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PROJECT PERFORMANCE ASSESSMENT REPORT

ECUADOR

MINING DEVELOPMENT AND ENVIRONMENTAL CONTROL TECHNICAL ASSISTANCE PROJECT
(LOAN 3655 EC)

April 7, 2003

Sector and Thematic Evaluation Group
Operations Evaluation Department

Currency Equivalents (annual averages)

Currency Unit = Sucres

Exchange Rate at Project Appraisal (December 1992):	US$1= 1,850 Sucres
Exchange Rate at Completion (December 2000):	US$1 = 25,000 Sucres
Exchange Rate as of July 2002:	US$1 = 25,000 Sucres

Abbreviations and Acronyms

ASM	Artisanal and Small-scale Mining
CAAM	Presidential Environmental Advisory Commission (*Comision Asesora Ambiental de la Presidencia da Republica)*
CEPE	Ecuador State Petroleum Corporation *(Corporacion Estatal Petrolera Ecuadoriana)*
CEPLAES	Social Planning and Study Center *(Centro de Planificacion y Estudios Sociales)*
CODIGEM	Corporation for Geological, Mining and Metallurgical Research and Development (*Corporacion de Desarrollo y Ivestigaciones Geologicas y Mineras)*
DFID	Department for International Development (UK)
DINAGE	National Geological Directorate (*Direccion Nacional de Geologia)*
DINAMA	National Directorate of the Environment (*Direccion Nacional de Medio Ambiente)*
DINAMI	National Directorate of Mines (*Direccion Nacional de Minas)*
ES	Evaluation Summary
FDI	Foreign direct investment
INEFAN	Ecuador Forestry Institute for Natural Areas and Wildlife (*Instituto Ecuatoriano Florestal de Areas Naturales y Vida Silvestre)*
INEMIN	Mining Institute of Ecuador
LATEN	Latin America and the Caribbean Region Environment Department
MA	Ministry of the Environment *(Ministerio del Ambiente)*
MEM	Ministry of Energy and Mines (*Ministerio de Energia y Minas)*
MOP	Memorandum of the President
ODA	Overseas Development Administration
PATRA	Ecuador Environmental Technical Assistance Project *(Proyecto de Asistencia Tecnica para la Gestion Ambiental en el Ecuador)*
SIDA	Swedish International Development Agency
SSM	Under-secretariat of Mines (*Sub-secretaria de Minas)*
UAM	Mining Environmental Unit (*Unidad Ambiental Minera*)

Measures and Equivalents

Metric System

Fiscal Year

Government: January 1 to December 31

Director-General, Operations Evaluation	:	Mr. Gregory Ingram
Director, Operations Evaluation Department (Acting)	:	Mr. Nils Fostvedt
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OED Mission: Enhancing development effectiveness through excellence and independence in evaluation.

About this Report

The Operations Evaluation Department assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, OED annually assesses about 25 percent of the Bank's lending operations. Assessments are conducted one to seven years after a project has closed. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons. The projects, topics, and analytical approaches selected for assessment support larger evaluation studies.

A Project Performance Assessment Report (PPAR) is based on a review of the Implementation Completion Report (a self-evaluation by the responsible Bank department) and fieldwork conducted by OED. To prepare PPARs, OED staff examine project files and other documents, interview operational staff, and in most cases visit the borrowing country for onsite discussions with project staff and beneficiaries. The PPAR thereby seeks to validate and augment the information provided in the ICR, as well as examine issues of special interest to broader OED studies.

Each PPAR is subject to a peer review process and OED management approval. Once cleared internally, the PPAR is reviewed by the responsible Bank department and amended as necessary. The completed PPAR is then sent to the borrower for review; the borrowers' comments are incorporated into the document that is sent to the Bank's Board. When an assessment report is released to the Board, it is also widely distributed within the Bank and to concerned authorities in member countries.

About the OED Rating System

The time-tested evaluation methods used by OED are suited to the broad range of the World Bank's work. The methods offer both rigor and a necessary level of flexibility to adapt to lending instrument, project design, or sectoral approach. OED evaluators all apply the same basic method to arrive at their project ratings. Following is the definition and rating scale used for each evaluation criterion (complete definitions and descriptions of factors considered are available on the OED website: http://wbln1023.worldbank.org/oed/oeddoclib.nsf/232d43ae09e87ac985256966007cc257/acaeb95358e99e578525698c005190da?OpenDocument).

Relevance of Objectives: The extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). *Possible ratings:* High, Substantial, Modest, Negligible.

Efficacy: The extent to which the project's objectives were achieved, or expected to be achieved, taking into account their relative importance. *Possible ratings:* High, Substantial, Modest, Negligible.

Efficiency: The extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. *Possible ratings:* High, Substantial, Modest, Negligible.

Sustainability: The resilience to risk of net benefits flows over time. *Possible ratings:* Highly Likely, Likely, Unlikely, Highly Unlikely, Not Evaluable.

Institutional Development Impact: The extent to which a project improves the ability of a country or region to make more efficient, equitable and sustainable use of its human, financial, and natural resources through: (a) better definition, stability, transparency, enforceability, and predictability of institutional arrangements and/or (b) better alignment of the mission and capacity of an organization with its mandate, which derives from these institutional arrangements. Institutional Development Impact includes both intended and unintended effects of a project. *Possible ratings:* High, Substantial, Modest, Negligible.

Outcome: The extent to which the project's major relevant objectives were achieved, or are expected to be achieved, efficiently. *Possible ratings:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Bank Performance: The extent to which services provided by the Bank ensured quality at entry and supported implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of the project). *Possible ratings:* Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Borrower Performance: The extent to which the borrower assumed ownership and responsibility to ensure quality of preparation and implementation, and complied with covenants and agreements, towards the achievement of development objectives and sustainability. Possible ratings: Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

The World Bank
Washington, D.C. 20433
U.S.A.

GREGORY K. INGRAM
Office of the Director-General
Operations Evaluation

April 7, 2003

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

**SUBJECT: Performance Assessment Report on Ecuador
Mining Development and Environmental Control Technical Assistance
Project (Loan 3655-EC)**

Attached is the Performance Assessment Report prepared by the Operations Evaluation Department on the above project. The loan of US$14 million equivalent was approved in fiscal 1994, and closed in fiscal 2001. An amount of US$3 million out of the Bank loan was cancelled.

The project objectives were to (a) assist the government in the implementation of its mining law, and thus attract new private mining investment and support the systematic development of increased, yet environmentally sound, mineral production; and (b) arrest and mitigate mining-related environmental degradation that results from the use of primitive and inadequate technology by artisanal and small-scale mining operations.

The project's outcome is rated moderately satisfactory. It established a modern regulatory framework for the mining sector and strengthened and restructured the public mining institutions. It made significant contributions in several areas: documenting the extent and impact of pollution created by artisanal and small-scale mining; increasing local awareness of environmental degradation; mobilizing affected communities; promoting less-polluting technologies and organizational models; implementing a demonstration common liquid effluent settling pond; and proposing comprehensive management plans in the two most critical areas. While relevance and efficacy are high, however, efficiency is modest. Country risks and depressed market conditions for gold and other metals and ores have prevented significant increases in private sector interest in the sector, and no significant discovery has been made so far. Also, even in the pilot area, small-scale miners have not invested in the treatment facilities that would be required to significantly reduce pollution from tailings.

Sustainability is rated unlikely on balance, though marginally so. Long-term *environmental sustainability* of mining sector development is uncertain as long as potential conflicts of interest exist within the Under-secretariat of Mining of the Ministry of Energy and Mines between its promotion of development and its responsibility for environmental monitoring, control, and enforcement. Insufficient capacity to monitor environmental performance of mining concessions and enforce regulations is also a constraint. Long-term sustainability will also depend on the development of oversight capacity by the Ministry of the Environment and on effective participation of local communities. Sustainability of environmental achievements in the small-scale mining sector is unlikely because technical assistance to promote replication of measures put in place under the project has been discontinued; monitoring of pollution in rivers has been interrupted; and local environmental committees no longer receive financial support.

Bank and borrower performance are both rated satisfactory, but *quality at entry* is rated unsatisfactory. The project's objectives were overly ambitious regarding the ability of a technical assistance project to *"arrest and correct"* negative environmental impacts from a complex and

diverse artisanal and small-scale gold mining sector. Also, the appraisal did not identify the potentially large impact of cyclical downturns in ore and metal markets on the resilience of project benefits. Finally, the Environmental Assessment (EA) carried out during preparation had important gaps, which led to an Inspection Panel investigation. The EA had a limited geographical scope and did not adequately cover the possible impact of increased mining activities on the country's natural areas. Also, consultations with stakeholders were insufficient. The partial failure to comply with environmental assessment guidelines has not resulted in adverse impacts, and the shortfalls in design were addressed during supervision, therefore overall Bank performance is rated satisfactory.

The main lessons learned from this project are:

Technical assistance that aims to encourage private investment in extractive industries requires the preparation of comprehensive EAs with a countrywide focus, with special attention given to the review of the adequacy and sustainability of regulations and institutional mechanisms for protecting sensitive ecosystems and communities. The EA should be prepared as early as possible after project identification, its recommendations should be reflected in project design, and extensive consultations with all potential stakeholders are critical. Finally, appropriate mitigation rules and enforcement institutions should be developed as early as possible.

- When most environmental responsibilities are delegated to a sector ministry, as in Ecuador, it is important to reduce potential internal conflicts of interest between the sector ministry's roles as investment promoter and environmental control and enforcement agency, by clearly separating the responsibility for these functions. Furthermore, sector oversight capacity also needs to be built up within the Ministry of the Environment, and support of local communities needs to be secured.

- Projects and programs involving natural resources extraction need to be carefully and proactively managed. The participation of NGOs and potentially affected local community associations in the monitoring of impacts was effective in Ecuador.

- For technical assistance projects addressing complex environmental, social and regulatory issues, continued Bank involvement beyond project closure would enhance the likelihood of sustainability. In Ecuador, the abrupt cut- off of the Bank's and cofinanciers'support resulted in program discontinuity and lack of replication of project achievements., in particular in the ASM program.

- Programs aiming at reducing or eliminating negative impacts from artisanal and informal small-scale mining require continuity over-time, flexible timing, and a comprehensive approach oriented toward addressing social, financial, and managerial aspects as well as legal and technical aspects.

Attachment

Contents

This report was prepared by Andres Liebenthal (task manager) with Charles Dahan and Dominique Babelon (consultants), who assessed the project in July 2002. The report was edited by William Hurlbut and Soon-Won Pak provided administrative support.

Principal Ratings

	*ICR**	*ES**	*PPAR*
Outcome	Satisfactory	Moderately Satisfactory	Moderately Satisfactory
Sustainability	Likely	Likely	Unlikely
Institutional Development Impact	Substantial	Substantial	Substantial
Bank Performance	Satisfactory	Satisfactory	Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Satisfactory

* The Implementation Completion Report (ICR) is a self-evaluation by the responsible operational division of the Bank. The Evaluation Summary (ES) is an intermediate OED product that seeks to independently verify the findings of the ICR.

Key Staff Responsible

Project	*Country Director*	*Division Chief/ Sector Director*	*Task Manager/Leader*
Appraisal	Ping-Cheung Loh	Paul Meo	Aura Garcia de Truslow
Completion	Isabel Guerrero	Peter van der Veen	Gotthard Walser

Preface

This is a Project Performance Assessment Report (PPAR) on the Ecuador Mining Development and Environmental Control Technical Assistance Project, for which the Bank approved a loan (Loan 3655 EC) for US$14 million equivalent on October 21, 1993. The credit closed on December 31, 2000, eighteen months after the original date.

This report is based on the Implementation Completion Report (ICR) prepared by the LAC Region (Report no. 22365, December 26, 2000), the Memorandum and Recommendation of the President (Report no. P5988-EC, September 22, 1993), the Loan Agreement, project files, economic reports from the Region, and discussion with Bank staff. An Operations Evaluation Department (OED) mission visited Ecuador in July 2002 to review the long-term impact of the project and discuss the project results and effectiveness of the Bank's assistance with representatives of the government, mining associations and companies, NGOs, and local communities. The cooperation and assistance of current and former government officials in the Ministry of Energy and Mines are gratefully acknowledged.

A year and a half after project completion, this PPAR seeks to validate previous ratings of the project in light of events since completion and to assess the longer-term economic, social, institutional, and environmental sustainability and impact of the activities supported by the project.

Following standard OED procedures, copies of the draft PPAR were sent to the borrower for comments but none were received.

BACKGROUND

Country Economic Background

1. Ecuador is a small-size economy with an estimated population of about 12 million. It is characterized by great geographical, ethnic, and cultural diversity between its Pacific coast (the center of agricultural exports and commerce, with the major port of Guayaquil), the Andean Highlands (based on traditional small-scale agriculture, and where the capital city, Quito, is located), and the sparsely populated Amazon region (where petroleum development took place). Incidence of poverty is very high, with close to 70 percent of the population living in poverty (1999), including 34 percent in extreme poverty. Income distribution is highly skewed.

2. The economy is highly dependent on a few export commodities, predominantly oil, but also bananas and shrimp. Petroleum development had an especially deep impact on the economy. Oil was discovered in the 1960s and fueled a major economic boom in the 1970s. The collapse in oil prices in the early 1980s had severe consequences: since then overall growth has been low or negative and there have been recurring debt crises and a series of stop-and-go restructuring and reform attempts. In March 2000, following a major economic crisis in 1999, the government announced an economic adjustment and reform program anchored in the full dollarization of the economy.

3. Because of regional and racial tensions, the central government, especially the office of the president, is relatively weak. Furthermore, the political system is highly fragmented, and getting legislation passed requires constantly shifting coalitions and alliances between a large number of parties and interest groups. This has resulted in the frequent changes in administration and ousting of ministers by Congress.

The Mining Sector

4. Ecuador does not have a long or significant tradition in mining and does not have a significant commercial-scale mining industry. In the early 1990s, the only commercial-scale operation was the Portovelo-Zaruma mine, a gold and silver mine that had been in operation since 1880 and that had just been closed down. The mine had been private until its closure, when the concession expired and it fell into the government's hands. It had then been invaded by informal workers. The government intended to privatize the mine after resolving outstanding labor and social issues associated with its operation (related to the mine's large number of informal workers). The government did not hold large interests in other mining operations or rights to large reserved areas.

