DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

BOLIVIA

MISICUNI WATERSHED ENVIRONMENTAL MANAGEMENT PROJECT

(BO-L1053)

LOAN PROPOSAL

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ABBREVIATIONS

ENDE	Empresa Nacional de Electricidad
FSO	Fund for Special Operations
ICAS	Institutional Capacity Assessment System
OC	Ordinary Capital
PEU	Project execution unit
PROMIC	Programa de Manejo Integral de Cuencas [Comprehensive Watersheds Management Program]
SECCI	Sustainable Energy and Climate Change Initiative

PROJECT SUMMARY

BOLIVIA
MISICUNI WATERSHED
ENVIRONMENTAL MANAGEMENT PROJECT
(BO-L1053)

Financial Terms and Conditions					
Borrower: Government of the Plurinational State of Bolivia **Executing agency:** Empresa Misicuni [Misicuni Corporation]				**OC**	**FSO**
			Amortization period:	30 years	40 years
Source	**Project**	**%**	Grace period:	6 years	40 years
Bank (OC)	3.5 million	70%	Disbursement period:	4 years	4 years
Bank (FSO)	1.5 million	30%	Interest rate:	SCF-Fixed	0.25%
Local	0	0%	Credit fee:	*	N/A
Total	**5 million**	**100%**	Currency:	U.S. dollars	U.S. dollars

Project at a Glance

Project objective/description:

Project objective: To supplement and strengthen measures to mitigate the indirect impacts of the Misicuni Project on the environment and population in the main dam's watershed, and to help ensure the sustainability of the investments made by the Government of the Plurinational State of Bolivia to harness the water resources of the Misicuni River. The project's specific objectives are: (i) to reduce susceptibility to erosion, enhance water management, and protect priority habitats in the areas of the watershed most exposed to such risks; and (ii) to promote soil and water conservation measures and sustainable, income-generating alternatives to subsistence farming within the communities resettled due to construction of the dam.

Special contractual conditions: As conditions precedent to the first disbursement: (i) the subsidiary agreement will be signed between the borrower and Empresa Misicuni (see paragraph 3.1); (ii) the executive coordinator and consultants will be selected and appointed for the project execution unit (PEU) (see paragraph 3.2); (iii) the executive and technical staff of Empresa Misicuni line units involved in project execution will be appointed (see paragraph 3.2); and (iv) the president of Empresa Misicuni will approve the operations manual and technical regulations for project execution (see paragraph 3.13).

Exceptions to Bank policies: None.

Project qualifies as: SEQ [X] PTI [X] Sector [X] Geographic [ ] Headcount [ ]

Procurement: All project procurements will be conducted in accordance with Bank policies and procedures, as established in documents GN-2349-7 and GN-2350-7. No exceptions to Bank policies are foreseen (see paragraph 3.8).

* The credit fee and inspection and supervision fee will apply to the OC resources portion, and will be established periodically by the Board of Executive Directors as part of its review of the Bank's lending charges, in accordance with the applicable provisions of the Bank's policy on lending rate methodology for Ordinary Capital loans. In no case will the credit fee exceed 0.75%, or the inspection and supervision fee exceed, in a given six-month period, the amount that would result from applying 1% to the loan amount divided by the number of six-month periods included in the original disbursement period.

I. DESCRIPTION AND RESULTS MONITORING

A. Background

1. The Misicuni River watershed

1.1 The Cochabamba valley is a region of Bolivia with a growing water scarcity problem for both consumption by the local population and farming. Water issues in the central valley have been the subject of study for decades because of the gradual decline in groundwater source productivity levels owing to population growth and competition for water sources. The irregular areal distribution and timing of rains have forced communities to build storage, protection, and regulation facilities as a way to offset water scarcity and excess. Such measures have, however, failed to alleviate the impact of variations in rainfall or ease demand pressure on groundwater sources.

1.2 Vegetation is scanty in the watershed. Tree and bush species have virtually disappeared from intensive use of the land for farming and ranching, creating high-altitude scrublands. Consequently, the valley's environmental units, foothills, and the slopes of the watershed chiefly host high-altitude scrubgrasses, mainly Peruvian feather grass (Stipa ichu) and other natural ground cover. The Misicuni watershed covers 10% of Tunari National Park; this park was created by decree in 1962,[1] but never had enough resources for its protection, such that there has been intensive occupation of its territory. An estimated 80,000 people live inside the park, 80% in campesino communities, and the remaining 20% in squatter settlements concentrated mainly in the southern part of the park.

1.3 In terms of soil management, the Misicuni watershed suffers from severe environmental deterioration caused by natural and human factors. The steep slope of the watershed, the soil's minimal infiltration capacity, the rapid surface water flow, and the irregular rainfall combine with human factors including deforestation, frequent burns, overgrazing, flood-based irrigation, and a number of poor farming practices. The solution to this complex set of problems requires complementary, integrated interventions targeting the watershed, designed chiefly to ease pressure put on the watershed's resources by campesino populations and to gradually counteract natural factors by means of soil, plant, and water management works and measures. Nearly 25% of the watershed displays sheet and rill erosion and active and expanding gullies. Approximately 6,000 hectares of land are on four- to five-year rotation (potato-potato-oats-fallow-fallow) because the areas being used are extremely steep and insufficiently protected against soil erosion, and nearly 30% of farmland suffers from degradation. In addition, some 30,000 animals (cattle, sheep, horses, llamas, vicuñas and other camelids) use nearly 6,000 hectares for intensive and extensive grazing which leads to erosion (steep slopes) and loss of plant cover.

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[1] Law 1262 expanded the size of Tunari National Park in 1991, expressly excluding all farmed areas and those with industrial facilities as of the date of the law's passage. The environmental license for the Misicuni Multiple Project, which was renewed on 8 September 2008, was based on this exception.

