdivian Temperate Forest**: endemism levels up to 70 percent, considered globally unique. Some parts are still pristine, providing global carbon sequestration, water filtration/retention, and other ecosystem services.
- **Magellanic Subpolar Forests**: one of the most extensive pristine areas in the world, harboring rare unexplored biodiversity and providing global environmental services such as carbon sequestration.
- **Patagonian Steppe**: a unique and vast area covered by highly adapted and highly endemic vascular species.
- **Central Andean Dry Puna**: a small area uniquely comprising a compressed mosaic of biogeographic provinces. It provides water services and represents a valuable living laboratory in the face of global climate change.
Threats to Biodiversity

8. The effects of infrastructure development on habitat conversion and degradation can be divided into three categories: (i) direct effects, (ii) induced effects by services associated with infrastructure, and (iii) indirect effects triggered by infrastructure placement.

9. **Direct effects** of infrastructure projects generate the most severe impacts on natural environments. Direct effects are responsible for habitat conversion for other land uses and habitat degradation through landscape barriers, pollution, soil removal and/or compaction, and the establishment of invasive species. Some impacts on natural environments are habitat destruction; fragmentation and connectivity loss; the alteration of hydrological, chemical, and physical cycles; and the alteration of biological composition. The scope and severity of these pressures may cause different degrees of loss of habitat function, which need to be evaluated.

10. **Induced effects** relate to the impact of services associated with infrastructure. In the case of roads, some associated services are toll houses, illumination, telecommunications, and other services for vehicles and passengers, which are currently not included in the Ministry of Public Work’s (MOP) planning in the development of infrastructure projects. In the case of dams, an associated service is the construction of a network of irrigation systems fed from the main dam. The development of sub-irrigation systems is included in MOP planning, but their construction is done by private property owners and is therefore not under MOP’s responsibility.

11. **Indirect effects** are related to the occupation of the surrounding territory that occurs after an infrastructure project is in place. In ecoregions subject to heavy intervention, the incremental impacts of infrastructure projects on natural environments may be considered low in relation to other activities such as agriculture, forestry, mining, and tourism. It is challenging to assign responsibility to indirect effects. In pristine ecoregions, infrastructure projects may induce occupation of an area due to increased access. Such effects can have a greater impact on the area, especially since ensuing occupation is not under the MOP management, and thus constitute a greater concern. In such a case, the MOP has a large responsibility, but it is not able to set up the corresponding protection instruments since other Government agencies (which will form part of the Project’s Advisory Council\(^5\)) have the authority regarding what protection instruments should be applied. As a result of this Project, the MOP will establish a new procedure through which it will make relevant recommendations to the other Government agencies aimed at protecting, through existing instruments, biodiversity that is being impacts indirectly by infrastructure works. To target indirect impacts this Project has

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\(^5\) The Advisory Council will be composed of representatives of the regulatory institutions responsible for overseeing infrastructure projects within the Environmental Impact Assessment System (Sistema de Evaluación de Impacto Ambiental, SEIA)
included pristine ecoregions such as the Magellanic Subpolar Forests, where the Chilean Government plans to intensively expand the road network in order to foster tourism in upcoming years. Infrastructure development in pristine ecoregions needs to be carefully planned.

12. Direct and induced effects produce the most severe impacts on natural systems in intensely used ecoregions. In Chile, these are the same ecoregions that are currently facing important conservation challenges. The Valdivian Temperate Forest has only 45 percent of its original forest cover left as a result of conversion to forestry and agriculture. Most of the typical vertebrates of this ecoregion are threatened or endangered and at least 11 tree species are threatened. Chilean Matorral presents an even more dramatic scenario, showing the highest human density (75 percent of the Chilean population in about 25 percent of the territory) and the highest conversion rates to agriculture and other uses in the country.

13. The rapid pace of infrastructure development increases these threats: the sector has doubled its investment pace reaching an annual average of US$1.5 million (1998–2003) and corresponding to 12 percent of the Chilean GDP. Road development has been particularly important. The road network comprises 80,000 kilometers of all road types that have directly converted about 484,000 hectares of land. It is also worth noting that as a result of climate change predicted temperature increases and precipitation decreases will likely result in the expansion of irrigation systems and road networks to the south, putting increased pressure on the Valdivian Temperate Forests ecoregion.

14. Direct and induced impacts are difficult and costly to reverse, and they generate loss and degradation of habitat functions and services. Avoiding these impacts at the planning and design level of projects is one of the most cost-effective ways to promote responsible biodiversity management in the infrastructure and public works sector.

15. When considering specific impacts of infrastructure works on biodiversity, it is possible to identify impacts that are associated with different ecoregions:

(i) Impacts on species with decreased population numbers that are endemic to the area. Currently affected ecoregions—Central Andean Dry Puna and Chilean Matorral;

(ii) Destruction of zonal ecosystems, mainly wetlands, as a result of direct filling or interruption of superficial or underground water flows that feed them. Currently affected ecoregions—Central Andean Dry Puna and Chilean Matorral;

(iii) Direct impacts on preserved forests (a new forest category recently established for native forests containing threatened species or high conservation value ecosystems). Currently affected ecoregions—Chilean Matorral, Valdivian Temperate Forests, and Magellanic Subpolar Forest;
(iv) Interruption of migration of mammals due to highway transformation or construction of high-speed highways. Affected ecoregions—Atacama Desert and Chilean Matorral;

(v) Destruction of riparian ecosystems through filling due to road construction. Affected ecoregions—Valdivian Temperate Forests, Magellanic Subpolar Forests and Patagonian Steppe; and


**Infrastructure Development Projects and Environmental Management in the MOP**

16. The MOP relied on instruments from the National Commission for the Environment (CONAMA, the highest Environmental Policy body in the country\(^6\)), such as Environmental Impact Studies,\(^7\) Environmental Impact Assessments,\(^8\) and internal reports to design appropriate mitigation measures to reduce the adverse environmental impacts of infrastructure works. This has allowed the MOP to make some progress in incorporating environmental and territorial criteria into its project management procedures including, for example, mitigation measures for threatened species. Some projects have established new practices including a preference for road design alternatives that protect natural heritage\(^9\) and methodologies to compensate for loss of ecosystem fragmentation.\(^{10}\)

17. Environmental legal and administrative tools employed in Chile started with the Environmental Impact Assessment System (EIAS) that was established in 1997. In 2001, the MOP’s internal environmental framework was established. In 2002, Regional Biodiversity Strategies were developed by each administrative region in Chile and in 2003 CONAMA’s Ministerial Council approved the National Biodiversity Strategy (NBS), which aimed to address conservation and the sustainable use of natural resources in the country. The NBS has compiled a list of national priority sites to be safeguarded in order to protect distinct features and comply with the Convention on Biological Diversity (CBD). These nationwide efforts were designed to provide frameworks for both future *in-situ* conservation and activities with impacts on biodiversity. In 2005, a Country Action Plan was developed based on the NBS framework, which aimed to strengthen institutional coordination to achieve conservation objectives and manage biodiversity. An additional “Matrix of Short-term Actions in the Public Sector,” developed by CONAMA,\(^{10}\)

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\(^6\) CONAMA has been replaced by the Ministry of Environment (MA)

\(^7\) “A full Environmental Impact Study is required for projects which pose potential adverse impacts on health, natural resources, entail resettlement of population, are located near protected areas or have a high potential of affecting the scenic value of an area or could potentially alter areas of high cultural or historical value” (Project Appraisal Document: Republic of Chile - Institutional Strengthening of the Ministry of Public Works Technical Assistance Project, p. 21).

\(^8\) “Projects that do not pose potentially adverse impacts are subject to more limited Environmental Impact Assessments” (Project Appraisal Document: Republic of Chile – Institutional Strengthening of the Ministry of Public Works Technical Assistance Project, p. 21).

\(^9\) *Vicuña – Yendegaia* road, in Southern Chile.

\(^{10}\) *Ancoa* irrigation dam, near Santiago.
highlighted specific commitments for infrastructure works, making the MOP a strategic player in efforts to protect important ecoregions and their biodiversity. In 2006, the MOP updated the biological information used to support the project planning process and prepared to adopt methodologies to integrate such information in early project design stages. Since 2007, the MOP’s new internal policies have been in place, making the EIAS mandatory for all MOP projects that could affect priority sites identified in the NBS, even though these priority sites are not under official protection. The MOP’s current planning and management system is based on compensation and mitigation and focuses on protected areas, priority sites, and threatened species. Compensation and mitigation measures are identified after project design, focusing on key direct and induced effects.

18. Although the MOP has demonstrated its commitment to improving biodiversity impact management, it still lacks effective tools to prevent habitat conversion and degradation around infrastructure projects. Current tools have not reached the appropriate scale to effectively address biodiversity-related issues.

*Barriers to Mainstreaming Biodiversity Conservation in Infrastructure Development Projects*

19. The main barriers faced by the MOP to incorporating biodiversity conservation into infrastructure works are:

(i) Current methodologies focus only on threatened species, ignoring other aspects of biodiversity such as ecosystems or other species with high conservation value and without considering habitats and their associated functions;

(ii) Current methodologies do not take ecological processes into account;

(iii) The baseline is taken at the end of the design process, after technical alternatives and design options have been evaluated, when there is no longer any possibility to make changes. This causes any biodiversity measure to be developed solely around mitigation and compensation schemes.

20. Biodiversity information is not integrated into the MOP’s decision-making system. As biodiversity considerations are not currently being addressed during the design process, the only way to satisfy biodiversity conservation needs is through compensation at the end of the design process when issues arise from an Environmental Impact Assessment. This increases project development times owing to regulatory delays and internal perceptions that project costs are unpredictable because the magnitude of impacts is not known until the end of the planning phase. It also exposes the MOP to compensation demands that are not always related to environmental impacts.

21. These challenges are a result of the weaknesses previously mentioned, lack of biodiversity value metrics and lack of information on conservation activity costs. The absence of this information prevents the MOP’s mainly quantitative decision-making system from combining biodiversity conservation information with engineering
information. Thus, the planning and project design procedures lack standardized criteria and methodologies for early assessment and identification of biodiversity impact minimizing options at an ecosystem/territorial level. Hence, both national and MOP policies are difficult to implement owing to a lack of effective tools. As a result of the lack of value metrics mentioned above, the MOP routinely fails to define the best alternative minimizing biodiversity impact and fails to define actions that truly minimize, mitigate, and compensate for the biodiversity losses caused by infrastructure projects.

22. In sum, these factors result in a MOP decision-making process that fails to include analysis and integration of important ecological information. In Chile, policies are proposed at the national level. In the case of biodiversity conservation, the MOP has not been able to develop corresponding internal guidelines, criteria, and procedures for policy implementation. Frequently, high-level policies and guidelines are not scaled down correctly for their effective institutional and on-the-ground implementation. This situation arises because (i) respective institutional teams are not trained to measure, value, and manage biodiversity; and (ii) there is a lack of timely information on biodiversity value and conservation costs presented with adequate metrics that could be combined with information regularly used in the infrastructure decision-making system.

23. Consequently, the MOP is not able to (i) determine the key institutional roles of an area that will eventually be impacted by an infrastructure plan or project at an ecosystem/territorial level; (ii) anticipate the financial costs of developing an ecosystem-based approach; and (iii) integrate such an approach into the decision-making process.

Framework for Solution

24. The Institutional Strengthening of the Ministry of Public Works Technical Assistance Project (TAL), Loan No. IBRD - 74580, articulates the Ministry’s goal of designing and implementing a long-term infrastructure planning process,\textsuperscript{11} through a MOP-World Bank Institutional Strengthening Program (ISP). The objective of this Project is to assist the MOP in supporting responsible and pragmatic methods and actions for biodiversity management in key ecoregions. This will be accomplished by incorporating a Biodiversity Management System (BMS) tool to be developed by the Project into a revised infrastructure planning process and contributing to the TAL components that focus on development of strategic national infrastructure plans. The BMS will be based on an ecosystem/population-level assessment approach and its information system will be integrated into the Territorial Information System (TIS)\textsuperscript{12} to be developed within the TAL. In the infrastructure planning process, the BMS will be

\textsuperscript{11} The TAL is designed to support MOP efforts to increase institutional efficiency (specifically for investments) in infrastructure project planning, implementation and supervision.

\textsuperscript{12} The Territorial Information System involves design and application of an information system, a database and a Geographic Information System to be financed under Component 1 (Integrated Planning) of the Institutional Strengthening of the Ministry of Public Works Technical Assistance Project of the IBRD.
employed before the EIAS, and thus help to guide the use of the EIAS\textsuperscript{13}. Through the review of available strategies and instruments, a support system will also be developed for a revised project planning and decision-making process that incorporates the BMS. The ISP is promoting many changes within the MOP, and an organized effort is under way to train the Ministry’s personnel and other stakeholders to apply the new methods and approaches. Such changes will be reinforced by the BMS’s efficiency in terms of the time needed for development of infrastructure projects and cost containment. A special effort will be carried out by the MOP team participating in this Project to make such advantages visible within the institution.

25. This integrated approach will be implemented in five pilot ecoregions with MOP infrastructure projects to validate the BMS. It will help to promote integration of biodiversity management into Ministry policies and methodologies in a timely manner during the project planning phases. At the same time, institutional capacity will be created to enable biodiversity management through an ecosystem approach that will become part of the guiding principles of the Ministry’s policy. It will also ensure that this policy is consistent with the strategic guidelines of the NBS and reflects its priorities and those of the Regional Biodiversity Strategies. Global benefits will result from the strengthening and leveraging of this new approach, which will enhance Chile’s ability to conserve its natural heritage. Other examples of similar information systems tackling a variety of challenges include a Biodiversity Information System for the Government of Argentina (http://www.sib.gov.ar/institucional) co-financed with GEF resources and the Biodiversity Information System for Mining operations that Argentina (http://www.mineria.gov.ar/estudios/irn/chubut/ind-flor.asp) prepared under the IBRD TAL: Programa de Fortalecimiento del Sector Minero Argentino (PASMA).

26. The adoption of the ecosystem approach for biodiversity management by the MOP will represent a paradigm shift in terms of the way that infrastructure projects are planned and managed. This will involve an integrated look at the geography and landscape of the area where an infrastructure project will be implemented before the planning and design of the project. The BMS application will include the characterization of ecosystem features in the area where a project will take place, identifying high-value ecosystems, and population units. Conservation and biodiversity values will be calculated according to an index that will be designed by this Project and that will consider indicators for representation, uniqueness, and continuity. The BMS will also involve sensitivity analysis of ecosystem units with respect to different infrastructure threats. With these tools, relevant information on the ecosystem and landscape will be available in the early phases of a project’s planning and design. Thus, this information can be considered in order to better integrate biodiversity management into the design of public works.

**Project Development Objective/Global Environmental Objective**

\textsuperscript{13} The BMS will complement existing mitigation regulation in Chile adding a biodiversity tenet. In addition to this, it will facilitate the systematization of the information to complement, optimize and make the best use of the existing regulations.
27. The Project has a **global environmental objective** to conserve biodiversity of global importance in key Chilean ecoregions through the development and application of a model for incorporating biodiversity considerations into infrastructure decision making.

28. The **Project Development Objective** is to assist the Chilean Government with its biodiversity conservation efforts in key ecoregions through a Biodiversity Management System (BMS) applied to the planning, design, construction, and operation of infrastructure works.