5. During the 1980s, a gold rush by informal miners in southern Ecuador had led to the development of significant artisanal and small-scale mining activities. This affected not only the Portovelo-Zaruma area but also the areas around Ponce-Enriquez (in the South-Western Cordillera, near the banana and shrimp farming areas on the coast) and Nambija (in the southeast, bordering the Amazon region). By 1990, up to 40,000 persons originating from poor Andean rural areas were engaged in informal mining for gold, with significant adverse effects. Besides being unstructured, unregulated, and untaxed, these low-technology activities were inefficient (recovering only 50 to 70 percent of the gold contained in the ore). They also risked contaminating rivers, endangering downstream population centers as well as major agricultural and acquacultural export areas (banana and shrimp). They also posed serious health hazards to miners and neighboring communities.

6. In the early 1990s, favorable world metal prices and a booming market worldwide stimulated interest from international mining companies for prospecting commercial-scale metallic ores in many countries. The Government of Ecuador started viewing the development of the private commercial

mining sector as potentially important to achieve export diversification, halt environmental degradation, and increase government revenues.

The Institutional Framework

7. The World Bank became involved in Ecuador's mining sector in 1989, through economic and sector work carried out in parallel with the preparation of the Mining Development and Environmental Control Technical Assistance Project. Bank assistance contributed to the design of a new mining law, passed in 1991, and a new institutional structure. The law, while a substantial improvement, still imposed a number of requirements with significant discretionary elements for the periodic renewal of concessions or their transformation, it lacked clarity with respect to criteria for cancellation of concessions, and it imposed a relatively high tax burden on concessions compared to laws in neighboring countries.

8. Before the 1991 Mining Law, the institutional framework in place was unsuited to the tasks needed to effectively promote and develop the sector. All data gathering and regulatory functions had been concentrated in the same semi-autonomous government institution, but the same agency was also investor and promoter of private investments, creating strong conflicts of interest. Mining information was non-existent and the concession process was characterized by long titling registration times, pre-emptive speculation, and corruption. The new Mining Law redefined the mandates, responsibilities, and functions of the different public mining institutions to better match functions of a modern state as a regulator and provider of basic information infrastructure. Concessioning and title registration functions were assigned to a National Directorate of Mines (DINAMI), under the Undersecretariat of Mines. Corporate and mining sector promotion functions were assigned to a Corporation for Geological, Mining, and Metallurgical Research and Development (CODIGEM). Environmental functions were assigned to the National Directorate for the Environment (DINAMA), under MEM's Environmental Undersecretariat. This framework was generally along the lines recommended by the Bank, except for CODIGEM (which still presented conflicts of interest between its corporate and geological and mineral research functions).

OBJECTIVES AND DESIGN

9. *The overall objectives of the project* were to (a) assist the government in the proper implementation of the Mining Law, and thus attract new private mining investment and support the systematic development of increased, yet environmentally sound, mineral production[1]; and (b) arrest and mitigate mining-related environmental degradation that results from the use of primitive and inadequate technology by artisanal and small-scale mining operations.

10. *The specific objectives* included (a) assisting the government in implementing its 1991Mining Law by strengthening sectoral institutions both at the policy and core function levels; (b) upgrading the technology used by small-scale miners; (c) instituting applicable environmental standards and a monitoring system; (d) helping contain and possibly detoxify mining-related hazardous wastes; and (e) monitoring mining-related health issues among the mining communities.

11. To achieve these objectives the project had three *main components*:

(a) *Policy Management* – This component consisted of technical assistance, support, and in-service training to help apply and revise the Mining Law and associated regulations, develop

1. The overall objectives are as listed in the Loan Agreement. In the Memorandum of the President, the wording of this objective is as follows: "to attract new private mining investment and support the systematic development of increased, yet environmentally sound, mineral production."

environmental regulations, and structure and strengthen sector institutions. Recipient institutions were MEM, DINAMI, DINAMA, and CODIGEM (later renamed DINAGE). The component focused on policy, legal, institutional, technical, and management aspects. It was expected at appraisal to cost US$2.6 million (actual cost was US$2.86 million).

(b) *Policy Implementation* – This component included (i) environmental management activities, with the assistance of the Swedish International Development Agency (SIDA), to develop systematic environmental monitoring and data baseline of the environmental pollution and health hazards caused by mining, and to implement methods to rehabilitate areas that had been environmentally degraded by mining activities and prevent further environmental degradation; (ii) the development of a geological information infrastructure, with the assistance of the Department for International Development[2] (DFID, UK), including regional geological maps and regional thematic maps of Ecuador's Western Cordillera, and appropriate prospection methodologies; (iii) the development of information and management systems, with SIDA assistance, including a mining information system that would provide public access to mining documentation and databases, and implementation of an improved mining cadastre; and (iv) technical assistance to the artisanal and small-scale mining (ASM) sector, with SIDA assistance, with emphasis on demonstrating the use of simple, yet effective, equipment and techniques for improving ore recovery and reducing environmental contamination, and identification of suitable potential private partners for joint ventures in mining. The component was expected at appraisal to cost US$18.3 million (actual cost was US$16.43 million).

(c) *Establishment of a Project Coordination Unit* (PCU) to manage and coordinate project activities. The component was expected at appraisal to cost US$0.8 million (actual cost was US$1.26 million).

12. Under the Loan Agreement, strong limitations were agreed to the State's direct involvement in mining. The government agreed to (a) separate the corporate and promotion functions of CODIGEM; (b) not create new or expand special mining zones and/or mining reserve areas, and not to start new operations outside these areas, directly or through CODIGEM; and (c) divest the Portovelo mine and other CODIGEM interests.

13. During implementation, there was no formal revision of the original project objectives or of the components. However, some components were refocused to reflect new priorities. In particular, (a) considerably more effort was put into reforming the Mining Law than planned at appraisal; (b) environmental management was extended to promote greater involvement of local communities and balanced relationships between mining and the community; and (c) assistance to artisanal and small-scale mining shifted from a purely technical and economic approach toward a more comprehensive approach including legal and managerial assistance to miners and their associations, assistance to local communities in the establishment of environmental committees, and health care and monitoring and awareness programs.

IMPLEMENTATION

14. The project closed in December 2000, eighteen months beyond the original date. The loan became effective only in July 1994, after a nine-month delay due to late establishment of the Project Coordination Unit. Further delays occurred during implementation. These were attributed to (a) slow finalization of co-financing arrangements with BITS, of Sweden (later integrated into SIDA) and ODA (which later on became DFID) (b) frequent changes in government and MEM administrations, which led

2. Formerly Overseas Development Administration (ODA)

to uneven commitment to the project objectives, at times, political interference in project management and allocation of funds, occasional backsliding and policy reversals (in particular during the period from mid-1996 to early 1998), and delays in processing of required legal and institutional changes.

15. Despite a generally unstable environment, the project was essentially implemented as planned. Annex B presents the project-specific objectives, detailed associated components, together with achievements, outputs, and outcomes. Actual project costs (US$20.55 million) were 14 percent less than planned at appraisal (US$25 million). An amount of US$3 million out of the Bank loan was cancelled (21 percent of the loan amount).

OUTCOME

16. The project outcome was ***moderately satisfactory***. Project objectives were substantially relevant to current and past Bank assistance strategy, in particular as they relate to private sector-led growth and environmental management. The project substantially met its objectives of establishing a modern regulatory framework for the mining sector and of strengthening and restructuring the public mining institutions. It also made important contributions to documenting the extent and impact of pollution created by artisanal and small-scale mining on the environment and on the health of miners and surrounding communities; to increasing awareness of environmental degradation and mobilizing and training affected communities to work toward reducing these impacts; to promoting changes to less-polluting technologies and organizational models among miners; to implementing a demonstration common liquid effluent settling pond; and to proposing comprehensive management plans in the two most critical areas. However, efficiency was modest, as depressed market conditions worldwide for gold and other metals and ores, and country risks, have prevented significant increases in private sector interest and investments in the sector, and no significant discovery has been made. Also, while the project prepared the ground for arresting and reducing pollution from small-scale mining, it did not achieve it on a large scale, as was originally intended. The project design proved overly ambitious in this respect and failed to identify the impact of economic constraints (particularly as gold prices decreased substantially) on the willingness and ability of small-scale miners to invest in sub-regional common disposal facilities , especially in the absence of long-term financing at reasonable terms and of pressure from environmental authorities.

RATINGS

Relevance: Substantial

17. The project was consistent with the Borrower's development priorities and with Bank assistance objectives as spelled in out the 1993 CAS for Ecuador.[3] Bank strategy at the time had three broad objectives: improving basic services targeted to the poor; reforming the public sector and strengthening public finances; and strengthening the basis for private sector-led growth. The project was fully consistent with the third objective, as it sought to reduce vulnerability of the economy by diversifying its productive, revenue, and export base through private sector-led growth in a new sector; and to maintain current export performance (by avoiding environmental damage to traditional exporting areas).

18. The project is also substantially consistent with the current Bank CAS[4] objectives, which are to (a) protect the poor; (b) restore macro-financial stability and growth recovery (by improving fiscal and public sector management, rehabilitating the banking system, and expanding the role of the private sector); and (c) support sustainable development and poverty reduction (including by improving environmental management). Although the mining sector is no longer the subject of specific Bank

3. Report P-5657-EC, dated May 5, 1993.

4. As spelled out in the Joint IBRD/IFC Country Assistance Strategy Progress Report, dated June 1, 2000 (Report 20444)

attention, the project remains generally consistent with the objectives of expanding the role of the private sector, and improving environmental management.

Efficacy: Substantial

19. Efficacy in reaching most overall and specific objectives is rated substantial, although the project has not had the intended effects of attracting private mining investments and its contribution to arresting mining-related environmental degradation from artisanal and small-scale mining was modest. An overall "substantial" rating is nevertheless justified because (a) depressed metal and mineral markets have, since 1997, substantially reduced interest in new exploration worldwide, a factor external to the project, which may reverse itself in the future; and (b) the objective of *arresting* environmental degradation and mitigating damage from small-scale mining was unrealistic under a technical assistance project, given the magnitude of investments required, the large number of artisanal small-scale miners, and the difficulty for them to reach agreement on common systems required to reduce costs.

Overall Objectives

20. *Implement the Mining Law, thus attracting new private mining investment – Efficacy: Substantial*. The investment environment was significantly improved through the reform of both legal and institutional frameworks according to best practice, as further detailed in the paragraphs below. However, due to the worldwide slump in the mining sector by the time these frameworks became operational, and high country risk due to severe national economic and political difficulties in the late 1990s, the anticipated increases in mining production and diversification were not achieved, and exploration efforts for larger projects did not materialize. However, this is not necessarily an indication of project failure, because, when world markets recover, Ecuador will be in a position to compete on equal footing with its neighbors to attract new investment in exploration.

21. *Arrest mining-related environmental degradation – Efficacy: Modest.* Environmental regulations and standards were developed, and the institutional capacity of MEM for their enforcement has improved. Furthermore, although late, comprehensive consultation mechanisms for the mining sector are being developed. However, effectiveness of monitoring and enforcement remains hampered by insufficient staffing and budget and questionable administrative reporting lines (para.33). With respect to the ASM sector, the project helped demonstrate the feasibility of reducing ASM-related contamination; succeeded in promoting change to less-polluting processing technologies; and increased environmental, health, and safety awareness among miners, local governments, and affected communities, and increased their environmental management capacity. However, the overall project objective of "arresting" degradation and mitigating damage from inadequate containment of tailings proved unrealistic, in the absence of supportive market conditions, financing mechanisms, and stronger enforcement.

Specific Objectives

22. The project generally achieved its specific objectives. Details on achievements and outcome of activities related to each one of these objectives are presented in Annex B.

23. *Assist in implementing the mining law by strengthening sector institutions – Efficacy: Substantial.* Although with some delays, the project achieved important results in both the establishment of a legal framework and institutional strengthening:

- The country now has a modern mining law, complemented by regulations needed to enforce it, as also stated by the ICR. The regulations are suitable to attracting private sector investment and supporting the systematic and environmentally sound development of industrial scale mining

production. The law provides a competitive legal basis for mining activities (its main features are summarized in Annex C) and is close to best practice. It is simple, flexible, transparent, and non-discretionary, and discourages speculative holding. In line with recommendations made by project advisers, the 1991 law was amended in August 2000 in several important respects, in order to increase private sector interest and institutional sustainability: royalties were eliminated, concession fees were increased (with a schedule of progressively increasing fees overtime), security of tenure was increased (by specifying non-payment of concession fees as the only ground for cancellation of concessions besides voluntary relinquishment) and stability of legal and tax rules was enhanced. Finally, the amendment allocated the proceeds of concession fees and other mining revenues in priority to public mining institutions, helping to ensure their financial sustainability.

- Regulations were prepared with project assistance and approved: general regulations to the law, which were issued in 1991, were revised in April 2001; mining safety regulations were issued in July 1996; and environmental regulations were issued in September 1997. The preparation of the mining environmental regulations was the first participatory experience in legal proposals in Ecuador. Further details on applicable environmental regulations are presented in Annex D.

- The institutions were further restructured and their capacity was strengthened. As mentioned in the ICR, the role of the government as owner and operator of mines was discontinued: CODIGEM's corporate functions were eliminated, and all state interests were privatized. In 1999, CODIGEM was transformed into DINAGE (National Geological Directorate), a department under SSM, with functions limited to production of geo-based information and promotion materials. A Mining Environmental Unit (Unidad Ambiental Minera, or UAM) was created under SSM to perform environmental monitoring functions and carry out a first review of environmental impact studies and environmental management plans submitted by concessionaires (approval authority remaining with MEM's Undersecretary of Environment). Staffing of all SSM departments was rationalized and reduced from 240 to 120 persons.

- State-of-the-art maps and databases were developed for the Western Cordillera (35,000 square kilometers, versus 24,000 planned at appraisal), which as mentioned in the ICR, can also be used for land use planning and management, management of water resources and the environment, prevention of natural disasters, and other uses, as well as for mining sector development (geological and thematic mapping of the Western Cordillera). Furthermore, as a result of an investigation by a Bank Inspection Panel (in response to concern of stakeholders on the use of geo-data, see Box), a formal system to monitor the use of geo-data has been put in place.

- A Mining Cadastre Administration System was developed. By allowing transparent and up-to-date management of mining concessions and property rights, it is likely to be a key factor to attracting and sustaining mining investments, monitoring sector activities and optimizing sector contribution to regional development. The system was highly praised by all those consulted as efficient, fair, and corruption-free. The set-up of an efficient mining cadaster based on a transparent set of regulations is central to good sector governance and is a major achievement of the project. .It has led to the relinquishment of substantial areas previously held preemptively for speculation purposes. As shown in Table E-1, while the number of titles granted in July 2002 was three times as many as in May 1991, the total area conceded was only about 30 percent of that conceded in 1991 (and the average concession size was only 10 percent of pre-project average size). Total area conceded so far (10,160 square kilometers) accounts for only about a third of all areas investigated under the geo-information component.