2. Communities settled in the Misicuni River watershed

1.4 The dam's area of influence is home to 355 families spread among eight communities, the most heavily populated of which is Patapampa, with 68 families, and the least populated of which is Khochamayu, with 28 families. Production in the Misicuni watershed revolves around potato growing, which accounts for 80% of total production; the remaining 20% is broken down into 15% oats for cattle feed and 5% in other categories. Potatoes also constitute the communities' primary source of food and income: Families with more sizeable incomes consume 20% of their potato crop, set aside 10% for seed, and sell the remaining 70%; while poorer families consume 70% and sell 20%. Other agricultural products of note for the family diet are papaliza (yellow potatoes), chuño (dehydrated potatoes for year-round consumption), and beans in some areas. As regards livestock, the communities raise cattle, sheep, camelids, and horses. Productive activities unfold within the context of a family system in which each family member performs farming and livestock-related chores. Crops are grown—especially on very steep slopes never left fallow—without the use of technologies to prevent erosion-based degradation; this jeopardizes the stability of the land and the safety of the campesinos themselves.

3. Investment in the Misicuni River watershed

1.5 Bolivia needs to increase its electricity generation capacity to cope with growing demand for energy; the Cochabamba valleys region needs greater and more reliable access to water for both household use and irrigation. With that in mind, the Government of the Plurinational State of Bolivia has prepared and is arranging financing for the execution of a "Misicuni Multiple Project" that has three objectives: to supply the city of Cochabamba with drinking water, to increase the amount of water available for irrigation in the Cochabamba valley, and to generate hydroelectric power.

1.6 The first block of investments aimed at building and operating the main dam is being executed with resources from the Andean Development Corporation (CAF) and the Italian government in the amount of US$84 million plus the local counterpart. This project includes the construction of a 469-hectare dam at its maximum elevation of 3,774 meters above sea level, drinking water treatment plants, pipelines to transport drinking water, and an irrigation system for approximately 6,000 hectares. Construction of the dam displaced approximately 1,300 people who were resettled in nearby areas. The execution period is 42 months, and the executing agency is Empresa Misicuni. The Bank will finance the second block of investments (project BO-L1043) in the amount of US$100 million, which will be supplemented with counterpart resources bringing the total to approximately US$110 million. Project BO-L1043 will convey the water, via a low-pressure tunnel, from the main dam to the southern slope of the Tunari mountain range into a reinforced steel penstock that will carry it to the hydroelectric plant located at 2,750 meters above sea level in Molle Molle. The water will then flow into an equalizing reservoir located near the electric power plant, and from

there will be diverted for household use and irrigation. The hydroelectric plant will generate 80 MW and will help boost the National Interconnected System's capacity to meet growing demand and increase the amount of renewable energy in the national energy matrix. The Misicuni Multiple Project will be executed by: (i) Empresa Misicuni, a public enterprise responsible for designing and building the main dam; and (ii) Empresa Nacional de Electricidad (ENDE), responsible for designing and building the hydroelectric plant.

4. Problem addressed, and project strategy and design

1.7 The dam will flood a portion of the farmland that supports the project's beneficiary communities. Despite the relatively low fertility, the communities prefer these lands because they are the easiest to farm, and the risk of frost is significantly lower there than in lands at higher elevations. Since potatoes are highly sensitive to frost, this is an extremely important factor for the communities. The soil on the hillsides has remained more fertile than the soils farmed more intensively in the valleys because of how extensively they have been used. Relocation of the communities to the hillsides will, however, increase pressure on that soil, making it less fertile and increasing the risk of water erosion because of the steepness.

1.8 Construction of the main dam will affect communities' farm and grazing lands. Communities whose lands will be most affected (nearly 16%) are Misicuni and Sivingani, while those least affected will be Putucuni and Aguadas (less than 3%). There will, however, be families from different communities who will lose, in some cases, all of their farmland. No more than 5% of grazing areas available in Patapampa will be affected. In general terms, communities whose farmlands are most affected are the ones whose grazing lands are the least directly affected. Nevertheless, they will be forced to establish new farmlands to the detriment of grazing areas, and failure to incorporate effective technological measures would bring about and increase degradation in the watershed supplying the dam, resulting in sedimentation. Among the measures designed to offset the effects of construction of the dam, Empresa Misicuni, as an entity established under public law[2] to execute and manage the Misicuni Multiple Project, is responsible for the watershed of the same name. Accordingly, Empresa Misicuni has built housing for displaced families from all the affected communities, providing them with basic utilities as well as facilities for education, healthcare, religious worship, unions, sports and other activities.

1.9 Faced with this problem, the Bolivian government is interested in ensuring environmental sustainability in the Misicuni watershed investments, specifically to

[2] Empresa Misicuni was created by Law 951 of 22 October 1987 as an entity organized and operating under public law with management, technical, financial, and administrative autonomy, responsible for execution and operation. Article 4 of Law 951 established phase one of the Misicuni Multiple Project for catchment of drinking water for the city of Cochabamba and its neighboring communities, as well as irrigation water for farmland in the central and lower valley of that department. Subsequently, the Bolivian government instructed ENDE to execute the Misicuni Hydroelectric Project.

help mitigate the possible direct and indirect environmental and social impacts of construction of the main dam. Such mitigation work will be undertaken in the framework of the existing Programa de Manejo Integral de Cuencas [Comprehensive Watersheds Management Program] (PROMIC) for the Misicuni River watershed, prepared for Empresa Misicuni in 2008. The PROMIC includes a works zoning map based on soil erosion and degradation risks that served as a basis for determining intervention measures for the entire watershed, including pilot projects identified for priority areas that include soil conservation and slope stabilization measures and technologies for preventing and reversing the degradation taking place in the watershed. The project proposed to the Bank is based on guidance established under the PROMIC; it applies a series of lessons learned in other Bank operations and projects from similar organizations.