**Project Components**

29. The Project comprises four components:

1. *Design of a Biodiversity Management System (BMS)*
2. *Application, Assessment, and Validation of the BMS in Pilot Ecoregions*
3. *Internalization and Dissemination of the BMS in the Ministry of Public Works, the Advisory Council, and with Public and Private Stakeholders*
4. *Technical and Administrative Project Management*

**B) Key Indicators, Assumptions, and Risks**

30. The key project objective and outcome indicators are shown in Table 1.

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<tr>
<th>Objective/Expected Outcome</th>
<th>Key Indicators</th>
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</table>
| To assist the Chilean Government in its biodiversity conservation efforts in key ecoregions using a Biodiversity Management System (BMS) in the planning, design, construction, and operation of infrastructure works | • Degree to which ISOP includes measures to conserve biodiversity  
• BMS integrated into the MOP’s decision making |

**Outcome 1**  
An ecosystem-based BMS developed as an integrated MOP tool

<table>
<thead>
<tr>
<th></th>
<th>Key Indicators</th>
</tr>
</thead>
</table>
|                      | • An index designed to value biodiversity in priority ecoregions with relevant MOP projects  
• An index designed to value threats in priority ecoregions  
• An analysis model designed for the BMS  
• A BMS designed to produce valuable biological information |

**Outcome 2**  
The BMS fine-tuned in five priority ecoregions and mainstreamed in the MOP Project cycle on a pilot basis.

<table>
<thead>
<tr>
<th></th>
<th>Key Indicators</th>
</tr>
</thead>
</table>
|                      | • General biodiversity valuation criteria fine-tuned  
• Ecoregion-specific biodiversity valuation criteria identified |
- Ecoregion-specific biodiversity threat valuation and biodiversity criteria calibrated
- BMS application experiences documented
- Number of recommendations made to key institutions responsible for biodiversity management to prevent an increase in the vulnerability of habitats and species in priority ecoregions.
- BMS weaknesses and strengths identified

**Outcome 3**
The BMS validated by participating agencies and related scientific/technical sectors

- Technical report prepared by participating agencies and the related scientific/technical sector endorsing the validation.
- A final BMS version defined.

**Outcome 4**
The BMS internalized by the MOP, the Project’s Advisory and Consultative Councils, and disseminated among key institutions

- Number of manuals on best practices produced
- Number of manuals on best practices made official by the MOP
- Number of BMS training events offered within the MOP
- Percentage of the MOP’s officers who participate in infrastructure design trained in the BMS application
- Number of BMS seminars conducted to disseminate the BMS among public sector employees and agencies within the Project’s Advisory and Consultative Council
- Number of decision makers (national authorities within the member agencies of the Project’s Advisory Council) acquainted with the BMS
- Number of dissemination seminars for the main players and ministries not included in the Project’s Advisory and Consultative Council through participation in four Consultative meetings
- Number of scientists and civil society representatives acquainted with the BMS

31. The key outcome and output indicators of the project components are shown in Table 2.
### Table 2: Project components, expected outcomes, and outputs

<table>
<thead>
<tr>
<th>Project Components</th>
<th>Expected Outcomes</th>
<th>Expected Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Design of a Biodiversity Management System</td>
<td>1.1 An ecosystem-based BMS developed as an integrated MOP tool</td>
<td>1.1.1. Creation of an inter-sectoral Advisory Council with MA, SAG, DGA, and CONAF; 1.1.2. Menu of tools to survey, describe, and monitor biodiversity using an ecosystem-based approach; and 1.1.3. Design of a tool to evaluate, weight, and manage biodiversity information.</td>
</tr>
<tr>
<td>2. Application, assessment, and validation of the BMS in pilot ecoregions</td>
<td>2.1 The BMS fine-tuned in five priority ecoregions and mainstreamed in the MOP Project cycle on a pilot basis.</td>
<td>2.1.1. A biodiversity baseline in five pilot ecoregions defined and set up; 2.1.2. Typology of infrastructure biodiversity threats elaborated and identified in five pilot ecoregions; 2.1.3 A BMS procedure elaborated with recommendations included on biodiversity management in pilot ecoregions; and 2.1.4 Design of a monitoring and follow up system in five pilot ecoregions. 2.1.5. The BMS piloted in the MOP project cycle in pilot ecoregions; 2.1.6. BMS weaknesses and strengths identified; and 2.1.7. The BMS adjusted to specific characteristics of each pilot ecoregion.</td>
</tr>
<tr>
<td></td>
<td>2.2. The BMS validated by participating agencies and related scientific/technical sectors</td>
<td>2.2.1. Outcomes of the pilot phase included in the BMS;</td>
</tr>
</tbody>
</table>
3. Internalization and dissemination of the BMS in the Ministry of Public Works, the Advisory Council, and among other public and private stakeholders

3.1 The BMS internalized by the MOP, the Project’s Advisory and Consultative Councils, and disseminated among key institutions

3.1.1. Guidelines developed to manage biodiversity based on the BMS application;
3.1.2. Training program including BMS dissemination events offered within the MOP framework;
3.1.3. An internal Communication and Promotion Strategy to support the BMS internalization process developed;
3.1.4. BMS dissemination seminars targeted to the Advisory Council institutions and to other potential public and private BMS users organized; and
3.1.5. An external Communication and Promotion Strategy to support the BMS internalization process developed.

32. The potential risks, their rating, and the mitigation strategy proposed by the Project are shown in Table 3.

**Table 3: Risks and identified mitigation measures**

<table>
<thead>
<tr>
<th>Risk</th>
<th>Rating</th>
<th>Mitigation measures</th>
<th>Residual Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS data requirements on biodiversity cannot be met owing to a lack of primary sources</td>
<td>Medium</td>
<td>The Project will make every effort to collect as much available information as possible and to model information that might not be available from primary sources, such as species abundance and distribution. However, the Project will need to prioritize the information that will be entered in the BMS during its pilot phase. The team will design a flexible algorithm that will take different amounts of information into account according to its availability in different ecoregions and locations, adequately calibrating and weighting each of the inputs.</td>
<td>Low</td>
</tr>
<tr>
<td>BMS data requirements on biodiversity threats cannot be met owing to difficulty in collecting data from primary sources</td>
<td>Low</td>
<td>Environmental and geographical conditions may cause difficulties in collecting impact data. However, the Project will ensure that subsets of core impact data are collected in each pilot ecoregion. These core data will be specific to case studies and ecoregions. Data will be defined during the early phases of the Project and validated with expert consultations.</td>
<td>Low</td>
</tr>
<tr>
<td>Current Environmental Impact Assessment (EIA)</td>
<td>Low</td>
<td>The Project will design a set of measures to include a climate change dimension into the BMS under Component 1. Thus, the BMS</td>
<td>Low</td>
</tr>
<tr>
<td>Risk Description</td>
<td>Likelihood</td>
<td>Probability Description</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>System does not consider climate change impacts</td>
<td>Medium</td>
<td>Could be fed by the outcomes of other projects and initiatives in Chile related to Climate Change (i.e. National Communications) in order to determine an optimal design of future infrastructure works that could be affected by climate change. At the same time, the information to be uploaded in the BMS will be available to feed future climatic models in the pilot ecoregions and to generate potential scenarios.</td>
<td></td>
</tr>
<tr>
<td>BMS-based preventive decisions are not fully accepted by the regulatory agencies that evaluate the MOP’s projects during an EIA process</td>
<td>Medium</td>
<td>The Project will ensure internalization of the BMS in the Advisory Council and in its member organizations as well as transferability/ability to apply it in terms of existing regulations and procedures that the Council’s members practice.</td>
<td></td>
</tr>
<tr>
<td>Either severe drought or flooding events associated with climate change could alter quality of data fed into the BMS during the pilot ecoregion phase</td>
<td>Low</td>
<td>Special provisions need to be made in an extreme event year, given the vulnerability of systems and the increase in scope and magnitude of impacts. The BMS will be designed so that it will properly take into account these events and their additional impacts on ecosystems.</td>
<td></td>
</tr>
<tr>
<td>Slow absorption and integration of new approaches within the MOP</td>
<td>Medium</td>
<td>The rationale driving the engineering methods of the MOP management is difficult to integrate with non-quantitative information. This Project will design metrics to gather, process, and analyze biodiversity information in order to make it compatible with quantitative information. The BMS will be designed to become a part of the official and already established Territorial Information System. The BMS is expected to be integrated in the MOP’s decision making and to be institutionalized by an administrative decision that will declare the system and the procedures an official MOP method. In addition, the Project will provide training sessions for the MOP’s regular staff and executive officers, as well as officials involved in decision making. A training program will be designed and made mandatory for MOP staff. The Project will finance the first set of these courses.</td>
<td></td>
</tr>
</tbody>
</table>

**Overall Risk Rating** | **Low** |
c) Country Eligibility


34. Furthermore, the following concrete actions demonstrate the country’s commitment to biodiversity conservation: (i) development of a Regional Biodiversity Strategy by each region in Chile; (ii) approval of the NBS in 2003 identifying priority sites to protect special features in order to comply with the CBD; and (iii) design of a National Action Plan based on the NBS framework aimed at strengthening institutional coordination to achieve conservation objectives and manage biodiversity.

D) Country Drivenness

35. The objectives, actions, and expected outcomes planned under the Project are highly consistent with the NBS approved by CONAMA’s Board of Directors in 2003. This strategy includes the 2004–2015 National Action Plan, which the MOP actively participated in developing. The plan states that “Special consideration should be given to protection of biological diversity in public construction and infrastructure works in Priority Sites that do not have an official protection status.” Although this is a non-binding approach, the MOP has voluntarily committed to complying with the guideline.

36. In turn, Chile has committed to addressing the observations included in the OECD Report 200514 which states that the institutional and management structures will give priority to biodiversity conservation objectives, making them compatible with other sustainable development goals. Thus, the Project is fully aligned with this national commitment.

2. Program and Policy Conformity

A) Program Designation and Conformity

37. The Project is aligned with the GEF’s Biodiversity focal area Strategic Objective 2, “To Mainstream Biodiversity in Production Landscapes/Seascapes and Sectors.” The Project is also consistent with Strategic Program 4 “Strengthening the Policy and Regulatory Framework for Mainstreaming Biodiversity.” The main constraining factor to biodiversity mainstreaming in the MOP is the inadequate valuation of biodiversity and the lack of biodiversity information of its Territorial Information System (value, conservation budgets, etc.). Thus, the Project will contribute to the Strategic Program through:

14 OCDE Environmental Performance Review, Chile, 2005
- Developing a Biodiversity Management System that incorporates biodiversity conservation analysis in the MOP;
- Integrating the information system of BMS into the MOP information system; and
- Helping the MOP to strengthen its internal policy and regulatory framework and build the necessary institutional capacity to effectively apply the new framework with measurable biodiversity outputs.

B) PROJECT DESIGN

Sectoral Issues

38. Even with advancements in the MOP policies and the mandatory use of the EIAS for infrastructure projects that affect the most sensitive areas, biodiversity protection within MOP projects has been very limited to threatened species, ignoring other biodiversity targets and not considering habitats and associated functions. In addition, the absence of biodiversity information in the MOP’s decision-making system currently causes critical environmental issues to be neglected during the design process.

39. At present, Chile is modifying its environmental institutional framework and governance structure through a new law published on January 26, 2010 that established a Ministry of Environment. A law on Biodiversity and Protected Areas was designed within the Ministry of Environment, and sent to the Legislative Assembly in February 2011. This new law will create a Biodiversity and Protected Areas Service that will administer protected areas as well as have authority over matters affecting biodiversity outside of them. Although the content of the law and the mandate of the Service are still a matter of great debate within different agencies of the executive power, this move demonstrates the strong commitment of the Chilean Government to biodiversity conservation, one of its national priorities.

Baseline Activities

40. Without this Project, biodiversity in key Chilean ecoregions would continue to deteriorate because of the impacts of infrastructure works that do not include ecosystem-based planning approaches. Moreover, infrastructure development and the related effects on biodiversity will increase in priority ecoregions such as the Valdivian Temperate Forest owing to increased infrastructure demands driven by climate change (for example, growing demand for irrigation). Similarly, any infrastructure works in Chile would be carried out without systemic consideration of biodiversity issues at the planning and design stages. Such works would continue to affect the biodiversity of global concern in the Chilean areas of the Atacama Desert, Central Andean Dry Puna, the Valdivian Temperate Forest, and the Southern Andean Steppe ecoregions in the Central-North part of Chile; in the Magellanic Subpolar Forests and Patagonian Steppe ecoregions in the south; and in the southernmost part of the Valdivian Temperate Forest ecoregion.

GEF Alternative and Incremental Cost
41. The Project identification process and allocation of GEF grant resources to implement the Project has mobilized a strategic alignment of financing support from the Government of Chile, NGOs, and the IBRD. Government financing has been secured through the participation of the Ministry of Public Works (MOP). Fundación Biodiversa is contributing its expertise in nature conservation and ecosystem-based management. The MOP has active programs with resources for mitigation activities and investments in the target areas of the Project. Finally, by means of an IBRD loan for the “Institutional Strengthening of the Ministry of Public Works,” the IBRD will carry out a core platform of activities to support the GEF’s MSP biodiversity objective and will provide important cofinancing for activities relating to the adoption of the BMS in the MOP. Without the GEF grant, leveraging of these additional resources (financial, in-kind, and knowledge support) to improve collaboration and implementation would not have occurred. The GEF incremental investment is important to support this necessary multisectoral approach (see Annex 1 for more details).

42. The total cost of the project, including co-funding and GEF funds, amounts to US$ 10,101,222. Of this total, co-funding constitutes 91% or US$ 9,192,133. GEF financing comprises the remaining 9% of the total, or US$ 909,090.

Project Components and Activities

43. The proposed Project has four components, three of which address the core aspects of the Biodiversity Management System: design, validation, and dissemination. A fourth component will provide technical and fiduciary support to the Project. Each component is described in detail below.

1. Design of a Biodiversity Management System (BMS) (US$1,419,986 of which US$337,746 would come from the GEF)

44. **Outcome.** The expected outcome of this component will be an ecosystem-based BMS developed by FB as an integrated tool for the MOP. This system will be composed of three subsystems: an information management system, a biodiversity valuation system, and a procedures system. It will support decision making for infrastructure design based on an ecosystem approach, which will be supported by (i) data at an ecosystem level as opposed to site-specific project planning; (ii) territorial value criteria based on its biodiversity; and (iii) a global territory sensitivity index (to be developed in the context of the Project).

45. **Approach.** The BMS will include a methodology derived from ecosystem and population data in order to develop procedures that facilitate integration of biodiversity management issues in the design and management of public works. These tools will be included in the new TIS, which is a geographic information system (GIS) financed by the “Institutional Strengthening of the Ministry of Public Works, Technical Assistance Project (TAL), Loan No. IBRD – 74580.” The component will design specific elements
and project tools such as (i) metric methodologies and tools (biological valuation criteria and indicators, measurement and valuation scales, attribute hierarchies, transactional instruments, etc.),\(^{15}\) and (ii) incorporation of a preventive approach to infrastructure planning by stating the criteria that should be included in the elaboration of plans\(^{16}\).