- The ASM sector is now largely formalized. As mentioned in the ICR, of the 169 ASM groups that existed before 1995, all have now been formalized as associations or cooperatives and 166 have been granted a legal title. New land invasions by informal miners have not occurred in recent years. A Chamber of Small-scale Mining has been established.

- Awareness of public authorities of the need to improve community consultation and participatory processes in mining activities grew substantially during implementation, particularly from 1997 onward, after an international conference in Quito on the subject in May 1997. A first study was carried out under the project in 1996 (and published in 1997 for the Quito Conference) of relationships of small-scale gold mining activities to indigenous communities, to be used as a basis for the development of consultation and conflict resolution mechanisms. Later, an assessment of community perceptions in the Intag valley was carried out in connection with the Bank Inspection Panel investigation (Box). Comprehensive guidelines for consultations with affected communities are currently being developed for the mining sector.

24. *Upgrading small-scale mining technology – Efficacy: Substantial.* Artisanal and small-scale gold mining technologies were improved in the pilot area of Ponce Enriquez (where mining is done more by small-scale mining enterprises than by artisan families). In parrallel with managerial and organizational improvements and with legalization, the project successfully promoted the switching to cyanidation processes and reduced, safer, and more efficient use of mercury, which increased efficiency of ore recovery, lowered use of mercury, and reduced negative environmental impacts and safety and health hazards. SSMs visited and most stakeholders met in the Ponce Enriquez mining region confirmed that use and pollution from mercury have significantly been reduced in the region.

25. *Instituting applicable environmental standards and monitoring system – Efficacy: Substantial*.

- Mining Environmental Regulations were passed in September1997, completing existing norms under the Water and Contamination Prevention and Control laws and their regulations, and the Mercury Use in Mining norm (Annex D). However, the national environmental limits for effluents discharged to natural watercourses, still do not include criteria for metal contents. Modifications to the Mining Environmental Regulations, which are under preparation in the Undersecretariat of Environmental Protection of MEM, are expected to address this issue.

- Extensive monitoring of the four most important southern mining areas took place during the period 1996–99, and an Environmental Information System with extensive baseline data on environmental quality was developed (containing information on waters soils, river sediments, and biota). The extensive publication and diffusion of the monitoring results helped raise environmental awareness in society, local authorities, and mining communities. The monitoring program helped define the principal contaminants (mercury, cyanide, and heavy metals) and their origin; and pointed to the need for adequate containment facilities, with priority given to the most affected regions of Ponce Enriquez and Portovelo-Zaruma. This work also demonstrated that, while the biota in rivers and estuaries was affected, downstream banana and shrimp farming activities had so far not been affected. Participation of small-scale miners and local communities in environmental monitoring and management was ensured through local environmental committees established in two municipalities under the project. These local committees were trained in simple biological monitoring methods that were developed under the project

- The workload imposed by the review of a large number of environmental assessments led UAM to discontinue monitoring activities after 1999 (Annex B). This monitoring work was not contracted out either. Also, the sustainability of local environmental management committees is uncertain in the absence of strong continued assistance and collaboration from the regional offices of DINAMI, and of independent and regular financial resources.

Box. Inspection Panel

In December, 1999, the Inspection Panel registered a request for inspection by an NGO and a farmers' association from the Intag valley (northern Ecuador) claiming that the public release of maps with mineral data collected under the project's geo-information component would attract mining companies and informal miners. The requesters maintained that mining activities in these areas would be unavoidable should the geo-information maps and data reveal the existence of mining potential in the region, and would result in significant degradation of critical natural habitats, including the ecosystem of El Choco and the Cotacachi-Cayapas Ecological Reserve.

The Panel concluded that Bank management had been substantially in compliance with Bank safeguard policies (including on Environmental Assessment, except in some respects, and Wildlands) and Project Supervision Policies. It concluded that the maps alone, even in conjunction with the geo-chemical data, were insufficient to locate ore deposits. Furthermore, Ecuador's legislation only permits mining activities in protected areas by exception, subject to strict environmental controls, and the Intag Valley, adjacent to the Cotacachi-Cayapas reserve, was excluded from the thematic mapping sub-component of the project. The Panel did not find any evidence that the Cotacachi-Cayapas reserve suffered substantial or permanent damage as a result of the project's sampling activities.

Nevertheless, the Panel found that the environmental assessment (EA) had covered only southern Ecuador, focusing on the environmental and social impacts of existing small-scale mining activities. The EA did not address the broader issue of the likely impact of increased mining activity in the country as a whole, including the north, and, therefore, in limiting the spatial/geographical scope of the EA, the Bank was not in compliance with the relevant provisions of OD4.01 and OD4.00, Annex A. Furthermore, the EA focused on pollution caused by artisanal mining activities, but did not address issues of the living environment (possible impact on Ecuador's rich biodiversity). Finally, there had been no nationwide consultation process carried out on the basis of the draft EA with communities that could be affected by mining activities or their representative associations. Consequently, the Bank was not in compliance with the requirements of OD4.01 concerning both the provision of adequate baseline environmental data in the EA report and consultation during the preparation of the project.

Shortly before an Inspection Panel request was received by the Bank, the Project Coordination Unit asked a well-known community development NGO to perform a sociological assessment of the Intag Valley and gather the views of stakeholders on thematic mapping. The assessment found that opposition to mining-related activities stemmed from a deep-rooted fear among small rural tenants and landowners with no secure tenure to their land, that mining activities on their lands could lead to their expulsion. Other segments feared that incipient eco-tourism activities associated with the reserve could be deeply affected. Finally, relationships with mining companies had been very tense in the region because of a heavily polluting cement plant present in the area (Selva Alegre)[5]) and of refusal by a foreign company to provide any information about its exploration activities in the Junin area between 1991 and 1997 (the company was eventually ousted by the community). The study recommended that (a) information campaigns should be carried out aiming at informing communities about the mining activity, its risks and benefits, life cycle, environmental aspects, legal framework, and rights and obligations of the State, the mining companies, and the population; (b) that the 1998 constitutional provisions requiring prior consultations with the population should be applied; and (c) a system to register purchasers of the geo-data and maps, and to monitor their use should be designed and established.

After loan closing, in January 2001, the Ministry of the Environment and MEM awarded a two-year contract to two reputable environmental NGOs to monitor the use of geological and thematic information in protected areas of the Western Cordillera and prevent unauthorized activities in such areas (seven national parks and ecological reserves, including Cotacachi-Cayapas). The terms of Reference for this contract were drafted in concertation with NGOs. The Bank also provided funding for this project through the Civil Society Fund. A network was set up whereby trained local residents (seven focal points, one in each area) would report suspicious mining-related activity to a central monitoring center. Procedures to channel complaints and investigate them were set-up. Well-founded encroachments are reported to MEM and MA for action. All complaints and status reports are available on the Internet. Finally, all purchasers of the thematic and geological mapping information have to sign a license agreement with MEM in which they commit to follow regulations regarding the use of the information and to communicate the use of this information to both MEM and the Ministry of the Environment.

Over the past 18 months, three complaints were received, but only one was related to mining. This recent complaint concerns a quarry in operation at the limit of the Pululahua Geo-botanical Reserve. After field investigation, it was found that, while the company was indeed exceeding the boundaries of its concession according to MEM coordinates, there was uncertainty whether these operations were or not within the boundaries of the Reserve, given lack of precision of limits in the decree establishing the reserve. This case raised the need again for MA and MEM to establish better consistency and accuracy in defining boundaries of protected areas and concessions[6]. The matter was referred to both ministries for action (MEM was about to perform another verification). The monitoring system thus appears to be working. However, the contract expires in January 2003 and it is uncertain at this point whether this important contract will be extended, and with which financing source.

5 The Selva Alegre case was eventually resolved between 1998 and 2000 through a dialogue process with the cement company, which was facilitated by an NGO contracted by the affected indigenous community—This case was presented in June 2002 at a World Bank- sponsored mining seminar on communities as a best practice case.

6 The concessions are located using differential GPS methodologies. The theme of a more precise definition of protected boundaries has reportedly been discussed many times by MEM and INEFAN and later MA, but much remains to be done.

26. The recognition of the importance of proper community consultation and participation to long-term sustainability of mining activities led the ministry to contract the NGO that had performed the sociological assessment of the Intag Valley to coordinate the work of a Technical Committee to prepare Guidelines for Consultation with Communities for the Mining sector. This work has a strong participatory approach and is based on extensive workshops with stakeholders (state and local governments, NGOs, indigenous and other communities) as well on detailed assessments of five case studies (including that of the Intag Valley). Draft guidelines are expected by November 2002. If well received, these could later be used as the basis for consultation regulations similar to those under preparation for the oil sector.*Helping contain and possibly detoxify mining related hazardous wastes*. *Efficacy: modest*. The substantial reduction in the use of mercury has also substantially reduced toxicity of tailings and effluents, in particular in the Ponce Enriquez and Portovelo-Zaruma areas,. With project assistance, some individual mines in Ponce Enriquez have also improved their tailing containment facilities and are recycling water. However, the effectiveness of these measures in the rainy season has not been verified. A small demonstration common liquid effluent settling pond was built and some reforestation activities are being implemented with the participation of producers. However, the major joint investments needed for an effective containment of tailings and water/liquid effluent management systems, which were identified under two comprehensive environmental management plans prepared for the two areas still most critically affected by ASM (Ponce Enriquez and Portovelo-Zaruma[7]) were not implemented. Major constraints are lack of incentives associated with low international prices of gold, lack of appropriate financing sources and terms, the difficulty in reaching agreements between a large number of stakeholders of different sizes and technological levels, and, given the difficult social issues involved, still weak enforcement by MEM.[8]

27. *Monitoring mining-related health issues among the mining communities – Efficacy: Substantial.* Baseline data, methods, and procedures for mining occupational health hazard investigation were developed and prevention measures were proposed, especially for diseases related to mercury, silicosis, and deafness. A Mining Occupational Health Hazard Information System (SIREM) was established and results were extensively published and distributed. About 700 miners were provided with their individual health diagnostics and information campaigns and training programs were organized to reach miners and their families in all areas and train them in safety and prevention of health hazards. The Cooperative of Bella Rica in Ponce Enriquez is still providing medical follow-up to workers. A health center specialized in mining-originated diseases was built in Ponce Enriquez and specialized equipment, including X-ray equipment for silicosis diagnosis was financed under the project. However, as of mid-2002, this equipment was still not operational, casting serious doubt on the efficiency of the health center. The mission was unable to verify the satisfactory operation of the health center, which was inoperative because the center's health personnel were on strike. Nevertheless, in all ASM areas, it appears that among mine owners and workers and their families, awareness of health and safety risks associated with mining and of prevention measures has considerably increased. In Ponce Enriquez, representatives of the local Environmental Management Committee reported that exposure to mercury vapors from archaic amalgam burning processes had virtually disappeared in the area.

Efficiency – Modest

28. A major objective of the project was to attract new private mining investment and support the systematic development of increased mineral production, resulting in increased exports and fiscal contributions. At appraisal,[9] the estimated production potential of metallic minerals (in 1991 prices) was estimated to increase from US$144 million (including US$140.8 million for a total estimated production

7. Operations at Nambija , an area where development of informal artisanal mining had been very chaotic, appear to have stopped for all practical purposes.

8. Enforcement may improve, however. During the assessment mission, the Regional Director of MEM/DINAMI stated that15 ASMs soon could be closed for non-compliance with their environmental management plans.

9. Annex 1, Table 3 of the MOP

of gold of about 12 tons per year) to US$607 million by 2000 (including US$500 million for a production of 42 tons of gold per year). Despite the considerable improvement in the legal and institutional framework, these benefits failed to materialize:

- Production from mining activities has stagnated (Table E-6) and no new major discovery was made. Formal production of gold (reported by enterprises) has substantially declined.

- After increasing to US$13.4 million in 1995, investments in exploration and production declined to US$4.6 million in 1999 (Table E-8). Foreign direct investment has remained minimal (Table E-9) and foreign companies have tended to withdraw from Ecuador. There are some indications of recovery in the domestic mining sector since 2000 (particularly in the construction materials sub-sector), and increasing curiosity from some foreign companies interested in large projects (in particular with respect to gold and potential for copper deposits), but investment levels remain very modest. Foreign investors who had bought the rights of ASM miners in Nambija (where one investor has bought over 95 percent of the titles) and in Portovelo-Zaruma (where an international company has entered into sharing arrangements with many small concession holders) have performed some exploration activities but have not yet reported any plan to start exploitation.

- Government revenues from patents and other fees reflect the development of the sector (Table E-10). After increasing to US$2.1 million in 1997, they decreased to about US$0.85 million by 2001. Elimination of royalties largely contributed to the decrease.

29. The main reasons for these disappointing results follow, in order of importance:

- Changes promoted by the project came too late for Ecuador to take advantage of the world mining boom of the early 1990s (while the project was being prepared). This boom, brought about by high metal prices on the world markets, had caused exploration investments worldwide to double, in particular by "junior companies." This boom ended in 1997, following a major scandal involving a junior company (BRE-X) and its subsequent bankruptcy as well as the failure of many other junior companies. Also, world prices fell starting 1997 (the Bank index of metals and minerals prices for the period January–July 2002, in *current* terms, was still only 73 percent of its 1990 value). As a result, exploration investments worldwide have fallen by as much as 60 percent. Large, established companies have focused on the development of their existing, known deposits, and have refrained from exploring new areas and countries.

- Official gold production and exports in Ecuador have been in steady decline since 1996, as the international price of gold fell by about 30 percent, from US$389 per ounce in 1996 to US$271 in 2001 (Table E-7). Official gold statistics are highly unreliable due to large unreported production and sales.[10] Nevertheless, reported gold production, which had increased significantly from less than 1 ton a year before 1994 to more than 7 tons a year in 1995–96 (reflecting increasing formalization of the small-scale sector rather than increasing production, estimated at appraisal at about 12 tons per year) fell sharply to less than 3 tons by year 2000. Although this may in part reflect an increase in tax evasion (in particular, the value-added tax), industry experts and representatives consulted by the assessment mission concurred that a large part of the small-scale sector had been deeply affected by the conjunction of the fall in world gold prices; the decline in ore reserves; and higher cost of mining due to increasing difficulty of ore recovery, lower gold content, and increased costs of labor and inputs since dollarization. Many of the smallest-scale mining operations had stopped, as in Nambija, or were barely surviving. In the absence of a

10. Due to the illicit use of gold in money laundering and tax (value-added tax) evasion. Small-scale and artisanal miners sell their output to domestic traders, who are unwilling to export officially and therefore to pay value-added tax that they will not recover.

substantial increase in gold prices, in the medium term, only the operations able to gain scale by buying the mining rights of others were expected to survive.

