



## Simplified Procedure

On or after: 3 August 2005

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**To:** The Board of Executive Directors  
**From:** The Secretary  
**Subject:** Guatemala. Proposal for a loan for a program for the environmental restoration of the Lake Amatitlán watershed

**Basic Information:** Borrower ..... Republic of Guatemala  
Amount ..... up to US\$18,870,000  
Source ..... Single Currency Facility of the Ordinary Capital

**Inquiries to:** Mr. Sergio Ardila (extension 2483)

**Remarks:** This operation was included in the country strategy approved by the Board of Executive Directors on 31 May 2005 (document GN-2355-1), and its amount does not exceed the ceiling established for Group D countries.

**References:** GN-1838-1(7/94), DR-398-5(5/03)

**Other distribution:** Representative in Guatemala

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

**GUATEMALA**

**PROGRAM FOR THE ENVIRONMENTAL RESTORATION OF THE  
LAKE AMATITLÁN WATERSHED**

**(GU-0066)**

**LOAN PROPOSAL**

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### Annex I      Logical framework

### Proposed resolution

Electronic Links and References	
Basic Socioeconomic Data	<a href="http://www.iadb.org/RES/index.cfm?fuseaction=externallinks.countrydata">http://www.iadb.org/RES/index.cfm?fuseaction=externallinks.countrydata</a>
Status of loan in execution and loans approved	<a href="http://ops/approvals/pdfs/GUen.pdf">http://ops/approvals/pdfs/GUen.pdf</a>
Tentative lending program	<a href="http://opsgs1/ABSPRJ/tentativelending.ASP?S=GU&amp;L=EN">http://opsgs1/ABSPRJ/tentativelending.ASP?S=GU&amp;L=EN</a>
Information available in the RE2 technical files	<a href="http://opsws3.reg.iadb.org/ibddocswebservices/getDocument.aspx?DOCNUM=532600">http://opsws3.reg.iadb.org/ibddocswebservices/getDocument.aspx?DOCNUM=532600</a>
Annex II – Procurement plan	<a href="http://ibddocs.iadb.org/WSDocs/getDocument.aspx?DOCNUM=562986">http://ibddocs.iadb.org/WSDocs/getDocument.aspx?DOCNUM=562986</a>

## ACRONYMS AND ABBREVIATIONS

AMSA	Autoridad para el Manejo Sustentable de la Cuenca y del Lago de Amatitlán [Authority for the Sustainable Management of the Amatitlán Watershed and Lake]
AWP	Annual work plan
CONAMA	Comisión Nacional del Medio Ambiente [National Commission on the Environment]
EIA	Environmental impact assessment
EMPAGUA	Empresa de Agua de Ciudad de Guatemala [Guatemala City Water Company]
FSO	Fund for Special Operations (IDB)
GIS	Geographic Information System
ICB	International competitive bidding
LAW	Lake Amatitlán Watershed
LCB	Local competitive bidding
MARN	Ministry of Environment and Natural Resources
NGO	Nongovernmental organization
OC	Ordinary Capital (IDB)
OPEC	Organization of the Petroleum Exporting Countries
PCR	Project completion report
PLANDEAMAT	Plan de Mediano y Largo Plazo para el Manejo Sostenible de la Cuenca [Medium- and Long-term Sustainable watershed management plan]

## PROJECT SUMMARY

### GUATEMALA

#### PROGRAM FOR THE ENVIRONMENTAL RESTORATION OF THE LAKE AMATITLÁN WATERSHED (GU-0066)

Financial Terms and Conditions <sup>1</sup>				
<b>Borrower:</b> Republic of Guatemala <b>Executing agency:</b> Autoridad para el Manejo Sustentable de la Cuenca y del Lago de Amatitlán [Authority for the Sustainable Management of the Amatitlán Watershed and Lake] (AMSA)			<b>Amortization period:</b>	25 years
			<b>Grace period:</b>	4 years
			<b>Disbursement period:</b>	4 years
<b>Source</b>	<b>Amount</b>	<b>%</b>	<b>Interest rate:</b>	Variable
IDB (Ordinary Capital)	US\$18,870,000	79	<b>Credit fee:</b>	0.25%
Local	US\$ 5,130,000	21	<b>Currency:</b>	United States dollars
Total	US\$24,000,000	100		
Project at a glance				
<b>Project objective:</b> <p>The program's goal is to reverse the current trend of environmental degradation in the Lake Amatitlán Watershed (LAW) in order to improve quality of life in the metropolitan area of Guatemala City. Given the magnitude of the problems, the purpose of this first program is to lay the groundwork for a medium-term environmental management plan to be agreed to by the various authorities involved in the watershed. The specific objectives of this program—the first in a series of interventions with the same goal—will be to strengthen AMSA as the watershed's environmental management authority with the capacity to analyze and implement subsequent stages of the PLANDEAMAT and to coordinate actions with municipal and national authorities; improve garbage collection and disposal services in the municipios in the southern part of the watershed; and stabilize the Villalobos riverbed so as to reduce the amount of sediment entering Lake Amatitlán and the risks to nearby infrastructure.</p>				
<b>Special contractual conditions:</b> <p>The conditions precedent to the first disbursement of the loan are as follows: (i) a funds transfer agreement must be signed by the Ministry of Public Finance and AMSA spelling out, among other things, how the loan resources and counterpart funds will be transferred, and what obligations AMSA will assume as executing agency; and (ii) the hiring of an operational management advisor (paragraph 3.13).</p> <p>Special disbursement to initiate program activities. The Bank may disburse up to the equivalent of US\$60,000 once the conditions set out in Clause 4.01(a), (b), (e), and (g) of the General Conditions of the loan contract have been met and the agreement referred to in (i) above for the hiring of the operational management advisor has been signed (paragraph 3.13).</p>				
<b>Special contractual clauses for the disbursement of funds for certain activities under Component II:</b> Prior to the disbursement of loan proceeds for the construction and operation of the new landfill, AMSA must present to the Bank's satisfaction: (i) an agreement signed by all the mayors of the municipios that will use the landfill, ratifying the commitments making it possible to guarantee that the costs of operating and maintaining the new landfill will be covered, as agreed to as a result of the improvement studies; (ii) an environmental impact assessment (EIA) approved by the Ministry of Environment and Natural Resources (MARN); and (iii) certification that the land required for the construction has been acquired (paragraph 3.19).				
<b>Special contractual clauses for the disbursement of funds for certain activities under Component III:</b> Prior to the disbursement of resources for the activities to stabilize the riverbed and slopes of the Villalobos River and its main tributaries, evidence will be presented to the Bank's satisfaction that the EIA has been approved by the MARN (paragraph 3.21).				
<b>Exceptions to Bank policies:</b> None.				
Project consistent with country strategy:    Yes [ <input checked="" type="checkbox"/> ]                      No [ <input type="checkbox"/> ] Project qualifies as:                                      SEQ [ <input type="checkbox"/> ]                      PTI [ <input type="checkbox"/> ]                      Sector [ <input type="checkbox"/> ]                      Geographic [ <input type="checkbox"/> ]                      Headcount [ <input type="checkbox"/> ]				
Verified by CESI on: 3 June 2005 Procurement: See cross-reference paragraphs 3.24 to 3.28				

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<sup>1</sup> The interest rate, credit fee, and inspection and supervision fee mentioned in this document are established pursuant to document FN-568-3 Rev. and may be changed by the Board of Executive Directors, taking into account the available background information, as well as the respective Finance Department recommendations. In no case will the credit fee exceed 0.75%, or the inspection and supervision fee exceed 1% of the loan amount.\*

\* With regard to the inspection and supervision fee, in no case will the charge 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. FRAME OF REFERENCE

### A. Environmental problems of the watershed

- 1.1 The Lake Amatitlán Watershed (LAW) measures 381 km<sup>2</sup> and encompasses portions of 14 municipios. According to the 2002 census of the Instituto Nacional de Estadística [National Institute of Statistics], the total population in the area is 1.45 million inhabitants. One third of the watershed's population resides in the southern part of Guatemala City<sup>1</sup> and a good portion of the rest lives in the southern part of Mixco and in five medium-sized towns.<sup>2</sup> The watershed's serious environmental problems affect the quality of life of most of its inhabitants, creating adverse effects on health, and endangering natural resources considered valuable in the country. Lake Amatitlán is located in the lower part of the watershed. It measures 14.9 km<sup>2</sup> and its volume is 286 million cubic meters. To a large extent, it is the receptor and indicator of the watershed's environmental problems.
- 1.2 The principal environmental problems identified in the watershed are grouped as follows:
  - a. Proliferation of illegal garbage dumps, due to the disorganized and inadequate disposal of approximately 70% of the waste generated in the area. In addition to being the source of diseases that affect residents, these dumps contribute to polluting rivers, streams, and aquifers and, further downstream, to polluting the lake.
  - b. Instability of the bed and slopes of the Villalobos River and its principal tributaries, which has resulted in a gradual silting up of Lake Amatitlán due to the large volume of sediment carried by the waters that feed into it. The instability of the principal riverbeds has unleashed a process of backward erosion that threatens infrastructure (bridges, housing) located in the middle and lower reaches of the watershed.
  - c. Pollution of the watershed's river network and of Lake Amatitlán itself, caused by the discharge of untreated wastewater from practically all the households and the 900 industries with sewage systems in the area. The river flow and wastewater discharged into the sub-watersheds of the Platanitos, Pinula, Las Minas, El Bosque, Molino, San Lucas, and Parrameño rivers flow into the

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<sup>1</sup> The northern part of Guatemala City drains into the Motagua River watershed (Atlantic slope) and the southern part and a portion of Mixco drain into the LAW (Pacific slope). In order to protect Lake Amatitlán, part of the wastewater from southern Guatemala City was diverted to the Motagua watershed in the 1970s, with a Bank-financed project. At that same time, and for the same reason, isolated solutions for the waste disposal problem were encouraged.

<sup>2</sup> Mixco and the five municipios have a population of 959,000 inhabitants, distributed as follows: Mixco (southern) 283,000; Villanueva 356,000; Villa Canales 104,000; San Miguel Petapa 101,000; Santa Catarina Pinula 32,000; and Amatitlán 83,000; the latter is located on the lakeshore.



Villalobos River, which functions as an open-air sewer emptying into Lake Amatitlán, practically converting it into a treatment lagoon.

- d. Pollution of the watershed's groundwater aquifers, and overexploitation and risk of contamination of the deeper ones, which are the water source for 590,000 inhabitants of Guatemala City and 900,000 inhabitants of other municipios in the watershed, due to the proliferation of inadequate individual wastewater disposal systems.
- e. Lack of conservation efforts in the few protected natural areas in the watershed and, consequently, significant lack of nature-related recreational opportunities throughout the metropolitan area.