46. **Outputs.** Activities related to the design of the BMS will include (i) the definition of territorial units for analysis; (ii) the definition of variables and information sources to value those units at the ecosystem and species levels; (iii) the design of a biodiversity value index in territorial units; (iv) the definition of principles for decision making that minimize the negative impact on biodiversity of infrastructure projects; and (v) the design of a geographic information system that includes all the above. This system will be based on accepted scientific principles, strategies, and methodologies; it will compile information on ecosystems and species and define a methodology to analyze and value the biodiversity and ecosystem information collected. The main outputs will be (i) creation of an inter-sectoral Advisory Council with MA, SAG, DGA, and CONAF; (ii) a menu of tools to survey and describe biodiversity under an ecosystem-based approach; and (iii) design of a tool to evaluate weight and manage biodiversity information.

2. **Application, Assessment, and Validation of the BMS in Pilot Ecoregions (US$7,766,619 of which US$294,651 would come from the GEF)**

47. **Outcome.** As a result of this component, the BMS will be tested, adjusted, and validated by FB in five pilot ecoregions.

48. **Approach.** The pilot ecoregions have been selected according to the following criteria: (i) global importance; (ii) biodiversity information needs to improve environmental assessment; and (iii) opportunities to plan from the standpoint of existing interventions and ecoregion degradation. Piloting in ecoregions will consist of applying principles, methodologies, and criteria defined by the BMS in infrastructure works in each ecoregion. This will allow for testing of the BMS and identification of its weaknesses.

49. The heterogeneity of the pilot ecoregions selected (see Annex 8 for more details) will allow criteria responding to different conditions to be developed—related to both ecosystem features and threat intensity—in order to adequately address future challenges to biodiversity management. These pilots will provide insights into specific threats and the scope of influence of various types of infrastructure projects according to each type of biodiversity target and the suite of problems that need to be addressed by the BMS. The

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\(^{15}\) Metric methodologies will allow for the definition of spatial units of analysis, as well as criteria to value such units from an ecological perspective. Every spatial unit will attribute biological values from a list of criteria that can be grouped by representation, uniqueness, and continuity criteria. These include criteria for diversity at different scales, endemism, and condition. This will inform project decision making at the planning phase.

\(^{16}\) The BMS will operate at an ecosystem level, covering sub-levels as species, populations, etc. The BMS will be updated periodically and used as a monitoring tool throughout the life of an infrastructure investment and also as a decision making tool at the beginning of future infrastructure investments.
pilot experiences will serve as a laboratory where BMS capabilities will be assessed. Once the BMS is assessed, main findings regarding project design and its relationship to ecosystems and populations will be reported. The system will also identify necessary adjustments to improve biodiversity management related to infrastructure works.

50. **Outputs.** The following outputs will be achieved: (i) a biodiversity baseline in five pilot ecoregions will be defined and set up; (ii) typology of infrastructure biodiversity threats will be elaborated and identified in five pilot ecoregions; (iii) a BMS procedure will be elaborated with recommendations channeled toward biodiversity management in pilot ecoregions; (iv) a monitoring and follow up system in five pilot ecoregions will be designed; (v) the BMS will be piloted in the MOP Project cycle; (vi) the weaknesses and strengths of the BMS will be identified; (vii) the BMS will be adjusted to the specificity of each pilot ecoregion; (viii) outcomes from the pilot phase will be included in the BMS; and (ix) the BMS will be validated by participating agencies and the respective scientific or technical sector.

51. The BMS will be validated with experts through workshops and consultations. The results of this activity will be (i) the identification of the types and severity of existing infrastructure threats on different types of ecosystems and/or populations within an ecoregion; (ii) recommendations for the improvement of procedures to manage biodiversity; and (iii) documents on lessons learned.

52. Finally, inputs from the implementation of the pilots will be used to adjust the BMS according to on-the-ground realities and thus help to adequately internalize its practical application within the institution.

3. Internalization and Dissemination of the BMS in the Ministry of Public Works, the Advisory Council, and with Public and Private Stakeholders (US$283,733 of which US$186,757 would come from the GEF)

53. **Outcome.** This component will support the ownership and dissemination of the BMS. The main outcome will be the internalization of the BMS within the MOP and its dissemination among key institutions (such as MA and the Ministry of Agriculture) during implementation, including members of the Advisory and Consultative Councils. This component will be carried out by FB.

54. **Approach.** This component seeks to strengthen the capacity of the MOP and the key participating agencies and stakeholders in order to ensure the internalization of the proposed tools. Capacity building activities will operate in three levels (a) MOP, (b) the Project’s Advisory Council and (c) the Project’s Consultative Council.

55. **Outputs at the MOP level involve the following:** Outputs of this component will include (i) development of guidelines to manage biodiversity based on the BMS application. For this purpose, the revision and fine-tuning of procedures—in order to
incorporate the BMS inputs—will be proposed for the following instruments: the Environmental Management Manual; the Road Manual (the MOP’s guiding instrument that covers the bidding basis and conditions of road works, technical assistance hiring, and geometrical design techniques, among others); other guiding documents, such as instruction manuals and models; and other internal regulations; (ii) the offering of a training program, including six dissemination events on BMS within the MOP and targeting environmental officers. This program will be designed to include and standardize the criteria for addressing biodiversity in the development of plans throughout the life of infrastructure projects; and (iii) creation of an Internal Communication and Promotion Strategy to support the BMS internalization process.

56. Outputs at the Project’s Advisory Council level involve the following: The Advisory Council will strengthen coordination and integration of the BMS with other public organizations that have environmental roles and competencies. In order to support this process, the following outputs will be developed: (i) BMS dissemination seminars targeted to ministries and agencies within the Advisory Council and to other potential public and private BMS users; and (ii) an external Communication and Promotion Strategy to support the BMS internalization process.

57. Outputs at the Project’s Consultative Council level involve the following: A Consultative Council comprising representatives of international and local NGOs with a solid background in nature conservation, as well as relevant local scientists with recognized contributions to related fields, will be created as soon as the Project begins to operate. The following outputs will be developed to involve the Consultative Council in the BMS effort: (i) BMS dissemination seminars targeted at civil society representatives; and (ii) an external Communication and Promotion Strategy to support the BMS internalization process.

4. Project Technical and Administrative Management (US$630,884 of which US$89,936 would come from the GEF)

58. Component 4 provides the necessary technical and fiduciary support elements to ensure efficient execution of the Project through administration, monitoring, evaluation, and coordination. The executing unit will be cofinanced by the GEF, with support from the ongoing IBRD project (Institutional Strengthening of the Ministry of Public Works Loan No. IBRD-74580). The Project Coordinator will carry out the implementation of the Project as well as the Monitoring and Evaluation Plan. FB will be in charge of this component.

C) SUSTAINABILITY

59. Successful internalization of the BMS by the MOP would secure sustainability beyond the Project implementation period through its integration into the broader framework of the ISP. Internalization will involve the assignment of a specific budget to update and maintain the BMS after the GEF project completion phase.
60. In addition, and as mentioned before, this Project is linked to an IBRD-financed TAL (Institutional Strengthening of the Ministry of Public Works Loan No. IBRD – 74580), which aims, inter alia, to develop an integrated project management process for the MOP’s infrastructure works. Environmental assessments are part of this integrated management, and the BMS developed under the Project will contribute directly to this requirement as a potentially mandatory tool to be used during project preparation.

61. Furthermore, the role of the Advisory Council in strengthening coordination and integration of the BMS with other public organizations will contribute to supporting this initiative.

D) Replicability

62. The expected lessons learned and the system to be designed will facilitate replication in other types of infrastructure plans and projects in other ecoregions as well as within other sectors (for example those that have similar environmental impacts, including sectors such as mining, housing, and hydroelectricity), both at a national and possibly a regional or international level.

E) Stakeholder Involvement

63. A number of potential stakeholders involved with policy development and biodiversity conservation were invited to meetings held at the Secretariat of Environment and Territory (SEMAT). During these meetings, the Project was explained to participants focusing on the following topics: background, justification, purpose and objectives, ecosystem approach, ecoregional management, and the internalization and dissemination of the BMS.

64. A specific meeting was convened with NGOs in October 2010. During this meeting, the following main issues were raised and responses were provided by the MOP and Fundación Biodiversa: (i) coastal-marine biodiversity in the Project scope was left out of the Project in the early stages given that marine biodiversity has a different behavioral dynamic compared to terrestrial biodiversity and requires specific knowledge; (ii) National Public Assets are relevant to the Project and will be analyzed together with other ecoregional attributes; (iii) Incorporation of the Ministry of National Assets (Ministerio de Bienes Nacionales) into the Advisory Council will be considered given that it would have no attribution at administrative and legal levels, or in technical teams in the field; (iii) Incorporation of the Ministry of Housing and Urban Development into the Consultative Council will be considered by the MOP; and (iv) In the meeting, the MOP and Fundación Biodiversa jointly reported on the status of project preparation.

65. Stakeholder participation is planned during the implementation phase to generate a sense of ownership and commitment to the Project in order to optimize the

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17 The Ministry of National Public Assets is in charge of protected areas, indigenous land, and patrimonial routes (ancient or touristic routes).
effectiveness of the components and the impact of the actions taken. The Nature Conservancy (NGO), Terram (NGO), SIRAP (GEF Project), and MA are considered key stakeholders, and it is expected that their experience and knowledge on biodiversity conservation will contribute to implementation and supervision of the Project activities.

66. Most of the stakeholders involved in national policies on natural resources management were convened in the preparatory stages of the proposed Project and showed interest in it.

F) MONITORING AND EVALUATION

67. Monitoring and evaluation (M&E) is designed to measure progress in achieving the impacts and outcomes established in the Project’s objective and in relation to the GEF Strategic Objective 2 and related policy programs.

68. The M&E plan will assess (i) how the Project results will contribute to mainstreaming biodiversity management under an ecoregional approach in the MOP decision-making system, and (ii) the degree to which the MOP’s Internal Standard Operating Procedures (ISOP) incorporate biodiversity considerations. M&E will be conducted by the Project Coordinator (PC) and supported by the Project Advisory Council and the Project Consultative Council. The Project Results Framework in Annex A provides detailed outcome indicators, target values, and sources of verification.

Project Reporting

69. The M&E plan for the Project includes semi-annual progress reports and mid-term and final evaluations. These evaluations will be conducted by independent external consultants.

70. The day-to-day monitoring of implementation progress will be the responsibility of the PC, who may be assisted by external consultants. The PC will work in close collaboration with the MOP, Fundación Biodiversa (FB), and the Advisory Council (AC). The Advisory Council will be composed of representatives of the regulatory institutions responsible for overseeing infrastructure projects within the Environmental Impact Assessment System (Sistema de Evaluación de Impacto Ambiental, SEIA). The Council will provide continuous guidance to the Project. The PC will also seek advice from the Consultative Council comprised of experts from academia and representatives from environmental NGOs in Chile.

71. The PC will be responsible for the preparation and submission to the MOP and FB of the following monitoring reports:

- Semi-annual reports outlining main updates in Project progress towards outcome achievements; and
- A Project Completion Report summarizing all Project activities, achievements, and outputs, and analyzing outcomes, lessons learned, objectives met or not met
and why, structures and systems implemented, etc. It will also include recommendations to facilitate replicability and scaling up.

_External Evaluations_

72. The M&E plan includes a mid-term and a final evaluation. The mid-term evaluation will determine progress toward outcomes and may identify courses of correction. It will focus on effectiveness, efficiency, and timeliness in Project implementation and will highlight issues requiring special attention and decisions. Recommendations from the mid-term evaluation will guide the second half of the Project’s term. An independent final evaluation will be carried out at the end of Project implementation to prepare the final report, focusing on delivery of Project results as planned (or as corrected by the mid-term review) and on the Project’s biodiversity conservation impact. This will include the success achieved with the mainstreaming of biodiversity considerations as measured by the indicators. The final evaluation will also provide recommendations for follow-up activities. The terms of reference for the mid-term and final evaluations will be prepared by the PC in consultation with the MOP and FB.

_Auditing_

73. The PC will engage the services of an independent auditor to provide certified annual audits of the financial statements relating to the Project, following World Bank guidelines and standards.

_M&E Budget_

74. Table 4 summarizes the monitoring activities, responsible parties, budget, and time frames for the Project. Only activities to be funded directly by GEF sources are listed in the table.
<table>
<thead>
<tr>
<th>M&amp;E Activity</th>
<th>Responsible Parties</th>
<th>Budget US$</th>
<th>Time frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inception Workshop</td>
<td>Project Coordinator and Project Steering Committee (PSC)</td>
<td>To be covered under Project management costs</td>
<td>Within the first two months</td>
</tr>
<tr>
<td>Inception Report</td>
<td>PC</td>
<td>To be covered under Project management costs</td>
<td>Immediately following Inception Workshop</td>
</tr>
<tr>
<td>Measurement of Means of Verification for Project Progress and Performance</td>
<td>PC</td>
<td>TBD as part of the Annual Work Plan</td>
<td>Annually prior to APR/PIR* and definition of annual work plans</td>
</tr>
<tr>
<td>Semi-annual Progress Report and Grant Monitoring Report</td>
<td>PC and PSC, WB</td>
<td>To be covered under Project management costs</td>
<td>Semi-annual, WB annually</td>
</tr>
<tr>
<td>Steering Committee meetings</td>
<td>PC</td>
<td>To be covered under Project management costs</td>
<td>Following Inception Workshop and monthly thereafter</td>
</tr>
<tr>
<td>Advisory and Consultative Committees meetings</td>
<td>PC, AC, and CM</td>
<td>17,050</td>
<td>Following Inception Workshop and bi-annually thereafter</td>
</tr>
<tr>
<td>Technical reports</td>
<td>Hired consultants</td>
<td>16,000</td>
<td>As required</td>
</tr>
<tr>
<td>Mid-term evaluation</td>
<td>PC, PSC</td>
<td>To be covered under Project management costs</td>
<td>At the mid-point of Project implementation</td>
</tr>
<tr>
<td>Final Evaluation and Report</td>
<td>PC, PSC</td>
<td>To be covered under Project management costs</td>
<td>At the end of Project implementation</td>
</tr>
<tr>
<td>Annual Audit of financial statements</td>
<td>Commercial auditor, PMU</td>
<td>4,800</td>
<td>Every year during the implementation of the Project</td>
</tr>
<tr>
<td>Visits to pilot ecoregions</td>
<td>PC, consultants</td>
<td>To be covered under travel budget</td>
<td>At least one visit per year during Project implementation</td>
</tr>
<tr>
<td><strong>TOTAL INDICATIVE COST</strong></td>
<td></td>
<td><strong>37,850</strong></td>
<td></td>
</tr>
</tbody>
</table>

*(Excludes Project staff time and World Bank staff time)*

*APR/PIR: Annual Project Report/Project Implementation Review*
3. Financing

A) Project Costs

Project costs by component are described in Table 5.

<table>
<thead>
<tr>
<th>Project Components</th>
<th>GEF Financing</th>
<th>Co-Financing</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Design of a Biodiversity Management System (BMS)</td>
<td>337,746</td>
<td>1,082,240</td>
<td>1,419,986</td>
</tr>
<tr>
<td>2. Application, Assessment, and Validation of the BMS in Pilot Ecoregions</td>
<td>294,651</td>
<td>7,471,968</td>
<td>7,766,619</td>
</tr>
<tr>
<td>3. Internalization and Dissemination of the BMS in the Ministry of Public Works, its Advisory Council, and with Public and Private Stakeholders</td>
<td>186,757</td>
<td>96,976</td>
<td>283,733</td>
</tr>
<tr>
<td>4. Project Technical and Administrative Management</td>
<td>89,936</td>
<td>540,948</td>
<td>630,884</td>
</tr>
<tr>
<td>TOTAL</td>
<td>909,090</td>
<td>9,192,132</td>
<td>10,101,222</td>
</tr>
</tbody>
</table>

B) Project Management Budget/Cost

Project management costs are described in Table 6.