- The country's political instability, unreliable judicial system, and the 1999 economic crisis act as disincentives to investment, as the country risk is high—among the five highest in the world.

- Widespread opposition to extractive activities of large segments of NGOs and rural and indigenous communities, lack of formal consultation procedures and of clear compensation rules, may have led some reputable international companies to abandon the country and others to shy away from further involvement, given less contentious alternatives.

30. This does not mean, however, that the project will not have the intended effects in the future, when the world economy and international ore prices become more favorable to resumed exploration activities, since Ecuador now has a very favorable incentive structure, comparable to its neighbors.

31. Regarding efficiency of pollution reduction measures, although no rate of return is available, economic returns to miners of technological changes promoted under the project (switching to cyanidation and improvements in amalgamation) are likely to be high, as they also greatly improve ore recovery. Their efficiency probably explains the encouraging adoption rates reported by the ICR in areas where these technologies were demonstrated. Overall efficiency in terms of reducing pollution of soils and rivers in the pilot area cannot be assessed because monitoring campaigns were stopped after 1999 (para. 25), so progress relative to the baseline data produced under the project cannot be measured. Representatives of the Ponce Enriquez local environmental committee, which until 2001 continued to perform regular biological measurements (based on simple counting of organisms and animal life), indicated to the assessment mission that one of the most critically affected rivers in the area was showing signs of recovery. However, UAM did not have the willingness nor the resources to resume testing of rivers and estuaries for their heavy metal content, as under the Swedish monitoring program.

Institutional Development Impact: Substantial

32. The institutional framework was restructured and capacities were considerably strengthened. The Mining sector law was passed and later amended to reflect best practice worldwide. The mandates, responsibilities, and functions of the different public mining institutions were redefined and staffing was rationalized and trained. These institutions are likely to be sustainable, as they are funded in large part from fees derived from mining rights, and this proportion will increase as more concessions are granted. State-of-the-art maps and databases were developed, available for mining sector development as well as for land use planning and management. A Mining Cadastre Administration System was implemented, allowing efficient and transparent management of mining concessions and property rights. Significant progress is being made toward the development of comprehensive consultation and participation mechanisms with affected communities.

33. Adequate environmental and safety regulations were issued and the capacity to monitor the sector environmental performance and assess environmental impacts was substantially improved within MEM. The primary responsibility for ensuring that the mining industry is environmentally sustainable was kept with the sector ministry. This came at a time when there was no overall environmental law; there was just an environmental coordinating office within the Presidency with no legal enforcement capacity; and there was an urgent need to establish a capacity to provide a timely response to the on-going mining sector development (particularly to face the small-scale mining issues). These are areas, however, where further improvements are necessary and remaining gaps need to be closed: (a)The capacity of UAM to monitor the environmental performance and compliance with environmental management plans of mining concessions and apply penalties upon defaulters need to be substantially strengthened; (b) although there are clear budgetary advantages to locating UAM and the regional environmental engineers under SSM

(exclusive dedication to mining, eligibility for funding through proceeds of patent and other fees), there are also potential conflicts of interests involved because the work assignments of UAM and the regional environmental engineers depend on a hierarchical structure (Sub-secretariat of Mines) which also has policy making and mining development promotion functions, and whose budget depends for a large part on patent fees paid by concessionnaires.. Perhaps UAM and the regional environmental engineers would be better located under a separate mining environmental division, reporting to MEM's Undersecretary of Environment. (c) Most importantly, an appropriate oversight capacity of MEM activities should be built within the newly created Ministry of the Environment[11] and local communities. (d) Finally, there is some fragility in all environmental regulations applicable to mining in protected areas, because all of them (prohibition of mining in protected areas, boundaries of protected areas) are incorporated under ministerial decrees rather than laws (Annex C).

Sustainability: Unlikely

34. On balance, sustainability overall is rated as unlikely, though marginally so. Resilience of regulatory and institutional achievements is substantial, but resilience of environmental achievements is uncertain. Current uncertainties regarding the ability of MEM to adequately monitor and enforce compliance with environmental regulations and discontinuity in the program of assistance to the ASM sector, affect replicability of project outcomes.

35. *Regulatory and institutional achievements aimed at promoting private sector investments in the mining sector are likely to be sustainable*, as they are incorporated in laws, which are difficult to reverse, and as the State has relinquished its rights to reserve areas and has privatized its mining interests. The institutions have already been restructured to eliminate unnecessary functions and excess staffing. The automatic allocation by law of proceeds of concession fees in priority to the two key mining institutions (DINAMI and DINAGE) should ensure their financial sustainability independently from government fiscal constraints.

36. *Long-term environmental sustainability of mining activities is uncertain.* Heightened environmental consciousness and the presence of strong and active environmental NGOs is likely to guarantee environmental sustainability. However, although UAM is struggling with implementation of recently enacted environmental regulations, its effectiveness can be hampered by inherent conflicts of interests within the SSM structure and insufficient capacity to monitor environmental performance of mining concessions and enforce regulations. Long-term sustainability will also depend on the development of an oversight capacity in the Ministry of the Environment, as well as on effective participation of local communities. Finally, it will depend on the ability of the government to develop rules for community consultation and participation that can be accepted by all parties, incorporated into regulations, and effectively be adopted as rules of conduct by the industry.

37. *Sustainability of environmental and social achievements in the small-scale mining sector is unlikely*, because the program was essentially discontinued after the project closed. Technical assistance to promote replication of measures promoted under the project has been discontinued; monitoring campaigns of pollution in rivers has been interrupted (the last campaign was in 1999); local

11 The project task manager considers that the move of UAM under the Under secretary of Environment of MEM would be counterproductive. At project start, the mining environmental capacity was under the Under-secretariat of Environment, which was, however, dominated by the hydrocarbon sector, with the consequence that very little attention was paid to mining and resulted in important delays in the start-up of all environmental components. This was the reason why UAM was eventually set-up under DINAMI. He further considers that, since UAM and the regional environmental engineers administratively report to DINAMI, and DINAMI does not have promotion functions, but regulatory ones, the administrative reporting lines are not inadequate. In the authors'opinion, however, conflict of interests may still exist because DINAMI is not an independent agency but only a department of the Under-secretariat of Mines. Furthermore, according to the January 1998 Environmental Regulations, the environmental responsibility for the mining sector rests with MEM's Under-secretariat of Environment.

environmental committees no longer receive support and are without funds to implement their activities. Furthermore, in Ponce Enriquez, MEM has not been responding to reports of non-compliance sent last year. Finally, the health center did not appear to function properly. Only legalization achievements are self-sustainable, and these will facilitate the ongoing restructuring of the ASM sector, which is driven by current economic incentives to increase scale and maximize ore recovery (by switching to more efficient technologies that are also less polluting). This in turn will facilitate environmental control, monitoring, and enforcement. But this process may take a long time and may slow considerably if international gold and copper prices increase again. Widespread replication of measures promoted under the project would require continued special programs of technical assistance and training from MEM, regular monitoring campaigns, financial and political support for local environmental committees, a stronger enforcement strategy, and better coordination with the Health Ministry. It is also likely to require a program that provides credit at reasonable terms to help miners implement the required larger tailing containment measures, particularly in the critical areas of Ponce Enriquez and Portovelo-Zaruma, where common management plans were developed under the project but not implemented due to lack of adequate financing (Portovelo-Zaruma) and absense of agreement between SSM associations, the processing mills and the local/regional/national governments. The development of programs to provide alternative economic opportunities in ASM areas to deal with unavaidable mine closures would also contribute to sustainability.

Bank Performance: Satisfactory

38. ***Quality at entry was unsatisfactory***. The project was and continues to be consistent with country and Bank priorities, and was grounded in substantial economic and sector work. The project was complex and had a large number of components, but all these components constituted a set of coherent actions required in order to achieve the project's objectives. The difficulty involved in changing environmentally unsound practices employed by artisanal and small-scale miners was properly identified as a risk . Risks associated with frequent changes of government and shifting coalitions in Congress were also well identified (including the possibility of reversing commitments of the government not to expand into mining operations, and of sustaining institutional improvements brought about under the project).

39. However, the project's overall objectives were over-ambitious regarding the ability of a technical assistance project, by itself, to *"arrest and correct"* negative environmental impacts from a complex and diverse ASM gold mining sector, particularly in the absence of parallel investment financing mechanisms, social programs, and well defined enforcement strategies.[12] Furthermore, the potentially large impacts of cyclical downturns in ore and metal world markets on the resilience of project benefits were not identified. The main flaw in project design, however, was the lack of a comprehensive environmental assessment (EA) process and of a consistent communication and public participation strategy. As recorded in the Inspection Panel report, the EA should have covered the possible impact of increased mining activities in the entire country (not just the south, where existing mining activities are concentrated), in particular on the country's vast critical natural areas. Furthermore, appropriate consultations with stakeholders were not held during preparation of the EA, particularly with respect to the geo-science component. Yet, during preparation, these issues were raised internally and by DFID, one of the co-financiers, but they were largely ignored. An environmental specialist was not brought on missions until appraisal and no social scientist participated in any mission from identification through Board approval.

40. ***Supervision was Satisfactory.*** Supervision missions were frequent, averaging 4.5 missions a year, and their composition had an appropriate skill mix, except for Bank environmental specialists and social scientists. Social scientists did not participate in missions until late 1999. Bank environmental specialists did not participate until 2000, but this was due to the presence of DFID and SIDA environmental specialists in the field, and their participation in Bank missions as well. There was good continuity, the

12 The wording of the specific objectives was more realistic. They call for " upgrading small-scale mining technology" and "helping contain and possibly detoxify mining related hazardous wastes".

government credited the project's success in part to the presence of the same Bank mining specialist for six years starting May 1995 (who also became the task manager in February 1999). Continued assistance by the long-term consultants provided by the co-financiers was also essential. The Bank adequately addressed issues arising during implementation, except that the Bank was initially slow to follow up on issues raised by DFID regarding the inability of MEM's environmental department to properly monitor and enforce regulations. Relationships with the government and co-financiers were good and constructive. The Bank provided expert assistance in the review of proposed legal changes and regulations. The Bank promoted increased awareness of the importance of preventing adverse impacts of mining on the community by organizing an international conference on the subject under the auspices of the Government of Ecuador in May 1997. When the issues leading to the review by the Inspection Panel arose, the Bank considerably stepped-up consultations with NGOs and communities. Although this process came late during project implementation, it has had subsequent positive outcomes, including the establishment of a monitoring system for protected areas and the development (underway) of consultation guidelines.

41. Despite the unsatisfactory rating for quality at entry, ***overall Bank performance is rated satisfactory*** because partial failure to comply with environmental assessment guidelines has not resulted in adverse impacts, and because these shortfalls were addressed during supervision.

Borrower Performance: Satisfactory

42. ***Project preparation*** by the government was ***satisfactory*** overall, despite fluctuations in commitment and delays, all due to frequent changes in sector ministers and undersecretaries. As mentioned in the ICR, a change in administration in 1992 substantially lowered commitment in 1992 and most of 1993. Nevertheless, the passing of the new Mining Law and its general regulations in 1991 and the creation of new institutional structures during preparation were substantial achievements. Commitment at working level remained strong throughout the preparation phase.

43. ***Implementation was satisfactory*** overall. Although with some delays, and despite considerable political instability and several changes in ministers and undersecretaries during implementation, the government succeeded in implementing important legal and institutional reforms in the sector, and managed to ensure the financial self-sustainability of some key institutions. This is indeed a remarkable performance. Furthermore, the government undertook in earnest to implement all the recommendations of the Inspection Panel, and went further into the design of comprehensive consultation guidelines. In the implementation of the small-scale mining component, it gave considerable attention to securing the participation of local communities and to the integration of socio-economic and cultural considerations in the component's approach. It is unfortunate that discontinuity in the small-scale mining technical assistance program and some remaining weaknesses in the institutional arrangement for environmental management threaten the sustainability of project achievements.

44. The government complied with all major covenants, although with delays. As stated in the ICR, these delays were mostly due to political instability and to varying degrees of commitment to the project objectives by the successive administrations. Delays were also due to resistance of some agencies (CODIGEM) to proposed changes in their functions. Initially, the project was also affected by shortages of counterpart funds and physical resources.

45. The Project Coordination Unit performed its procurement, financial management, reporting, and accounting functions well, and addressed initial deficiencies in inter-institutional coordination, consultant selection, and project accounting. The ICR states that continuity in project coordination was excellent, with the same project coordinator remaining in its function for more than five years (August 1995 to December 2000). This project coordinator played a very active role in ensuring satisfactory project implementation and provided continuity in the midst of frequent changes in MEM. Long-term specialists

financed by the co-financiers, who assisted MEM throughout implementation, were also very important to project success.

LESSONS

- The preparation of comprehensive environmental assessments with a countrywide focus is a very important step in the preparation and design of technical assistance projects aiming at encouraging private investments in extractive activities. It is not an additional hurdle in the process of preparing a project, but a necessary tool to optimize project design and facilitate implementation, which should be reviewed and updated regularly Also, consultation mechanisms have to be set up as early as possible during project preparation. In Ecuador, the EA failed to include a review of the adequacy and sustainability of regulations and institutional mechanisms to prevent impacts and protect sensitive ecosystems; to assess whether adequate and enforceable rules existed to protect affected communities; and to organize extensive information campaigns and consultations with all potential stakeholders countrywide. The sources of opposition to mining activities which led to the request for an Inspection Panel investigation might have been identified and addressed during project design if the consultation and information process had been more robust at the time of preparation of the EA and during the first phases of implementation..

- Ideally, strong and independent environmental protection institutions should be responsible for ensuring that mining development is environmentally and socially sustainable . In countries like Ecuador, where such an institution is still very weak, a mixed approach has been adopted which delegates most environmental responsibility to the sector.ministry. However, potential internal conflicts of interest between the role of MEM as investment promoter and environmental control and enforcement agency undermine the credibility of the institution with society and with investors.. Allocating these functions to different vice-ministers would be a step in the right direction, but it is also likely to be insufficient if the Ministry of the Environment does not also have appropriate oversight and recourse functions and capabilities. Also, promoting the participation of civil society and local communities is of fundamental importance.

- Staffing, resources, and training requirements of departments and units in charge of activities such as EA review, monitoring, and enforcement need to match each one of the functions assigned to them. through the design and periodic review of detailed institutional plans that take into account expected workloads after project completion. Otherwise, as in Ecuador, it is likely that monitoring activities will receive last priority in the allocation of available managerial, human and financial resources, and may be abandoned altogether under tight budget constraints.