1.10 The project will contribute to implementation of the PROMIC for the Misicuni River watershed, whose strategic lines of action include: (i) investments to protect the watershed and prevent silting of the reservoir, and sediment and erosion risk prevention and control measures; and (ii) the dissemination of soil and water conservation practices tied to local crops that make it possible to reverse the degradation of the watershed and, as a result, increase production, minimize the effects of local climate factors, and diversify sources of income. Priority areas for the application of protection and recovery measures were determined based on the levels of degradation, with priority given to those at high risk for erosion (active sheet erosion and gullying) that would carry sediment to the reservoir. Project activities having to do with the implementation of environmental measures in productive practices will make those communities with the greatest potential for impacting the dam and those whose resources and income will most be affected by the dam a priority. As to the measures proposed, priority has been given to those that prevent and mitigate degradation but require local materials and are labor intensive, in accordance with the conditions of the watershed's communities. Supplemental pilot projects have been developed based on the opportunities afforded by the watershed and future dam to improve the environment and the lives of the families affected.

1.11 **Lessons learned.** Three key lessons can be learned from experience gained on the aforementioned Bank operations: (i) mitigation and protection measures should be developed with the active involvement of local stakeholders and within the framework of master plans for watershed management; (ii) farmers must derive a short-term benefit from the implementation of proposed technological changes; and (iii) the involvement and strengthening of local institutions is key to ensuring the maintenance of public protection infrastructure. The proposed project incorporates these lessons in its design.

1.12 In keeping with the framework agreement signed between Empresa Misicuni and the affected communities, the proposed project will seek to reach all of the communities in sequence, initially by getting families to take part in demonstration pilot projects dealing with sustainable technologies and practices, as well as

alternative economic activities. These pilot projects aim to encourage, by means of demonstration, expansion of the alternative activities, practices, and technologies they promote to all of the watershed's communities. Depending on the proposed measure, and as resources allow, priority will be given to the communities and families most seriously affected by the dam. Outreach, training, and strengthening activities aimed at all communities will be undertaken, however. There will likewise be a direct relationship established between project staff and the communities, based on relationships already forged by Empresa Misicuni through its outreach work.

1.13 **Project consistency with the Sustainable Energy and Climate Change Initiative (SECCI).** The project is consistent with the objectives of the SECCI Adaptation to Climate Change strategic pillar, in that: (i) it promotes investments designed to reduce the Misicuni dam's susceptibility to the impact of erosion and sedimentation, which would be expected to progress faster in the absence of the prevention and reversal measures included under the project; and (ii) it will finance works and promote awareness raising within the beneficiary population with respect to the adoption of practices and technologies that ensure that conservation and protection works be more resistant to climate change.

1.14 **Country strategy.** The project will contribute to the Bank's country strategy with Bolivia for the period 2008-2010 (document GN-2485-2) in the following strategic areas: (i) poverty reduction, social inclusion, and access to basic services, with identified areas of action such as delivery of clean drinking water, support for productive infrastructure, and the availability of energy inputs; (ii) mitigation of impacts from infrastructure projects; and (iii) reduction in vulnerability to natural disasters. Generally speaking, environmental degradation and exposure of people and productive activities to natural threats, together with institutional weaknesses in managing and reacting to natural phenomena, constitute a degree of vulnerability that could exacerbate the effects of natural disasters and increase the risk of physical, socioeconomic, and environmental losses in Bolivia. In this context, watershed management geared toward reversing degradation and decreasing the exposure of people and productive activities to erosion, sedimentation, landslides, and floods is an important measure for reducing such threats.

B. Objective, components, and costs

1.15 **Objectives.** The project objective is to supplement and strengthen measures to mitigate the indirect impacts of the Misicuni Project on the environment and population in the main dam's watershed, and to help ensure the sustainability of the investments made by the Government of the Plurinational State of Bolivia to harness the water resources of the Misicuni River, and support the watershed's environmental and social sustainability. The project's specific objectives are: (i) to reduce susceptibility to erosion, enhance water management, and protect priority habitats in the areas of the watershed most exposed to such risks; and (ii) to promote soil and water conservation measures and sustainable, income-generating

alternatives to subsistence farming within the communities resettled due to construction of the dam.

1.16 **Targets.** The project will pursue the following primary targets: (i) 15% of the priority areas identified in the Misicuni watershed have soil conservation measures and control of water runoff; and (ii) eight communities actively participate in pilot projects that promote agricultural and agroforestry production and employ technologies promoted by the project in at least 50% of the productive areas they manage.

1.17 **Components.** The project has two components: (i) watershed protection and conservation measures; and (ii) pilot projects demonstrating sustainable watershed management activities and practices.

1.18 **Watershed protection and conservation measures** (US$1.617 million). This component will provide financing for:

a. Watershed protection and conservation, including: (i) gully control using stone and wood dams and forest community gabions; and (ii) stabilization of slopes using plant cover (bio-traps) and gabion retaining walls.

b. Protection and recovery of degraded areas, including: (i) slope control using forest community biotraps; and (ii) closure of areas needing to regain plant cover.

c. Management of water runoff, specifically, gabions for gullies, riverbeds, and tributaries, and erosion mitigation measures for access routes to project areas.

d. Forestation and reforestation through the planting small forests in very steep areas, as well as conservation measures for plant and animal life threatened or in danger of extinction, or on which threatened or endangered species feed.