1.3 These problems result from a combination of factors, including:

- a. An annual population growth rate in the municipios of the LAW ranging between 4.1% and 7.7% during the 1981-2002 period. This was bolstered to a large extent by unanticipated migration from low-income rural areas, which resulted in uncontrolled land use and serious deficiencies in sanitation services.
- b. Weak and inefficient institutional frameworks, both at the level of the municipios (which are responsible for providing public sanitation services) and at the level of the central and regional environmental authorities; as a result, the necessary social agreements and control and regulatory actions have not been developed.
- c. Lack of familiarity with and understanding of the problem (information, technical studies, etc.) among decision makers and the population as a whole; therefore, a lack of political will to tackle the problems.

1.4 **Land use.** Uncontrolled urban growth has occurred in the municipios on the outskirts of Guatemala City. Unlike growth in the capital, land use in these areas was not accompanied by a planned process to provide urban services, including water and sewage. It is estimated that the area occupied in the watershed grew from 6,900 hectares in 1984 to 14,885 hectares in 1997, representing an annual growth rate of more than 6%; this declined in the following years to a 4.7% population growth rate. In the municipios targeted by the program that have coalesced with Guatemala City, new housing developments are dispersed in urban "islands" whose locations are determined by real estate developers and by geomorphological conditions (deep ravines drain into the river network, causing breaks that are difficult for the sanitary network to bridge), having to resolve, semi-independently, their needs for basic service (water, sewage, treatment) and urban infrastructure.

1.5 Rapid urbanization has "sealed off" a sizeable portion of the surface of the watershed, thus contributing to increased peak flows from roadways; it has also eliminated plant cover from fragile lands along the ravines, accelerating erosion.

This has been aggravated in part by inadequate wastewater disposal in higher areas. In addition, the practically uncontrolled extraction of construction materials (sand) from riverbeds, mainly in the lower reaches of the Villalobos River, has contributed to the severe problems of riverbed and slope stability, and increased the sediment load of the waters flowing into the lake. This situation can affect inhabited areas and major infrastructure such as roads and bridges, since riverbed instability in the lower river is generating backward erosion toward the upper parts of the river.

- 1.6 Attempts have been made to remedy the situation caused by the absence of land-use planning, regulation, and control through the application of specific sectoral or municipal regulations (municipal regulations on subdivisions, central agency regulations on land reserves for educational, recreational and forestry purposes). However, since these efforts were made without a comprehensive view of the problem, they have not taken into account the need for urban and regional environmental management.
- 1.7 **Public services.** In principle, garbage collection services are the responsibility of the municipalities. Nonetheless, for some 30 years, these services have been provided by private small-scale entrepreneurs, who set prices by negotiating individually with service users, apparently under competitive conditions.<sup>3</sup> The average cost per household ranges between US\$2 and US\$3/month in the area. This arrangement has three main shortcomings: (i) there is no obligation to use the service; therefore a large percentage of households do not use the collection services and dispose of their waste in illegal and inappropriate places, mainly the ravines; (ii) there is no clear incentive for collectors to transport garbage to disposal sites or to provide regular service; this may contribute in part to the proliferation of illegal dumps; and (iii) this system may be generating higher than necessary collection costs because different collectors sometimes serve the same neighborhoods. Something that can be said for the existing system is that, so long as no collusion exists among providers, competition maintains rates in line with collection costs. This system operates partially in consolidated areas; in marginal areas, where not all inhabitants can afford to pay the rates charged by the entrepreneurs, the service is supplemented in very limited fashion by local organizations. For example, the municipalities provide garbage collection services in public places (schools, market places, etc.), and some provide services in small, central residential areas.
- 1.8 The garbage collected in the municipios of Villanueva, Villa Canales, San Miguel Petapa, Amatitlán, Palín, southern Mixco, and Santa Catarina Pinula is taken to a site located at kilometer 22 of the highway to the Pacific (Villanueva municipio) for final disposal. Guatemala City has a disposal site for its waste. The site at

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<sup>3</sup> About four years ago a private garbage collection association (ECORECUENCA) was created with 35 members (approximately 50 vehicles). According to its directors, its purposes are to protect the interests of its members, coordinate the definition of service delivery areas, and protect the environment.

kilometer 22 formerly operated as an open-air dump but AMSA has undertaken rehabilitation works to convert it into a sanitary landfill. AMSA spends about US\$37,500/month on this effort but only receives around US\$8,800/month in revenues from the garbage trucks. This site has sufficient capacity to receive another 200,000 m<sup>3</sup> of garbage, enough for it to operate for approximately a year and a half more without any further action. At present, approximately 380 tons (500 m<sup>3</sup>) are received daily, some from industries and to a lesser degree from nearby municipios. Since the site is located in the Parque Naciones Unidas [United Nations Park], which is administered by the Fundación Defensores de la Naturaleza [Nature Protection Foundation], its operations were restricted by the environmental authority to a three-year period ending in the first half of 2006. Accordingly, AMSA has had to identify suitable alternative disposal sites and promote the creation of an association of the municipios that will use the new landfill. These municipios have made contributions for purchasing the site to be identified by AMSA, based on the findings of preliminary technical studies.

- 1.9 Potable water, sewage, and wastewater treatment services are furnished in the watershed under three types of arrangements: (i) divisions of the municipal administration of Guatemala City<sup>4</sup> and the municipalities of Santa Catarina Pinula, Villanueva, Villa Canales, Amatitlán, San Miguel Petapa, and Mixco, which provide services primarily in the central, consolidated areas; (ii) community organizations, which administer small, independent potable water and sewage systems and small wastewater treatment plants, the latter required under current regulations before authorization can be given for constructing new housing developments; only a few of these are currently in operation even though they went on line fairly recently; and (iii) independent community water supply systems without sewage or wastewater treatment services. The Bank currently supports efforts to resolve the solid waste disposal problem in the Guatemala City metropolitan area through a technical-cooperation operation (ATN/MT-7736-GU, in the amount of US\$420,000), which benefits Guatemala City, Mixco (north), Chinautla, Palencia, San José Pinula, and some parts of Santa Catarina Pinula and Villa Nueva. Three alternative disposal sites have already been selected under the project and a call for bids is expected to be issued during the second half of 2005 to select a private sector concessionaire that will be in charge of the construction, operation, and maintenance of a sanitary landfill to serve those areas. The activities planned under the program described herein have taken into account the progress of this technical-cooperation operation (ATN-.MT-7736-GU).
- 1.10 Public water supply and sewage systems administered by the municipalities combined serve about 60% of the watershed's population (including Guatemala City, where coverage is higher). The problems of these systems include: (i) rates that are not pegged to consumption and that do not cover operation, maintenance, and investment costs, as well as poor rate collection; (ii) very limited technical and

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<sup>4</sup> The firm EMPAGUA is in operation, but it is not entirely independent of the municipality.

administrative capacity and excessive political interference in service operation, which has resulted in poor maintenance levels, inability to expand coverage as necessary, and very high estimated losses in the water and sewage networks; and (iii) frequent rationing and poor quality and coverage of services, which makes it difficult to propose and obtain rate increases to generate the funds for the investments needed to adequately operate and maintain the systems. No reliable assessment exists of the many independent potable water and sewage systems, although it is common knowledge that they generally do not monitor the quality of the water they provide. In addition, some of the operators do not provide reliable service, and complaints have been received about the sewage services, particularly with regard to the handling of discharges. The rates charged by independent system operators which depend entirely on groundwater, tend to be higher than those charged by the Empresa de Agua de Ciudad de Guatemala [Guatemala City Water Company] (EMPAGUA) or the municipalities, since they must at least cover their operating costs.

- 1.11 Water and sanitation service delivery is the responsibility of the municipios. At the national level, it is coordinated by the Instituto de Fomento Municipal [Municipal Development Institute] (INFOM), which acts as sectoral authority and finances and regulates activity in this area. The Bank has implemented several technical-cooperation operations to promote a sectoral reform process to clarify the roles of the different participating agencies (service providers, policymakers, regulators, sources of financing); while specific proposals have been made, none have been implemented. Because of the limited success of the sectoral reform process to date, no appropriate institutional framework exists for handling the investments needed to control the pollution of rivers by untreated wastewater.

**B. Institutional framework and country strategy for environmental management in the watershed**

- 1.12 The central government recognizes the problems of the watershed and has been taking action to address them. In 1995 a commission was created under the Office of the President of the Republic to restore Lake Amatitlán (Executive Order 489-95). In 1996 the commission became what is now AMSA, which was given direct responsibility for comprehensive management of the watershed. It was also tasked with coordinating actions with the rest of the public sector and the private sector to solve the watershed's environmental problems, formulate a sound policy, and implement the Medium- and Long-term Sustainable Management Plan for the Lake Amatitlán Watershed (PLANDEAMAT). For administrative purposes, AMSA is attached to the Office of the President of the Republic. It receives funds from an allocation in the State's general budget and from the fees collected at the kilometer 22 landfill. The municipios in the watershed are represented on AMSA's Board of Representatives, as are (ad honorem) the different sectors involved in the use of the watershed's natural resources.

- 1.13 The PLANDEAMAT was recently updated by AMSA. It contains a general discussion of the principal environmental problems of the watershed, the policy guidelines AMSA should follow in addressing them, and short-, medium-, and long-term programs and projects, taking into account the current legal and institutional framework. The program described herein is consistent with PLANDEAMAT's take on the problems and their solutions.
- 1.14 In the past, AMSA's principal actions under the PLANDEAMAT aimed to control sediment in the Villalobos River; overhaul domestic wastewater treatment plants serving districts in southern Guatemala City, Mixco, and Villanueva; partially overhaul the kilometer 22 landfill; monitor water quality in the rivers and in Lake Amatitlán; carry out protective reforestation; and foster environmental education and dissemination.
- 1.15 Until the end of 2000, Guatemala's environmental authority was the Comisión Nacional del Medio Ambiente [National Commission on the Environment] (CONAMA), which was created in 1986 by Decree 68. Its functions included policymaking, application of environmental legislation, and control of the environmental impact of public and private activities throughout the country.
- 1.16 In January 2000, the Secretariat of Environment and Natural Resources was created by executive order to coordinate actions in the sector. That December, the Secretariat and CONAMA were merged to form the Ministry of Environment and Natural Resources (MARN) by Decree 90-2000 of the Congress of the Republic. The MARN is the highest-level governmental body for decision making and coordination on environmental issues. It is responsible for formulating environmental and natural resource policy, as well as policy on protected area management and administration; it has also been charged with working with the Ministry of Agriculture to formulate fisheries and land-use policy. It has regulatory, control, and supervisory responsibilities in the area of environment and natural resources, and approves environmental impact assessments (EIAs). The MARN is seeking to firmly establish itself as a smaller institution, but one that is efficient in coordinating the actions of other entities, and promoting decentralization to regional and municipal authorities.
- 1.17 The Bank is preparing a technical-cooperation operation to strengthen the MARN. It will include specific components to accelerate application of the legal framework on EIAs, improve information management, reorganize the ministry, and fine-tune environmental policy on critical issues such as water pollution management and control.
- 1.18 Guatemala has basic regulations on the discharge of wastewater, solid waste disposal, and environmental impact assessments (EIAs), but enforcement has been weak. Although standards exist on the maximum allowable amounts of the principal contaminants in wastewater, in practice these standards are not enforced.