<table>
<thead>
<tr>
<th>Project Management Costs</th>
<th>Indicative GEF Financing</th>
<th>Indicative Co-financing</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>($ a) %</td>
<td>($ b) %</td>
<td>c =a + b</td>
</tr>
<tr>
<td>TOTAL</td>
<td>89,936 14.3</td>
<td>540,948 85.7</td>
<td>630,884</td>
</tr>
</tbody>
</table>

C) Consultants Working for Technical Assistance Component

Consultants involved in technical assistance work are described in Table 7.
Table 7: Local and international consultants for technical assistance

<table>
<thead>
<tr>
<th>For Technical Assistance</th>
<th>US$/ person week*</th>
<th>Estimated person weeks**</th>
<th>Tasks to be performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity Technical Coordinator</td>
<td>1,577</td>
<td>80</td>
<td>Deliver results and manage funds aligned with the work plans approved by the PSC; provide technical support and coordinate Project’s work plan in order to achieve outputs established for Project components; Maintain collaborative working relationships among Project consultants, coordinate consultant work activities; ensure timely preparation and submission of annual/semi-annual reports to the Bank; report to the PSC about work plan implementation; lead recruitment process for consultants and service providers; manage consultant activities, NGOs, and other stakeholders; communicate with local and national authorities on matters pertaining to activities described in the Project document; analyze and evaluate results of activities; document and solve issues during Project implementation; support effective PSC functioning; and advise all Project counterparts on applicable administrative procedures and ensure their proper implementation.</td>
</tr>
</tbody>
</table>
| Biodiversity Senior Specialist (Flora) | 1,577 | 34 | Provide technical support to the following activities:  
(i) **BMS design:** Define the territorial units of analysis, variables and territorial data units; develop an index to assess biodiversity management; generate a methodology to assess ecoregional threats; define areas of influence; establish principles, methodologies, and strategies for decision making on infrastructure design; develop a biodiversity information system; and test and validate the system.  
(ii) **BMS application:** Identify potential threats in priority ecoregions; adjust the BMS to the specificity of priority ecoregions; and evaluate and adjust the BMS.  
(iii) **BMS internalization:** Support the design and implementation of the training program. |
| Biodiversity Senior Specialist (Fauna) | 1,577 | 20 | Provide technical support to the following activities:  
  
a. **BMS design:** Define territorial units of analysis, variables, and territorial data units; develop an index to assess biodiversity management; generate a methodology to assess ecoregional threats; define areas of influence; establish principles, methodologies, and strategies for decision making on infrastructure design, develop a biodiversity information system; and test and validate the system.  
b. **BMS application:** Identify potential threats in priority ecoregions; adjust the BMS to the specificity of priority ecoregions; and evaluate and adjust the BMS.  
c. **BMS internalization:** Support the design and implementation of the training program. |
Support Component 3: Design and implement a training program, workshops, and seminars on the BMS within the MOP; and report on the quality of the events and obtain feedback from participants.

Support Component 3: Lead the internalization processes.

Provide technical support to integration of GIS biodiversity information into the BMS; facilitate the BMS design; facilitate information integration; and identify weaknesses and propose solutions.

Support information system management propose a methodology for gathering and processing information; design an information system for biodiversity; propose logical design; and ensure validation and implementation of the system.

Support landscape ecology and conservation biology aspects of the BMS design; and validate information and participate in meetings of the Consultative Council.

Support the internalization component; lead the communication strategy within and outside the MOP; carry out internal communications; and support the production of training materials.

Advise independent annual audits of the Project financial statements.

* Provide dollar rate per person week. **Total person weeks needed to carry out the tasks.

D) CO-FINANCING SOURCES

<table>
<thead>
<tr>
<th>Name of Co-financier (source)</th>
<th>Classification</th>
<th>Type</th>
<th>Project</th>
<th>Percent*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Public Works</td>
<td>National Government</td>
<td>In-kind</td>
<td>8,122,200</td>
<td>88.36</td>
</tr>
<tr>
<td>GEF Agency(-ies) (IBRD)</td>
<td>Multilateral Agency</td>
<td>Soft loan</td>
<td>1,032,000</td>
<td>11.23</td>
</tr>
<tr>
<td>Fundación Biodiversa (FB)</td>
<td>NGO</td>
<td>In-kind</td>
<td>37,932</td>
<td>0.41</td>
</tr>
<tr>
<td>Total Co-financing</td>
<td></td>
<td></td>
<td>B 9,192,132</td>
<td>100</td>
</tr>
</tbody>
</table>

E) COST-EFFECTIVENESS

75. The proposed Project represents the most cost-effective option. This is primarily because it will be integrated into a context of ongoing reform and institutional
strengthening that is defined by two World Bank loans (IBRD Technical Assistance Loan) which aim to improve the efficiency of the MOP’s direct investment and concession programs. In particular, one of the critical points of collaboration is the strengthening of the infrastructure planning systems, the specific component of the TAL into which this Project is integrated. These activities represent a favorable framework and a unique opportunity to include a focus on biodiversity in the planning and management of infrastructure works. In addition, they will ensure quick adoption of the new approaches, given that the reform process is strongly supported by various levels of the MOP management.

76. The most expensive and least efficient option would have been a separate operation with different timing, which would have required independent development of specific components to include a biodiversity protection approach in infrastructure works. The development of the BMS for priority ecoregions will produce valuable information for conservation planning beyond integration of a biodiversity approach into infrastructure planning, since such information will be key for other institutions working to mainstream a holistic ecosystem vision into their own work (for example, parts of the Project’s Advisory Council\(^{18}\)). Therefore, cost-effectiveness will be achieved not only by the Project’s integration into the infrastructure reform process initiated by the loan operation, but also through support for continued biodiversity benefits via application of the BMS and facilitation of biodiversity mainstreaming into other sectors.

4. INSTITUTIONAL COORDINATION AND SUPPORT

A) CORE COMMITMENTS AND LINKAGES

77. The GEF Project components will complement and be integrated into the ISP that the MOP is developing jointly with the World Bank. This is a US$11.7 million TAL to assist the MOP’s modernization process. This Project includes development of both the “Planning” and the “Integrated Management of Projects” components. Their implementation will include this GEF Project integrating the information generated regarding biodiversity value as Territorial Information System (TIS) layers. The TIS is currently under development as a part of the ISP, which will allow inclusion of all territorial information into the management of the MOP’s plans and projects. The BMs will produce additional layers to the TIS. These layers will be directly linked to the TIS. It will also closely coordinate its own institutional capacity-building and internalization activities with training activities of the ISP in order to ensure that the products of these projects become part of the new systems and procedures created by the “Planning” and the “Integrated Management of Projects” components. Coordination between the GEF Project and the TAL will be carried out through collaboration allowing biodiversity information to be integrated into the TIS. The BMS information system will be designed

\(^{18}\) The Advisory Council will be composed of representatives of the regulatory institutions responsible for overseeing infrastructure projects within the Environmental Impact Assessment System (\textit{Sistema de Evaluación de Impacto Ambiental}, SEIA). The Advisory Council will provide continuous guidance to the Project.
as a part of the TIS and nested into it. Formal coordination meetings between the TAL and the GEF Project will be carried out periodically to ensure alignment and to exchange information and experience. Since this Project entails a profound procedural change for the MOP, close integration with the TAL becomes extremely relevant and will be closely followed. The planning component contributes to the counterpart budget committed by the MOP, through a contribution of US$40,000 for training activities, plus a contribution of about US$1,000,000 representing a part of the TIS’s development and equipment costs.

78. The proposed Project will be linked and coordinated with two full-sized GEF Projects executed by MA. The first is the Design of an Institutional Framework and a Comprehensive System of Marine and Terrestrial Protected Areas, both Private and Public, implemented by the UNDP. The link between the two will be established via the Advisory Council and its contribution to technical discussions for implementing the Project’s capacity-building component and the methodologies for estimating the biodiversity value of each territory. The MOP Project will sign a Memorandum of Understanding (MOU) with the UNDP’s Project to ensure coordination. Formal coordination will be carried out through periodic technical meetings to exchange information and experiences or lessons learned. Bilateral meetings and day-to-day communications will also be carried out to ensure full integration and coordination.

79. The Regional Protected Area System for the Conservation and Sustainable Use of the Valdivian Temperate Rainforest Project is implemented by the UNDP. The criteria and methodologies to be developed in the proposed MSP will be considered in the protected areas that this UNDP Project seeks to design and implement in Los Ríos and Los Lagos regions. The MOP Project will sign an MOU with this Project to ensure coordination. Formal coordination will be carried out through periodic technical meetings to exchange information and experiences or lessons learned. Bilateral meetings and day-to-day communications will also be carried out to ensure full integration and coordination.

B) PROJECT IMPLEMENTATION ARRANGEMENT

80. Fundación Biodiversa (FB) will be responsible for Project implementation. It will set up a Project Steering Committee (PSC), in which the Ministry of Public Works will be the Project Executing Agency and FB will be the Executing Partner. The Secretariat of Environment (SA) under the MOP is the focal point for the Project and it has the institutional mandate to lead environmental issues in the MOP. The FB will also be in charge of procurement and financial management (FM) activities, comprising budgeting, accounting, and reporting, and including the preparation of Interim Unaudited Financial Reports (IUFREs), provision of internal control, and handling of the disbursements and the external audit process under the MOP’s supervision. For the purposes of carrying out the Project, the MOP shall enter into an agreement with FB under terms and conditions satisfactory to the World Bank to guide Project co-execution, which shall include, inter alia, the obligation of the MOP to promptly provide the funds, facilities, services, and other resources required by FB to assist in the Project implementation.
81. The Advisory Council will consist of the Ministry of Environment (MA), the Livestock and Agriculture Service (Servicio Agrícola y Ganadero, SAG), the Water Directorate (DGA), and the National Forestry Corporation (CONAF), all of which are government agencies with responsibility for natural resources and biodiversity management. They will be key collaborators in ensuring the Project and its results adhere to relevant procedures, regulations, and public policies.

82. Furthermore, the Project will have a Consultative Council including representatives of international and local NGOs with solid background in biodiversity management and nature conservation, as well as relevant local scientists with recognized contributions in related fields.

83. On behalf of the Recipient, the MOP will be responsible for the following tasks:

- Convene and lead the Advisory Council;
- Be responsible for and supervise activities delegated to the Executing Partner (FB) during Project implementation;
- Provide guidance on and fine-tune the mainstreaming process within the MOP once the BMS is designed and ready to be applied;
- Guide the dissemination process;
- Convene and provide logistical support for validation, dissemination, and mainstreaming of activities (including workshops, consultations, etc.);
- Verify the execution of all the activities included in the Project;
- Approve all products related to the BMS and its manuals; and
- Verify the adequate achievement of products and give final approval for consultancy payments.

84. As Executing Partner, FB will carry out the following tasks:

- Assist the MOP in the carrying out of the Project with due diligence and efficiency and in accordance with sound technical, economic, financial, managerial standards and practices satisfactory to the World Bank;
- Assist the MOP in the carrying out of the Project in accordance with the Anti-Corruption Guidelines;
- Use the Grant funds in accordance with the terms and conditions of this Agreement, and in conformity with administrative, technical, financial, procurement, auditing, participatory and legal standards and practices;
- Provide technical support for Project activities in accordance with indicators and criteria defined in the OM;
- Prepare terms of reference for the audits under terms and scope acceptable to the World Bank;
- Recruit a fiduciary assistant and appoint auditors acceptable to the World Bank;
- Take all actions necessary to enable the MOP to comply with its obligations under this Agreement.
Enable the World Bank under the Subsidiary Agreement to inspect the activities carried out, their operation and any relevant records and documents; and

Furnish all such information as the Recipient, the MOP or the World Bank shall reasonably request.

Participate in the Advisory Council and Consultative Meetings.

85. The Advisory Council and the Consultative Council will be convened by the Executing Agency to act as advisory bodies for the Project.

86. A **Project Coordinator** will provide day-to-day leadership coordination and administration of the Project. The PC will be physically located within FB and liaise and work closely with all interested stakeholders, as well as link the Project with other relevant activities. The PC will:

- Manage implementation of all Project activities, including preparation and updates of Project work and budget plans, record keeping, accounting and reporting; preparation of TOR, technical specifications, and other documents as necessary; selection of Project consultants, coordination and supervision of consultants and suppliers, workshops, consultations, public outreach and other events and arrangements, including travel;
- Prepare the annual work plan and budget at the beginning of each calendar year;
- Produce quarterly operational reports and Annual Progress Reports that will summarize progress made by the Project against expected results, explain any significant differences, detail necessary adjustments, and be the main reporting mechanism for monitoring Project activities; and
- Prepare all the reporting documents required by the World Bank, including semi-annual progress reports, interim un-audited financial reports, independent audits of financial statements, procurement reviews, etc.
Annex 1. Incremental Cost Analysis

Baseline

1. Without the GEF contribution, the Chilean Government would continue to apply assessment and mitigation measures on a project-by-project basis only after the planning and design phases, always using slightly different criteria, and lacking any territorial planning that considers biodiversity criteria. There would be no guidelines and methodologies to allow for the analysis of these measures in a systematic way within the institution and from an ecosystem perspective, thus reducing the effectiveness of protection, mitigation, restoration, and/or compensation actions. In the baseline scenario, each project would have its own budget for biodiversity protection activities (both planned and those that would arise during project implementation) that would be executed according to the MOP’s traditional approach. It should be highlighted that the proposed GEF funding will allow for the mainstreaming of biodiversity considerations in activities corresponding to 12 percent of the Chilean GNP.

2. Without input from the GEF, the expected loss in global environmental benefits would be significant in terms of both degraded and pristine ecoregions. On one hand, Chilean Matorral and the Valdivian Temperate Forest still have important percentages of endemism in global terms and are listed as hotspots although their conservation status is highly threatened. On the other hand, and given that infrastructure development is the human activity that most influences biological systems, pristine ecoregions such as the Magellanic Subpolar Forests are at great risk in light of the Chilean Government’s plans to expand the road network in the area in order to foster tourism activities in the coming years. Infrastructure development in pristine ecoregions needs to be carefully planned.

3. In sum, without a GEF investment, the likely scenario would be the following:
   - Biodiversity of global importance in Chile would continue to deteriorate as a consequence of infrastructure development.
     - Chilean Matorral and the Valdivian Temperate Forests ecoregions (both containing remarkable levels of endemism and already heavily converted and affected by human activities) would continue to suffer direct and induced effects of infrastructure projects on biodiversity.
     - Ecoregions with fewer interventions so far, such as the Atacama Desert, the Central Andean Dry Puna, the Southern Andean Steppe and especially the Magellanic Subpolar Forests ecoregion, one of the most pristine in the world, would continue to deteriorate at an exponential rate owing to national plans to expand road networks.
   - Furthermore, the MOP management model would lack timely biodiversity information and would not consider biodiversity at the planning phase, but instead evaluate projects in isolation and provide weak mitigation and compensation measures that do not provide necessary biodiversity benefits.
Finally, the MOP would have limited technical capacity to address biodiversity conservation matters.