1.19 **Pilot projects demonstrating sustainable watershed management activities and practices** (US$2.595 million). This component will counter the main problems identified as factors with greater impact on the sustainability of the watershed and its ecological and environmental functions, specifically: the use of ineffective farming practices and technologies and failure to employ soil and water conservation measures; the lack of available structures to sustainably manage breeding animals; and the lack of alternatives to farming capable of generating income and, consequently, reducing pressure on the land. Therefore, the component will finance the execution of a set of demonstration pilot projects, to show communities what measures they might institute to address these priority issues: (i) use of new soil and water conservation technologies; (ii) wetlands recovery; (iii) fish farming and fishing; and (iv) raising vegetables using solar tents. These pilot projects will provide nonreimbursable financial support to farmers who agree to use technologies and practices promoted by the project. The financing to be provided will consist of a fixed amount for each eligible technology and up to a maximum aggregate amount per producer for the life of the project. The manner of operation of this system of nonreimbursable transfers will be described in the

project Operations Manual, which will also detail the execution modality for the wetlands recovery project calling for the construction of communal-use works.

1.20 **Cost and financing.** The project is designed as a specific investments loan with a four-year disbursement period. The cost of the operation will be US$5 million. The Bank will provide 70% of the resources from the Ordinary Capital (OC), and the remaining 30% from the Fund for Special Operations (FSO).

Table I-1. Project Cost and Financing
(US$ million)

Investment component	IDB	Total	%
I. Direct costs	4.21	4.21	84.25
2.1 Watershed conservation and protection	1.61	1.61	33.79
2.2 Demonstration pilot projects	2.59	2.59	51.90
II. Project management	0.57	0.57	11.50
III. Monitoring, evaluation, and audits	0.197	0.197	3.95
a. Monitoring and evaluation	0.157	0.157	3.14
b. External audit	0.04	0.04	0.80
IV. Contingencies*	0.015	0.015	0.3
Total	**5.00**	**5.00**	**100**
Percentage	**100**	**100**	**100**

* The Bank financing includes payment of taxes.

C. Results framework with key indicators

Table I-2. Indicators

Key indicators	When measured	Rationale behind their selection
42% of production areas and 30% of families have incorporated conservation measures to prevent soil degradation and improve water management in eight beneficiary communities.	Year 3 of execution	The task of involving communities in conservation and management tasks promoted by the project is the most difficult. Achievement of the project's objectives can be envisioned once the first group of families (30%) has begun to adopt the measures.
At least one fishing and fish farming pilot project and one pilot project for growing vegetables in solar tents are underway.	Start of year 4 of execution	Implementation of the pilot projects will require the communities' voluntary participation, in addition to the development of internal capacity within the executing agency to organize the projects and start execution. The start of these projects will demonstrate how Empresa Misicuni's capacity has matured.

II. FINANCING STRUCTURE AND MAIN RISKS

A. Financing instruments

2.1 The project will finance specific investments, and will be implemented over four years on the following disbursement schedule:

Table II-1. Disbursement Schedule
(US$ million)

Source	Year 1	Year 2	Year 3	Year 4	Total	%
IDB	0.5	1.2	1.8	1.5	5.0	100
Total	0.5	1.2	1.8	1.5	5.0	100
%	10	24	36	30	100	100

B. Environmental and social safeguards risks

2.2 This project has been designed to establish environmental and social mitigation measures for its associated investments—construction of the dam and the Misicuni Hydroelectric Plant (loan BO-L1043)—while making a positive environmental and socioeconomic impact on the watershed. The planned investments for conservation and sustainable management of the Misicuni watershed will therefore have a positive socioeconomic and environmental impact on the quality of life and well-being of the beneficiary communities settled in the watershed, and no adverse direct or indirect social or environmental impacts are foreseen. Based on the expected positive environmental and social impacts, and because the project is consistent with the environmental and social safeguard policies, it has been classified as Category "C." The project will also meet the requirements of the Disclosure of Information Policy (Operational Policy OP-710).

2.3 The indirect environmental and social impact mitigation measures to be financed under the project will include the following: watershed management and conservation, including soil and water conservation, forestation, wetlands recovery, agricultural conservation activities, and technical assistance and training, as well as restoration of the socioeconomic conditions of the communities displaced by the Misicuni dam. In addition to these measures, in order to ensure implementation of the investments in watershed management and other measures included in the project, and based on the institutional analysis, this operation will strengthen the environmental management capacity of Empresa Misicuni's management team by providing it with the necessary human resources and hardware and software. The Operations Manual and the technical regulations, which include the eligibility criteria and procedures for pilot project execution, incorporate issues related to the environmental supervision, evaluation, and monitoring of the project, including guidelines and processes to ensure the environmental and social management thereof, bearing in mind Bolivian legislation governing these areas and the Bank's Environment and Safeguards Compliance Policy.

C. Fiduciary risk

2.4 Empresa Misicuni's institutional capacity for project execution was evaluated using the Institutional Capacity Assessment System (ICAS). The analysis found that Empresa Misicuni's institutional capacity for execution of projects with external financing is "satisfactory," and that the associated institutional risk is "low," with equal ratings in five of the seven systems considered in the analysis, and "acceptable" with medium risk in the two others. The lower individual ratings for the goods and services administration system and the internal control system are positively offset by the higher rating for planning and organization and internal and external control. Empresa Misicuni's execution capacity received the lowest rating with a "medium" grade for development with a "medium" risk level because its human resources are limited and its capacity is committed to obligations already assumed.

2.5 Because of its characteristics, execution of the Misicuni Watershed Environmental Management Project (loan BO-L1053), will not require Empresa Misicuni to develop any specific capacity to execute a Bank operation. In the past, Empresa Misicuni has executed projects financed by other multilateral development agencies such as the Andean Development Corporation (CAF), and so has gained certain experience with the rules and procedures governing the execution of projects with such agencies. Because of this, no improvements matrix, as called for under the ICAS methodology, is necessary since mitigation of shortcomings detected via administrative measures that can be done at the project level is considered to be sufficient. Specifically, additional personnel need to be provided in order to create the project execution unit (PEU), which must have a project executive coordinator and support staff for accounting/finance and procurement, and consultants at certain times to provide support for technical execution of the components. Empresa Misicuni will cover the operation and maintenance costs for the planned works.