- 1.19 The administrative capacity of the participating municipios is weak. Decentralization has been promoted since the signing of the Peace Accords, and as of 1996 the municipios have benefited from regulations that increased their revenues by allowing them to collect the single real estate tax directly. Nevertheless, greater revenues have not yet translated into improved technical capabilities or institutional competence. The municipios' capacity for implementation is poor, especially in terms of public service administration and environmental management in their areas of jurisdiction.
- 1.20 In order to solve common problems, 14 municipalities<sup>5</sup> formed the Asociación en Mancomunidad de Municipalidades del Departamento de Guatemala [League of Municipalities of the Department of Guatemala] through a public document published in December 2004. It is a nonprofit organization with legal status, its own assets, and the capacity to acquire rights and obligations. Its purpose is to develop and support programs and projects to improve social and economic conditions and the well-being of participating municipios. The improper disposal of solid waste has been identified as a priority problem to be solved. Municipalities that were not among the founding members may ask the general assembly of the league to be admitted, demonstrating their interest by means of an agreement to this effect from their municipal corporation that authorizes the mayor to sign the necessary documents and make the financial contributions required of all members. The league's basic organization includes the general assembly, a board of directors, a president who serves as its legal representative, a vice president, a secretary, and a treasurer. The mayor of Amatitlán is currently the president of the league.

### **C. The Bank's strategy**

- 1.21 The core objective of the Bank's strategy with Guatemala for the 2004-2007 period is to reduce poverty. To this end, the strategy proposes two interrelated objectives: (i) to improve the conditions for efficient production and incorporate excluded sectors in the productive process; the improvement of sanitation infrastructure is included here as a priority activity; and (ii) to strengthen human capital with equity. A cross-cutting objective of the strategy is to improve the country's institutions to support stronger governance as a prerequisite for progress in both areas. This program is consistent with the strategy's first general objective in that it will help improve environmental infrastructure in the metropolitan area of Guatemala City, protect road infrastructure threatened by the instability of the Villalobos River, and bring the problem of inappropriate solid waste disposal under control. The program will also help improve environmental governance in the watershed area, and is therefore consistent with the strategy's cross-cutting objective of improving governance in the country.

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<sup>5</sup> San Miguel Petapa, Mixco, Fraijanes, Chinautla, San Pedro Ayampuc, San José del Golfo, Chuarrancho, San Pedro Sacatepéquez, San Juan Sacatepéquez, San Raymundo, Santa Catarina Pinula, Amatitlán, Palencia, and Villa Canales.

**D. The program strategy**

- 1.22 Solving the problems of the Lake Amatitlán watershed will require a sustained effort over an estimated period of over 10 years. The previous diagnostic assessment shows a weak institutional framework and a number of problems that require a significant program of investments, some of which are urgent. The construction of a new sanitary landfill to serve southern Guatemala City, and efforts to stabilize the Villalobos riverbed are pressing, which is why they have been included in this first operation. A plan for tackling the water pollution problems is also imperative, and will depend to a large extent on how the institutional framework is reorganized and on the capacity of this new institution to improve coverage and the quality of potable water and sewage services in the metropolitan area. It will be necessary not only to devise technical proposals (engineering designs) for improving potable water, sewage, and wastewater treatment services, but also to negotiate agreements for addressing the institutional weaknesses of service providers. The negotiation will depend in part on how the sectoral reform proposed for these services at the national level is implemented. The program described herein will contribute to the process by producing technically feasible alternatives for tackling water pollution and by strengthening AMSA as a catalyst for sectoral reform. Once a suitable institutional framework is in place, subsequent stages of the LAW cleanup plan can be undertaken, and could be the subject of new IDB loan operations.

## II. THE PROGRAM

### A. Objectives

- 2.1 The program's goal is to reverse the current trend of environmental degradation in the Lake Amatitlán Watershed (LAW) in order to improve quality of life in the metropolitan area of Guatemala City. Given the magnitude of the problems, the purpose of this first program is to lay the groundwork for a medium-term environmental management plan to be agreed to by the various authorities involved in the watershed. The specific objectives of this program—the first in a series of interventions with the same goal—will be to strengthen AMSA as the watershed's environmental management authority with the capacity to analyze and implement subsequent stages of the PLANDEAMAT and to coordinate actions with municipal and national authorities; improve garbage collection and disposal services in the municipios in the southern part of the watershed; and stabilize the Villalobos riverbed so as to reduce the amount of sediment entering Lake Amatitlán and the risks to nearby infrastructure.

### B. General description

- 2.2 The project has three components: (i) institution-strengthening, (ii) solid waste management; and (iii) natural resources management.

#### 1. Component I. Institution-strengthening (US\$2,215,000)

- 2.3 This component will seek to strengthen AMSA in the following areas: (i) environmental planning, (ii) monitoring and control, and (iii) environmental education. It will also help strengthen the municipios' capacity to carry out basic environmental management activities.
- 2.4 **Improve environmental planning capacity.** Three studies will be carried out under this line of action. The objective of the first, "Pollution Control Plan for Lake Amatitlán and the Villalobos River," will be to develop a medium- and long-term strategy for controlling water pollution in the watershed. This study will involve setting up a mathematical model to simulate water quality in the watershed's principal rivers, and a water quality model of Lake Amatitlán. These models will be used to predict the hydrological system's response to pollution control measures planned for the LAW, which will include expanding the sewage network, intercepting discharges, and treating wastewater (both domestic and industrial) more or less intensively. They will serve as tools for analyzing treatment alternatives and for designing medium- and long-term investment plans in this field. The study will include locating pollution sources (urban and industrial), describing them, and inputting these data into AMSA's geographic information system (GIS) for use by the Environmental Quality Control Unit in monitoring the watershed.



- The study includes taking samples and analyzing river and lake water, and other activities related to calibrating and testing the models to be set up.
- 2.5 The second study, “Villalobos River and Lake Amatitlán Sediment Model,” will supplement the information available on the sediment problem in the watershed. The aim is to improve understanding of the hydrodynamics of sediment transport in the Villalobos River, and to predict its impact in terms of riverbed erosion and the reduction of the lake’s volume and area once riverbed stabilization works have been completed. A bathymetry survey of Lake Amatitlán will be conducted, the findings of which will be compared to those from a bathymetry survey conducted over 20 years ago. This will make it possible to quantify volume loss, determine how sediment is deposited in the lake, and establish a new baseline against which the impact of the investments will be measured in the future.
  - 2.6 The purpose of the third study, “Update of the PLANDEAMAT and Formulation of the Subsequent Stages of the Sustainable Management Plan for the LAW,” is to update the existing strategy to solve the watershed’s environmental and natural resource management problems. This will include reviewing institutional responsibilities vis-à-vis the execution of the necessary actions, and examining different financing mechanisms that will enable the responsible agencies (AMSA, municipalities) to meet their obligations. The information generated by the program as a whole will be used both for the aforementioned studies and for the advisory services to improve the garbage collection management systems, which is described below. Program outcomes will also be assessed. This study will also examine AMSA financing mechanisms to supplement current national budget allocations.
  - 2.7 **Improve monitoring and control capacity.** Four core actions are included in this component. The first, “Upgrading the AMSA Laboratories,” will seek to upgrade existing installations and equipment. To avoid duplicating analysis capability already available at other institutions (public or private), AMSA will use specialized laboratories in the country for special and less frequent analyses. Laboratory equipment and materials used for basic sampling and analysis will be supplemented, as will those needed for physical, chemical, and microbiological analysis. The technical team currently working in the AMSA laboratory will receive training on the use of modern methods for evaluating surface and ground water, sediments, and ecosystems.
  - 2.8 Under the second action, “Support for AMSA’s Monitoring and Control Unit,” the instruments still needed by the unit for performing its functions will be provided, as well as two vehicles for traveling to sampling sites. Funds will also be earmarked to enable responsible technical staff to attend specialized courses (national and international) on pollution control strategies and methodologies, and to visit environmental control agencies in other Latin American countries to observe implementation of similar programs.

- 2.9 Program funds for the third action, “Support for Controlling the Extraction of Aggregate from the Villalobos River,” will be used to set up a control program and finance the first two years of its operations, including staffing and equipment costs (vehicle, computers, and field equipment). The decision was made to finance the first two years of personnel costs to ensure that the program can have a significant immediate impact which will help it take off and become fully consolidated.
- 2.10 Resources for the fourth action, “Support for Land-use Management,” will be used to supplement AMSA’s Geographic Information System (GIS) by furnishing database software and procuring two vehicles to improve coverage of activities by the respective AMSA unit. These funds will also be used to provide staff training on practical aspects of land-use management that an agency such as AMSA that has advisory/coordination functions needs to cover. Funds have been provided for high-level advisory services, which will focus on improving the level of detail of land-use management proposals and facilitating coordination with local authorities. These investments will convert the GIS into an environmental management tool for tracking the evolution of the principal environmental parameters in the different sub-watersheds, evaluating the environmental impact of projects and actions of any size, and staying up to date with the task of locating critical areas that require special management conditions.
- 2.11 **Environmental education.** The environmental education to be funded with program resources aims to encourage the communities to adopt new attitudes toward the environment. Information will be disseminated on the environmental situation of the watershed, as well as on the causes of and possible solutions to the main problems. A number of small pilot projects will also be funded to: (i) build and equip an environmental information center; (ii) recycle solid waste transported by the Villalobos River to the lake; (iii) procure and equip a mobile environmental education unit; and (iv) provide training for educators from public and private schools. These activities will be executed in coordination with and as support for other program activities.
- 2.12 **Support for environmental management by the municipios.** Under this activity, training will be provided on environmental management (land-use, control of utility operations, citizen participation). Specialized agencies will provide the courses to groups of 5 to 15 municipal staff per topic.