**GEF Alternative**

4. The incremental contribution of the proposed GEF Project arises from the identification of new biodiversity information and management instruments as well as institutional strengthening and incorporation of an ecosystem vision as a part of the Project. These opportunities and instruments will allow the MOP to plan using a new approach to identifying valuable information that allows them to manage biodiversity and design works as part of a broader planning system that is ecosystem-based. The BMS to be developed by this Project will be integrated into the Ministry’s planning system, which will be derived from the ongoing Institutional Strengthening Program (World Bank TAL), thereby allowing the MOP to develop and implement an instrument to assess the biodiversity impacts of their projects and plans that will act prior to the EIAS. This is a key change proposed by the Project as it will enable the MOP to incorporate this variable earlier in project planning and under an approach that is coherent with the functioning and biodiversity value of Chile’s main ecological regions. The incremental outcomes of this Project include (i) the removal of barriers to mainstreaming biodiversity, and (ii) the creation of institutional capacities and establishment of a working framework to integrate biodiversity management into infrastructure development activities. Regarding the pilot ecoregions, the incremental contribution will be reflected in the use of an ecosystem-based approach and methodology to assess biodiversity management that will be based on new field knowledge at the ecoregion level. This approach will be applied to new projects and will allow for improved biodiversity management in future infrastructure works. In addition, the pilot value of this Project will stand as an example to other sectors with a role in biodiversity management in Chile.

5. The GEF intervention will contribute directly to decreasing the loss rate of biodiversity of global importance by achieving the following:

- Establishing a working framework for integrating biodiversity conservation into infrastructure development activities (indicator: the BMS and procedure manuals designed).

- Creating institutional capacities within the MOP, the most relevant public agency in charge of infrastructure development in Chile (indicator: a BMS training program designed, launched, and carried out).

- Providing timely biodiversity information for infrastructure-related decision making before the design and planning phases (indicator: the BMS available and tested).

- Developing a robust and ecosystem-based tool to value biodiversity and a protocol to incorporate this information into project design and planning (indicator: number of hectares valued through the BMS).

- Integrating the BMS fully into the MOP’s Technical Information System and project management protocols (indicator: the BMS inserted into the TIS).
• Training the MOP officers in a new approach to project design and management (indicator: number of MOP employees trained).

6. The total cost of the project, including co-funding and GEF funds, amounts to US$ 10,101,222. Of this total, co-funding constitutes 91% or US$ 9,192,132. GEF financing comprises the remaining 9% of the total, or US$ 909,090.
## Annex 2. Results Framework Matrix

<table>
<thead>
<tr>
<th>Project Strategy</th>
<th>Objective verifiable indicators</th>
<th>Sources of verification</th>
<th>Risks and assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GEO</strong></td>
<td><em>To conserve biodiversity of global importance in Chilean key ecoregions through development and application of a model for mainstreaming biodiversity considerations into infrastructure decision making.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PDO</strong></td>
<td>To assist the Chilean Government with its biodiversity conservation efforts in key ecoregions through a Biodiversity Management System (BMS) applied to the planning, design, construction, and operation of infrastructure works</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Degree to which ISOP includes measures to conserve biodiversity</td>
<td>No ISOP to evaluate biodiversity in terms of new projects within the MOP</td>
<td>The MOP and ISOP documents; GEF Tracking Tool</td>
</tr>
<tr>
<td></td>
<td>BMS integrated into the MOP’s decision making</td>
<td>No system available in the MOP</td>
<td>At least 25 million hectares valued through the BMS by the end of the Project&lt;br&gt;&lt;br&gt;The BMS developed, tested, and integrated into the MOP’s decision-making system</td>
</tr>
<tr>
<td><strong>Outcome 1</strong>&lt;br&gt;<strong>An ecosystem-based BMS developed as an integrated MOP tool</strong></td>
<td>An index designed to value biodiversity in priority ecoregions with relevant MOP projects</td>
<td>No index developed</td>
<td>Project reports</td>
</tr>
<tr>
<td>Outcome 2</td>
<td>BMS fine-tuned in five priority ecoregions and mainstreamed in the MOP project cycle on a pilot basis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An index designed to value threats in priority ecoregions</td>
<td>No index available</td>
<td>An index developed</td>
<td>Project reports</td>
</tr>
<tr>
<td>An analysis model designed for the BMS</td>
<td>No model available</td>
<td>A model developed</td>
<td>Project reports</td>
</tr>
<tr>
<td>A BMS designed to produce valuable biological information</td>
<td>No system in place</td>
<td>System designed, pretested, and ready to use</td>
<td>Project reports</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Lack of interest among the MOP staff in cooperating with the development and testing of the BMS</td>
</tr>
</tbody>
</table>

<p>| General biodiversity valuation criteria fine-tuned | No criteria available | Valuation criteria identified and fine-tuned by experts | Workshop results; Project reports |
| Ecoregion-specific biodiversity valuation criteria identified | No criteria identified | Criteria identified | Project reports |
| Ecoregion-specific threat valuation and biodiversity criteria calibrated | No criteria available; no calibration done | The criteria calibrated | Project reports |
| BMS application experiences documented | No experience to document | Documentation of experiences carried out | Project reports |</p>
<table>
<thead>
<tr>
<th>Number of recommendations to key institutions responsible for biodiversity management to prevent an increase in the vulnerability of habitats and species in priority ecoregions</th>
<th>No recommendations</th>
<th>Written recommendation(s) produced and delivered according to the BMS procedures for each ecoregion.</th>
<th>BMS results</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS weaknesses and strengths identified</td>
<td>No BMS in place; no weaknesses and strengths identified</td>
<td>Weaknesses and strengths identified</td>
<td>Project reports</td>
</tr>
<tr>
<td><strong>Outcome 3</strong> The BMS validated by participating agencies and the related scientific/technical sector.</td>
<td>Technical report prepared by participating agencies and the related scientific/technical sector endorsing the validation.</td>
<td>No BMS in place.</td>
<td>The BMS validated by all stakeholders involved</td>
</tr>
<tr>
<td><strong>Outcome 4</strong> The BMS internalized by the MOP, the Project’s</td>
<td>Number of manuals on best practices produced</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Advisory and Consultative Councils, and disseminated among key institutions</td>
<td>Number of manuals on best practices made official by the MOP</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Risks</td>
<td>Manuals are produced but not used</td>
<td>Lack of interest in applying the BMS by the MOP staff</td>
<td></td>
</tr>
<tr>
<td>Number of BMS training events offered within the MOP</td>
<td>0</td>
<td>3</td>
<td>Project reports</td>
</tr>
<tr>
<td>Percentage of the MOP officers who participate in infrastructure design trained in the BMS application</td>
<td>0</td>
<td>65</td>
<td>Training reports with participants’ attendance and feedback</td>
</tr>
<tr>
<td>Assumptions</td>
<td>Decision makers fully accept and support application of the BMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of BMS Seminars conducted to disseminate the BMS among public sector employees and agencies within the Project’s Advisory and Consultative Councils.</td>
<td>0</td>
<td>3</td>
<td>Workshop reports with participants’ attendance and feedback</td>
</tr>
<tr>
<td>Risks</td>
<td>Lack of interest in applying the BMS by other institutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of decision makers (national authorities within member agencies of the Project’s Advisory Council) acquainted with BMS</td>
<td>0</td>
<td>10</td>
<td>Project reports</td>
</tr>
<tr>
<td>Number of dissemination seminars for the main players and Ministries not included in the Project’s Advisory and Consultative Council through participation in four consultative meeting.</td>
<td>0</td>
<td>6</td>
<td>Seminar reports with participants’ attendance and feedback</td>
</tr>
<tr>
<td>Number of scientists and civil society representatives acquainted with the BMS</td>
<td>0</td>
<td>10</td>
<td>Assumptions - Scientists and civil society representatives are genuinely interested in the BMS design and its validation process</td>
</tr>
</tbody>
</table>

(*) The BMS will provide biodiversity information to case studies but will not be tested on infrastructure works.
Annex 3. Project Management Structure

The following diagram describes the basic management structure proposed for the Project.

1. The MOP and Fundación Biodiversa (FB) are responsible for Project implementation. For that purpose, the MOP shall enter into an agreement with FB, under terms and conditions satisfactory to the World Bank, which shall include inter alia: (i) the obligation of the MOP to promptly provide the funds, facilities, services and other resources required by Fundacion Biodiversa to assist in the implementation the Project; and (ii) the obligation of Fundacion Biodiversa to comply with specific actions as previously defined in the Project Brief.

2. The MOP and FB will set up a Project Steering Committee (PSC). The Ministry of Public Works will be the Project Executing Agency and FB will be the Executing Partner. The Secretariat of Environment (SA) under the MOP is the focal point for the Project, and it has the institutional mandate to lead environmental issues in the MOP. The SA jointly with FB will lead the technical aspects of the Project and will be in charge of the overall Project implementation.

3. The Advisory Council will consist of the Ministry of Environment (MA), the Livestock and Agriculture Service (Servicio Agrícola y Ganadero, SAG), the Water Directorate (DGA), and the National Forestry Corporation (CONAF), all of which are
government agencies with responsibility for natural resources and biodiversity management. They will be key collaborators in ensuring the Project and its results adhere to relevant procedures, regulations, and public policies.

4. The Project will have a **Consultative Council** including representatives of international and local NGOs with solid background in biodiversity management and nature conservation, as well as relevant local scientists with recognized contributions in related fields.
Annex 4. Brief Description of the Project Executing Agency

1. The Ministry of Public Works (MOP) and Fundación Biodiversa (FB) are responsible for Project implementation. For this purpose, the MOP shall enter into an agreement with Fundación Biodiversa, who will execute the Project. In this context, they will set up a Project Steering Committee (PSC). The Ministry of Public Works will be the Project Executing Agency and FB will be the Executing Partner.

Ministry of Public Works

2. The MOP is in charge of design, construction, expansion, rehabilitation, maintenance, and operation of public works under its jurisdiction including roads, highways, bridges, tunnels, airports, airfields, irrigation dams, river defenses, rainwater collectors, rural water and coastline infrastructure, etc. It is also responsible for compliance with the national Concessions Law and the Water Code. In this context, the MOP provides the framework for the “management, distribution, use and conservation” of water resources within the country. The MOP reports directly to the President of Chile.

3. The MOP was first created by law on June 21, 1887 under President José Manuel Balmaceda as the Ministry of Industry and Public Works. Since then, it has undergone several reorganizations. At present, the MOP carries out its activities through a Secretariat and two General Directorates. The main function of the General Directorate of Water is implementation of the Water Code, and the General Directorate of Public Works is in charge of technical management of infrastructure. The MOP is territorially decentralized; there is a Regional Ministerial Secretariat in each of the fifteen regions of the country, which are in turn managed by Regional Offices. At present, more than 8,700 people work for the MOP.

4. The General Directorate of Public Works has six executive units: (i) Coordination of Public Works Concession; (ii) Airport Authority; (iii) Department of Architecture; (iv) Directorate of Water Works; (v) Port Works Department; and (vi) Highway Authority. Furthermore, there are three non-executing units: (i) Directorate of Accounting and Finance; (ii) Planning Directorate; and (iii) Attorney.

5. The Strategic Alignments of the MOP are the following:
   - Promoting economic development through infrastructure with territorial vision integrated;
   - Promoting social and cultural development through infrastructure to improve the people’s quality of life;
   - Contributing to sustainable management in terms of environment, water resources, and ecosystems; and
   - Achieving an acceptable level of efficiency in the use of resources.

Fundación Biodiversa
6. Fundación Biodiversa (FB) is a non-profit organization. Its purpose is to support, strengthen, and create initiatives aimed at conservation and sustainable use of biodiversity. FB carries out its activities by supporting local organizations and public and private organisms to create management models and information in order to facilitate decision-making processes for the protection of ecological heritage.

7. The main work areas of FB are as follows:

- Biodiversity: Generation and systematization of information for biodiversity management, and consultancies for design, investment, and management of initiatives for Biodiversity Conservation.
- Public policy for natural resource management: Technical assistance to public organisms to design or implement actions related to natural resources management and biodiversity, and technical assistance to NGOs, academic working groups, and similar entities to facilitate their contributions to improve public natural resources and biodiversity management.
- Participatory management of biodiversity: Promotion of initiatives for participatory community processes in biodiversity management and development of participatory management initiatives regarding natural resource conservation and the sustainable use of biodiversity.
Annex 5. Financial Management and Disbursement Arrangements

A. General

1. A simplified financial management assessment was conducted to the proposed implementing entity in accordance with OP/BP 10.02; the Financial Management Manual for World Bank-Financed Investment Operations of March 2010 and the Information Kit Supplement for GEF Medium-Sized Projects of April 2010. The assessment was performed from October 7 to 8, 2010 and updated on February 15-17, 2012 through a desk review and virtual communications with the entity staff. The purpose of this assessment was to determine MOP’s and Fundación Biodiversa’s capacity to properly manage and account for all project proceeds and to produce timely accurate and reliable financial statements for Bank special purposes.

2. On the basis of the assessment performed and the project design, financial management arrangements are not envisaged to be complex, but will need to be strengthened and clearly defined mainly as it relates to the coordination between MOP and FB. Based on project design and current arrangements, FM’s inherent and control risk is considered modest. The risk analysis is mainly based on project features; interaction required with several actors; Fundación Biodiversa’s lack of previous experience with fiduciary requirements of the Bank; dependence on external accounting services, and lack of documented administrative procedures. In this regard, an action plan has been prepared and Fundación Biodiversa in coordination with MOP will have to complete it in accordance with deadlines. Considering the above mentioned, the FM team concludes that proposed financial management arrangements are acceptable to the Bank subject to completion of the action plan, which mainly refers to the need for: (i) a Subsidy Agreement between MOP and FB that includes roles and responsibilities of both entities in terms of financial management; (ii) preparation of a simplified Operational Manual - reflecting detailed funds flow arrangements between MOP and FB; (iii) agreement on the content of interim un-audited reports (IFRs); and iv) contracting of an experienced financial management assistant for the project under TORs acceptable to the Bank.

B. Reporting and Information System

3. Project transactions will be recognized under accrual accounting base. The project will follow local rules in terms of accounting and will tailor a chart of accounts in accordance with project information needs. MOP in coordination with Fundación Biodiversa will be responsible for preparing consolidated project financial statements. FB will use the information system called Minisoft (commercial software utilized by the external accountant) to record project transactions by main activities. Although the project envisages in-kind contributions (mainly own human resources, experts, capacity in the field), these will be not considered part of the project financial statements as they are not easily measured.
4. For purposes of “rendición”, FB will prepare a statement of sources and uses of funds and then submit for MOP’s review and later consolidation process. Interim un-audited Financial Reports (IFRs) will be based on MOP’s information system (SICOF) and information provided by FB. MOP will be responsible for sending interim un-audited financial reports, satisfactory to the Bank, with a periodicity of semi-annual basis, 45 days after the end of each calendar semester. The core content of IFRs will be agreed with the Bank.

5. As the Fundación does not have formal written policies and procedures covering all routine budgeting, accounting and related administrative activities, the preparation of a simplified Operational Manual is a key requirement for project implementation. The manual will include a financial management section setting out the funds flow arrangements, the main accounting policies, a chart of accounts, and financial reports customized to project information needs.