- Effective communication, consultation, and stakeholder participation strategies need to be designed early during preparation and maintained throughout implementation of extractive industry projects, as stated in the ICR. Ecuador's experience with the participation of NGOs and potentially affected local community associations in the design and implementation of a participatory monitoring system to detect and report any encroachment by mining activities in seven natural reserves, shows that such partnerships can be effective . With respect to geo-scientific mapping activities, early information and extensive consultations regarding inclusion or exclusion of ecologically sensitive areas could have effectively alleviated fears of NGOs and potentially affected communities, including of the Intag valley, and allowed timely adoption of remedial measures.

- Programs aiming at reducing or eliminating negative impacts from artisanal and informal small-scale mining require continuity, flexible timing, and a comprehensive approach oriented toward addressing social and managerial aspects as well as legal and technical aspects. A single technical

assistance project, such as this one, implemented over five years, cannot be expected to resolve such complicated issues. At best, it succeeds, as in this case, in raising awareness of health and environmental issues in a pilot area, performing and publicizing baseline diagnostics, pressing for legalization, and identifying, demonstrating, and promoting technical and organizational solutions. Considerably more time and efforts would be required to generalize the adoption of the recommended measures. The need for an integrated approach to technical assistance incorporating legal, organizational, and participatory aspects, is highlighted in the ICR as a lesson. However, in addition to technical assistance, financing at acceptable terms for the larger investments, such as containment and water/liquid effluent management systems, also needs to be available. Finally, enforcement would have been much easier if it had coincided with more favorable gold prices and if programs had been implemented in parallel for the development of alternative activities able to absorb laid-off workers

- The involvement and balance of foreign specialists together with national expertise reinforce capacity building impact and sustainability of TA projects, as stated in the ICR. Under the project, the involvement of long term foreign specialists, most of them funded by DFID and SIDA, has contributed to introduce cutting edge methodologies and technologies in Ecuador. However, the incorporation of a large number of national consultants has helped to insert the project into the country's reality, and permitted the transfer of technology, contributing to the sustainability of project results.

- For technical assistance projects addressing complex environmental, social and regulatory issues, continued Bank involvement beyond project closure would enhance the likelihood of sustainability. In Ecuador, the abrupt cut- off of the Bank's and cofinanciers'support resulted in program discontinuity and lack of replication of project achievements, in particular in the ASM program. On the other hand, continued Bank involvement after completion to resolve issues in the Cotacachi-Cayapas area contributed to the design and establishment of a monitoring system which was also extended to other protected areas.

Annex A. Basic Data Sheet

MINING DEVELOPMENT AND ENVIRONMENTAL CONTROL TECHNICAL ASSISTANCE PROJECT (L 3655-EC)

Key Project Data *(amounts in US$ million)*

	Appraisal estimate	*Actual or current estimate*	*Actual as percent of appraisal estimate*
Total project costs	24.0	20.55	86%
Loan amount	14.0	11.0	76%
Cofinancing	8.1	8.8	109%
Cancellation		3.0	
Date physical components completed			
Economic rate of return	Not applicable	Not applicable	

Project Dates

	Original	*Actual*
Identification		February 1989
Preparation		August 1989-September 1992
Appraisal		December 1992
Negotiations		May 1993
Board Presentation		October 21, 1993
Signing		
Effectiveness	January 1, 1994	July 18, 1994
Project Completion		
Project Closing	June 30, 1999	December 31, 2000

Staff Inputs (staff weeks)

	Total
Up to Appraisal	48.7
Appraisal to Board	20.9
Board to Effectiveness	
Supervision	98.9
Completion	9.6
Total	178.2

Mission Data

Stage of Project Cycle	*No. of Persons and Specialty*		*Performance*	*Rating*
Month/Year	*Number*	*Specialty*	*Implementation Progress*	*Development Objective*
Identification/Preparation:				
03/89	1	MS		
08/89	2	MS, MLS		
09/89	1	ME		
10/89	1	ME		
05/90	2	MS, ME		
08/90	1	MS		
11/90	1	MS		
05/92	2	OO, MS		
09/92	1	OO		
Appraisal/Negotiations:				
12/92	7	OO, ME, ES, DS (Bank); E, ES (ODA); MS (SIDA)		
05/93	1	DC		
Supervision				
06/94	1	OO	S	S
11/94	2	OO, E	S	S
05/95	1	MS	S	S
06/95	2	E, MS	U	S
08/95	1	E	U	S
09/95	2	E, MS	U	S
10/95	1	MS	U	S
02/96	4	E, MS, EyE, OO	U	S
04/96	1	MS		
07/96	2	EyE, MS	S	S
09/96	1	MS	S	S
10/96	6	EyE, MS (Bank), ES, MS (ODA)	S	S
		PO, ES (SIDA)	S	S
04/97	1	EyE		
05/97	3	EyE, MS, LS		
06/97	2	EyE, MS		
10/97	2	EyE, MS	S	S
11/97	6	EyE, MS (Bank)	S	S
		MS(2) (ODA)	S	S
		ES(2) (SIDA)	S	S
03/98	2	EyE, MS	S	S
09/98	1	EyS		
11/98	5	EyE, MS (Bank)		
		MS (DFID)	S	S
		ES, MS (SIDA)	S	S
04/99	1	MS	S	S
04/99	1	ME		
06/99	1	MS		
10/99	2	MS, SS		
11/99	7	MS, SS(2) (Bank)	S	S
		MS (DFID)	S	S
		PO(2), ES (SIDA)	S	S
			S	S
06/00	6	SM, MS, ES, SS(3)	S	S
ICR				
08/00	1	MS		
10/00	3	MS, SS(2)		
11/00	3	MS, SS(2) (Bank), ES, MS (DFID)		

MS: Mining Specialist; MLS: Mining Legal Specialist; ME: Mining Economist; OO: Operations Officer; ES: Environmental Specialist; DC: Division Chief; E: Economist; EyE: Energy Economist; PO: Project Officer; LS: Legal Specialist; EyS: Energy Specialist; SS: Social Specialist

Annex B. Table of Specific Objectives and Components

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
(a) - Assisting the government in implementing its new Mining Law passed in 1991, by strengthening sectoral institutions both at the policy and core function levels			*Achieved – The project achieved important results in both the establishment of a legal framework and institutional strengthening.* *The country now has a modern mining law, completed by general, health and safety, and environmental regulations to enforce it. The law was recently further improved through an amendment, and a new general regulation, which provide a sustainable and competitive framework for the development of the mining sector.* *Institutions were restructured and their capacities were strengthened, often according to best practice. The mandates, responsibilities and functions of the different public mining institutions were redefined to mach functions of a modern state as a regulator of sector activities (mining and environment) and provider of basic information infrastructure. The role of the Government as owner and operator of mines was discontinued. The National Mining Directorate (DINAMI) has now 7 regional offices and an Environmental Mining Unit (UAM). Finally, staffing was rationalized and reduced from 240 to 120 persons.* *State-of-the-art digital maps and data bases were developedwhich, in addition to mining sector development, are being utilized for land use planning and management. Furthermore, as a result of an investigation by the Bank Inspection Panel, (in response to concern of some stakeholders on the use of geo-data), awareness of public authorities about the need to improve consultation and participatory processes in mining activities increased, and a formal system to monitor the use of geo data has been put in place. Also, five natural reserves and two parks of the western cordillera, which were totally or partially included under the thematic mapping component, are currently monitored by a participative network of seven local community representatives and two important NGOs.* *A Mining Cadastre Administration System was developed. By allowing transparent and efficient management of mining concessions and property rights, it is likely to be a key factor in attracting and sustaining mining investments, monitoring sector activities and optimizing sector contribution to regional development.* *A modern and powerful mining, geological and environmental information system was developed and cooperation fostered between DINAMI, DINAGE and UAM.* *The Artisanal and Small Scale Mining (ASM) sector is now largely formalized. 99% of miners have formal mining rights directly or through associations (cooperative or condominium which have jointly been granted a legal title), and land invasions by small-scale miners have not been reported in the past few years.* *Finally, there has been significant progress towards the development of more comprehensive consultation mechanisms for the mining sector.* *<u>Outcome.</u>* *Project exploration activities had been growing significantly until 1997 and resulted in an increase in formal gold production from 1 t/y to7 t/y. But formal gold production decreased afterwards to about 2.8 tons in 2000. Exploration efforts for larger projects did not mature, due to severe national economic and political difficulties, worldwide slowdown in the mining sector due to low prices of metals, high domestic costs due to dollarisation, and contentious relationship with local*	

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
			communities.	
	A-Policy Management A-1 Legal Framework	Technical assistance to MEM in the administration and refinement of the regulatory framework.	A mining law (law 126) was prepared and passed in May 1991. Three regulations to the 1991 mining law (law 126) were prepared and approved. They include: (a) general regulations (October 1991); (b) mining safety regulations (July 1996); and (c) environmental regulations (September 1997). A draft new mining law, improving on fiscal, environmental and social aspects, and further simplifying and strengthening mining rights was prepared and subjected to an open and broad consultation process. It was presented to Congress early in 1999, but not debated due general political difficulties at the time. Instead, most of the elements of the draft law were incorporated in an amendment to the Mining Law and passed by Congress in August 2000 (annex C). Finally, amended general regulations to the mining law were published in April 2001. The new mining framework is now simple and transparent and provides considerable security and stability to investors. Titles are granted on first come first served basis[1] and discretionary elements in approval of concessions were eliminated. The mining concession gives a real property right to the concessionaire and a single title which can be divided. The concession cannot be cancelled, except for voluntary relinquishment and non payment of patent fees. Royalties were eliminated. As a result, speculation on titles was considerably reduced. Remaining for optimization of the mining legal framework are the consolidation of the mining law, and criteria for better qualification of consultants for the preparation of EAs and environmental audits. With assistance from an NGO, the Social Planning and Studies Center (CEPLAES), MEM is preparing guidelines for communities' consultation for the mining sector. These guidelines are expected to be completed by the end of November 2002 and may be used as a basis for future consultation regulations in the mining sector.	Achieved – The project achieved important results. The country now has a modern mining law, completed by regulations to enforce it, which provide a sustainable and competitive framework for the development of the mining sector. Significant progress is being made in the development of more comprehensive consultation mechanisms for the mining sector.

1. Recently a bidding process was introduced whereby, if two parties apply for a title to the same area within the same hour, the title will be granted to the party that offers the highest administrative fee.

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
	A -2 Institutional Strengthening	Technical Assistance to: - MME - DINAMI - DINAMA (now UAM) - CODIGEM (now DINAGE) In-service training to Ecuadorian staff Provision of office and laboratory minor works and equipment, informatics and transport vehicles.	Substantial improvements were made to the initial reorganization of MEM derived from the 1991 Mining law, which had eliminated the Mining Institute of Ecuador (INEMIN) and created DINAMI and CODIGEM. An institutional study was carried-out under the project which resulted in the definition of a modern institutional model for the sector. As a result, an optimized institutional structure was established and implemented, with modernized mandates and functions. It became fully operative at the end of 1999. - The new set of sector entities under the Undersecretary of Mining includes: (i) the National Mining Directorate (DINAMI), responsible for the administration of mining rights and environmental permits through the National Mining Cadastre, its 7 regional representations, and a newly created Environmental Mining Unit (UAM); (ii) the National Geological Directorate (DINAGE), focusing on earth sciences information management. UAM processes the environmental permits and maintains the sector environmental information system, but the environmental permits are issued by the Undersecretary of Environmental Protection. - CODIGEM was dissolved, thus eliminating the corporate function of the state in the mining sector; - MEM mining personnel was rationalized; - Procedures established; - Operational manuals were prepared; - Training programs were implemented; and - Modern office infrastructure, vehicles and equipment (including computer hardware and software for SIM and SADMIN) were provided and are being kept up to date; - Financial autonomy of these institutions was strengthened through priority allocation of mining fees and penalties for their operations.	The project's institutional Development impact was substantial. The institutional framework was restructured and capacities were strengthened according to best practice. The mandates, responsibilities and functions of the different public mining institutions were modernized and streamlined and clarified, to fit with the functions of a modern state as a regulator of sector activities (mining and environment) and provider of basic information infrastructure. The role of the Government as owner and operator of mines was discontinued. Personnel was reduced from 240 to 120 persons. However, as a result of the legal changed promoted by the project, UAM is currently overworked by the review of a large number of Environmental Assessments and Management Plans leading to interruption of monitoring activities after 1999. Control and enforcement activities have been weak. To address these issues, MEM is currently reorganizing UAM with the assistance of the former project coordinator.

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
	B- Policy Implementation			
	B 2 Geological Information Infrastructure	Technical assistance of DFIC to DINAGE (formally CODIGEM) for the preparation of geological and thematic maps at a scale of 1:250,000, covering a total area of 28,000 km^2 of Ecuador's western cordillera. Analysis of known ore districts in Ecuador and proposal for prospection methodologies. Specialized equipment and software; vehicles; data, map, imagery and remote sensing services.	Geological and thematic maps of 36,000 km^2 of Ecuador Western Cordillera were prepared and published (including the three major gold mining regions of the country) 100% of the planned regional geological, geochemical, geophysical maps of known ore districts maps were published by mid-2000. A series of books and brochures were published and workshops organized to inform the public (NGOs, communities, universities, schools) on the potential use of the geo-information for land use management. Systems were established and techniques developed for the production of maps and geo scientific projects in digital forms. Most essential professional staff from DINAGE was trained in the use of these tools.	In addition to their use in the development of the mining sector, these state-of-the-art digital maps and data bases can be utilized for land use planning and management. However, only 3 sets of maps were bought until mid-2002, and MEM is considering lowering prices to attract potential users. Furthermore, in response to expressed concern of NGOs regarding the use of geo-data for mining activities in protected areas, and as a result of a Bank Inspection Panel investigation, awareness of public authorities on the need to improve consultation and participatory process involving mining activities increased. A formal system to monitor the distribution and use of geo data has been established by inter-ministerial decree between MEM and ME. The five natural reserves and two parks of the western cordillera which were totally or partially included in the thematic mapping component are being monitored by a participative net of seven local community representatives, linked to a monitoring center maintained by a consortium of two reputable NGOs, which were competitively selected. Two complains were received recently and were processed, demonstrating that the model functions well.
	B 3 Improvement and implementation of a mining cadastre	Technical Assistance to DINAMI; and computer hardware and software.	A computerized Mining Cadastre Administration System was developed and is operational in all DINAMI central and regional offices. The information, updated daily, is available to the public on the internet. The system is linked to the environmental data base and to the geological information system. Up-to-date maps showing the location of mining concessions and of protected areas are also available. Title requests can be made in any of DINAMI' s 7 regional offices and are processed within 2-3 weeks by the interested regional office.	The Mining Cadastre Administration System, in support of the regulatory and institutional framework, allows transparent and fast processing and management of mining rights and is key to attract and sustain mining investments, monitor sector activities and optimize sector contribution to regional development. Corruption, which was pervasive prior to 1991, appears to have been eliminated. 99% of the Small Scale Mining (SSM) sector is now formalized, either individually in the case of small and medium enterprises, or through associations (cooperatives or condominium) of Artisan and small scale miners, which have been granted joint legal titles. Land invasions by informal miners were not reported during the last years. However, a large part of the gold produced by SSMs continues to be sold informally, due to the value added tax involved.