## **2. Component II. Solid waste management (US\$8,880,000)**

- 2.13 This component has three basic actions designed to improve solid waste management in six municipios of the Lake Amatitlán watershed. The municipios in the watershed belong to League of Municipalities of the Department of Guatemala, and have agreed to tackle the problems of solid waste management together.

- 2.14 **Conditioning and closing of the kilometer 22 landfill.** Pursuant to a decision by the MARN, this garbage disposal site is to be shut down within the first six months of 2006. To that end, a plan was developed for conditioning the landfill and another for closing it, which will be financed with project resources, thereby supplementing AMSA's efforts to reduce the site's environmental risks. Conditioning works include supplementing the network of leachate collection pipes, a leachate collection pond, leachate recirculation equipment, reconditioning of the lower gabion wall, side ditches to channel surface runoff, piezometric probes, and gas capture systems. When the landfill is closed, the site will be conditioned, all cells permanently sealed, and then covered by vegetation. The conditioning and closing designs were prepared during project preparation.
- 2.15 **Improvement the structure of solid waste collection and disposal contracts.** Advisory services will be provided to the mayors and authorities of the municipios that will use the new sanitary landfill in their work to design and implement a new contract system for solid waste collection, transportation, and disposal. While the private sector approach will be maintained, the new system will seek to overcome the problems of poor coverage and lack of incentives to dispose of waste at the landfill, and make the new landfill a financially feasible venture. The study will consider alternative fee scales, rates, and collection mechanisms, different forms of contracting collection and disposal services, as well as the respective economic and financial implications. Discussions will be held with the garbage collectors' association to ensure that its members understand and accept the model decided upon. Under this activity, agreement will be reached on the profile of the intermunicipal body that will be charged by the League of Municipalities of the Department of Guatemala with executing the contracts and supervising operation of the new sanitary landfill. Detailed drafts of the terms of reference for these advisory services have already been prepared.
- 2.16 **Design and construction of the new sanitary landfill for the southern part of the Lake Amatitlán Watershed.** The project will finance the final design studies, including the environmental impact assessment and the construction of the new sanitary landfill to benefit six municipios in the southern part of the watershed. Detailed drafts of the terms of reference for these studies have already been prepared. This landfill should begin operating before the landfill at kilometer 22 is closed down. AMSA has chosen a site for the new landfill and the participating municipios have authorized the funds for buying the land. Site selection will be confirmed during the design study, and must be approved by MARN before construction can begin. Estimated construction costs are based on the preselected site and include conditioning works (leveling and waterproofing, rainwater drainage system, leachate drainage and treatment system, retaining walls, enclosure, and illumination), administration buildings, platform scale, and a control post at the entrance. The design study for the new landfill will examine the feasibility of introducing methane gas capture and treatment systems in connection with the issuance of tradable certificates for reduced greenhouse gas emissions within the

framework of the Kyoto Protocol. It will also study the alternatives for marketing such certificates (i.e., direct investment in the facilities by AMSA and the municipalities, partnerships with private firms to finance and market the certificates, sale of rights to private firms that would make the investments and market the certificates).

- 2.17 The program will also finance the final design and construction of a recycling plant. This will include civil works, electromechanical equipment (feeders, bag breakers, conveyor belts), wheelbarrows, drums, and tools for processing the garbage. The people currently working under unhealthy conditions at the kilometer 22 landfill will be employed at this new plant.
- 2.18 The project will cover the cost of the bidding process to award the construction and operation of the new landfill and the recycling plant to a specialized firm that must meet all environmental and operational standards indicated in the final design studies and the environmental impact assessment, which must be approved by the MARN.

### **3. Component III. Investments in natural resources management (US\$8,123,000)**

- 2.19 This component will finance works and actions to stabilize the riverbed and slopes along the Villalobos River, improve plant cover in critical areas of the watershed, and design management plans for the watershed's protected areas.
- 2.20 **Stabilization of the bed and slopes of the Villalobos River and its main tributaries.** This will include construction of some 60 check dams to stabilize the longitudinal slope of the river and its tributaries, which should reduce the flow of sediment into Lake Amatitlán. The design studies, which will be financed with AMSA's own resources, will determine where these structures should be placed, where controlled extraction of aggregate will be permitted, and regulations on the extraction of aggregate.
- 2.21 **Improvement of plant cover.** This activity refers to reforestation and improvement of plant cover in eroded areas or aquifer recharge areas, for the purpose of controlling surface runoff, reducing river bank erosion, and increasing aquifer recharge. Some 800 hectares will be reforested and another 450 will be allowed to regenerate naturally, with bank conservation and stabilization structures, located on public and private lands in the LAW municipios, in accordance with agreements signed by AMSA and the beneficiaries and acceptable to the Bank. The priority areas for these activities are Parque la Cerra, in the municipio of San Miguel Petapa, and Parque Naciones Unidas, in the municipios of Villa Nueva and Amatitlán. Program funds will be used to hire a specialized firm to take charge of reforestation and maintenance activities during the first two years. The beneficiaries must undertake to maintain the vegetation after that.

- 2.22 **Management plans for protected areas.** The program will support completion of the management plans for the protected areas in Cerro Alux, Volcán Pacaya, Parque Naciones Unidas, and Parque La Cerra. These plans will include the design of mechanisms for contracting out management of these areas to nongovernmental organizations (NGOs),<sup>6</sup> which will be entitled to engage in ecotourism activities and revenue-generating actions to finance their tasks as set out in the management plan, provided they have no adverse effect on environmental quality. Funds are included for marking boundaries, placing signs, and safeguarding the protected areas of Cerro Alux and Parque La Cerra, based on the designs formulated during the pre-project studies. The conservation and controlled use of these natural areas should allow for the development of recreational activities for the residents of the metropolitan area, as a means to partially bridge the enormous gap in this area.

### C. Cost and financing plan

- 2.23 The estimated total cost of the program is US\$24 million, which is distributed by funding source and investment category as shown in Table II-1 below. The US\$18.87 million provided by the Bank will be distributed as indicated in Table II-1. The local contribution will be covered in part by a US\$5 million loan granted to the Government of Guatemala by the OPEC Fund.<sup>7</sup>
- 2.24 The category of administration and supervision (7.2%) will cover the cost of four specialized technical advisors and one operational advisor, as well as administrative, financial, and legal support staff to strengthen the Financial-Administrative Division; it will also cover the cost of program audit, evaluation, and monitoring.
- 2.25 Direct costs include the procurement of goods, advisory services, and construction contracts, as well as the contract for supervising the construction contracts of the solid waste management and natural resources management components. Contingencies have been set at 5% of total costs.
- 2.26 Given the new financial parameters for Guatemala, Bank resources will cover the taxes on all procurements. The cost of the land for the new landfill in the southern part of the LAW has not been included in Table II-1 because it will be covered by the League of Municipalities of the Department of Guatemala with resources provided by the municipalities that will use the landfill.

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<sup>6</sup> The Parque Naciones Unidas is managed by Defensores de la Naturaleza, an NGO that has been working to improve the level of conservation in the park. Reports on the tasks undertaken can be found on the NGO's website.

<sup>7</sup> In a letter dated 27 March 2001, the Director General of the OPEC Fund informed the Government of Guatemala that the operation had been approved.

**Table II-1. Cost and financing (in thousands U.S. dollars)**

	<b>IDB</b>	<b>Local</b>	<b>Total</b>	<b>%</b>
<b>I. ADMINISTRATION AND SUPERVISION</b>	<b>1,725</b>		<b>1,725</b>	<b>7.2</b>
Technical and operational consultants for execution	1,000		<b>1,000</b>	4.2
Administration	575		<b>575</b>	2.4
Audit	75		<b>75</b>	0.3
Evaluation and monitoring	75		<b>75</b>	0.3
<b>II. DIRECT COSTS</b>	<b>14,218</b>	<b>5,000</b>	<b>19,218</b>	<b>80.1</b>
II.1 Institution-strengthening	2,215		<b>2,215</b>	<b>9.3</b>
II.1.1 Planning capacity	1,230		<b>1,230</b>	5.1
Pollution control plan	850		<b>850</b>	3.5
Bathymetric survey and sediment model of Villalobos River	80		<b>80</b>	0.3
Update of PLANDEAMAT	300		<b>300</b>	1.3
II.1.2 Monitoring and control	535		<b>535</b>	2.2
Upgrade of AMSA laboratories	100		<b>100</b>	0.4
Strengthening of Monitoring and Control Unit	135		<b>135</b>	0.6
Control of extraction of aggregates	100		<b>100</b>	0.4
Land-use management	200		<b>200</b>	0.8
II.1.3 Environmental education	250		<b>250</b>	1.0
II.1.4. Technical support for municipalities	200		<b>200</b>	0.8
II.2. Solid waste management	7,790	1,090	<b>8,880</b>	37.0
II.2.1 Conditioning and closing of kilometer 22 landfill	150	1,090	<b>1,240</b>	5.2
II.2.2 Improvement of collection and disposal system	440		<b>440</b>	1.8
II.2.3 Design and constructing of new landfill	7,200		<b>7,200</b>	30.0
II.3 Natural resources management	4,213	3,910	<b>8,213</b>	33.8
II.3.1 Stabilization of Villalobos riverbed	2,663	3,910	<b>6,573</b>	27.4
II.3.2 Improvement of plant cover	1,000		<b>1,000</b>	4.2
II.3.3 Management plans for protected areas	550		<b>550</b>	2.3
<b>III. Unallocated</b>	<b>1,200</b>	<b>0</b>	<b>1,200</b>	<b>5.0</b>
III.1 Contingencies	1,200	0	<b>1,200</b>	5.0
<b>IV. FINANCIAL COSTS</b>	<b>1,727</b>	<b>130</b>	<b>1,857</b>	<b>7.7</b>
IV.1 Interest	1,727		<b>1,727</b>	7.2
IV.2 Commitment fee	0	130	<b>130</b>	0.5
IV.3 Inspection and supervision fee	0	0	<b>0</b>	
<b>Total</b>	<b>18,870</b>	<b>5,130</b>	<b>24,000</b>	<b>100</b>
Percentage	78.6	21.4	<b>100.0</b>	

- 2.27 The Bank loan will have: (i) a variable interest rate; (ii) a 0.25% credit fee on undisbursed amounts; (iii) a four-year grace period; and (iv) a 25-year amortization period.
- 2.28 The OPEC Fund loan has: (i) a 2.5% interest rate on disbursed balances; (ii) a 1% service charge on undisbursed amounts; (iii) a five-year grace period; and (iv) a 15-year amortization period.

### III. PROGRAM EXECUTION

#### A. The borrower and the executing agency

##### 1. The borrower

- 3.1 The borrower will be the Republic of Guatemala and the executing agency will be the Autoridad para el Manejo Sustentable de la Cuenca y del Lago de Amatitlán [Authority for the Sustainable Management of the Amatitlán Watershed and Lake] (AMSA). Counterpart funds will be provided by the Republic of Guatemala and may include resources from a loan from the Fund of the Organization of the Oil-exporting Countries (OPEC). The Bank will participate in the administration of those funds in accordance with the agreement to be signed for that purpose. *As a condition precedent to the first disbursement of the loan, a funds transfer agreement will have been signed by the Ministry of Public Finance and AMSA spelling out, among other things, how the loan resources and the counterpart funds will be transferred, and what obligations AMSA will assume as executing agency.*

##### 2. The executing agency

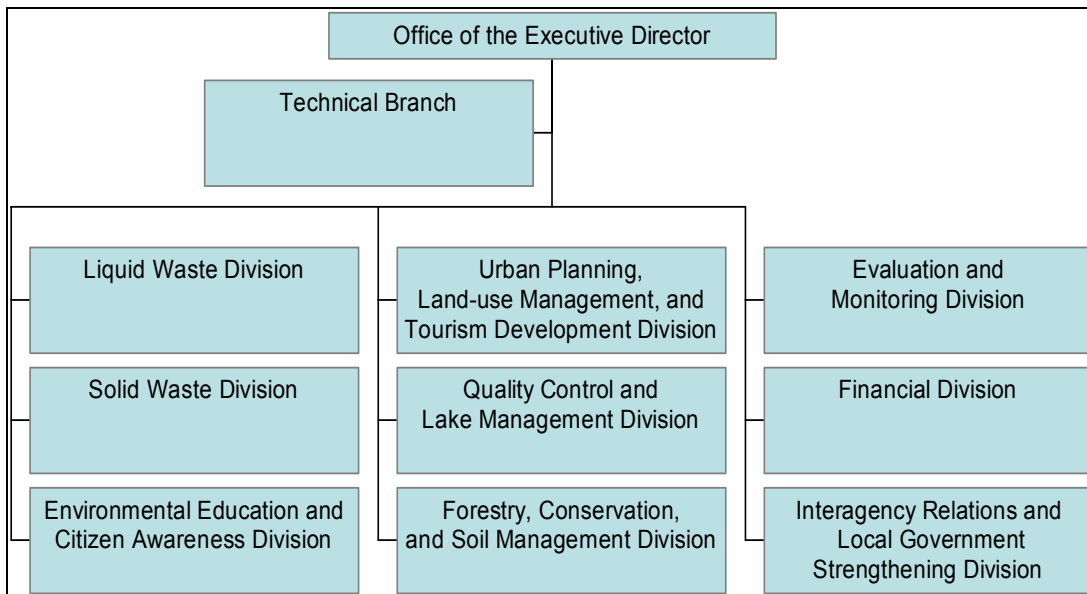
- 3.2 AMSA is attached to the Office of the President of the Republic. It is governed by its own charter, issued by Decree 64-96 of 1996, and by its operating regulations, which are contained in Executive Order 186-99 of 1999. AMSA is a public agency responsible for planning, coordinating, and executing measures and actions by the public and private sectors necessary for restoring the ecosystem of Lake Amatitlán and its tributary watersheds.
- 3.3 AMSA was created because of the Government of Guatemala's concern about the environmental situation of Lake Amatitlán and its watershed. The government considered it necessary to design and implement a comprehensive management plan for the watershed and to execute programs and projects to reclaim the water ecosystem and its physical environment. Article 1 of the AMSA Charter declares the reclamation and protection of Lake Amatitlán a matter of national interest and urgency. The guidelines and mechanisms under which AMSA has been carrying out its activities in recent years are contained in the PLANDEAMAT.
- 3.4 The different sectors involved in the use of watershed resources are represented on a Board of Representatives that decides on matters of substance for AMSA. The Departmental Governor of Guatemala chairs the Board, which also includes the Vice President of the Republic and 10 other members representing various public and private sector agencies. Pursuant to Decree 64-96 of the Congress of the Republic, AMSA's technical and administrative activities, as well as its legal representation, are the responsibility of its Executive Director, a high-level official



who can be appointed and removed at the discretion of the President of the Republic.

- 3.5 AMSA has a Technical Branch and nine divisions, all under the Office of the Executive Director. It also has legal and technical assistance services, a water station, a laboratory, and operational and field staff and assistants. Figure III-1 is AMSA's current organizational chart.

**Figure III-1: AMSA Organizational Chart**



- 3.6 In addition to the Executive Director and the Deputy Technical Director, at present AMSA has 25 professional, technical, and administrative staff. As institution under the central government, AMSA must manage its finances in accordance with the budget laws of the central government and government contract law; AMSA is supervised by the Contraloría General de Cuentas de la Nación [Office of the Comptroller General of the Nation]. To fulfill the functions set out in its Charter, AMSA receives funds from the State's general budget.
- 3.7 The table below summarizes AMSA's budget execution for the 2002-2005 period. It shows that during that period AMSA executed US\$11 million, primarily resources allocated under the State's general budget; the annual average for the past four years has been on the order of US\$2.7 million.

<b>Table III-1. Budgetary execution of AMSA</b> <b>2002-2005 period</b> <b>(in thousands of current U.S. dollars)</b>					
ITEM	2002 <sup>a/c/ 8</sup>	2003 <sup>a/d/</sup>	2004 <sup>a/e/</sup>	2005 <sup>b/f/</sup>	Cumulative Total
<b>I. Operating expenditures</b>	<b>189</b>	<b>562</b>	<b>501</b>	<b>627</b>	<b>1,879</b>
<b>II. Investments</b>	<b>2,442</b>	<b>1,051</b>	<b>865</b>	<b>4,300</b>	<b>8,658</b>
Comprehensive management Villalobos River	529	210	271	419	1,429
Tourism infrastructure	149	-	-	424	573
Reclamation of Amatitlán Lake	140	-	-	2,580	2,720
Overhaul of treatment plants	506	198	204	443	1,351
Sanitary landfill	862	643	390	434	2,329
Dredging and cleanup of Lake Amatitlán	256	-	-	-	256
<b>Total expenditures (I+II)</b>	<b>2,631</b>	<b>1,613</b>	<b>1,366</b>	<b>4,927</b>	<b>10,537</b>

3.8 Of the total annual amount mentioned above, AMSA executed almost US\$2 million (18%) in operating expenditures and US\$9 million (82%) in investments in works for the environmental improvement and rehabilitation of the LAW. The investments in 2005 focus primarily on the reclamation of Lake Amatitlán.

3.9 AMSA's investments in the 1998-2003 period are moderate when compared with the needs of the LAW, but major when compared with the actions of other public agencies. It is worth noting that because AMSA is recognized throughout the country as the agency charged with the management of environmental problems in the Amatitlán watershed, in 1998 it had to deal with a large part of the problems produced in the watershed as a result of the floods caused by Hurricane Mitch.

3.10 Aside from its State budget allocation, AMSA can accept donations, request and accept national and international technical and financial assistance, and secure resources on its own, including donations, income for services rendered, securities and stocks, and revenues from fines. Since October 2004, AMSA has been charging for garbage disposal at the kilometer 22 landfill at the rate of US\$2.70 per pick-up truck and US\$4 per large-body truck, regardless of the size of the load. Monthly revenues from this activity run between US\$10,000 and US\$15,000.

## **B. Program execution**

3.11 Program execution will be the direct responsibility of the Office of the Executive Director of AMSA. The Office of the Executive Director will receive the support of

<sup>8</sup> <sup>a/</sup> Budget spent; <sup>b/</sup> Budget allocated; <sup>c/</sup> Exchange rate on 30 June 2002: Q7.922745/US\$1; <sup>d/</sup> Exchange rate on 30 June 2003: Q7.934085/US\$1; <sup>e/</sup> Exchange rate on 30 June 2004: Q7.918265/US\$1.

its specialized functional areas for its technical and administrative management tasks.

- 3.12 AMSA is administratively and financially autonomous, has an independent budget, and is legally empowered to directly conduct bidding processes, hire, and disburse resources. AMSA's Financial-Administrative Division will administer program resources, both counterpart funds and Bank loan proceeds, and will therefore be responsible for preparing the annual budgets, processing them with the Ministry of Finance, and executing them pursuant to the corresponding legal requirements and procedures. AMSA's Financial-Administrative Division will be responsible for: (i) opening specific and separate bank accounts for managing program resources from the Bank loan and the local counterpart; (ii) maintaining suitable systems for the administration and payment of contracts with suppliers and consultants; (iii) maintaining a suitable accounting and financial system for recording the transactions made with program resources, and for the structure of internal control; (iv) preparing disbursement requests and the corresponding expense vouchers; and (v) maintaining a suitable system for filing support documentation on eligible expenditures for verification by Bank staff and external auditors.
- 3.13 To support project implementation AMSA will use project resources to contract five principal advisors with broad expertise in their fields: (i) an advisor in operational management with experience in implementing multilateral bank projects; and (ii) four advisors with expertise in: (a) sanitary engineering, in particular water pollution control; (b) solid waste management; (c) river hydraulics and sediment transportation; and (d) natural resources management, with emphasis on the management of plant cover to protect soils and improve slope stability. These advisors will answer directly to the Executive Director of AMSA; the advisor for operational management will work with the Financial-Administrative Division, while the four technical advisors will work directly with the Environmental Control and Quality Division, the Solid Waste Subdivision, the Urban Planning and Land-use Management Subdivision (responsible for stabilizing the Villalobos riverbed), and the Soil Conservation and Management Division, respectively. As a condition precedent to the first disbursement, the executing agency will be required to hire the services of an operational management advisor. In this regard, at the borrower's request, the Bank may disburse up to the equivalent of US\$60,000, once the funds transfer agreement mentioned in paragraph 3.1 above has been signed and the conditions set out in Clause 4.01(a), (b), (e), and (g) of the General Conditions of the loan contract have been met.
- 3.14 AMSA will follow the Bank's consultant selection and contracting procedures to contract the candidates selected for the aforementioned positions of operational management advisor and the four technical advisors. It will also hire national staff to provide administrative, financial, and legal support to Financial-Administrative Division.

- 3.15 The operational management advisor will answer to the Executive Director on the outcome of program execution, measured in terms of satisfactory achievement of the targets of the components and activities. This advisor will also recommend to the Executive Director any adjustments in program execution that may be necessary, oversee preparation of the program's annual work plan (AWP), and answer questions and address concerns with the Bank's Country Office in Guatemala.
- 3.16 The technical advisors will support the respective division chiefs in: (i) preparing the final terms of reference for the procurement of goods and services; (ii) evaluating the technical and economic proposals presented for the provision of goods and services in their areas of competence, and selecting and awarding same with the approval of the AMSA Executive Directors; (iii) providing technical oversight of the progress of the contracts; and (iv) implementing the monitoring and control processes, and any activities developed with the Bank as part of program administration.
- 3.17 AMSA will be responsible for tendering and contracting all program studies, procurement of goods, and construction of works. Special aspects of the solid waste management and natural resources management components are discussed below.
- 3.18 **Solid waste management component.** AMSA will contract the consulting services and works for this component through its Financial-Administrative Division, with support from the Solid Waste Division. A sanitation engineer with international experience in solid waste management (see paragraph 3.13) will be hired with program resources and for the duration of the program to support the Solid Waste Division. The kilometer 22 landfill conditioning works will be contracted at the outset of the program, while the job of closing it will be contracted out as soon as the new sanitary landfill is in operation. The study on improving the solid waste collection and disposal system and the design study for the new sanitary landfill will also be commissioned at the outset of the program; they must be completed before construction of the new landfill begins.
- 3.19 The land selected for the new sanitary landfill will be purchased by the League of Municipalities of the Department of Guatemala with funds already furnished by the municipios that will be using it: Villanueva, Villa Canales, San Miguel Petapa, Amatitlán, Magdalena Milpas Altas, and Santa Catarina Pinula. The choice of site must be confirmed by the design study and the EIA for the landfill. Before construction of the landfill begins, the following must be completed: (i) the study on improving the solid waste collection and disposal system; and (ii) the design study for the new sanitary landfill, including the environmental impact assessment, which must have MARN approval. While the municipios that will use the new landfill have indicated to the Bank that they are willing to assume operating and maintenance costs, the specifics of financing will be agreed to on the basis of the findings of the study to improve the garbage collection system in the area. *Prior to*

*the disbursement of loan resources for the construction and operation of the new landfill, AMSA must present to the Bank's satisfaction: (i) an agreement signed by all the mayors of the municipios that will use the landfill ratifying their commitment to guarantee that the costs of operating and maintaining the solid waste collection and disposal system, and the new landfill in particular, will be covered as agreed to as a result of the improvement study; (ii) an environmental impact assessment approved by MARN; and (iii) certification that the land required for the construction has been purchased.*

- 3.20 When the works on the new landfill are completed, AMSA will turn it over to the League of Municipalities, which will be responsible for supervising its operation. This task will be handled by a small technical team designed and organized as part of the study on the improvement of the solid waste collection and disposal system.
- 3.21 **Natural resources management component.** The works to stabilize the beds of the Villalobos River and its tributaries will be contracted out by AMSA, with support from its Urban Planning and Land-use Management Division and an international expert in river hydraulics and sediment transport (see paragraph 3.13). These works are expected to be contracted out in several groups, so that they can all be executed in year one of the project. The final designs are currently being commissioned on the basis of terms of reference prepared during the project studies. AMSA will hire a specialized firm to supervise the construction contracts. *The first disbursement of loan proceeds for the activities involving stabilization of the Villalobos riverbed and slopes and its main tributaries will require, in addition to fulfillment of the conditions precedent to the first disbursement under the program, that the following condition be met: approval, by the MARN, of the environmental impact assessment for those works to be carried out.*
- 3.22 For the actions to improve plant cover and stabilize slopes, AMSA's Financial-Administrative Division, with the support of the Forestry and Conservation Division, will contract a specialized firm. Before doing so, however, agreements must be signed with the beneficiaries of the land, in which they accept responsibility for maintaining the plant cover and works after the second year of execution. The Forestry and Conservation Division will receive support from a natural resources management specialist with expertise in this type of program.
- 3.23 The studies to supplement the management plans for the protected areas in Cerro Alux, Volcán Pacaya, Parque Naciones Unidas, and Parque La Cerra will be commissioned by the Financial-Administrative Division, with the support of the Forestry and Conservation Division, in coordination with the authorities responsible for managing these areas. The studies will be contracted out to specialized NGOs or firms in accordance with contracting procedures agreed to with the Bank. The investments for enclosures, the placing of signs, and conservation actions in these parks will be made in coordination with the authorities in charge of managing each area, through local calls for bids.

**C. Procurement of goods and services**

- 3.24 **Goods.** Goods will be procured pursuant to Bank policy, as set out in document GN-2349-3 “Policies for the procurement of works and goods financed by the IDB” of 19 January 2005. International competitive bidding (ICB) will be required for the procurement of goods partially or entirely financed with loan proceeds and whose value exceeds the equivalent of US\$150,000. Local competitive bidding (LCB) may be used in accordance with national legislation for procurements valued at between US\$25,000 and US\$150,000. Procurement involving amounts below US\$25,000 will be by shopping (three quotations). Goods will be procured in accordance with the procurement plan previously approved by the Bank, which will indicate the type of procurement, estimated values, and the quarter in which the call for bids will take place. If more than one call for bids is scheduled, the plan will indicate the quarters in which they will each take place.
- 3.25 **Consulting services.** For selecting and contracting consulting services valued at US\$200,000 or more, a short list with international expressions of interest will be used. If the value is less than US\$200,000 it will not be necessary to advertise internationally. Consultants will be selected and contracted pursuant to Bank policy (document GN-2350-4 of 19 January 2005), and consulting services will be contracted in accordance with the procurement plan previously approved by the Bank.
- 3.26 **Works.** ICB will be used for works valued at more than US\$1.5 million; for amounts ranging between US\$150,000 and US\$1.5 million, LCB will be used; for works valued at less than US\$150,000, shopping will be used. Works will be contracted in accordance with the procurement plan previously approved by the Bank.
- 3.27 **Procurement plan.** In accordance with the aforementioned Bank policies, a procurement plan acceptable to the Bank must be submitted by the borrower to the Bank for approval, before the loan negotiations. This plan must specify: (i) the specific contracts for goods and consulting services required for implementing the project during at least the first 18-month period; (ii) the methods to be used to select the consultants; (iii) the methods proposed for procuring goods; and (iv) the applicable procedures for the Bank’s review (see Appendix I of the aforementioned documents). The borrower must update the procurement plan annually as necessary, or whenever substantial changes are involved, always for the next 18-month period. All proposed revisions of the procurement plan must be submitted to the Bank for approval, and the current version of the procurement plan must always be available. A preliminary version of the procurement plan can be found in Annex II.
- 3.28 **Procurement review.** Supervision of the procurement of goods and works will be conducted ex ante and pursuant to Annex I of document GN-2349-4. Supervision of

the consultant selection process will also be conducted ex ante, pursuant to Annex I of document GN-2350-4.

**D. Execution period and disbursement schedule**

- 3.29 The planned implementation period for the program is four years. The following table shows the expected flow of disbursements and the flow of resources from the OPEC Fund.

**Table III-2 Annual Disbursements  
(US\$000)**

Source/year	1	2	3	4	Total
IDB	3,284	6,950	4,401	4,235	18,870
Local/OPEC	4,183	50	867	30	5,130
Total	7,467	7,000	5,268	4,265	24,000

- 3.30 **Recognition of previous expenditures.** With Bank acceptance, loan proceeds may be used to reimburse expenditures made as of the date the loan is approved, provided substantially analogous requirements to those established in Bank policy have been met.

**E. Revolving fund**

- 3.31 A revolving fund will be set up for the program through a bank account in the program's name. Given the number of contracts and simultaneous payments that will have to be made, it is proposed that the revolving fund be created with no more than 5% of the loan. The executing agency will be responsible for submitting semiannual reports to the Bank on the status of the revolving fund, no later than 60 days after the close of each six-month period.

**F. Monitoring, supervision, and evaluation**

- 3.32 **Monitoring.** Monitoring will involve the systematic review of program progress, based on the AWP's prepared and implemented by AMSA, which are to be submitted annually to the Bank no later than 31 August of each year for each subsequent year. It has also been proposed that, no later than 30 days after each calendar six-month period, AMSA submit semiannual progress and monitoring reports on the program. The reports should describe, at the very least: (i) the progress achieved with regard to program outcome indicators, outputs, and processes; (ii) compliance with contractual clauses; (iii) the schedule of activities and action plan for the following six-month period; and (iv) issues that may jeopardize program development and achievement of its objectives.

- 3.33 **Supervision.** Bank supervision of the program will be done by the Bank's Country Office in Guatemala. Annual administrative missions are considered necessary for evaluating program progress and for agreeing on adjustments that may be needed to ensure smooth execution.
- 3.34 **Evaluation.** The work to update the PLANDEAMAT, which is the principal regulatory tool for AMSA's activities, will be financed with program resources. The update will include evaluating program outcomes, which will be used as inputs for planning subsequent efforts to clean up the watershed. In addition, a project completion report (PCR) will be prepared upon program completion. Information for the program evaluation will be obtained from: (i) the environmental monitoring plans implemented by the Quality Control Division; (ii) progress reports on the solid waste management programs prepared by the respective Division of AMSA and by the technical body to be created by the league; (iii) the sediments study and the bathymetry survey of the lake to be conducted in year three of the program; and (iv) execution and monitoring reports to be prepared by the Forestry Division for the activities in that field. The program evaluation conducted as part of the studies to update the PLANDEAMAT should answer the following questions: (i) what are the direct benefits to households and the regional environmental benefits from the solid waste management program; and (ii) how much have the investments in natural resources management reduced the amount of sediment entering Lake Amatitlán and what is their estimated economic value. Program resources (administration and supervision/evaluation and monitoring) will be used to hire an independent international consultant to perform a midterm evaluation at the end of year two of program execution. This evaluation will examine: (i) the levels of physical/financial execution in all components; (ii) the way in which the procurement of works, goods, and services has been carried out; (iii) the progress of tasks related to works/studies supervision and collection of data to verify program impacts as set out in the program's logical framework; and (iv) a quick evaluation of the program's performance to date. Recommendations for improving the program's implementation and impact will be based on the findings of the evaluation

#### **G. External audit**

- 3.35 The external audit will be conducted by a firm of independent auditors, pursuant to Bank policies and requirements (documents AF-300 and AF-400). It will be contracted in line with the procedures described in the Bank's procurement of audit services document (AF-200), following the guidelines established in the terms of reference for the external audit of IDB-financed projects (AF-400).
- 3.36 The external audit will be both financial and functional. A semiannual internal report must be submitted within 60 days after the end of the first calendar six-month period, and the annual report on the program's financial statements no later than 120 days after the close of the fiscal year. Audit costs are included as program



costs and financed with loan proceeds. The auditors will be hired for a multiyear period of no less than three years, and the final audited financial statements are to be presented no later than 120 days after the last disbursement has been made.

#### **IV. VIABILITY AND RISKS**

##### **A. Technical viability**

- 4.1 The program is considered feasible from the technical standpoint and is fully justified for the following reasons:
- a. It responds to urgent needs widely felt by the community to control environmental degradation in the watershed and to take action to promote its improvement in the medium and long terms. In itself, AMSA's creation in 1996 clearly demonstrates the importance attributed to the problem by the national government. Full government and the community support can therefore be expected during program execution.
  - b. Although AMSA lacks experience in implementing Bank programs, in recent years it has undertaken actions and carried out works similar to those planned under the program. For example, it has conducted campaigns to sample the quality of river and lake water, and constructed works to stabilize the Villalobos riverbed and to improve the kilometer 22 controlled dump, which lies within the jurisdiction of the municipio of Villanueva. To strengthen AMSA's limited experience and lack of familiarity with executing more intensive programs such as this one, the program will cover the cost of contracts for technical and operational specialists who will support program execution.
  - c. The principal works proposed—such as construction of the new sanitary landfill, stabilization of the Villalobos riverbed—have been studied at the prefeasibility level by international experts with recognized experience. The final designs of the new sanitary landfill will be financed with program resources, and AMSA is using its own resources to contract the designs for the stabilization works on the Villalobos River and its tributaries. This study will be supervised by an international specialist hired specifically for the purpose. The program will also cover the cost of hiring experts to evaluate the final designs and the specifications for the construction works.
  - d. The proposed four-year execution schedule is sufficient for carrying out the proposed activities. Special attention has been given to closing the garbage dump at kilometer 22 and to constructing the new sanitary landfill, the definitive location of which will be confirmed in the design studies. These two works must be carried out in coordinated fashion to avoid environmental problems in the area.

## **B. Institutional viability**

- 4.2 AMSA will serve as the core executing-coordinating agency of the program as a whole. Its institutional and operational framework was evaluated to ascertain its institutional, technical, and operational capacity for executing the project. It was concluded that, although AMSA has been carrying out the functions assigned to it by law with relatively acceptable levels of technical and operational efficiency, technical and administrative support needs to be included in the project to ensure efficient program execution.
- 4.3 Institution-strengthening of AMSA (described in chapters II and III of this document) will bolster its organizational, functional, and staffing structure, not only for the purposes of project execution but also to enable it to better fulfill its responsibilities in managing the watershed. Strengthening efforts will include: (i) training and advisory services provided by qualified consultants on key technical and operational aspects of project implementation and on areas related to carrying out its functions once the project ends; and (ii) procurement of equipment for monitoring the environmental status of the watershed and for controlling and monitoring pollution, which are tasks AMSA will continue with in the future.

## **C. Economic viability**

- 4.4 The project will provide two types of benefits to inhabitants in the watershed area. First, institution-strengthening will enable AMSA and the municipalities to provide better environmental management of the watershed. In particular, it will improve AMSA's environmental planning and control of the watershed, and strengthen the municipalities' capacity for managing garbage collection services. The program will also generate direct benefits through the natural resources management works (stabilization of the Villalobos riverbed and improved plant cover), and through investments to improve the municipios' solid waste disposal. The benefits stemming from the investments in natural resources management are difficult to measure, but stabilization of the Villalobos riverbed will reduce the risk of damage to bridges and roads that cross the mid-reaches of the river; it will also reduce the risk of damage to riverside dwellings and properties. The investments in plant cover management will help protect aquifer recharge areas, from which the great majority of inhabitants of the watershed obtain their supply of potable water. The investments to improve the solid waste disposal system will generate significant environmental benefits, and have been quantified in economic terms.
- 4.5 Under the solid waste management component, the construction of a new sanitary landfill will be financed to benefit the residents of six municipios of the LAW, and the dump at kilometer 22 will be upgraded and closed. In the economic assessment, the equivalent annual cost (investment and operation) of an environmentally sustainable garbage collection and disposal system was compared with the willingness of users to pay for this type of system. For purposes of the analysis,

- information was collected in 2001 through a survey in the beneficiary municipios that targeted 250 families in consolidated urban areas and 152 families in marginal areas. Although the absence of an up-to-date census makes it impossible to assert that these are the correct proportions, during the earlier phases of the work many of the areas were visited and the most up-to-date maps were used to select the sample.
- 4.6 Garbage collection service in these municipios is provided both by private enterprises and by the municipalities. While in consolidated urban areas 18.4% of the inhabitants stated that they did not use this service, in marginal areas the figure was 48.4%. Garbage is collected three times a week for the great majority of households that receive the service. Despite the existence of garbage collection services, many households still choose to dispose of their garbage in illegal dumps (11%) or ravines (15%), or to burn it (31.8%). No information exists on the real cost of any of these systems, but private entrepreneurs pay US\$2.56 per truck (Q20) for disposing garbage at the kilometer 22 landfill. The municipios usually do not charge for the service but they only reach a small fraction of inhabitants. Private businesses charge fees ranging from Q15 to Q25 per house per month, or an average of Q17.60 in consolidated urban areas and Q15.96 in marginal areas. An average collection cost of Q16.80 was used for the purposes of this assessment, assuming that private entrepreneurs should be covering all their costs, and that current charges basically cover the service provided.
- 4.7 To evaluate the cost of operating the new landfill, the designs of the prefeasibility study for the Zanjón Malena site were used. It was estimated that collection efficiency would rise from the present 30% (120 tons/day) to a maximum of 90% within a 12-year period (620 tons/day, considering a 34% population increase during that period). The garbage collected from industries and other sources, estimated at 180 tons/day, must be added to that collected from households. Taking into account investment costs of around US\$6.2 million and annual operating costs of US\$555,000, it is estimated that the annual equivalent cost of disposal per ton, at a 12% discount rate, is US\$8.76. Of this, approximately 65% corresponds to investment costs and 35% to operating costs. On this basis, it is estimated that the cost of disposal per family would be of US\$0.95 per month, or Q7.41/household-month.
- 4.8 The contingent valuation method was used to estimate willingness to pay. In the surveys, the heads of household were asked if they were willing to pay for regular garbage collection service that, in addition to removing the garbage from their homes, would dispose of it in an environmentally sustainable manner in a sanitary landfill, freeing ravines and public lands of garbage. The families recognize that an efficient service offering broader coverage will make it possible to eliminate illegal garbage dumps, diminish the risk of disease, prevent river pollution, and improve environmental conditions in the whole area. Rates ranging from Q16 to Q94 were assumed in the survey. Logit-linear and logarithmic models were estimated and nonparametric estimates (Turnbull's method) were used, limiting the willingness to

pay to a maximum of 5% of income. As the results were quite consistent, the lower value was used in the evaluation, which corresponds to an average willingness to pay of US\$5.19 (Q37.90) at the time of the surveys. This willingness to pay represents on average 1.44% of income in consolidated urban areas and 2.25% in marginal areas.

- 4.9 These results indicate that the total cost of the collection and disposal system would amount to Q24.21 per family, or approximately 64% of the average willingness to pay of the households in the area, thus confirming the economic viability of the investments.

#### **D. Environmental viability**

- 4.10 The core objective of the program is to lay the groundwork for a watershed management plan that will reverse the current trend of pollution and environmental degradation in the medium and long terms. To this end, the program will first focus on strengthening the institutions responsible for the control of solid waste disposal, erosion of riverbeds and banks, and protection of parks and critical areas, and aims to maximize the possibilities of success of these institutional strengthening and reform actions.
- 4.11 At the same time, the program will finance investments considered to be urgent and feasible based on current institutional conditions, with support to the executing agency under the program. The principal investments will be comprised of the works to stabilize the Villalobos riverbed and slopes, activities to protect aquifer recharge areas, management plans for protected natural areas, the works to upgrade and close the kilometer 22 landfill and to construct a new sanitary landfill to replace the one at kilometer 22 (see paragraphs 2.13 to 2.22). These investments will not only help improve environmental conditions in the watershed but also the beneficiary population's hygiene, health, and safety.
- 4.12 The works to stabilize the Villalobos riverbed will help stem the steady weakening of the riverbed and reduce the volume of sediments entering Lake Amatitlán. Recent events have amply demonstrated that this erosion process threatens the integrity of riverside lands and the stability of road infrastructure in the watershed. *Prior to launching the program-financed works, AMSA must present to the Bank's satisfaction the corresponding EIA approved by MARN (see paragraph 3.21).*
- 4.13 The kilometer 22 landfill, located within the Parque Naciones Unidas, operated for several years as an uncontrolled open-air garbage dump that received large amounts of solid waste from several municipios and industries in the area. In light of the ensuing problems, the municipio of Villanueva decided to legalize its use by converting it into an authorized but uncontrolled disposal site. AMSA took control of the site in 1997, undertaking a series of works to improve its sanitary situation. This included fencing it, constructing a sentry box at the entry to the site, improving

access, and covering the waste periodically. AMSA also began constructing a surrounding ditch to prevent rainwater from flowing into the dump, retaining walls at the lower and mid-sections of the dump, and a leachate collection network. It also began laying waterproof liners at the base of new cells, conditioning some slopes, and preparing a site for waste segregation. These actions have notably improved the sanitary aspects of the operation.

- 4.14 Under the program, the dump's infrastructure will be supplemented to bring new areas into operation as a sanitary landfill, albeit temporarily, given CONAMA's decision to close the site. The program will also finance actions to upgrade the site after it has been closed so it can return to its original function as part of the Parque Naciones Unidas.
- 4.15 The program will finance the studies and final designs for the construction of the new sanitary landfill, including its EIA. In principle, the studies will confirm the technical, economic, social, and environmental desirability of the most suitable site for the landfill. The program will finance construction of the landfill and a recycling plant. The latter will produce: (i) social benefits, as it will foster the segregation of materials that could be used in the markets under more efficient and hygienic conditions; and (ii) environmental benefits, by conserving resources, which is implicit in recycling. *Prior to opening the bidding process for the construction of the new landfill, AMSA must present to the Bank's satisfaction the EIA approved by MARN. The Bank's policy on resettlements (OP-710) must be followed should resettlement become necessary during program operation.*
- 4.16 An environmental analysis of the program's impact conducted during its preparation found that it would have a significant and positive environmental impact. Nevertheless, an EIA will be required for the major works that complies with the standards of the national authorities and with the Bank's basic guidelines in this area. It is worth noting that the Bank is preparing a technical cooperation operation to strengthen the EIA analysis and supervision capacity of the MARN (GU-T1014).