C. Fund Flow and Disbursement Arrangements

6. Grant funds will be deposited in a Designated Account (in US Dollars) held by the Ministry of Finance at the Central Bank, which will also operate with a Cuenta de Monetización in pesos to be opened by MOP in the Banco del Estado, from which transfers will be made to a private bank account in pesos to be opened by Fundación Biodiversa, at the Banco de Chile (private commercial bank) to carry out all payments in accordance with the procedures established in the Operational Manual.

7. Funds deposited into the DA as advances will follow the Bank’s disbursement policies and procedures as described in the legal agreement and Disbursement Letter.

8. Project design involves decentralized management of funds from MOP to FB, including consultant services and training activities. MOP (DCyF in coordination with DGOP) will transfer funds to FB against planned expenditures. FB will prepare at least quarterly programming, detailing the activities planned and estimations of funds required. Such estimations will be reviewed and approved by DGOP in coordination with the Secretariat of Environment (SEMAT) from MOP and will be used as the basis to process a transfer of funds from MOP to FB. For documenting the use of funds, FB will submit for MOP’s review at least quarterly statements of sources and uses of funds and corresponding bank reconciliations.

9. Disbursements from the WB will be based on semi-annual interim un-audited reports which comprise:

   (i) Sources and Uses of Funds Statement
       This report summarizes Bank-administered sources and other local counterpart funds; and uses of funds by disbursement category (in the Grant Agreement) and financing source.

   (ii) Detailed Expenditure Report
       This report provides information by disbursement categories.
(iii) **Project Six-Month Forecast of cash needs**

This report summarizes forecast expenditures for each financing source and by disbursement categories, taking into account any balance remaining in the Designated Account.

(iv) **Designated Account Statement**

Reflect the movements of the Project Designated Account.

10. Although disbursements will be based on forecasted reports, Fundación Biodiversa is responsible for maintaining records evidencing eligible expenditures, copies of receipts and supplier invoices of the project for ex-post reviews from the Bank and external auditors. MOP in coordination with Fundación Biodiversa will submit semi-annual interim un-audited reports for Bank’s review. A set of the interim un-audited reports will be sent to the TTL and based on FMS review; CTR will proceed to disburse the requested amount.

11. Funds will flow from the World Bank Grant account to a USD Designated Account, which will have a corresponding project local currency accounts for payments. Fundación Biodiversa will make payments to suppliers and consultants from the Designated Account for project components under the following disbursement categories.

<table>
<thead>
<tr>
<th>Table of Grant Proceeds [TBC]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>(1) Consultant services, Goods and training under Part 1 of the Project</td>
</tr>
<tr>
<td>(2) Consultant services, Goods, and Training under Part 2 of the Project</td>
</tr>
<tr>
<td>(3) Consultant services and training under Part 3 of the Project</td>
</tr>
<tr>
<td>(4) Operating Costs under Part 4 of the Project (including audit fees)</td>
</tr>
<tr>
<td><strong>TOTAL AMOUNT</strong></td>
</tr>
</tbody>
</table>

D. **Auditing Arrangements**

12. Project annual audited financial statements are required to be submitted for Bank’s review, six months after the end of each Recipient’s fiscal year. Audit of project annual financial statements will be conducted by the Contraloría General del Estado in accordance with International Standards on Auditing (ISAs) issued by the International Federation of Accountants (IFAC). If due to any unforeseeable circumstances, where
CGR is not able to perform the audit of the project, a private sector auditor acceptable to the Bank may be hired. The audit will include a visit to MOP and Fundación Biodiversa. Audit costs will be financed out of grant proceeds.

13. Auditors should submit the following:
   i. Opinion on the project financial statements; and
   ii. An internal control management letter.

E. Financial Management Supervision Plan

14. Financial Management supervision would include on-site and off-site supervisions.

15. *On-site supervision* will be carried once a year to review project performance. This review will include transaction review to verify the eligibility of expenditures. However, depending on the project performance and risks rating, supervision intensity could be adjusted.

16. *Off-site supervision* will comprise desk reviews of interim financial reports and audited financial statements and will be complemented through virtual communications to assure a correct implementation of observations/recommendations and provide technical assistance during the project’s implementation period.

F. Action Plan

<table>
<thead>
<tr>
<th>#</th>
<th>Shortcoming</th>
<th>Action/s</th>
<th>Responsible</th>
<th>Target</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Qualified fiduciary assistant for Project implementation</td>
<td>Submit TOR for Bank review to ensure qualified staff will be appointed</td>
<td>Fundación Biodiversa</td>
<td>A professional appointed two months after signing of the Grant Agreement</td>
<td>Pending</td>
</tr>
<tr>
<td>2</td>
<td>Simplified Project Operational Manual approved by the Bank</td>
<td>Ensure readiness of simplified Project Operational Manual for Bank review/approval</td>
<td>Fundación Biodiversa</td>
<td>Prior to signing of the Grant Agreement</td>
<td>Pending</td>
</tr>
<tr>
<td>3</td>
<td>Tailored form of financial reporting</td>
<td>Insert necessary lines in the Chart of Account. Agree with the Bank on the core content of the IFRs. Adjust information system accordingly.</td>
<td>Fundación Biodiversa</td>
<td>Prior to signing of the Grant Agreement</td>
<td>Pending</td>
</tr>
<tr>
<td></td>
<td>Inter-institutional agreement between the MOP and FB</td>
<td>Sign an inter-institutional agreement between the MOP and FB</td>
<td>Fundación Biodiversa</td>
<td>Inter-institutional agreement signed upon Grant Agreement signature</td>
<td>Pending</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------</td>
<td>---------------------------------------------------------</td>
<td>----------------------</td>
<td>-------------------------------------------------------------------</td>
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</tr>
<tr>
<td>4</td>
<td>Timely appointment of auditors</td>
<td>Auditors acceptable to the Bank selected for a three-year period</td>
<td>Fundación Biodiversa</td>
<td>Six months after signing of the Grant Agreement</td>
<td>Pending</td>
</tr>
</tbody>
</table>

5
Annex 6. Procurement Arrangements

A. General

1. Procurement for the proposed Project would be carried out in accordance with the World Bank’s “Guidelines Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers”, dated January 2011; the World Bank’s “Guidelines Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers”, dated January 2011, and the provisions stipulated in the Grant Agreement. Various eligible items under different expenditure categories are described in general below. For each contract to be financed by the Grant, the applicable procurement methods or consultant selection methods, estimated costs, requirements for prior reviews and time frames are agreed upon between the Recipient and the Bank in the Procurement Plan (PP). The PP will be updated at least annually, or as required in order to reflect Project implementation needs and improvements in institutional capacity.

2. **Procurement of Works**: Not foreseen.

3. **Procurement of Goods**: Goods procured under this Project will include computer peripherals, software, field equipment, books, and databases. Goods will be procured under contracts awarded on the basis of shopping. Procurement will be done using a model of request of quotations agreed with (or satisfactory to) the Bank in the Operational Manual.

4. **Procurement of non-consulting services**: Non-consulting services procured under this Project will include printing and publication services. Procurement will be done using a model of request of quotations agreed with (or satisfactory to) the Bank in the Operational Manual.

5. **Selection of Consultants**: Consultant services provided by firms are not foreseen. Specialized advisory services can be provided by individual consultants hired according to Section V of the Guidelines.

6. **Training**: The Project will finance all costs associated with training and workshops required for the implementation of the Project.

7. **Operating Costs**: Operational costs under this Project will include incremental expenses incurred on account of Project implementation, including office equipment, communication, office administration, travel, per diems, and vehicle operation.

B. Assessment of the Agency’s Capacity to Implement Procurement

8. Based on the implementation arrangements, the Ministry of Public Works and Fundación Biodiversa are responsible for Project implementation. For that purpose, they will set up a Project Steering Committee (PSC). The MOP will be the GovernmentExecuting Agency and FB will be the Executing Partner. Under this scheme, FB will be
in charge of financial management and procurement issues in terms and conditions acceptable to the MOP and the Bank. These conditions will be reflected in an inter-institutional agreement to be signed between the MOP and FB.

9. An assessment of the Executing Partner’s capacity to implement procurement actions for the Project was conducted in October 2010. The assessment reviewed the organizational structure for implementing the Project. The overall Project risk for procurement is Average. The level of risk for this Project will be reassessed and revised once there is evidence that mitigation measures have been taken, such as (i) adequate implementation of an Operational Manual; (ii) development of Sample Procurement Documents for Project implementation, and (iii) procurement reviews conducted by independent auditors and/or Bank staff.

C. Procurement Plan

10. The Recipient, at Project appraisal, developed a procurement plan for Project implementation, which provides the basis for the applied procurement methods. This plan has been agreed upon between the Recipient and the Project Team during negotiations, and will be available in the project database. The Procurement Plan will be updated annually in agreement with the Project Team, or as required in order to reflect Project implementation needs and improvements in institutional capacity.

D. Frequency of Procurement Supervision

11. In addition to prior review supervision to be carried out by the Bank offices, the capacity assessment of the Executing Partner recommends annual supervision missions to carry out post review of procurement actions. The Bank will assist the Recipient with the start-up activities by providing training in procurement under Bank procedures to key staff.

E. Thresholds for Procurement Methods and Prior Review

12. Thresholds recommended for the use of the procurement methods specified in the Project procurement plan are identified in the table below, which also establishes thresholds for prior review.
<table>
<thead>
<tr>
<th>Expenditure Category</th>
<th>Contract Value (Thresholds) US$ thousands</th>
<th>Procurement Method</th>
<th>Contracts Subject to Prior Review</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Goods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 - 350</td>
<td>NCB</td>
<td>First</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>Shopping</td>
<td>First</td>
</tr>
<tr>
<td></td>
<td>Regardless of value</td>
<td>DC</td>
<td>All</td>
</tr>
<tr>
<td><strong>2. Consulting Services</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.a Firms</strong></td>
<td>&gt;100</td>
<td>QCBS, QBS, FBS, LCS</td>
<td>&gt;100</td>
</tr>
<tr>
<td></td>
<td>&lt;100</td>
<td>QCBS, QBS, FBS, LCS, CQS</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td></td>
<td>Regardless of value</td>
<td>SSS</td>
<td>All</td>
</tr>
<tr>
<td><strong>3.b Individuals</strong></td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

**Note:**
- ICB = International Competitive Bidding
- NCB = National Competitive Bidding
- DC = Direct Contracting
- QCBS = Quality- and Cost-Based Selection
- QBS = Quality-Based Selection
- FBS = Fixed Budget Selection
- LCS = Least-Cost Selection
- CQS = Selection Based on Consultants' Qualifications
- SSS: Single Source Selection

**Thresholds for Prior Review:** The contracts subject to prior review will be detailed in the Procurement Plan.

**F. Details of the Procurement Arrangements Involving International Competition**

1. **Goods, Works, and Non-Consulting Services**

   (i) A list of contract packages to be procured following ICB is presented in the Table A8.2, and direct contracting in Table A8.3. TBC during appraisal.
Table A8.2: Contract Packages to be Procured Following ICB

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ref. No.</td>
<td>Contract (Description)</td>
<td>Estimated Cost</td>
<td>Procurement Method</td>
<td>P-Q</td>
<td>Domestic Preference (yes/no)</td>
<td>Review by Bank (Prior/Post)</td>
<td>Expected Bid-Opening Date</td>
<td>Comments</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

2. Consulting Services

   (i) A list of consulting assignments with a short list of international firms.

   Table A8.3: Consulting Assignments

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ref. No.</td>
<td>Description of Assignment</td>
<td>Estimated Cost</td>
<td>Selection Method</td>
<td>Review by Bank (Prior/Post)</td>
<td>Expected Proposals Submission Date</td>
<td>Comments</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

   (b) Short lists composed entirely of national consultants: Short lists of consultant services estimated to cost less than US$500,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.
Annex 7. Environmental and Social Safeguard Policies

A. Context for the Safeguard Policies Analysis

1. The BMS possesses no characteristics relevant to the safeguards analysis in terms of risks or impacts. In fact, the BMS becomes a key instrument to provide baseline information for the Environmental Assessment process and, in the future, for informed decision making in terms of environmental management within the MOP. The Project will not involve any physical location in terms of component implementation. No physical environmental and social impacts are expected from the implementation of this technical assistant. The Project does not involve civil works and will not involve social and environmental assessment of MOP projects. However, and as a part of an information system design, it will pilot the production of baseline data focused on the following ecoregions that have the most valuable global attributes in terms of uniqueness and global services in Chile:

(i) Chilean Matorral: Endemism levels up to 90 percent, considered highly unique globally. The Chilean Matorral covers 148,407 square kilometers ranging from 23ºS to 39ºS. It is listed as a critical/endangered habitat because it has been severely affected by fire, mining, logging, and human occupation.

(ii) Central Andean Dry Puna: Unique as it comprises a mosaic of provinces compressed in a small area. It provides water services and represents a valuable living laboratory in the face of global climate change.

(iii) Valdivian Temperate Forest: Endemism levels up to 70 percent, considered highly unique globally. Some parts are still pristine and provide global carbon sequestration, water filtration/retention, and other environmental services.

(iv) Magellanic Subpolar Forests: One of the most extensive pristine areas in the world, harboring rare, unexplored biodiversity providing global environmental services such as carbon sequestration.

(v) Patagonian Steppe: A unique and vast area covered by highly adapted and highly endemic vascular species. The Patagonian Steppe is an extensive area covering 487,200 square kilometers in the southern part of South America. This ecoregion is home to at least 1,200 vascular species. It is listed as a critical/endangered, extremely fragile habitat for a number of rare and specially adapted flora and fauna. Its vegetation consists of shrubs and tuft grasses with an important vascular plant endemism reaching 30 percent.

B. Key Safeguard Policy Issues and their Management

2. In terms of the need for environmental assessment, the Project has been classified as Category C, and there are no safeguard policies triggered, as shown in the table below.
3. This GEF Project will finance consultancies and assessments for development of the Biological Management System (BMS). There are no specific investments financed that would have an environmental impact. The BMS is focused on collecting, validating, and disseminating key biodiversity information. However, the Project itself will provide a key tool to produce baseline information on biodiversity at relevant scales fully pertinent to any process of environmental assessment within the MOP.

4. The Environmental Impact Assessment System (EIAS) is mandatory for all MOP projects that might affect priority sites identified in the National Biodiversity Strategy approved in 2003 by CONAMA, even though these priority sites are not under official protection. MOP’s current planning and management system is based on compensation and mitigation and focuses on protected areas, priority sites, and threatened species.

5. The BMS will collect as much available information as possible, and will model information that might not be available from primary sources. This system will test the generation of the biodiversity information collected, with attributes, scales, representation, and content useful for the future planning of environmental works. It will determine if this information is indeed useful and if all critical issues are covered. This validation process will receive input from a group of experts from World Wide Fund for Nature, TNC, Conservation International, etc., and agencies from other sectors (CONAF, MA), which will serve as peer reviewers through workshops and meetings. The MOP has manifested its commitment to integrate BMS into every instance of decision making and during the environmental management planning process. It has also committed to disseminating related information among relevant institutions (such as MA and the Ministry of Agriculture) and sectors that also generate impacts on national biodiversity (for example, construction and mining).