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
				Processing time of mining concession applications was reduced from an average of 10-12 months to 3 weeks, significantly lower than the four month appraisal target. Considerable areas have become available for exploration, which were previously taken by pre-emptive speculators. As of July 2002, 1,866 concessions had been granted for a total of about 1.016 million of Ha and 547 (about 370,000 Ha) were being processed. In comparison, in May 1991, the total number of concessions was only 616, but accounted for about 3.52 million of Ha. The average area per concession of 545 Ha in 2001 is about ten times lower than it was in 1991(5,700 Ha per concession).
	B3 Development and operation of a mining information system	Technical assistance to DINAMI, DINAGE and UAM.	Three main data bases were established: (i) a bibliographic information system; (ii) a project information data system on mining operations; and (iii) a geographical information system including geological, mining and environmental Information. DINAGE was equipped with advanced computer hardware and software, local network, links to internet and intranet. 15 technicians from DINAMI, DINAGE and UAM were trained as monitors and cooperation between these institutions was enhanced. A number of publications and technical documents, and user's manuals, were prepared.	Modern and powerful mining, geological and environmental information systems were developed. The first application was the production of thematic digital maps, which required the establishment of specific norms and standards. Cooperation between DINAMI, DINAGE and UAM was enhanced.
(b) upgrading small-scale miners' technology			***Satisfactorily achieved. Artisanal and small scale gold mining conditions were improved in the pilot area in terms of efficiency, environmental impact and mitigation, and safety and health hazards. Training in technical,legal, managerial, safety and occupational health aspects was given toa large number of small scale miners. Participation of small scale miners and local communities in environmental management was enhanced through the creation of Environmental Management Committees and the establishment of an ASM chamber of mines. Finally, environmental management master plans were prepared for the most impacted mining regions of Ponce Enriquez and Zaruma/Portovelo.***	
	B - Policy Implementation – B-1 Environmental Management	B 1 (ii) Implementation of methods to rehabilitate environmentally degraded areas by mining activities and prevent further	With SIDA assistance and national consultants: Socio-economic studies were carried out and helped understand the functioning of artisanal and small scale mining. As a result, remedial measures were developed and implemented in the pilot area of Ponce Enriquez. They include:	Awareness of environmental and health impacts has considerably increased throughout the mining areas. In the pilot mining area of Ponce Enriquez, near the SW coast of Ecuador where risks to impact other economic activities (shrimp and bananas)

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
		prevent further environmental degradation. Implementation of a pilot demonstration project.	(i) Demonstration of the feasibility to replace mercury amalgamation by cyanidation of gravimetric concentrates; (ii) Improvement of metallurgical processes to reduce mercury use, improve efficiency and decrease environmental impact; (iii) Training of small scale miners in management, technical and safety and occupational health aspects (45 courses to a total of 1600 participants took place until 1999) (iv) publication of a large number of informative publications, user friendly manuals and guidelines.; (v) Creation of local Environmental Management Committees (as part of the Decentralized National Environmental Management System), and their training in the monitoring of environmental and socio-economic impacts from mining; (vi) Provision of training and information to the indigenous communities of Shuar and Ashuar in the Nambijia gold mining area in the Ecuadorian Southern Amazon area; (vi) Construction of a small demonstration settling pond (3 meter-high and about 2.5 meters water depth) for the settling of water effluents from mines and gravimetric plants, before they are disposed of in the river. (vii) Preparation of a comprehensive environmental management master plan for the Portovelo Zamura area, and of a collective environmental management system for the Ponce Enriquez area.	are significant, 40% of gold processing plants are now using more effective cyanidation processes. Most remaining amalgamation plants are now only adding mercury in amalgamation drums where only concentrates from gravimetric treatment are processed, and are processing gases (previously, mercury was added directly in the mills). Other works, such as water recycling and improvement of tailing/amalgamation deposits, were completed and/or were under implementation Mercury use was substantially reduced through more effective processes and/or replacement by cyanidation. Liquid effluents from 22 ASM plants, members of the Bela Rica Cooperative, are being treated in a demonstrative pilot common effluent settling pond. Most importantly, communities have become involved in monitoring environmental and socio-economic impacts from mining through Environmental Management Committees and their environmental monitoring groups. an ASM chamber of mines has been established.
(c) Instituting applicable environmental standards and monitoring system			***Satisfactorily achieved. Mining Environmental Regulations were passed. However, the national environmental limits for effluents discharged to natural water courses, still do not include criteria for metal contents. Modifications to the Mining Environmental Regulations are being prepared by the Under-secretariat of Environmental Protection of MEM and are expected to address this issue. Extensive monitoring of the four most important southern mining areas took place during the period 1996-1999, and an Environmental Information System with extensive environmental baseline data on environmental quality(containing information on waters soils, river sediments and biota) was developed. The environmental capacity developed within UAM to monitor the sector environmental performance and assess environmental impacts is substantial. The extensive publication and difusion of the monitoring results helped develop an environmental awareness within society, authorities, and mining communities. The systematic monitoring performed with SES assistance helped define the principal contaminants and their origin and pointed to the need for adequate containment facilities (with priority to be given to the most impacted regions of Ponce Enriquez and Portovelo/Zaruma) to reduce significant pollution from mercury, cyanide and heavy metals. This work also demonstrated that, while the Biota in rivers and estuaries is impacted***	

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
			downstream, banana and shrimp farming activities have so far not been affected. ***However, the work load imposed by the review of a large number of EAs obliged UAM to discontinue monitoring activities in the last 18 months. Also, the sustainability of local Environmental Management Committees, which were trained in simple biological monitoring methods and are involved in environmental monitoring, is uncertain in the absence of strong assistance and collaboration from the regional offices of DINAMI and of independent and regular financial resources.***	
	A-Policy Management			
	A-1 Legal Framework	Instituting applicable environmental standards	Mining Environmental Regulations were passed in September 1997, complementing existing norms under the Water and the Contamination Prevention and Control laws and their regulations, and the Norm on Mercury Use in Mining. Mining Regulations specify that, in addition to presenting Environmental Assessments, Environmental Management Plans and annual Audits, concessionaires are obliged to protect and minimize impacts on biodiversity, forests, local communities, and cultural heritage. To that effect, the Mining Environmental Regulations include norms for the handling and storage of solid wastes and handling and treatment of liquid effluents. The limits permitted are those established under the National Contamination Prevention and Control Regulations (1989), which include norms for water, soil, air, noise, and solid wastes. However, these regulations establish maximum concentration limits for contaminants in superficial and marine water for uses such as drinking, irrigation, agriculture and sports, but not for fauna and flora protection. Also, although there are criteria for the quality of effluents discharged to natural water courses, they do not include criteria for metals. Finally, there are no sampling and analysis criteria. To address these issues and other, the Under Secretariat of Environmental Protection of MEM is preparing additions to the Mining Environmental Regulations which would include specific criteria for the mining sector. Also, new National Environmental Regulations are being prepared by MA.	Partially achieved – Mining Environmental Regulations were passed, but there are still a few important gaps (i.e. lack of limits for metals in liquid effluents discharged to natural water courses). Modifications to the Mining Environmental Regulations, and new National Environmental and Control Regulations are being prepared respectively by MEM and MA, and are expected to address this issue.
	B- Policy Implementation			
	B-1 Environmental Management	B 1 (i) Development of systematic environmental monitoring and data baseline of the environmental pollution	With Swedish International Development Agency (SIDA) assistance, contamination caused by, and impact of, mining activities in southern Ecuador were evaluated 7 times during 1996 and 1999 in the most important gold mining areas of Ponce Enriquez (near the bananas and shrimps farming activities) Santa	An extensive environmental baseline data on environmental quality, containing information on waters, soils, river sediments and biota was developed. The SES monitoring report has demonstrated that: (i) the principal contaminants are mercury

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
		and health hazards caused by mining,	Rosa, Zaruma/Portovelo (near the Peruvian Border) and Nambija (in the Amazon). Water from rivers and estuaries, sediments from rivers and aquatic fauna were investigated. Bio-aquatic investigation studies were also implemented in 1996 and 1998 in the rivers and estuaries of the above areas. A full set of environmental monitoring guidelines, including specific sampling and analysis procedures were prepared and integrated to UAM activities. The 1999 monitoring program was executed without SES support. Environmental baseline studies were completed, and results were published and presented at seminars and workshops. An environmental monitoring network and an environmental information data base were developed. In addition, as already commented, a network of Environmental Management Committees were created (as part of the Decentralized National Environmental Management System). Simple biological monitoring methods were developed. The committees were trained in their use and became involved in the monitoring of environmental and socio-economic impacts from mining.	that: (i) the principal contaminants are mercury, cyanide and heavy metals; (ii) the most impacted regions are Ponce Enriquez and Portovelo/Zaruma; (iii) contamination is mainly due to direct or indirect discharge of tailings from inadequate deposits of cyanidation plants and gravimetry-amalgamation operations; (iv) mercury and heavy metals are incorporated in the Biota in the rivers and estuaries but banana and shrimp farming activities are not impacted by the mining activity; and (v) if priority is given to the Ponce Enriquez and Zaruma-Portovello mining areas, most contamination problems from mercury, cyanide and heavy metals would be resolved with proper storage of tailings in adequate deposit systems, and rehabilitation of the rivers could be very quick, due to favorable natural conditions The wide publication of monitoring results helped develop an environmental awareness within local society, authorities, and mining communities. Environment control and enforcement remain weak. The environmental monitoring capacity developed within UAM could permit constant monitoring of the sector environmental performance and of implementation of Environmental Impact Assessments and Environmental Management Plans. However, the workload imposed by the review of a large number of EAs has led UAM to discontinue the monitoring program in the last 18 months. Furthermore, there are potential conflicts of interest in UAM and the regional environmental engineers reporting to DINAMI administratively. They would be better located under MEM's Undersecretary of Environmental Protection. The environmental information system is an important information and reference tool for UAM. The information has been already used under the project in a number of studies and in the preparation of thematic maps. It is also an important information source and reference for scientific and research activities and for interested mining companies. Environmental Management Committees are in place but their sustainability will depend on whether they receive strong backing and collaboration from MEM's regional offices and independent and regular financial resources are

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
				ensured to them (which was not the case in Ponce Enriquez).
(d) Helping contain and Possibly detoxify mining-related hazardous wastes			***Significantly achieved – Tools to help improve environmental performance of the ASM sector were developed and tested in a pilot area. Mercury use (and consequently mercury content in wastes) was reduced. Some ASMs have improved their containment facilities. A demonstrative pilot common liquid effluent settling pond was built.*** ***Ambitious Environmental Management Master Plans were prepared for the important gold SSM mining areas of Ponce Enriquez and Zaruma/Portovelo, including substantial investments in tailings containment. However, due to the magnitude of investments needed, lack of financing, low international prices of gold, the difficulty in reaching agreements between a large number of stockholders involved, and the still weak control and enforcement capacity and willingness of MEM, the proposed common facilities have not yet been implemented.***	
	A- Policy Implementation B-1 Environmental Management	B 1 (ii) Implementation of methods to rehabilitate environmentally degraded areas by mining activities and prevent further environmental degradation	Following the preparation of a pre-feasibility and a feasibility study prepared with SES assistance, a conceptual waste management plan was prepared by international experts for the pilot mining area of Ponce Enriquez in February 1999. This plan included: a water management system; a transport network for tailings from individual gravity/amalgamation plants; construction of common cyanidation tailing dams (15 to 30 meters high); and improvement of existing gravimetry/amalgamation tailing deposit facilities (prior to being sent to cyanidation plants). A formal EA was recommended by the study. Due to the level of investments involved, the lack of financing, and the difficulty in reaching an agreement between the Bella Rica Cooperative and the largest cyanidation plants, this common waste management plan has not yet been implemented. In lieu, a small demonstration settling pond was constructed (plastic lined, 3 meters-high dikes, about 2.5 meter water level) for the settling of water effluents from 22 of the existing 50 ASM mines and gravimetric plants, before they are disposed of in the river. The pond is part of the complete Environmental Management Plan which needs to be implemented by the Bela Rica Cooperative according to Environmental Regulations. The small pond was built under a financing and management agreement between the Cooperative (which provided the materials and operation and maintenance), the municipality (which provided the land) and the project (which provided funds for construction and technical assistance). An environmental management master plan was also completed in 2000 for the Portovelo Zamura area (important old mining area near Peruvian border) to define measures necessary to contain severe contamination of the Puyango river from a very large	The project promoted the use of more efficient, less polluting, processing technologies, water management systems, better and environmentally sound containment systems; and better effluent control. Liquid effluents from 22 ASM plants, members of the Bela Rica Cooperative, are treated in a demonstrative pilot common effluents settling pond, built under an agreement between the cooperative, the municipality and MEM. Mercury use was reduced (1-2 Kg of Hg per Kg of Au recovered compared to about 8Kg in Peru) and many plants have installed cyanidation facilities for their gravimetric concentrates. Under community pressure, some small and medium-scale operations have improved their tailing containment facilities and started to implement some reforestation near their operations. The Ponce Enriquez Environmental Management Committee reported to the assessment mission that turbidity in one of the region's impacted river had been reduced and that animal life had started to reappear. The comprehensive Environmental Management Master Plans prepared for the mining areas of Ponce Enriquez and Zaruma/Portovelo were not implemented, due to the amounts of investments needed, lack of financing, low international prices of gold, difficulty of reaching agreements between a large number of stakeholders, and weak control and enforcement pressure from MEM.