## **E. Risks**

- 4.17 The following risks have been identified:
  - a. **AMSA's limited experience in executing similar programs.** The program includes a significant number of contracts for consulting services, the procurement of goods, and the construction of works which, although fortunately not technically complex, surpass AMSA's experience in terms of the size and number of contracts it has managed in the past. To mitigate this risk, the program has resources earmarked for strengthening the Financial-Administrative Division, which will be directly in charge of procurement. Moreover, a specialist

with broad operational experience in implementing projects with multilateral banks will be hired to support the procurement process.

- b. **Coordination with municipalities for the solid waste management component.** For this component to be successful, municipal authorities must reach agreement within the League of Municipalities of the Department of Guatemala on how to change the solid waste collection system so as to increase coverage and ensure the service's financial sustainability. To facilitate this process and mitigate the risks inherent in negotiations involving several municipalities, the program will hire an international consultant to advise the mayors in the decision-making process. The consultant will serve as an advisor to the league and will fuel the discussion and decision-making process among municipal authorities by presenting simulations of different forms of organization for the service and information on the experiences of other metropolitan areas. AMSA's involvement will consist of commissioning the studies that will guide the process (study of reform and design study for the new landfill), and contracting construction and operation of the new landfill, which the league is currently unequipped to do. Before authorization can be given to tender the construction of the new sanitary landfill to proceed, the mayors must present the agreements required for ensuring the financial sustainability of the garbage collection and disposal system.
- c. **Continuity of PLANDEAMAT.** The objective of the program is to consolidate the watershed's environmental management plan. Implementation of the plan in the future will require institutional changes in the watershed that make it possible to undertake the investments to control water pollution and improve potable water and sewage services. It will also require continued governmental support for the investments. To mitigate the risks inherent in the institutional reform process, subsequent stages of the program will be designed on the basis of a careful evaluation of institutional capacity, so that the scope of investments and the operation and maintenance commitments do not exceed the capacities of the institutional framework.

**LOGICAL FRAMEWORK**  
**PROGRAM FOR THE ENVIRONMENTAL RESTORATION OF THE LAKE AMATITLÁN WATERSHED**  
**GU-0066**

Narrative Summary of Objective	Objectively Verifiable Indicators	Means of Verification	Assumptions
<p><b>GOAL</b></p> <p>Reverse the trend of environmental degradation in the Lake Amatitlán watershed (LAW).</p>	<ol style="list-style-type: none"> <li>Garbage collection services are used by at least 90% of the population in the watershed and all garbage collected is disposed in sanitary landfills that meet all sanitary standards.</li> <li>Environmental indicators of the Villalobos River and Lake Amatitlán show significant improvement as compared with 2004 in terms of: (a) water quality (dissolved oxygen, BOD*, coliforms, nutrients), and (b) the annual inflow of sediment into the lake, which is reduced by more than 50%.</li> </ol>	<ol style="list-style-type: none"> <li>Annual environmental monitoring reports of the watershed, produced by AMSA</li> <li>Reports on public services produced by municipalities and by bodies that regulate garbage collection services</li> </ol>	<p>The inhabitants of the Lake Amatitlán watershed adopt the program's environmental initiatives as their own, and collaborate in their implementation.</p> <p>Effective coordination exists among the municipalities of the watershed, the departmental government, and AMSA for implementing environmental cleanup and improvement programs.</p>
<p><b>PURPOSE</b></p> <ol style="list-style-type: none"> <li>To implement the environmental management plan of the LAW in order to solve critical environmental problems affecting the watershed</li> </ol>	<ol style="list-style-type: none"> <li>Updated PLANDEAMAT proposal discussed and endorsed by all the municipios of the watershed at the end of year 3 of the program; steps taken to secure financing for subsequent stages of the investment plan to control water pollution in the watershed</li> <li>Garbage collection service coverage increases to 90% in the six municipios of the southern watershed that will use the new sanitary landfill, and the garbage collected is disposed of in the new sanitary landfill by the end of program year 2.</li> </ol>	<ol style="list-style-type: none"> <li>Annual environmental monitoring reports on the watershed, produced by AMSA</li> <li>Annual reports on the solid waste collection and disposal system, produced by AMSA</li> </ol>	<ol style="list-style-type: none"> <li>AMSA continues receiving budgetary support for its work and is successful in negotiating the actions of the PLANDEAMAT with the municipios.</li> <li>AMSA obtains financing for subsequent stages of investment called for in the PLANDEAMAT.</li> </ol>

\* BOD – biochemical oxygen demand



Narrative Summary of Objective	Objectively Verifiable Indicators	Means of Verification	Assumptions
	3. The average annual inflow of sediment into Lake Amatitlán falls by at least 50% by the end of program year 3, and the slopes of Villalobos River have been stabilized.	3. Baseline for coverage and disposal generated by the design studies for the new landfill and improvement of the collection and disposal system 4. Annual reports produced by AMSA on the stability of the Villalobos River and on the results of the bathymetric survey of Lake Amatitlán	
<b>COMPONENTS</b>  1. Strengthening of AMSA's capacities for planning, control, and environmental monitoring of the watershed	1. An updated proposal for the PLANDEAMAT has been formulated, including, in particular, detailed proposals for investment plans to control water pollution in the Villalobos River and Lake Amatitlán, by the end of program year 3.  2. AMSA has a mathematical model of the quality of water in the Villalobos River and Lake Amatitlán, including oxygen, coliform, and nutrient levels, at the end of program year 2.	Quarterly progress reports on the program by AMSA.	AMSA reaches agreement with all the municipios in the watershed, the MARN, and government authorities, on investment programs for treating wastewater in the watershed municipios, for subsequent stages of the PLANDEAMAT.  AMSA agrees to industrial pollution control programs with the private sector, with the support of national and municipal authorities.

Narrative Summary of Objective	Objectively Verifiable Indicators	Means of Verification	Assumptions
	<p>3. By the end of program year 3, AMSA has a calibrated model of sediment production and transport in the Villalobos River. By the end of program year 2, AMSA's capacity for environmental monitoring has been improved :</p> <p>(a) AMSA laboratory equipment upgraded, (b) hydrometeorological network expanded with four new stations, (c) staff of the Monitoring and Control Unit trained in pollution control techniques, and an effluents control and monitoring program is in operation, (d) a program to control the extraction of aggregate from the Villalobos River is in operation and effective; and (e) the GIS has been installed and is actively used for environmental and land-use monitoring and control.</p>		<p>Municipalities make appropriate use of training received on land-use regulation and management in their areas of influence.</p>
<p>2. New garbage collection system in operation in southern watershed area</p>	<p>1. Landfill at kilometer 22 closed by end of year 2.</p> <p>2. New contract system for garbage collection and disposal agreed to with local authorities in six municipios in the southern watershed, and implemented by the middle of program year 2.</p> <p>3. Contract awarded to a private enterprise for constructing and operating the new sanitary landfill, by the middle of year 2.</p> <p>4. New sanitary landfill constructed for six municipios in the southern watershed, 18 months after program is launched.</p>	<p>Quarterly progress reports on the program, prepared by AMSA.</p>	<p>AMSA and League of Municipalities of the Department of Guatemala exercise effective control of the new garbage collection contracts in six municipios of the southern watershed area, and of the operation of the new sanitary landfill.</p>

Narrative Summary of Objective	Objectively Verifiable Indicators	Means of Verification	Assumptions
3. Stabilization works in the beds of the principal rivers of the watershed have been concluded, unstable slopes in protected areas have been reforested, management plans for protected areas have been prepared.	1. Sixty (60) check dams and works on banks to stabilize the Villalobos Riverbed are in place. The first 30 check dams should be operating by the end of year 1 and the remaining 30 by the middle of program year 2. Reforestation of 800 hectares of unstable slopes in the watershed, in aquifer recharge areas on land belonging to the municipios, or in protected areas of the watershed, by the end of program year 4.  2. Plant cover naturally regenerated on 450 hectares of unstable slopes on the Villalobos River or in aquifer recharge areas in public lands, by the end of program year 4.	Quarterly progress reports prepared by AMSA.	AMSA and the municipalities provide appropriate maintenance for works to stabilize the Villalobos Riverbed and to reforest the slopes.  Authorities responsible for managing protected areas implement the management plans.
<b>ACTIVITIES</b>  <b>1. Institution-strengthening</b>  1.1 Planning capacity Pollution control plan Bathymetric survey and sediment model Villalobos River Update of PLANDEAMAT 1.2 Monitoring and control Upgrade of AMSA laboratories Strengthening of Monitoring and Control Unit Control of the extraction of aggregate Land-use management	The entire budget has been disbursed by the end of the project. A breakdown follows (US\$ 000):  <b>2,215</b>  1,230 850 80  300 535 100  135  100 200	Quarterly progress reports prepared by AMSA.	The bidding processes for works, studies and procurements have been successful and the works are executed satisfactorily (applies to all activities).

Narrative Summary of Objective	Objectively Verifiable Indicators	Means of Verification	Assumptions
1.3 Environmental education	250		AMSA receives the budgetary allocations required for executing the project.
1.4 Technical support for municipalities	200		
<b>2. Solid waste management</b>	<b>8,880</b>		Agreements on reforestation activities reached with municipios and authorities that manage protected areas.
2.1 Conditioning and closing of the km 22 landfill	1,240		
2.2 Improvement of garbage collection and disposal system	440		
2.3 Design and construction of sanitary landfill	7,200		Agreements reached with land owners regarding the new sanitary landfill.
<b>3. Natural resources management</b>	<b>8,123</b>		
3.1 Stabilization of Villalobos riverbed	6,573		Design studies for the works are completed and satisfactory.
3.2 Improvement of plant cover	1,000		
3.3 Management plans for protected areas	550		

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-\_\_/\_

Guatemala. Loan \_\_\_\_/OC-GU to the Republic of Guatemala  
Program for the Environmental Restoration of the  
Lake Amatitlán Watershed

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Republic of Guatemala, as Borrower, for the purpose of granting it a financing to cooperate in the execution of a program for the environmental restoration of the Lake Amatitlán Watershed. Such financing will be for the amount of up to US\$18,870,000, from the resources of the Single Currency Facility of the Bank's Ordinary Capital, and will be subject to the Financial Terms and Conditions and the Special Contractual Conditions of the Project Summary of the Loan Proposal.

(Adopted on \_\_ \_\_\_\_\_ 200\_)