6. The potential indirect and long-term impacts of the Project will be positive. The Project seeks to integrate the BMS under a broader framework of the MOP’s decision-making process, and the BMS will contribute to preserving the integrity of the targeted ecoregions through incorporation of the BMS into environmental assessments.

<table>
<thead>
<tr>
<th>Safeguard Policies Triggered</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Assessment (OP/BP 4.01)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Natural Habitats (OP/BP 4.04)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Forests (OP/BP 4.36)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Pest Management (OP 4.09)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Physical Cultural Resources (OP/BP 4.11)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Indigenous Peoples (OP/BP 4.10)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Involuntary Resettlement (OP/BP 4.12)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Safety of Dams (OP/BP 4.37)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Projects on International Waterways (OP/BP 7.50)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Projects in Disputed Areas (OP/BP 7.60)</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
7. The Project will be executed by the MOP and co-executed by Fundación Biodiversa (FB). FB has strong experience in the assessment of biodiversity conservation. In addition, it has prior experience in the design and implementation of biodiversity strategies.

8. Given that the Project does not trigger any safeguard policies, the MOP’s Institutional Capacity for Safeguards Policies has not been analyzed. However, this GEF Project presents an opportunity to strengthen the MOP in terms of its environmental assessment (EA) capacity and technical quality. Although the Project has not triggered safeguard policies, the Bank recognizes that the Ministry of Public Works, like any agency involved in the financing of infrastructure projects, plays a central role in environmentally and socially sustainable development of the Chilean economy. Therefore, this GEF Project will represent a key tool in ensuring compliance with this role by giving biodiversity management a preeminent role in the national EA process. In this vein, the substantive policy standards contained in the World Bank Safeguard Policies will be incorporated into the relevant components of the BMS.
Annex 8. Map of Ecoregions in Chile

Global Ecoregions in Chile

Chilean Ecoregions:
- Atacama desert
- Central Andean dry puna
- Chilean matrual
- Magellanic subpolar forests
- Patagonian steppe
- Southern Andean steppe
- Valdivian temperate forests
- SudamERICa
Annex 9. Description of the Pilot Ecoregions

1. The main characteristics of the selected ecoregions in relation to their size, nature, and level of threats, conservation values, and singularities are described in this Annex.

   A. Central Andean Dry Puna

   | Size: 307,000 square kilometers (119,000 square miles) |
   | Ecosystem Status: Vulnerable |

Synopsis

2. The Central Andean Dry Puna extends across 307,400 square kilometers in the Andean High plateau, east of the Atacama Desert. It is listed as relatively stable or intact. Its limiting factor is water: life concentrates around wetlands, where birds and other species groups complete their reproduction and feeding cycles. The Central Andean Dry Puna ecoregion is extremely valuable in the face of global climate change, as it becomes a living laboratory to study species’ and systems’ movement patterns and processes. This is because the region is composed of a remarkable mosaic of biogeographic provinces and gradients that are compressed in a small area. The Central Andean Dry Puna is dominated by tuft grasses and shrubs locally know as “ichu” and “tola”. Threatened species such as Polylepis have been decreasing in recent years. Another important species is yareta (Azorella compacta), a woody plant with extremely low growth that occurs only above 3,200 meters and which has become an important living climate change indicator.

General Description

3. The Central Andean Dry Puna is located in the southern part of the Andean Cordillera, occidental to Argentina, Bolivia, and Chile. The area encompasses snow-capped peaks, volcanoes, salt flats, lagoons, and high plateaus. In Chile, the ecoregion includes parts of the regions of Arica y Parinacota, Tarapaca, Antofagasta, and Atacama.

4. The region lies at an elevation of 3,500–5,000 meters above sea level. The dry puna is oligothermic. The northern part of the ecoregion has a temperature ranging from 8 to 11°C, while temperatures in the southern area are lower. The mid-southern sections of the ecoregion are drier than the north, with an annual precipitation that varies from 51 to 406 millimeters.

Biodiversity Features

5. At high elevations, over 4,000 meters above sea level, the vegetation grows in cushion bogs or bofedales, including floating submerged cushion plants. Large cushions are formed by Distichia muscoides, Oxychloe andina and Plantago rigida. Other genera

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include *Gentiana, Hypsela, Isoetes, Lilaeopsis, Ourisia,* and *Scirpus.* In well-drained areas, some of the cushion plants include *Azorella compacta* and *Werneria aretioides.*

6. From east to west, the vegetation changes from shrubland steppe with xerophilous shrubs such as *Adesmia, Baccharis, Fabiana,* and *Senecio* to grassy steppe with grasses of the genera *Calamagrostis, Festuca,* and *Stipa* (UNESCO 1981). Some of the common shrubs are *Baccharis incarum, B. boliviensis, Parastrephila lepidophylla,* and *Fabiana densa.* In some areas, these shrubs reach heights of 2.5 meters.

7. Polylepis (*Rosaceae*) is only found in the South American Andes. Most of the species in this genus are exposed to harsh climatic conditions. Some of the flora found in these desert-like areas includes *Lampaya sp., Parastrephila lepidophylla* and grasses such as *Festuca orthophylla.*

8. Some of the vegetation that has adapted to high concentrations of salt in the soil constitute halophyte communities, which are found especially in areas close to the salt flats. These species include *Anthobryum sp., Atriplex atacamensis, Distichlis humilis, Muhlenbergia fastigiata, Parastrephia lucida, Salicornia pulvinata, Senecio pampae, Suaeda foliosa, Tessaria absintoides,* and *Triglochin maritima.*

9. Flora restricted to this ecoregion include the genera *Barneoudia, Hexaptera, Nototriche, Pycnophyllum,* and *Werneria.*

10. Mammals in the region include vicuña (*Vicugna vicugna*), puma (*Felis concolor*), Andean cat (*Felis jacobita*), Andean fox (*Pseudalopex culpaeus*), and quirquincho (*Chaetophractus nationi*).

11. Birds include the flamingos *Phoenicopterus chilensis, Phoenicoparrus andinus,* and *Phoenicoparrus jamae.* Other bird species include *Pterocnemia pennata, Tinamotis pentlandii,* and *Chloephaga melanoptera.*

12. Most of the endemic birds in the ecoregion are found in Polylepis forests and scrubs. Endemic birds found in this ecoregion include the endangered Ash-breasted tit-tyrant (*Anairetes alpinus*); the critically threatened royal cinclodes (*Cinclodes aricomae*); the Berlepsch’s canastero (*Astenes berlepschi*), classified as vulnerable; and the line-fronted canastero (*Astenes urubambensis*), scribble-tailed canastero (*Astenes maculicauda*), short-tailed finch (*Idiopsar bracyurus*), and gray-bellied flower-piercer (*Diglosa carbonaria*), classified as species of least concern.

13. Endemic birds found in this ecoregion include the endangered Cochabamba mountain-finch (*Poospiza garleppi*); the maquis canastero (*Astenes heterura*), rufous-bellied saltator (*Saltator rufiventris*), and chesnut canastero (*Astenes steinbachii*) classified as vulnerable; the wedge-tailed hillstar (*Oreotrochilus adela*) and Tucuman mountain-finch (*Poospiza baeri*), classified as near threatened; and the citron-headed yellow-finch (*Sicalis luteocephala*) and bare-eyed ground-dove (*Metriopelia moreni*),
classified as a species of least concern. Other endemic fauna include an amphibian, *Telmatobius huayra*.

**Threats**

14. The Andean puna has been markedly affected by livestock grazing for centuries. The natural vegetation has been severely affected by grazing, burning, firewood collection, and clearance for cultivation. The camelids, goats and sheep in the area degrade the herbaceous vegetation, making the life cycle for the plants difficult to complete. The clearing of Polylepis forest for agriculture, firewood collection, and burning for pasture poses an important threat to the endemic fauna, especially birds.

15. The overuse of *Polylepis tarapacana* and *Azorella compacta* for fuelwood threatens these two species. Mining activities in the Cordillera Occidental pollute the water bodies and poorly drained areas.

**B. Chilean Matorral**

<table>
<thead>
<tr>
<th>Size: About 149,000 square kilometers (57,500 square miles)</th>
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</thead>
<tbody>
<tr>
<td>Ecosystem Status: Critical/Endangered</td>
</tr>
</tbody>
</table>

**Synopsis**

16. The **Chilean Matorral** covers 148,407 square kilometers ranging from 23ºS to 39ºS. It is listed as critical/endangered\(^{20}\) because it has been severely affected by fire, mining, logging and human occupation. This is one of the only 5 Mediterranean zones in the world, all of them listed as critically endangered by WWF. The Chilean Matorral contains unique *sclerophyllus* forests. At a country level, it is home to 50 percent of vertebrate species, 50 percent of endemic species, and 50 percent of threatened species. Levels of endemism reach 50 percent in plants, 62 percent in reptiles and up to 90 percent in some reptile and amphibian groups.

**General Description**

17. The Matorral occupies central Chile between 32º and 37º south latitude. The Pacific Ocean lies to the west, and the Chilean Coastal Range lies parallel to the coast. The Chilean Central Valley lies between the coastal range and the Andes Mountains, which border the Matorral ecoregion in the east. To the north, there is the extremely dry Atacama Desert, which separates the Matorral from the tropical forests of northern South America. A semi-desert region known as El Norte Chico, (the “little North”) lies between 28º and 32º south latitude and is the transition zone between the Atacama Desert and the Matorral. To the south lies the cooler and wetter Valdivian temperate rain forest ecoregion.

18. The Chilean Matorral ecoregion is one of only five Mediterranean shrublands of its kind that together support 20 percent of the plant species on the Earth. This ecoregion is the only Mediterranean climate shrubland and woodland in South America. Many species of endemic plants and animals live in specific parts of this ecoregion, which is home to several plant communities.

19. Coastal Matorral is a low, soft scrubland that extends from La Serena in the north to Valparaiso in the south. Typical species are the coastal daisy (*Bahia ambrosioides*), Palhuén (*Adesmia microphylla*), and Palo de Yegua, and the wild coastal fuchsia (*Fuchsia lycioides*). The coastal matorral is similar to the *garrigue* of the Mediterranean Basin and the coastal *sage scrub* of Southern California.

20. Matorral is a shrubland plant community composed of sclerophyll ("hard-leaved") shrubs and small trees, cactus, and bromeliads. Typical species include Litre (*Lithraea venenosa*), Quillay or Soapbark Tree (*Quillaja saponaria*), cactus (*Echinopsis chiloensis*), and bromeliads of genus *Puya*, with a diverse understory of herbs, vines, and geophytes. The matorral is similar to the *chaparral* of California and the *maquis* of the Mediterranean Basin.

21. Espinal is a savanna plant community composed of widely spaced clumps of trees, predominantly espino (*Acacia caven*), and spiny carob tree (*Prosopis chilensis*), with an understory of annual grasses introduced from the Mediterranean Basin in the 16th century. Much of the espinal was formerly matorral, but has been degraded over the centuries by the intensive grazing of sheep, goats, and cattle.

22. Sclerophyll woodlands and forests were once more extensive, but now exist in small patches in the coastal ranges and Andean foothills. The sclerophyll forests and woodlands are composed predominantly of evergreen sclerophyll trees, including Peumo (*Cryptocarya alba*), Boldo (*Peumus boldus*), Mayten (*Maytenus boaria*), and Chilean Wine Palm (*Jubaea chilensis*).

23. The ecoregion has many endemic plant species with affinities to the South American tropics, the Antarctic flora, and the Andes. About 95 percent of the plant species are endemic to Chile, including *Gomortega keule*, *Pitavia punctata*, *Nothofagus alessandrii*, and the Chilean Wine Palm, *Jubaea chilensis*.

24. Many species of cacti grow throughout the Chilean Matorral, along with many other species of plants adapted to the Mediterranean climate. A rich diversity of plants is unique to this ecoregion, and nearly 1,500 species of plants are endemic. Several whole genera of trees and other plants found here are endemic, as is one entire family of trees, which is highly unusual. One species of tree, the huge Chilean palm, has a very restricted distribution and is highly threatened. Among the animals found in the Chilean Matorral are several species of lizards, including various South American swifts of the genus *Liolaemus*. Other animals include five endemic rodents, a species of mouse opossum, and...
15 endemic birds, including three species of tapaculo birds, the Chilean mockingbird, the Chilean Tinamou, and the giant hummingbird, the world’s largest hummingbird.

Threats

25. The population of the Central part of Chile continues to grow, causing increasing environmental pressure from development measures such as road and residential construction and the clearing of vast areas of land for crops and livestock grazing. In some cases, people use fire to clear land, a practice that has destroyed a large part of the Chilean Matorral. People have also brought invasive plant and animal species into the ecoregion.

C. Valdivian Temperate Rainforest

<table>
<thead>
<tr>
<th>Size: 248,000 square kilometers (96,000 square miles)</th>
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<tbody>
<tr>
<td>Ecosystem Status: Critical/Endangered</td>
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</tbody>
</table>

Synopsis

26. The Valdivian Temperate Rainforests cover 248,100 square kilometers in Chile and Argentina, ranging from latitudes 33°S to 48°S. They are among the most pristine areas of the world, and the only cool-temperate rainforest in South America. Endemism reaches 50 percent for plants, 5.3 percent for birds, 22 percent for mammals, 56 percent for fish, and 70.7 percent for amphibians. The Valdivian Temperate Forests is the habitat of Dromiciops fliroides, commonly known as “monito del monte,” which is the sole representative of the Order Microbiotheria, a marsupial considered a living fossil in South America.

General Description

27. The Valdivian Temperate Rainforests are among the world’s major temperate rainforests, and the only rainforests of this kind in the whole of South America. Millions of years of isolation have created unique habitats and a large number of endemic plant species.

28. The Valdivian Temperate Rainforests expand from the low coastal mountains across the central valley and into the high Andes. The southern beech forests that develop in this ecoregion are among only three of this type of forest in the world.

29. Some people believe that these forests were once part of the ancient Gondwanaland land mass because they more closely resemble forests in Australia and New Zealand than other forests on the South American continent.

Biodiversity Features
30. Because of rapid elevation changes, the region is home to many species with specialized habitat requirements. These include the world’s smallest deer, the endangered pudu, South America’s largest woodpecker, the Magellanic woodpecker, and two pine-seed eating parrots. A fascinating bird, the Juan Fernández fire crown, an endemic species of hummingbird, is found here. It has earned its name from the colors on its crown, which shift from emerald to scarlet, depending on the light.

31. The Valdivian Forests are very dense, with epiphyte-laden trees reaching up to 46 meters (150 ft) in height. The most abundant trees are Antarctic beech, but many other trees are also present, including the threatened guaitecas cypress and the monkey puzzle tree. These forests are also home to the extraordinarily tall Alerce trees, which can reach heights of over 114 meters (375 ft) and live for more than 3,000 years.

**Threats**

32. Logging and conversion of forests into agricultural land and timber plantations are the major threats to this ecoregion.

**D. Patagonian Steppe**

<table>
<thead>
<tr>
<th>Size: 487,200 square kilometers (188,100 square miles)</th>
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</thead>
<tbody>
<tr>
<td>Ecosystem Status: Critical/Endangered</td>
</tr>
</tbody>
</table>

**Synopsis**

33. The **Patagonian Steppe** is an extensive area covering 487,200 square kilometers in the Southern part of South America. It is listed as critical/endangered. This ecoregion is home to at least 1200 vascular species. It is an extremely fragile habitat to a number of rare and specially adapted flora and fauna. Vegetation consists of shrubs and tuft grasses, with important vascular plant endemism reaching 30 percent.