Objectives	*Components*	*Related Activities*	*Output*	*Outcome*
			number of ASM mines and/or small treatment plants. Pollution is constraining development of a downstream bi-national irrigation project and possible tourism activities. Environmental and social problems in this area are severe because of the community's overwhelming dependence on mining.	
(e) Monitoring mining-related health issues among the mining communities.			***Achieved - Baseline data and Information System on Mining Occupational Hazards (SIREM) were developed. Methods and procedures for mining occupational health hazards investigation were developed and prevention measures were proposed. Investigation results were extensively published and SSMs were trained. A health center specialized in mining originated diseases was built by the mining organizations, the districts and the Ministry of Heath, but as of mid-2001, x-ray equipment had still not been installed.***	
	B - Policy Implementation B-1 (I) Systematic monitoring of and establishment of a data base of occupational health hazards caused by mining	With Swedish International Development Agency (SIDA) assistance, development of occupational health baseline data.	Regulations for Mining Safety were prepared and published in July 1996, in addition to the Workers Safety and Health and Improvement of Occupational Environment Regulations published in November 1986 (Decree 2393). The health of 700 miners was checked in 1998 for silicosis, mercury, lead, and cadmium, and deafness in the mining areas of Ponce Enriquez, Portovelo-Zaruma, and Nambija. About 30% were diagnosed with abnormal levels. Occupational health baseline studies were completed, and results were published in scientific and simple formats and presented at seminars and workshops to increase health risk awareness and the need for prevention. Didactic health and safety information publications were also prepared and extensively distributed. SSMs were trained in safety and occupational health and 12 local physicians were trained in X-ray interpretation and silicosis diagnostic. A health center, specialized in mining-originated diseases, was built in Ponce Enriquez, with financing from the mining organizations, the local government and the health ministry. Specialized equipment, including X-ray equipment for silicosis diagnostic was financed by the project. A computerized Mining Occupational Health Hazards Information System (SIREM) was designed and implemented.	Miners and their families considerably increased their awareness of health risks associated with traditional mining activities, and of the required prevention measures, particularly in the Ponce Enriquez area. In Ponce Enriquez, representatives of the local Environmental Management Committee reported that exposure of miners to mercury fumes from archaic amalgam burning processes had been virtually eliminated. The Ponce Enriquez Health Center is in operation, but the mission was unable to assess its effectiveness as personnel was on strike. However, the fact that the X-ray equipment financed under the project was still in storage, uninstalled and unused, casts serious doubts about the Center's performance.

Annex C. Main Features of Ecuador's Mining Law

Law 126 of May 31, 1991	*Decree-Law 144 of August 18, 2000 (Changes only)*
State ownership of all mineral substances; which it may concede to domestic or foreign persons or entities.	Exploitation of resources subject to sustainable development principles and environmental protection and conservation.
Separate concessions for exploration and exploitation. Maximum concession size is 5,000 hectares for exploration and 3,000 for exploitation. Authorizations required for beneficiation plants and commercialization	Single concession for all stages of exploration, exploitation, beneficiation, processing and commercialization, up to 5,000 hectares. Sale by concessionnaires of own minerals is free. Otherwise, trade in metallic ores requires license. Compulsory notification of start of production prior to initiation. Start of production conditional on approval of Environmental Impact Assessment.
Concession confers real property right separate from property of land, and it is transferable, transmissible and mortgageable.	Mining rights can be divided or accumulated (subject to maximum limit of 5,000 hectares)
Concession can be granted to groups of persons, jontly responsible, without need for legal entity (Condominium)	
Validity of concession: 2 years for exploration concessions (extendable to 6 years) and 20 years for exploitation (renewable)	Indefinite
Time limit for start of work: 6 months for exploration and 1 year for exploitation.	Concessionaire's choice (but subject to payment of increasing patents and to a fine from year 9 onwards).
Cause for extinction of concessions: non-payment of patents for 6 months inactivity damage to environment undue use of resource illegal exploitation relinquishment	Cause for extinction of concession: non-payment of patents for 6 months relinquishment
State reserves the rights to create special mining zones and reserved areas	Eliminated.
Special mining regime for artisanal or small-scale mining	Eliminated. Replaced by obligation of MEM to promote evolution towards medium and large scale mining through special programs.
Annual patent fees: Exploration: first two years: equiv. to US$ 1.5 per ha; increasing to US$4.5 in first two-year renewal and US$7.5 in second two-year renewal. Exploitation: US$4.5 per ha	Annual patent fees: (a) Conservation year 1-3: US$1 per ha year 4-6: US$2 per ha year 7-9: US$4 per ha year 10-12: US$8 per ha year 13 on: US$16 per ha (b) Production: US$16 per ha
Allocation of patent fees: State Treasury	Automatic priority allocation to DINAMI and DINAGE and maintenance of SADMIN and SIM. Surplus distributed as follows: 50% to municipalities, 20% to provincial councils, 10% to municipalities, 15% to the Police, 15% to higher education institutions with geology, mining and environmental faculties.
Royalties: 3% of gross production value, distibuted as follows: 30% to municipalities, 25% to provincial councils, 5% to the Police and 40% to the State.	Eliminated
Export taxes: exempt, except 0.5% general export tax (FONIM)—Sales of minerals to Central Bank considered as exports.	
	Title processing fee: US$100 per transaction

Law 126 of May 31, 1991	*Decree-Law 144 of August 18, 2000 (Changes only)*
Sale of mining products and imports of equipment and goods not produced locally are exempt from VAT. However, VAT charged on all domestically produced (and similar imported) inputs and equipment. No drawback system.	Sale of miningsubstances (such as ores, mineral concentrates and tailings) and imports of goods not produced locally are exempt from VAT. However, 10% VAT charged on all domestically produced inputs and equipment. Tax credit.
Transfer of mining rights not subject to VAT or capital gain tax.	
Pre-operating expenses depreciable over four years. All new investments in exploration and mine development are also deductible.	
Carry forward for losses- 8 years, subject to limit of 50% of tax base.	
	Stability of legal and tax rules for period to be established by Ministry of Energy and Mines

Other applicable provisions from general tax and business laws:

Equal treatment of foreign and local investors in all aspects. No requirements of minimum local ownership or participation in management or board.

Company contribution to Social Security System: 12.15% of payroll.

Corporate Income Tax: 25%.

Mandatory Profit Sharing: workers have rights to 15% share of pre-tax profits, distributed as follows: 10% divided among workers (up to 40SMV per worker), 5% among workers with families (up to 20SMV per family), and balance to be used in infrastructure and social expenditures in area of influence. Effectively brings corporate income tax rate to about 36%.

Import duties: 5% to 10% for most products related to mining activities (5% for equipment).

VAT tax rate: 12%, except on imports.

Note: tax of 11% on remittances abroad, which was applicable at the time of appraisal, was eliminated during project implementation.

Annex D. Environmental Aspects

Background

A Presidential Environmental Commission (CAAM) was created in September 1993 to address increased environmental and social problems, as a result of productive activities such as hydrocarbons, shrimp farming, bananas and flowers plantation, forestry and mining; and accelerated urbanization of the country. Through a participation process CAAM prepared the Environmental Management Basic Principles (1993), the Environmental Basic Policies (1994), and Ecuadorian Environmental Plan – PAE (1996). PAE defined as priority actions the rationalization of the environmental legal framework, institutional strengthening of environmental management entities, and delegation of environmental responsibilities to local and sectorial governments. In line with the delegation principle, environmental responsibilities for the energy, hydrocarbons and mining sectors rested with Under Secretariat of Environment of MEM. In October 1996, while implementation of the Bank Ecuador Environmental Technical Assistance Project (PATRA) was starting, the Ministry of Environment (MA) was created as the national environmental authority in charge of national environmental policies and strategies, as well as the coordination and regulation of National Decentralized Environmental Management System. MA replaced CAAM upon its dissolution in 1998.

The National Environmental Management System

Environmental Management Strategy - The National Environmental Management Law approved by congress in 1999 confirmed the ministry as national environmental authority. Also, a strategy for sustainable development was established the same year. On this basis, decentralization strategy for environmental management is one of the MA's key management policies and MA is establishing accreditation and decentralization agreements with local and sectoral governments. As a result, environmental management of mining, Hydrocarbons and energy sector remain with the Under-secretariat of Environment in MEM. Regulations to the National Environmental law are being prepared and are expected to be passed by end of 2002.

Main Mining Sector Aspects of the National Environmental Management Law –

- Establishment of a decentralized environmental system including the participation of the civil society.
- Extraction of non renewable resources from natural protected areas is exceptionally permitted for national interest, after an economic feasibility and impact evaluation study have been carried out.
- All potentially polluting projects need a license from respective sectoral ministry previously to any activity. Agreed base line study, EIA, risk evaluation and management plan, management plans, monitoring system, contingency and mitigation plans, environmental audit and closing plans are required previously to license delivery.
- Regulations will define mechanisms for social participation such as consultation, public hearings, diffusion of environmental information etc…

National Environmental Information System and an Environmental Management System (Sistema Unico de Manejo Ambiental), These systems, including an EIA scheme, were designed under PATRA and are being implemented. Also under PATRA, MA has developed several proposals for strategies and policies in areas including water resources, disaster prevention, industry, oil and mining. However, most of them have not yet been approved.

Organization and Responsibilities. MA was created as the national environmental authority in charge of national environmental policies and strategies, as well as the administration, management,

control, and coordination of environment matters throughout Ecuador. MA's decentralized organization includes four under-secretariats and 11 regional districts. The Under-secretariat of Environmental Quality is composed of: (i) the Contamination Control and Prevention Directorate, which responsibilities include environmental impacts evaluation, environmental monitoring and control, environmental auditing; and (ii) Local Environmental Management Directorate responsible for the support to decentralization, institutional strengthening, and dissemination.

Despite some improvement in the MAs operating capacity through PATRA, its environmental management capacity is still very weak. Especially, the Contamination Control and Prevention Directorate needs a strong strengthening program. MA expects to implement such program during the next two years with bilateral assistance from Holland.

Mining Sector Environmental Management within MEM

Environmental Organization and Responsibilities

As for the Energy and Hydrocarbon Sectors, the environmental management of the Mining Sector is under the responsibility of the Under-secretariat of Environmental Protection in MEM. Coordination with MA, other sectors and local government on environmental maters is also under its responsibility. Activities such as the review and follow-up of Environmental Assessments, environmental management plans and audits; processing of environmental permits; environmental monitoring, and control; and operation of the environmental, safety and heath information systems, are implemented by the Mining Environmental Unit (UAM) under the National Mining Directorate within the Sub-secretariat of Mining (DINAMI). But, the environmental permits are issued by the Under-secretary of Environmental Protection. UAM was created as part of the organizational restructuring which took place under the project, and is in charge of the mining environmental activities which were until then the responsibility of the National Directorate of Environmental Protection (DINAPA), under the Under-secretariat of Environmental Protection. UAM has a total staff of 7 multidisciplinary professionals and 7 regional environmental engineers. During project implementation this team was trained and equipped and its expertise and technical skill improved significantly. However, as a result of the legal changes promoted by the project, UAM is currently overworked by the review of a large number of Environmental Assessments and Managements Plans leading to interruption of monitoring activities after 1999. Control and enforcement activities remain weak. The application of strict environmental control measures depends to a large part on having effective organization and properly trained and remunerated specialists in adequate number. To address these issues, MEM is currently reorganizing UAM with the assistance of the former project coordinator. Guidelines for the preparation of EAs and a system of review, approval, and follow-up of EAs are also being prepared. Finally, there are potential conflicts of interest in UAM and the regional environmental engineers reporting to DINAMI administratively. Perhaps UAM and the regional environmental engineers would be better located under a separate mining environmental division, reporting to MEM's Undersecretary of Environment

Relevant aspects of the Mining Sector Environmental Framework

Mining Environmental regulations to the Mining Law were approved in September 1997, complementing existing norms under the Water and the Pollution Prevention and Control laws and their regulations and the Norm on Mercury Use in Mining. The preparation of the mining environmental regulations was the first participation experience in legal proposals in Ecuador. Main relevant aspects of these regulations include:

- The Mining Environmental Strategy is multidisciplinary, including social and occupational aspects, decentralized and executed with local governments and communities' participation, under MEM policy and guiding principles.

- In no event concessions are granted or mining activities allowed in natural protected areas. In protected forest and vegetation, mining concessions are possible upon the prior authorization of the Ministry of Environment through a special commission for mining authorizations.
- The preparation of a preliminary EIA prior to initial exploration activities and of an EIA and an Environmental Management Plans prior to advanced exploration, exploitation, or mineral treatment activities is compulsory. Annual environmental audits are also compulsory. All EIAs and environmental audits must be disseminated in the area of influence, under the supervision of Under-secretariat of Environmental Protection.
- Concessionaires are obliged to protect and minimize impacts on biodiversity, forests, local communities, and cultural heritage. To that effect, the Mining Environmental Regulations include norms for the handling and storage of solid wastes and handling and treatment of liquid effluents. The limits permitted are those established under the National Contamination Prevention and Control Regulations (1989), which include norms for water, soil, air, noise, and solid wastes. However, these regulations do not include limits for metals in liquid effluents discharged to natural water courses.
- Upon closure, obligations to adequately remove all installations and housing facilities, and to rehabilitate mining degraded areas according to plans presented in EAs. Concessionaires remain responsible for all damages to the environment after closure.

Modifications to the Mining Environmental Regulations and new National Environmental and Control Regulations are being prepared respectively by MEM and MA and are expected to address the above standards issue, optimized criteria for better qualification of consultants for the preparation of EIAs and environmental audits and improve the timeframe when EIA reports are due for exploration and exploitation activities to ensure that EIAs are approved before any activity is started and measures recommended can be taken into account in the design.

Consultation Mechanisms - Significant progress towards the development of more comprehensive consultation mechanisms for the mining sector took place under the project. Under an IDF grant and with assistance from an NGO, the Social Planning and Studies Center (CEPLAES), MEM is preparing guidelines for communities' consultation for the mining sector. These guidelines aim at facilitating dialogue between the main stakeholders, including mining promoters, small miners, communities, NGOs and local and national governments. They are expected to be completed by the end of November 2002 and may be used as a basis for future consultation regulations in the mining sector. In addition, the project helped change the criteria for publication and diffusion of information on pollution monitoring and control and helped strengthen local communities and governments environment management capacity aiming at more effective environmental management committees and more environmental local consciousness.

Indigenous Peoples - The indigenous communities are well organized in Ecuador and have organized federations to make sure their voice is heard, but no specific rights and/or measures are considered in the mining legal framework for indigenous lands. Indigenous reserves and land deeded to indigenous peoples based on traditional communal rights is considered under the law as commonly owned lands and the concept of "easement arrangement" and its procedures apply. However, a study on "Relations between Indigenous peoples and gold mining" was carried out under the project (1997). The main causes of conflict reported by the study include: (i) separate property of land and its underground; (ii) environmental impacts; (iii) undesired social impacts. Study recommendations include: (a) design of specific criteria and norms to facilitate relations between indigenous peoples and mining activities; (b) strengthening of indigenous organizations and teams in negotiation processes, environmental and social monitoring; and (c) transparent information on mining legislation and techniques.

Health and Safety – Regulations for Mining Safety were prepared and published in July 1996, in addition to the Safety and Health of workers and Improvement of Occupational Environment Regulation

published in November 1986 (Decree 2393). In addition to comprehensive safety norms for mining operations, the 1996 regulations oblige the concessionaire to report any accident to DINAMI within 24 hours, to have a safety unit when the number of workers is higher than 100 and/or a safety and hygiene comity when the number of workers is higher than 15.

Under the project, occupational health base line studies were prepared and published, Base line data, methods and procedures for mining occupational health hazard investigations were developed and prevention measures were proposed especially for diseases related to mercury, silicosis, deafness. A Mining Occupational Health Hazard Information System (SIREM) was established. Results were extensively published and distributed and SSMs were trained in safety and occupational health. A health center specialized in mining-originated diseases was built in Ponce Enriquez and specialized equipment, including X-ray for silicosis diagnostic was financed by the project. However, as of mid 2002, this equipment was still not operational. The mission was unable to verify the satisfactory operation of the health center, which was inoperative due to a strike in the center's health personnel.

Use of Mercury by ASMs- In addition to the Mercury Use Norm No. 338, published in September 1989, the Mining Environmental Regulations only authorize the use of mercury by ASMs equipped with amalgamators, retorts, particulates sedimentation facilities and mercury recovery systems devices to avoid atmospheric, water and soil pollution. Currently, 99% of SSM sector is formalized and has presented EIAs and Environmental Management Plans either individually in the case of small and medium enterprises, or through associations (cooperatives or condominium) of artisan and small scale miners, which have been granted joint legal titles. Under the project, SSMs and local environmental and safety committees were trained in environmental, health, safety, and operational aspects. The sector is monitored by the regional environmental engineers but enforcement so far has been weak. This may change in the future, however: during the assessment mission, the regional director of DINAMI informed that 15 ASMs would be shortly closed for non compliance with their Environmental Management Plans. SSMs visited and most stakeholders met in the Ponce Enriquez mining region confirmed that use and pollution from mercury have significantly been reduced in the region due to replacement by cyanidation of gravimetry concentrates and/or more efficient use of mercury.

Main Aspects of the Project Environmental Assessment[1]

An Environmental Assessment was prepared in February 1993, based on a number of environmental, occupational health and socio-economic studies prepared during project preparation, including the Swedish Geological International (SGAB) reports on "Development of Small Scale Mining" and "Environmental Impact and Measures for Environmental Control". The EA gives quite a comprehensive picture of the adverse environmental, safety, health and social impacts of SSM in the main mining areas of Southern Ecuador and in the rivers draining from these operations.

The EA provides incomplete information on current baseline conditions due to lack of monitoring data. Particularly lacking are reliable data on occupational health and safety, contamination of the food chain and toxic effects of methyl mercury and other heavy metals. However, the EA considers that the improper use of mercury is the major problem due the favorable local conditions for its transformation in a more bio-accumulative and toxic form, methyl mercury, and that pollution caused by cyanidation is not a major issue due to the natural oxidation of cyanide residues. As a result, the EA recommended the implementation of upgraded, less polluting and more efficient SSM technologies.

The EA proposal also proposes sub-components in the project for monitoring of pollution related to mining activities, and for improving expertise in monitoring and controlling occupational health and toxicological problems related to mining, including the preparation of baseline data.

1. This section built on Roger Badstone's "List of Findings from Initial Portfolio Review" of Safeguard Policy.

The EA provides a good description of the evolving legal and regulatory environmental management system for the mining industry in Ecuador and its weaknesses. Proposals for strengthening the system and improving environmental monitoring and enforcement were appropriately included as components of the project. However, the occupational health and safety component of this proposal and initiatives to address the health and hygiene conditions of the SSM communities should have received more emphasis.

The EA do not really deal with "Analysis of Alternatives" and presentation of an "Environmental Management Plan". As this was primarily a TA project, it would have been more appropriate to give more emphasis to different policy, regulatory and management alternatives for improving the efficiency and output of the SSM sector, improving environmental control, health and safety, and health and social conditions in SSM communities.

The EA addresses the "Impact of Mining on Indigenous People in Ecuador". A distinction is made between the indigenous Andean communities "whose recognition by the mainstream – the modernizing, westernized culture – has been taking place over more than four centuries, and the Amazon tribes, that have lived fairly independently from the rest of the Ecuadorian nation until quite recent times". The EA recognizes that "most land rights of indigenous communities are not yet formal" and "that the administration of mining concessions will have to be done carefully to protect the environmental sustainability of indigenous populations and prevent further encroachment of unacceptable mining activities in their territories"

Finally, the issue of Natural Habitats is largely ignored in this EA. This is surprising for mining operations.

Main Comments of the WB Inspection Panel Investigation on the Project's EA

- The EA "A" categorization was appropriate, but late in the preparation process and a more expanded and robust EA process should have been undertaken.
- Limiting the geographical scope of the EA for the project to the southern regions of the country (where the ASM is concentrated) was inappropriate for a sector project which was promoting country wide development of its mineral resources – including the ecologically more sensitive northern regions of the country.
- The EA did not adequately address available baseline environmental data for the biologically rich regions in the North of the country.
- During the preparation of the EA, LATEN staff and a co-financer noted "gaping holes" and "inadequacies" in the EA, but, due to other pressures to approve and move the project forward, these concerns were never addressed. LATEN referred specifically to the "Wildlands Policy" (OPN 11.02, now OP/BP 4.04 on Natural Habitats), which should also have been triggered by this project but was ignored in the preparation of the EA. IP noted that LATEN final sign off on EA was a mistake.
- Consultations with stakeholders and locally affected peoples only started 5 years after project approval and clearly did not meet EA OD 4.01 requirement on public consultation. In any case the meetings that were held later were characterized by the IP as "information" rather than "consultation" meetings as required by the OD.

Annex E. Statistical Indicators

Table E-1: Number and Area of Concession Contracts Signed/Titles Registered and Granted At Appraisal and Current

	Number			*Area (ha)*		
		Registered	*Reg.& Granted*			*Reg.& Grant.*
	up to May-91	*up to Jul-02*	*up to Jul-02*	*up to May-91*	*up to Jul-02*	*up to Jul-02*
Exploration & Prospection	463	18	20	3,465,000	12,032	12,032
Exploitation	153	91	91	50,000	7,521	7,527
Comprehensive		1,623	1,755		952,474	996,468
Total	**616**	**1,732**	**1,866**	**3,515,000**	**972,027**	**1,016,027**
Total sq. Km				35,150	9,720	10,160
Ratio 2002/1991		2.81	3.03		0.28	0.29
Average size of Concession (ha)				5,706	561	544

Source: May 1991: Staff Appraisal Report (Page 34)- July 2002: National Mining Cadaster

Definitions:

Registered: Titles have been issued and are registered in the National Cadaster.
Granted: Concession has been granted but registration of title is pending payment of patent or expiration of posting period.
Granted: Concession has been granted but registration of title is pending payment of patent or expiration of posting period.
In process: Application has been received and is being processed.
Rejected or cancelled: Application not meeting requirements; or concession has expired; or concession has been cancelled due to non-payment of patent rights.

Table E-2. Mining Concessions Outstanding as of July 15, 2002- by Province

	Number				Area (Ha)			
Province	***Registered***	***Granted***	***In Process***	***Rejected or Cancelled***	***Registered***	***Granted***	***In Process***	***Rejected or Cancelled***
Azuai	374	21	107	2,268	168,752	7,636	60,018	4,083,676
Chimborazo	106	18	9	685	25,747	710	9,273	1,400,923
El Oro	302	7	31	1,043	174,638	1,971	3,097	1,224,358
Pichincha	391	57	254	2,833	157,803	27,735	110,017	6,093,514
Zamora	169	5	78	1,312	201,742	340	175,633	2,681,234
Loja	156	1	40	887	193,771	1,630	7,044	2,196,013
Guayas	234	25	28	557	49,574	3,978	4,260	509,328
Total	1,732	134	547	9,585	972,027	44,000	369,342	18,189,046

Table E-3. Mining Concessions by Type as of July 15, 2002

	Number				Area (Ha)			
Type of Concession	***Registered***	***Granted***	***In Process***	***Rejected or Cancelled***	***Registered***	***Granted***	***In Process***	***Rejected or Cancelled***
Comprehensive	1,623	132	493	754	952,474	43,994	362,527	1,451,793
Exploration	18	2	8	7,561	12,032		4,314	16,562,239
Exploitation	91		46	1,270	7,521	6	2,501	175,014
Total	1,732	134	547	9,585	972,027	44,000	369,342	18,189,046

Table E-4. Mining Concessions by Type of Ore/Material (issued during period 1991-july 2002 only)

	Number				Percent			
	Metallic	***Non-Metallic***	***Construction Materials***	***Total***	***Metallic***	***Non-Metallic***	***Construction Materials***	***Total***
Number of Titles	951	550	1,126	2,627	36%	21%	43%	100%
Area (Ha)	816,072	176,860	35,672	1,028,604	79%	17%	3%	100%

Source: National Mining Cadaster.

Definitions

Registered: Titles have been issued and are registered in the National Cadaster.
Granted: Concession has been granted but registration of title pending payment of patent or expiration of posting period.
In process: Application has been received and is being processed.
Rejected or cancelled: Application not meeting requirements; or Concession has expired; or concession has been cancelled due to non-payment of patent rights.

Table E-5. Ecuador- Mining Concessions- Number and Areas Processed per Year

		Number	
Year	***Requested***	***Granted***	***Rejected***
1991	165	3	9
1992	996	188	66
1993	828	203	209
1994	1,144	296	493
1995	1,222	360	898
1996	1,240	302	1,064
1997	991	322	995
1998	871	277	1,408
1999	1,173	297	1,317
2000	754	240	971
2001	2,463	1,163	1,085
Jan-Jul 2002	783	458	331
Total	12,630	4,109	8,846

		Area	
Year	***Requested***	***Granted***	***Rejected***
1991	1,943	966	18,483
1992	993	19,184	128,948
1993	1,567	5,471	280,317
1994	679	8,281	919,455
1995	474	17,635	702,423
1996	1,256	43,190	444,970
1997	1,233	20,005	186,480
1998	695	51,220	612,076
1999	1,094	85,780	300,845
2000	1,010	107,371	765,893
2001	518	681,215	936,717
Jan-Jul 2002	995	238,161	810,193
Total	12,457	1,278,479	6,106,800

Table E-6. Ecuador- Reported National Mining Production

Ore	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Gold (Grms)	451,113	863,062	933,375	1,182,349	7,410,496	7,207,558	3,068,773	1,474,399	2,025,981	2,871,367	
Silver (Grms)						7,996					
Limestone (Ton)	3,659,901	3,159,770	1,822,145	4,306,665	4,088,941	3,490,754	4,510,515	2,803,661	2,864,857	3,147,015	
Construction Materials(M3)		362,673	163,899	1,034,235	2,264,458	1,324,796	1,873,780	2,411,429	2,459,207	2,595,542	
Clay (Ton)	283,141	277,929	131,238	279,439	53,822	835,867	185,234	811,951	412,598	324,671	
Feldspar (Ton)	2,253	3,249	2,015	5,691	10,297	10,321	60,328	69,318	33,142	47,041	
Kaolin (Ton)	12,014	6,379	507	6,622	45,054	86,542	7,345	5,600	20,652	11,022	
Bentonite (Ton)	135	392		1,118	511	432	205			41	
Siliceous Sands(Ton)	10,489	35,507	18,750	33,534	26,486	24,070	43,240	25,926	21,978	27,522	
Marble (Ton)	1,711	1,961	8,620	2,572	10,948	1,556	1,089	19,693	2,508	1,680	
Gypsum (Ton)					2,430	2,038	1,510	1,672	1,456	1,043	
Pomez (Ton)						231,875	368,269		275,274	344,850	
Carbon Dioxide (Kg)			5,200	34,129		8,723	8,029			28,843	
Antimonium (Ton)							507,872				
Puzolana (Ton)								5,266	13,978	27,687	
Baritina (Ton)									2,532	1,476	
Zeolita (Ton)									1,237	1,291	
Source: National Mining Directorate (DINAMI)											
Official Gold Exports (Grms)						13,669,000	8,757,000	3,826,000	3,298,000	2,534,000	2,367,000

Official Gold Exports

Year	Kilograms
1996	13,669
1997	8,757
1998	3,826
1999	3,298
2000	2,534
2001	2,367

Source: Empresa de Manifiestos

Table E-7. International Price of Gold (US$ per ounce)

Year	*US Domestic*	*UK London*
1970	36	
1975	162	
1980	613	
1985	318	
1986	368	
1987	478	
1988	438	
1989	383	
1990	385	
1991	363	
1992	345	
1993	361	
1994	385	
1995	386	
1996	389	
1997	332	
1998	295	294
1999		279
2000		279
2001		271
Jul. 2002		313

Source: US Domestic Prices-- Engelhard Corp.
UK London: World Bank Commodity Price Data

Table E-8. Total Investment by Companies (MILLION US$))

	1997	*1998*	*1999*	*2000*	*2001*
Mines and Quarries	1.17	1.19	0.57	2.08	6.43
Total	**479.34**	**599.53**	**461.14**	**253.51**	**795.06**
%	**0.24%**	**0.20%**	**0.12%**	**0.82%**	**0.81%**

Source: Superintendencia de Companias

Table E-9. Direct Foreign Investment in Mining and Quarries
Investment in Company Establishment and Capital Increases

	1994	*1995*	*1996*	*1997*	*1998*	*1999*
No. of Companies	19	14	10	12	5	3
Amounts Invested:						
Million Sucres	1,015	914	245	2,103	1,264	340
US Dollars	**441,881**	**312,692**	**67,400**	**474,932**	**185,201**	**16,796**
Exchange rate	2297	2923	3635	4428	6825	20243

Source: Superintendencia de Companias

Table E-10. Government Revenues from Mining Activities Since 1991 Mining Law s (US$)

Year	*Royalties*	*Patents*	*Processing Fees*	*Mining Right Auction Fees*	*Products and Services*	*TOTAL*
1991	193.61	9,505.85				9,699.45
1992	109,764.72	194,522.81				304,287.53
1993	338,312.77	284,657.03				622,969.80
1994	448,517.97	971,344.96				1,419,862.93
1995	453,361.31	1,008,484.06				1,461,845.37
1996	690,874.26	1,127,794.33				1,818,668.59
1997	733,231.56	1,408,549.00				2,141,780.56
1998	385,221.84	758,271.29				1,143,493.13
1999	239,498.69	504,113.59				743,612.28
2000	267,203.73	732,391.19				999,594.92
2001	225,338.06	530,462.62	140,900.00		3,196.66	899,897.34
2002*	2,825.66	716,529.87	53,200.00	56,318.10	21,918.55	850,792.18
TOTAL	**3,894,344.18**	**8,246,626.59**	**194,100.00**	**56,318.10**	**25,115.21**	**12,416,504.08**

Note: Since 1995: Source: SADMIN.
* Up to July 17, 2002.