D. Economic viability

2.6 The activities proposed for the project have been subjected to a cost-effectiveness assessment based on the following considerations: (i) actions associated with comprehensive watersheds management are regarded as actions involving "public goods," since the main benefits are public in nature, in terms of both restoring the watersheds' ecological functions and associated social factors; (ii) the measures planned under the Misicuni Watershed Environmental Management Project are typical of comprehensive watersheds management, and the benefits expected from project activities are also "public goods" inasmuch as they promote the sustainability of the watershed's ecological functions; and (iii) the project includes the introduction of agricultural best practices and new income-generating activities, which will yield "private" benefits from improvements in production sustainability; these benefits will be captured by the beneficiaries, albeit in the medium and long term.

2.7 Two criteria have been used to ensure that the financed activities are cost-effective: (i) selection of biophysical measures and agricultural practices that are more effective in the reversal and/or mitigation of watershed degradation and increasing production with subsidiary environmental value; and (ii) selection of execution methods that require minimum implementation costs and use local materials and labor and methods that reduce demand for capital-intensive manufactured inputs. The economic evaluation methodology adopted for the project also utilized, as a reference, those measures more effectively instituted under the Programa Manejo Integral de Cuencas [Comprehensive Watersheds Management Program] (PROMIC) and the proposals contained in the portfolio of the Plan Nacional de Cuencas [National Watersheds Plan]. On this basis, the application of agricultural practices and watershed conservation and protection measures are expected to: (i) reduce erosion and degradation in the measures' area of influence, as well as the loss of productive soils, up to 75% as compared to a condition without such measures; (ii) improve water management, with priority given to reducing erosion and greater filtration, up to 17% as compared to a condition without such measures; (iii) increase incoming stemming from agricultural, fishing, and forestry activities up to 55% as compared to a condition without such measures; (iv) improve water quality through less use of agrochemicals and less sedimentation due to lower erosion up to 40% and 50%, respectively; (v) increase plant coverage in the watershed, as compared to a condition without the project; and (vi) raise awareness and increase knowledge in the communities about comprehensive watershed management and the importance of protecting the environment and natural resources. The costs of the measures planned under the Misicuni project, with the effectiveness demonstrated above, fall within the order of magnitude of the experiences in the watersheds of the Tunari mountain range (southern slope), and Taquiña, Pajcha, and Pintu Mayu, Khora Tiquipaya, La Llave, and Huallaquea, Chocaya, and Pairumani.

III. IMPLEMENTATION AND MANAGEMENT PLAN

A. Project execution and management

3.1 The borrower for this project will be the Government of the Plurinational State of Bolivia, and the executing agency will be Empresa Misicuni. **A subsidiary agreement will be signed between the borrower and Empresa Misicuni, as a condition precedent to the first disbursement of the Bank loan proceeds.** Empresa Misicuni will create a project execution unit (PEU) reporting directly to the chairman of its board of directors. The president of Empresa Misicuni will be in charge of general coordination, with support from the PEU.

3.2 The PEU will have: (i) an executive coordinator; (ii) a civil engineer, responsible for Component 1; (iii) an agriculture specialist, responsible for Component 2; (iv) a monitoring and evaluation specialist; (v) a financial management specialist; and (vi) a procurement specialist. **The executive coordinator and consultants will be selected and appointed for the PEU, as a condition precedent to the first**

disbursement. The PEU's work will be supplemented by the contracting of other specialists (an agronomist, civil engineer, and community development specialist), who will work as consultants in execution of the components. Furthermore, **the executives and technical staff of Empresa Misicuni line units involved in project execution as a counterpart and source of support for the PEU will be appointed, as a condition precedent to the first disbursement.** The executive coordinator, who will possess technical competence and sufficient experience in the specific issues of the project, will be contracted using loan resources to work full time throughout the project execution period. He or she will also be responsible for project implementation in the field and the technical and environmental oversight of project activities, including regular inspections of the works and monitoring of their operation and maintenance. The executive coordinator will ensure fluid and ongoing contacts with Empresa Misicuni's technical and administrative units.

3.3 The basic responsibilities of the PEU will be to: (i) prepare the bid specifications for hiring consultants and procuring goods and services; (ii) organize and monitor the bidding processes; (iii) award and manage contracts; and (iv) conduct technical and administrative oversight and supervision of contracts for goods and consulting services required for effective implementation of the project.

3.4 The PEU will also be responsible to the Bank for: (i) coordinating all MHP-related activities on an ongoing basis; (ii) preparing physical-financial status reports on the operation; (iii) delivering no objection and loan disbursement requests pursuant to the procurement plan, and maintaining accounting records, which will be used as the principal source for preparing such requests and any financial reports; (iv) implementing and maintaining a control system that ensures the proper use and safeguarding of the loan proceeds, as well as maintaining files that document project transactions; and (v) preparing and submitting, in a timely fashion, all documentation requiring the Bank's consideration as well as any technical reports the Bank might request. The PEU will act as a permanent link between Empresa Misicuni and the Bank and will be responsible for the timely performance of all contractual clauses of the loan contract and all agreements and project-related activities.

3.5 For the execution of Component 2, the PEU will select, via a competitive process and pursuant to Bank procurement policies, the service providers who will execute the pilot projects under terms of reference agreed upon with the Bank. The PEU will employ the following criteria for selecting these service providers: (i) experience in the specific subject-matter of each pilot project; (ii) key personnel with broad competence in the specific subject-matter of the pilot project; (iii) knowledge of and access to effective methodologies for executing the pilot projects; (iv) capabilities and experience in technology transfer to the beneficiaries; and (v) submission of technical proposals that ensure the economic feasibility of the activities to be financed. The candidates selected will enter into execution agreements with the executing agency under which a system of payment against evidence of outcomes will be established.

3.6 According to the project Operations Manual, the PEU will work in close coordination with Empresa Misicuni's line units and will rely on Empresa Misicuni's current programming, execution, and control capabilities. In addition, external control will be based on the capacity of independent external auditors eligible for the Bank.

3.7 **Revolving fund**. Proceeds from the Bank loan will disbursed to the executing agency using a revolving fund of up to 5% of the loan amount.

3.8 **Procurement.** Goods and related services, and works will be procured in accordance with the Policies for the Procurement of Goods and Works Financed by the Inter-American Development Bank (document GN-2349-7), and consulting services paid for with project resources will be selected and contracted in accordance with the Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank (document GN-2350-7), as set forth in the loan contract and the procurement plan. The procurement plan for the first 18 months is provided as an annex. This plan will be updated annually and whenever substantial changes are made. Based on the positive findings of the analysis using the Institutional Capacity Assessment System (ICAS), Bank supervision of the initial procurement and contracting for the project for each selection modality will be on an ex ante basis, and thereafter may be on an ex post basis. Sole-source contracting will be subject to ex ante review.

3.9 In order to mitigate one risk identified during preparation—the executing agency's lack of installed technical capacity to assume the new functions required for execution of this project—the contracting of technical staff who specialize in watershed management and have broad experience in the project area is planned, so as to capitalize on available expertise in the region. During the preparation phase, experts were hired via a competitive process to support the task of determining the watershed conservation and protection measures. Pursuant to paragraph 5.4(a) of the Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank (document GN-2350-7)—"tasks that are a continuation of previous work that the consultant has carried out and for which the consultant was selected competitively"—staff involved in the preparation phase may be contracted on a sole-source basis for project execution. Such contracting would constitute a natural continuation of the services provided during the preparation stage and would lend continuity to the project; this will also make it possible to shore up the executing agency's technical capacity and accelerate the project preparation and startup process.

3.10 **Audit.** The executing agency will submit the project annual financial statements, audited by an eligible independent auditing firm selected pursuant to Bank policies and procedures. During execution, these audited financial statements will be delivered annually within 120 days after the close of each fiscal year. Audit costs will be covered with the Bank loan proceeds.

B. Monitoring and evaluation

3.11 **Monitoring.** Throughout project execution, the executing agency will deliver monitoring reports on project activities to the Bank, for its approval, no later than 30 May and 30 November. To this end, the executing agency will have a monitoring and evaluation system that integrates financial and accounting information with information on project outputs and outcomes. The reports will focus on the fulfillment of output indicators and progress toward the outcomes specified in the Results Matrix (see Annex II), analyze problems encountered, and indicate the corrective measures taken. The reports deliverable by 30 November of each year will also include the annual work plan for the subsequent year, with projected disbursements and an updated procurement plan. The reports will be reviewed at semiannual meetings between the Bank and the executing agency.

3.12 **Evaluation.** The executing agency will deliver to the Bank: an evaluation report 18 months into the execution period, counted from the effective date of the loan contract; a midterm report within 60 days after the date on which 50% of the loan proceeds have been disbursed; and a final evaluation report within 60 days after the date on which 90% of the loan proceeds have been disbursed. Terms of reference for these reports will require the Bank's no objection. These reports will address: (i) progress toward the targets identified in the Results Matrix; (ii) the extent to which contractual obligations have been met; (iii) the effectiveness of the monitoring and evaluation system; (iv) effectiveness of soil and water conservation measures; and (v) effectiveness of the pilot projects in terms of promoting agricultural and agroforestry practices and other sustainable activities. The final report will also address: lessons learned; the extent to which the activities are sustainable; the level of public spending going to health and safety services at project-end; and the pending challenges related to delivery of services to users, especially technical assistance services in the areas of production, conservation, health, and safety. Evaluations will be conducted independently. Once agreed between the executing agency and the Bank, evaluation reports will be released to the public on the executing agency's website. The reports will remain available to the executing agency or the Bank, if either decides to conduct an ex post review after completion of the project.

C. Development activities during project execution

3.13 In order to provide flexibility and allow communities to be involved in the development of the pilot projects, project execution will be guided by a series of eligibility, technical, and cost criteria contained in the technical regulations for project execution. **The president of Empresa Misicuni will approve the Operations Manual and Technical Regulations for project execution, as a condition precedent to the first disbursement.**

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RESULTS MATRIX

Project objective	• General objective: To mitigate the indirect impacts of the Misicuni Project on the environment and population in the main dam's watershed, and to help ensure the sustainability of the investments made by the Government of the Plurinational State of Bolivia to harness the water resources of the Misicuni River. • Specific objectives: (i) To involve the communities settled in the dam's watershed in its protection by promoting the introduction of conservation measures and measures to protect priority natural habitat; (ii) to promote sustainable farming practices and new productive activities designed to improve food security and raise income levels in the communities displaced by the hydroelectric project.	
Results indicators	**BASELINE** **(Problem To Be Addressed)**	**GOAL** **(Project Outcome)**
	• Twenty-five to thirty percent of the dam's watershed—on both the hillsides and in the gullies—is affected by degradation that must be mitigated in order to ensure the benefits of the dam; • The communities have received financial compensation, their homes have been rebuilt with basic utilities included, schools, etc. as part of the compensation measures implemented by Empresa Múltiple Misicuni. However, this has not solved the problem of land scarcity, which will lead the communities to extend their crops and/or reduce fallow time on the lands located on the hillsides. • Population growth in the communities will increase pressure on the hillsides, making it necessary to plan soil and water conservation measures. • The most vulnerable families and the families who have lost the most land may see their food security jeopardized, with serious repercussions for their health and well-being. • Although a number of studies have been conducted on the watershed, there is no reliable baseline for the current situation of the affected families.	• Soil conservation measures and water runoff regulation implemented in 15% of priority areas identified in the Misicuni watershed; • Eight communities take active part in pilot projects that promote economic diversification and are implementing the soil and water conservation technologies promoted by the project in 50% of the productive areas they manage; • 10% of the communities have incorporated new productive activities (solar tents, fishing, fish farming, etc.); • Baseline for the agricultural situation in the affected communities developed with their participation and a monitoring system is established for the main indicators selected.

	Baseline	Year 1	Year 2	Year 3	Year 4	Goal	Remarks
Component 1: **WATERSHED PROTECTION AND CONSERVATION MEASURES**							
Output 1: Watershed protection and conservation works							
1.1 Structures to control gullies and stabilize slopes. **Unit: Number of gullies and/or hectares** • Control gullies with forest community stone dams (m3) • Control gullies with forest community wooden dams (m2) • Control gullies with forest community gabions (m3) • Stabilization of gully slopes with forest community biotraps (m2) _____ • Stabilization of slopes with gabion retaining walls (m3) • Control of erosion on slopes with forest community biotraps (m2)	(1) <u>Current condition of the gullies in the dam's area of influence</u>: 5,460 hectares with active gullies (classified on maps as mildly active, expanding, and priority) Of these, approximately **1,000 hectares have been categorized as priorities in need of immediate intervention** (ii) <u>Current condition of the slopes in the areas surrounding the dam</u>: 6,300 hectares with very steep slopes prone to landslides and erosion (in areas classified as moderately active and priority)		**107.4** hectares of gullies with their slopes plus **8.4** hectares of slopes worked on in areas surrounding the dam (hectares affected by the works) 30%	**143.2** hectares of gullies with their slopes plus **11.2** hectares of slopes worked on in areas surrounding the dam (hectares affected by the works) 40%	**107.4** hectares of gullies with their slopes plus **8.4** hectares of slopes worked on in areas surrounding the dam (hectares affected by the works) 30%	**35** % (358 hectares) of priority gullies and slopes with: (i) sediment retention and stabilization measures on 358 hectares; and (ii) slope stabilization measures on 28 hectares Detail: (i) **5 of 7 gullies worked on over 358 hectares** 5 of 7 gullies with stone walls (equal to 37.29 hectares); with wooden dams (equal to 37.29 hectares); with gabion retaining walls (equal to 58.29 hectares); and biotraps (equal to 223.71 hectares) (ii) **4 of 8 slopes worked on over 28 hectares** 4 of 8 slopes with gabion retaining walls (equal to 28 hectares) and with biotraps (equal to 28 hectares)	

	Baseline	Year 1	Year 2	Year 3	Year 4	Goal	Remarks
	Of these, **8 slopes constitute a priority, needing immediate intervention, and 4 are near the dam and involve action on 28 hectares** (Map of critical gullies and slopes around the dam)						
1.2 Construction of works to protect and recover degraded areas. **Unit: hectares of degraded hillsides** Control hillsides with forest community biotraps and closure to regain plant cover (m2)	Condition of degraded areas: In approximately 50% (6,000 hectares) of the lands used for farming and raising livestock in the dam's area of influence, there are areas prone to sheet erosion and landslides **9 zones directly related to the dam constitute priorities for intervention; they are located on the east and west sides of the dam and involve 115 hectares (approx. 2% of the total)**		**12** hectares with protection and recovery works for degraded areas in the areas surrounding the dam (hectares affected by the works) 10%	**46** hectares with protection and recovery works for degraded areas in the areas surrounding the dam (hectares affected by the works) 40%	**57** hectares with protection and recovery works for degraded areas in the areas surrounding the dam (hectares affected by the works) 50%	**Intervention in 115 hectares in 9 zones (100% of the degraded areas prioritized and requiring immediate intervention) in the area directly adjoining the dam where 8 beneficiary communities of the project are located** (2% of the total degraded area) in the process of recovery via biomechanical protection means 9 zones between gullies and lands for farming and raising livestock, 4 to the east and 5 to the west, equal to 115 hectares	

	Baseline	Year 1	Year 2	Year 3	Year 4	Goal	Remarks
1.3 Construction of water control works to manage water runoff. **Unit: Number of works and/or hectares** • Water control in riverbeds, tributaries, and gabion works (m3) • Environmental mitigation measures on roads	Condition of areas with high levels of runoff (tributaries): 1,710 hectares suffering from degradation and instability because of tributary runoff (within broadening gullies) Of these, 16 tributaries (one third) are marked for priority and immediate intervention (approx. 74 hectares) (Map of tributaries with broadening gullies)		**29.32** hectares with water control works and environmental mitigation of roads (hectares affected by the works) 40 %	**29.32** hectares with water control works and environmental mitigation of roads (hectares affected by the works) 40%	**14.67** hectares with water control works and environmental mitigation of roads (hectares affected by the works) 20%	**Interventions in 73.33 hectares in 16 zones (35% of tributaries marked for intermediate intervention)** in tributary runoff areas with water control measures and environmental mitigation of roads One third of 16 tributary areas with gabions (equal to 73.3 hectares) and with environmental mitigation measures for roads (equal to 73.3 hectares)	
Output 2: Protection works for priority habitats							
2.1 Planting of native species in very steep areas **Unit: Very steep hectares** Forestation with small forests in very steep areas (rocks and plants) (m2)	**Condition of the very steep areas:** 3,100 hectares of very steep land that have lost plant cover, suitable for the planting of native forests		**20** hectares of very steep land planted with the khiswara, khehuiña, and thola species in parts of 7 communities 20%	**40** hectares of very steep land planted with the khiswara, khehuiña, and thola species in parts of 7 communities 40%	**40** hectares of very steep land planted with the khiswara, khehuiña, and thola species in parts of 7 communities 40%	**Interventions performed on 100 hectares in 28 areas (100% of the areas and high-risk hectares, equal to 3% of the hectares in the dam's entire area of influence)** in very steep areas planted with native species	

	Baseline	Year 1	Year 2	Year 3	Year 4	Goal	Remarks
	Within these areas, 28 sites, which account for 100 hectares (approx. 3%) have been given priority because of their direct relationship to the dam in the high areas, because they are high-risk and require immediate intervention, and because they are not being farmed (Map of rocky areas with vegetation)					28 sites in high areas, 16 to the east and 12 to the west (equal to 100 hectares)	
Component 2: PILOT PROJECTS DEMONSTRATING CONSERVATION MEASURES AND SUSTAINABLE WATERSHED MANAGEMENT							
Output 3: Soil and water conservation measures							
3.1 Promotion of soil and water conservation measures	Communities use farming practices and technologies that have an impact on soil and water conservation and reduce the sustainability of their income in the long term	Opening of a competitive bidding process for execution of the pilot project	Execution of the pilot project begins with coverage of 100 hectares Community workshops in 8 communities	Coverage of 125 hectares in the pilot project 4 additional community workshops	Coverage of 20 hectares in the pilot project 4 additional community workshops		

	Baseline	Year 1	Year 2	Year 3	Year 4	Goal	Remarks
Output 4: Wetlands recovery							
4.1: Wetlands recovery **Unit: Project** - Construction of works to recover wetlands	There are 14 wetland areas used as animal drinking troughs affected by the construction of the tunnel		**1** wetland area recovered		**1** wetland area recovered	**2** wetland areas recovered for livestock and farming with measures for alternative recharging sources	
Output 5: Fishing and fish farming							
4.2: Introduction of fishing and fish-farming activities	Families displaced by the construction of the dam work exclusively in farming under uncertain conditions		**1** fishing and fish-farming pilot project under way		**1** fishing and fish-farming pilot project under way	**2** nonindustrial fishing and fish farming projects being managed by families affected by the dam	
Output 6: Solar tents							
4.3: Vegetable growing in solar tents	Families displaced by the construction of the dam work exclusively in farming under uncertain conditions	**1** demonstration pilot project under way	**1** pilot project for growing vegetables in solar tents under way		**1** pilot project for growing vegetables in solar tents under way	**3** projects growing vegetables with solar tents being managed by families affected by the dam	

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PROCUREMENT PLAN

Reference no.	Description of contract and estimated cost of procurement (US$)		Estimated cost of procurement (US$)	Procurement method	Review (ex ante or ex post)	Source of financing		Prequalification	Estimated dates		Status
						IDB (%)	Local (%)		Publication of specific procurement notice	Completion of contract	
1. WORKS											
1	Item:	Watershed and priority habitat conservation and protection measures - Component 1	1,617,619	National competitive bidding (NCB)	Ex ante	100%	0%	No	Semester 2	Semester 8	
2	Item:	Wetlands recovery works - Demonstration pilot project 2	532,000	NCB	Ex ante	100%	0%	No	Semester 2	Semester 8	
2. GOODS											
3	Item:	Purchase of vehicle	40,000	Price comparison (PC)	Ex ante	100%	0%	No	Semester 1	Semester 2	
4	Item:	Purchase of computer hardware and GPS	40,000	PC	Ex post	100%	0%	No	Semester 1	Semester 2	
5	Item:	Purchase of satellite images	31,118	PC	Ex post	100%	0%	No	Semester 1	Semester 2	

4. CONSULTING FIRMS

6	Item:	Contractor for demonstration pilot projects 1	270,000	Quality- and cost-based selection (QCBS)	Ex ante	100%	0%	No	Semester 2	Semester 8	Quality-based selection (QBS) might be used depending on the need to develop a short list
7	Item:	Contractor for demonstration pilot projects 2	228,000	QCBS	Ex ante	100%	0%	No	Semester 2	Semester 8	QBS might be used depending on the need to develop a short list
8	Item:	Contractor for demonstration pilot projects 3	87,000	QCBS	Ex ante	100%	0%	No	Semester 2	Semester 8	QBS might be used depending on the need to develop a short list
9	Item:	Contractor for demonstration pilot projects 4	129,000	QCBS	Ex ante	100%	0%	No	Semester 2	Semester 8	QBS might be used depending on the need to develop a short list
10	Item:	Audit firm to provide external audit services for the project	40,000	Least-cost selection (LCS)	Ex post	100%	0%	No	Semester 2	Semester 8	

11	Item:	Consulting firm to monitor, evaluate, and develop a baseline	157,000	QCBS	Ex post	100%	0%	No	Semester 2	Semester 8	
5. INDIVIDUAL CONSULTANTS											
12	Position:	Project coordinator	144,000	National Individual Consultant selection based on Qualifications (QCNI)	Simplified ex ante	100%	0%	No	Semester 1	Semester 8	
13	Position:	Agricultural production specialist	72,000	QCNI	Simplified ex ante	100%	0%	No	Semester 1	Semester 8	
14	Position:	Civil works specialist	72,000	QCNI	Simplified ex ante	100%	0%	No	Semester 1	Semester 8	
15	Position:	Monitoring and evaluation specialist	72,000	QCNI	Simplified ex ante	100%	0%	No	Semester 1	Semester 8	
16	Position:	Procurement specialist	36,000	QCNI	Simplified ex ante	100%	0%	No	Semester 1	Semester 6	
17	Position:	Finance specialist	48,000	QCNI	Simplified ex ante	100%	0%	No	Semester 1	Semester 8	