**General Description**

34. This ecoregion extends roughly from the mid-Andean Precordillera Southward, ending just North of the Strait of Magellan. This steppe is bordered on the West by the cold temperate forest slopes of the Andes, and on the East by the Pacific Ocean. It extends North-West as shrubland steppe and to the north as thorn thicket, gradually making the transition to Argentine Monte. This area is a cold desert scrub steppe, with almost constant wind and year-round frosts likely. This ecoregion has high levels of endemism in both plants and animals.

35. This Patagonian steppe ecoregion mainly covers the Patagonia region of Argentina from the Atlantic Ocean shore to barely across the border into Chile. The topography of this ecoregion includes low-lying mountains, plateaus and plains. Soils are

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variable but generally they are rocky-sandy and poor in fine materials and organic matter. The climate is very dry and cold with snow during the winter and frosts nearly year-round, however annual precipitation does not normally average more than 200 mm. A characteristic of the Patagonian climate is the constant drying wind that blows with great force from the West, particularly in the summer months. Winter generally lasts for five months from about June to September with temperatures between 1° and -3° C. Elevations range greatly in this expansive ecoregion from close to sea level near the shores of the Atlantic up to 2,000 m in the North and about 700 m in the Southern extents of the ecoregion due to the Andean areas on the Western side.

**Biodiversity Features**

36. In general, the vegetation of this steppe ecoregion is xerophytic and highly adapted against drought, wind and herbivores. The vegetation is considered strongly related to the Andean flora, though the average numbers of endemic species for dominant families is very high with as much as 60 percent endemism in Leguminosae and 33 percent in Compositae. There are three main types of vegetative communities. The most densely covered is semi-desert (45 percent), shrub-steppe (30 percent) and grass-steppe (20 percent). Desert like areas also exist with little to no vegetative cover as well as wet meadow areas which have close to 100 percent vegetation cover.

37. Semi-desert vegetation has highly adapted features; dwarf and cushion shrubs are the most widely occurring vegetation type in the ecoregion. Shrubs species of Acantholippia, Benthamiella, Nassauvia and Verbena genera grow in these areas as well as cushion plants of Mulinum spinosum, Brachyclados caespitosus and tuft grasses; the most common being the species of Poa and Stipa. Also abundant are species with heteroblastic growth and small limited-growth branches covered with tight leaves. Junellia tridens and Nassauvia glomerulosa are good examples of this type of plant. Taller woody shrubs indicate a change to shrub steppe communities within the ecoregion. These species of Anarthrophyllum, Berberis, Schinus and Verbena can grow up to three meters tall. Valleys and lowlands with higher amounts of water available to vegetation host species as: sedges (Eleocharis), rushes (Juncus), grasses (Agrostis, Hordeum, Polypogon) and, in saline areas, halophytic species (Distichlis, Nitrophila, and Puccinellina).

38. In this ecoregion, it is possible to find two endemic species of the genus Prosopis, one species of Larrea and species of the genera Lycium and Schinus. Genera and species endemism are very frequent in this ecoregion, among them Philipiella, Neobaclea, Xerodraba, Benthamiella, Pantacantha, Saccardophyton, Duseniella, Eriachaenium, and Lepidophyllum. There are also numerous endemic species of mammals, birds and amphibians. The National Council for Bird Preservation points to this region as one of the most important in terms of the presence of endemic bird species, and according to it there are probably ten of such species.

39. The fauna is extremely varied in this region. Among birds, there are the lesser rhea (Pterocnemia pennata), Patagonian tinamou (Tinamotis ingoufi), grey eagle-buzzard
(Geranoaetus melanoleucus), peregrine falcon (Falco peregrinus), band-winged nightjar (Caprimulgus longirostris), lesser canastero (Aethes pyrrholecua), Patagonia mockingbird (Mimus patagonicus), and Patagonian yellow-finch (Sicalis lebruni) just to name a few. Among mammals we find the mara (Dolichotis patagonum), chinchilla (Lagidium viscacia), Wolffsohn's mountain viscacha (Lagidium wolffsohni), Patagonian weasel (Lyncodon patagonicus), Patagonian opossum (Lestodelphis halli), “zorrino patagónico” (Conepatus humboldti), puma (Felis concolor), “zorro gris chico” (Dusicyon griseus), guanaco (Lama guanicoe), etc. Among the reptiles, important species are “lagartijas” (Liolaemus fitzingeri and L. kingi), “geko patagónico” (Homonata darwin), and “chelco” (Diplolaemus darwin), among others.

40. Endangered species include the “caiquén Colorado” (Chloephaga rubidiceps), “huemul” (Hippocamelus bisculcus), “ñandú petiso” (Pterocnemia pennata), “guanaco” (Lama guanicoe), and “zorro gris chico” (Dusicyon griseus).

Threats

41. The major problem is desertification due to over-grazing, primarily by sheep, damaging the limited plant coverage and exposing the soil to erosion. There is also pressure on foxes and pumas due to hunting and/or poisoning because they are considered a potential threat to livestock.

E. Magellanic Subpolar Forests

| Size: 147,200 square kilometers (56,800 square miles) |
| Ecosystem status: Relatively Stable/Intact |

Synopsis

42. The Magellanic Subpolar Forests range from 45°S to 56 °S, covering 147,200 square kilometers. They are listed as a relatively stable and intact ecosystem. It is one of the most pristine areas in the world and is listed by Conservation International as one of the 37 “Wilderness Areas of the World.” Magellanic Subpolar Forests host outstanding non-vascular floristic richness harboring more than 5 percent of the world’s bryophytes in less than 0.01 percent of the Earth’s land surface. While vascular plants are 20 times more abundant than non-vascular plants both globally and in tropical South America, non-vascular plants are dominant in the Sub-Antarctic Magellanic ecoregion. Magellanic Subpolar Forests have 450 species of mosses (58 percent of the country) and 300 species of liverworts (86 percent of the country), and many of its species are still to be scientifically discovered and described. “Turberas” or Magellanic tundra can also be found in the colder areas with high rainfall. This tundra is characterized by prostrate

22 http://www.nationalgeographic.com/wildworld/profiles/terrestrial/nt/nt0402.html
dwarf shrubs, cushion plants, grass-like plants, and bryophytes on water-logged terrain, which characterizes the vegetation of scrub or bogs. These habitats have not been fully scientifically described and remain unknown in terms of their micro-biodiversity. Inclusion of this ecoregion in this Project will provide experience of great significance for other projects in the area south of latitude 43°.

**General Description**

43. The subpolar *Nothofagus* forests cover the western part of the southern end of South America. The ecoregion is colder and in parts drier than the Valdivian temperate forests and is in general floristically poorer. The fauna is related to that of the bordering ecoregions, especially of the Valdivian temperate forests and the Patagonian steppe. Nevertheless, its varied and majestic landscapes, which include high mountain peaks, enormous ice fields, and innumerable fiords, are inhabited by unique and endemic animal and plant species that are sometimes abundant within this ecoregion.

44. The subpolar *Nothofagus* forests extend along the Southern Andes Mountains and the Chilean archipelago from 47ºS to the Cape Horn, including the regions of Southern Aysen and Magallanes in Chile.

45. Permanent snow, ice caps, and glaciers are present on the summits of many of the higher elevations. The effect of cold temperatures, strong and permanent west winds, and high precipitation of about 5,000 millimeters per year on the windward side of the mountains has resulted in the formation of three enormous ice fields.

**Biodiversity Features**

46. The vegetation shows principally two types of forest, mainly evergreen *Nothofagus betuloides* forests to the west and deciduous *Nothofagus pumilio* and *Nothofagus Antarctica* forests toward the east that extend into Argentina. In Tierra del Fuego, the evergreen forests are found to the south and the deciduous forests toward the interior. The deciduous forest is formed by pure *Nothofagus pumilio* at lower elevations in different combinations, with the more ecologically tolerant *Nothofagus antarctica*, which prevails in more arid situations or less drained soils. In the humid or wet places of these forests grow especially rich bog communities dominated by *Sphagnum*, *Juncaceae*, *Cyperaceae*, and grasses.

47. The deciduous forest shows an east-west transition into an evergreen forest, where mixed *Nothofagus pumilio*-*Nothofagus betuloides* forests dominate. With approximately 1,000–4,000 millimeters of annual precipitation, *N. betuloides* becomes dominant, forming pure forests or mixed ones with *Drymis winteri*, *Maytenus magellanica*, and *Pilgerodendron uvifera*. Inland shrubs of *Fuchsia*, *Ribes*, *Hebe*, *Gaultheria*, and *Empetrum* accompany the forests, while in coastal areas *Hebe elliptica* forms a dense scrub. In the north, *Nothofagus dombeyi* and *N. nitida* are found up to 48ºS, and *Podocarpus nubigena* up to 51ºS.
48. The colder, high-rainfall areas of the most southwestern parts of the ecoregion are characterized by Magellanic moorland or Magellanic tundra, which extends through the Chilean archipelago to 48ºS. This tundra is characterized by prostrate dwarf shrubs, cushion plants, grass-like plants, and, on water-logged terrain, bryophytes that in different combinations form vegetation of scrub or bogs. In sheltered areas, even on the outermost islands, only fragments of the evergreen forest develop. The bogs comprise characteristic species, many with austral affinities such as *Astelia*, *Bolax*, *Altha*, *Donatia*, *Drapetes*, *Gaimardia*, *Lepidothamnus*, and *Phyllachne*.

49. Over the highest mountains, usually limited by a belt of low “krumholz” of prostrate specimens of *Nothofagus* species, alpine vegetation is found above the forests. The timberline descends from north to south, from approximately 1,000 meters to 500 meters. Above that, diverse plant communities of dwarf shrubs, cushion heaths, alpine meadows, and subnival desert are found.

50. These communities generally increase in richness toward the Patagonian steppes. Similar communities are also found around the glaciers.

51. The flora of the ecoregion is diverse. In terms of the phytogeographical classification of Cabrera, the ecoregion is part of the Subantarctic province and shows close relationships to that of the Valdivian temperate forests to the north. This biogeographical province belongs to the Austral realm, and several genera of the ecoregion have representatives or close relatives in Australia, New Zealand, and Tasmania, such as *Nothofagus* trees and *Blechnum* ferns in the forests, and many cushion and shrub genera of bogs and scrub such as *Lepidothamnus*, *Hebe*, *Donatia*, *Gaultheria*, *Gaimardia*, *Luzuriaga*, *Oreobolus*, *Schoenus*, and *Astelia*.

52. Important levels of endemism are found among plants with several mostly herbaceous species being confined to the ecoregion.

53. A few examples of conspicuous endemic or nearly endemic species found in this ecoregion are grasses such as *Deschamsia kingii*, *Festuca cirrosa*, *Poa darwiniana*, *P. yaganica*, and herbs or subshrubs such as *Onuris alismatifolia*, *Ourisia fuegiana*, *O. ruelloides*, *Senecio eightsii*, *S. humifusus*, *S. websteri*, *Nassauvia latissima*, *Acaena lucida*, *Perezia lactucoideis*, *Viola commersonii*, *V. tridentata*, *Phyllachne uliginosa*, *Lebetanthes myrsinites*, *Nardophyllum bryoides*, *Caltha dioneifolia*, *Hamadryas magellanica*, *Ranunculus sericocephalus*, *Gavilea australis*, *Olsynium obscura*, *Valeriana sedifolia*, *Abrotanella submarginata*, *A. trilobata*, and *A. emarginata*. Many of these species are found in the alpine regions in the mountains above the forests, where many endemic species of this ecoregion also occur.

54. Although endemism level in general is low, a few endemic, monospecific genera are found, such as *Drapetes*, *Saxifragella*, and *Saxifragodes*. Some monospecific genera such as *Pilgerodendron* (*Cupressaceae*), the world’s southernmost conifer, is especially well represented in the ecoregion. A few Austral genera are especially relevant because they are the most diversified in the ecoregion, such as *Abrotanella* and *Ourisia*; both have
several endemic species. Some genera do not have endemics but are well represented in diversity, frequency, or abundance such as the Austral parasitic fungus *Cyttaria* associated to *Nothofagus* species. Cryptogams in general, that is, fungi, lichens, mosses, and liverworts, are important in the ecoregion.

55. Endemism in the flora, however, is not mirrored in the fauna, where there are few endemics. Among the avifauna, most birds of the subpolar *Nothofagus* forests extend their ranges to the north into the Valdivian forests, such as the conspicuous firecrown hummingbird (*Sephanoides sephanoides*), Magellanic woodpecker (*Campephilus magellanicus*), “rayadito” (*Aphractura spinicauda*), Austral parakeet (*Enicognathus ferrugineus*), and black throated huet-huet (*Pteroptochos tarnii*). Some also extend their ranges into the southern Andean or Patagonian steppes. There seem to be, however, a few near endemics such as two geese (*Chloephaga hybrida* and *C. rubiceps*), blackish cinclodes (*Cinclodes antarcticus*), black-throated finch (*Melanodera melanodera*), and striated caracara (*Phalcoboenus australis*).

56. Mammals also tend to have geographic distributions that extend north to other Andean ecoregions or east into the Patagonian steppes. The puma (*Puma concolor*), two foxes (*Dusicyon griseus* and *D. culpaeus*), guanaco (*Lama guanicoe*), huemul (*Hippocamelus bisulcus*), pudu pudú (*Pudu pudu*), and huillín (*Lutra provocax*) are the largest native animals in the area and are relatively abundant in some parts of the ecoregion. Historically, some of these animals, especially huemul, have reduced ranges since the arrival of the Europeans because of hunting, predation by dogs, susceptibility to cattle diseases, and competition with cattle and introduced red deer. The most important populations of huemul are found in the area. The only endemic and near-endemic mammals appear to be small, ground-dwelling mice such as *Akodon hershokovitzi*, *A. lanosus* and *A. markhami*.

**Threats**

57. The subpolar *Nothofagus* forests are seriously threatened by habitat conversion at present. The region has been affected by extensive burning and logging, especially around the main cities and in the more populated areas of the region. A marked increase in the population and tourism in the northern part of the region have been produced by the recent construction of the Chilean Carretera Austral that currently unites Coyhaique to Cochrane and Villa O’Higgins. This could cause problems related to increasing fires, logging, and grazing by cattle and sheep. Although the vegetation is probably adapted to grazing by native animals such as huemul and guanaco, the introduction of exotic cattle can have a harmful impact on the ecosystems.

58. An increase in tourism can have far-reaching effects such as introduction of non-native species. Threats from established exotic species continue to endanger this ecoregion. Some exotic animals have been introduced purposely for hunting or for fur or meat such as the European rabbit (*Oryctolagus cuniculus*) and North American beaver (*Castor canadensis*), which have already invaded large areas in the southern portion of this ecoregion. Beavers build dams affecting regeneration of the forest and the hydrology
of the region. Alien plants form a major percentage of the flora, especially in open, disturbed places such as logged or burnt forests. About 25 percent of the exotic species were most likely introduced by European colonists. Many of these species have been found on the island of Tierra del Fuego. Although sustainable forestry projects are being implemented in this ecoregion, most of the forestry management is poor, and entire stands are converted into chips with low added value.

59. Literature Cited: