

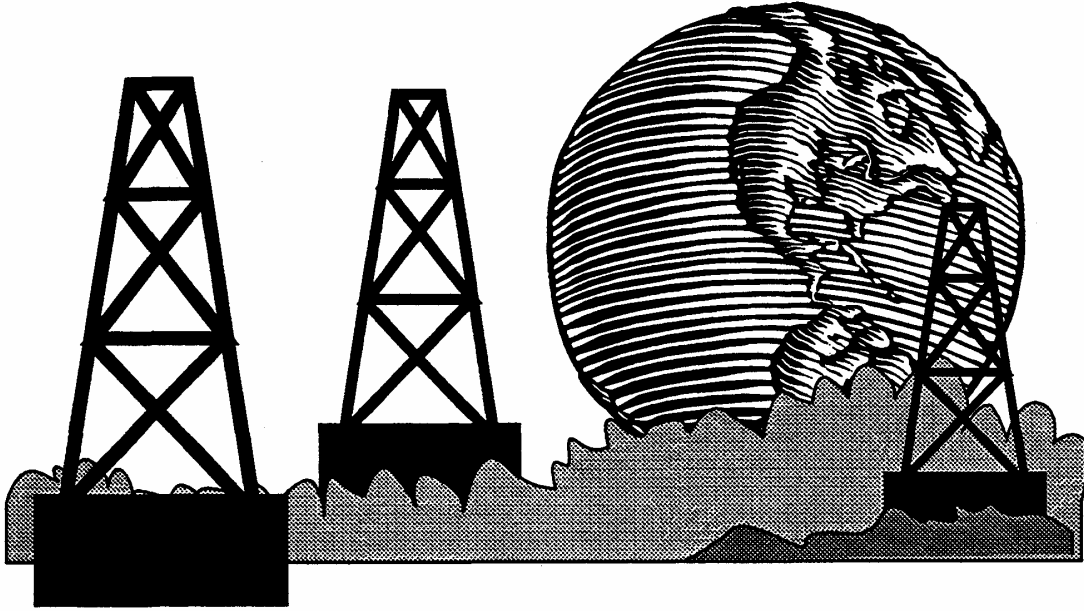
RAINFOREST NEGOTIATION EXERCISE (RNE)

Rainforest Negotiation Exercise is an exercise prepared by Christopher A. Cummings and Barbara L. Marcus, the Sustainable Enterprise Program (SEP), and R. Edward Freeman and Jason Lunday, the Darden School, University of Virginia. It is intended for educational purposes only. Copyright © 1994 by the Sustainable Enterprise Program and Darden.

This exercise is a chapter in the book *Stakeholder Negotiations: Exercises in Sustainable Development* (1995) edited by Alan R. Beckenstein, Frederick J. Long, Matthew B. Arnold and Thomas N. Gladwin. The book contains six exercises that illustrate how different institutions place competing demands on the natural environment, how they attempt to incorporate these demands on the natural environment, and how they attempt to incorporate these demands into a sustainable development strategy.

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Exercise 6

RAINFOREST NEGOTIATION EXERCISE (RNE)

Ecuador's Amazon region is considered to be one of the greatest areas of biodiversity in the world, serving as a home to over 22,000 plant and animal species. This biodiversity has great practical value (for example, raw materials for new drug development) as well as aesthetic value. This region is also the home of numerous indigenous peoples who depend on plant and animal abundance for their survival. This region, like many other tropical rainforest regions, is considered threatened. Economic and social pressures have led to the deforestation of 200 million hectares of the world's tropical rainforest for the past two decades.

In 1991, a consortium of foreign oil companies led by Conoco, Inc. has proposed to develop several oil fields in Ecuador's Amazon region. Conoco has already spent 90 million to explore the potential of the area, known as Block 16. It has identified over 200 million barrels of oil reserves, a huge figure that would amount to 20% of Ecuador's total reserves. The debate over the future of Ecuador's rainforest pits two compelling perspectives against one another. Conoco and the Ecuadorean government believe that the fields can be developed in an environmentally sensitive way, while environmental organizations, indigenous peoples' representatives, and multilateral lending institutions are all questioning the company's intent and the appropriate development strategy for the region.

Conoco recognizing the complexity of its plan to move forward with oil exploration, has presented a draft environmental protection proposal and has asked major stakeholders to meet and discuss the proposal. You will represent one of seven stakeholder groups

Exercise 6: Rainforest Negotiation Exercise (RNE)



meeting to review the proposals for Block 16. you may also be asked to conduct a financial analysis of the Block 16 site.

RAINFOREST NEGOTIATION EXERCISE (RNE)

“All of a sudden we have pressures from organizations from Europe, from the States, claiming the Amazonian jungle has to be untouched, the same way they’re demanding we pay off the debt; they’re still getting cheap export goods. I think it’s a little unfair the pressure we have from different sides. They say, ‘Don’t use this, don’t touch this,’ but do we have an alternative?”¹

**-- Petroecuador’s
Environment Unit Chief
Manuel Navarro**

BACKGROUND

A consortium of foreign oil companies led by Conoco, Inc. is interested in developing several fields in an oil development block located in Ecuador’s Amazon Region. The consortium has spent \$90 million on exploration efforts in the area, known as Block 16, over the past four years and determined that the block has over 200 million barrels in reserves, 20% of Ecuador’s total reserves. Conoco’s proposed development plan would require an up-front investment of \$600 million for drilling and production equipment, two parallel 160 km pipelines and a new 140 km road. Approximately \$60 million, 10% of the total expected investment, is intended for environmental protection initiatives. Conoco has submitted this plan to Petroecuador, the state oil company that manages oil exploration and production, for approval.

Conoco’s plans for development in Block 16 have been questioned. Past development efforts by Petroecuador and foreign oil companies have damaged forest and water resources, and resulted in the colonization of rainforest areas. The government has yet to establish comprehensive environmental guidelines on oil exploration and extraction activities.

Block 16 borders Yasuni National Park, an area which numerous ecologists claim is one of the most biologically diverse regions on earth. The block also is located within the

traditional territory of the Waorani, an indigenous Indian tribe. Environmental and indigenous peoples groups are pressuring the government to halt future development in the region. In order to meet its financial obligations to Conoco, Petroecuador has solicited the World Bank for a \$100 million loan. Indigenous and environmental groups have demanded that the loan be reconsidered and that no further development in rainforests be allowed until various demands have been met.

Block 16 has emerged as the focus of a major international debate over the parameters of sustainable development, and all of the stakeholder parties are facing difficult questions.

THE STAKEHOLDER TEAMS

Several stakeholders have emerged within the debate over Block 16:

Conoco, Inc.: Conoco, the \$15.9 billion subsidiary of E.I. du Pont de Nemours and Company, is interested in developing Block 16. The company has spent three years exploring Block 16 and together with its development partners has spent \$90 million. The company firmly believes that the block can be developed without damaging the area's natural resources or indigenous communities. The company is aware that several companies in similar situations have terminated operations or been slowed by battles with local groups.

The Waorani: The Waorani, nomadic, isolated groups of hunters and farmers, live within the boundaries of Block 16. The Waorani have halted the operations of other companies in the region, have called for a moratorium on exploration and production in the region, and desire legal rights to "their" land.

The Ecuadorean Government: The government depends on oil revenues for 50% of the country's foreign exchange and 60% of its annual budget. But past oil practices have devastated areas with important natural resources, and the government is under pressure from multilateral institutions and environmental groups to improve management of its natural resources and to cede land rights to indigenous peoples.

The Natural Resource Defense Council (NRDC): Based in New York, NRDC is an international environmental advocacy organization with a staff of 150 lawyers and scientists. NRDC is concerned that continued development of rainforest regions and poor environmental stewardship will eliminate Ecuador's natural resources and have a severe impact on indigenous tribes.

Fundación Natura: Ecuador's leading environmental group, Natura has worked for a decade to promote environmental education, establish national parks and train park personnel. Natura is concerned that Yasuni National Park, the primary focus of its efforts, will be forever changed by oil production.

The World Bank: The world's leading lending institution for development projects, the World Bank has come under fire from environmental advocates for supporting projects with negative environmental impacts. The organization is considering a \$100 million loan to finance Ecuador's oil operations.



Tierra Viva: One of Ecuador's radical environmental groups, Tierra Viva is opposed to any new development in rainforest land. The group represents young environmentalists and has held a protest against Conoco's development plans in Quito, the nation's capital.

STAKEHOLDER DIALOGUE

In November of 1990, Conoco convened a meeting of the stakeholders in Quito to share information and develop an agenda for discussion. The meeting generated an extensive list of options to ensure that development of Block 16 would not jeopardize YAsuni or the Waorani.

It is now January of 1991, and Conoco has convened a second meeting in an effort to develop a comprehensive plan and ensure unanimous support for its proposal. The company has proposed an environmental management plan which includes four major areas: drilling techniques, preventing colonization, pipeline management and park management². Specific actions are detailed below:

Drilling Techniques

- Utilize diagonal drilling techniques, which entail drilling at various angles from a small number of wells as opposed to vertically from many. This practice could reduce deforestation at Conoco's proposed initial 500,000 acre production block to 1,000 hectares – a 90% reduction by industry standards in the region.³
- Reinject toxic formation water produced in oil drilling back into the ground. Reinjection would eliminate the typical industry practices of diverting formation water to unlined collection pits, which frequently spill into nearby rivers and streams and adversely affect groundwater supplies. Reinjection also improves oil flow by filling underground voids. To date, only the Atlantic Richfield Company (ARCO) has engaged in this practice in Ecuador.⁴
- Allow stakeholders to audit Conoco's operations and fund their on-going involvement in the management of Block 16.⁵

Preventing Colonization

- Create and manage a road-monitoring system in order to prevent colonization and agricultural conversion of new lands. Many environmentalists believe that colonization is the greatest threat to the ecosystem and indigenous populations. TO date, only Petro-Canada has set up such a system – it is working with the Ecuadorean Army to control settlement.⁶
- Do not construct a bridge to new areas. In Block 16, the Napo River acts as a natural barrier to colonization in and around the block. Barges will be used to transport employees and all supplies, so that park rangers can prevent would-be colonists from using the road to enter Yasuni National Park.⁷

- Disallow any contact between Conoco employees and the Waorani. In the past, oil companies have spread disease and, through gifts and trading, made native populations dependent on western goods.⁸

Pipeline Management

- Bury the pipeline, which would minimize the threat of oil spills and help to reduce the size of the road needed. In the past, flooding and earthquakes have severely damaged the Trans-Ecuadorean pipeline (above-ground), resulting in spills estimated at over 10 million gallons.⁹
- Minimize road construction and take measures to minimize deforestation and silt runoff. Helicopters can be used to transport materials for the pipeline. While roads are not necessary for pipeline construction, they are seen as necessary for on-going maintenance.¹⁰

Park Management

- Avoid production drilling in the portion of Block 16 that overlaps with Yasuni National Park.¹¹
- Create an environmental management plan for Yasuni National Park with relevant stakeholders. Fund government management of the park and training for rangers.
- Use drilling areas as outposts for scientific research teams.¹²
- Reinject natural gas into the ground in order to store it for later use or regulate its combustion to minimize emissions. Natural gas, a valuable energy resource, is a by-product of oil extraction. However, oil companies typically burn this gas with open flames, without regard for emissions.¹³
- Provide the Waorani with meaningful title to their lands, giving them profit-sharing opportunities through leasing.¹⁴
- Work with the Waorani to establish needed services, such as schools and health clinics.¹⁵
- Disallow fishing, hunting, or trapping by Conoco employees.¹⁶
- Inoculate indigenous people to help minimize the spread of disease.¹⁷

OPTIONAL: FINANCIAL ANALYSIS OF THE BLOCK 16 PROJECT SITE¹⁸

Appendix 2 is a financial analysis of the Block 16 project site. Since Conoco has not yet arranged all contractual details with Petroecuador (applicable tax rate, length and term of production contract), this analysis is of the project's overall profitability.

Base Case Fixed Assumptions



To date the Conoco-led consortium has invested \$90 million in exploration. The site is expected to eventually produce 45,000 barrels of oil daily at peak operations. It is assumed that two-thirds of the required capital investment will be financed through loans, the remainder through equity. Loans will be amortized in 1996 to 2005. From 1991 through the end of 1995, the interest to be paid on the principal accrues to the principal. In 1996, when large-scale production begins, it is assumed that annual interest payments will also begin. Depreciation is calculated on a straight-line basis over 10 years. For simplicity, depreciation begins in 1996, when interest payments begin.

The Ecuadorean government collects funds from the project in two ways: taxes and royalties. Both may be negotiable. The typical income tax rate is 42.5%. Royalties are collected on each barrel of oil produced – between 3-5% depending on production levels. Royalties are not collected if production levels are below 30,000 barrels per year.

Sensitivity Analysis

Three major assumptions affect the internal rate of return (IRR) analysis most significantly – environmental expenditures required, the long-term price of oil, and the real interest rate. The “base case” presented assumes:

Conoco must invest \$60 million in environmental protection for Block 16, creating a \$600 million total investment cost and operating and maintenance cost of \$3.00 per barrel. Some measures, such as the increase production, although this analysis does not account for this benefit. If there were no environmental controls at the site, project cost would be \$540 million and operating and maintenance cost \$2.55 per barrel. Costs might need to be higher than this projection as well.

Average long-term price for Ecuador’s oil will be \$15 per barrel.¹⁹ This is the best guess of experts. The oil extracted from the Oriente region is relatively heavy and very viscous. This type of oil is considered inferior to Brent North Sea crude and sells for approximately \$4 per barrel less. Of course, prices could fluctuate wildly, moving \$5 or more in either direction.

Table 1

Oil Price (per barrel)	Internal Rate of Return (required rate of return = 20%)	
	With Pollution Controls	Without Pollution Controls
\$10	7.62%	10.30%
\$15	18.50%	21.20%
\$20	26.85%	29.54%

The real interest rate has been assumed to be 10%. The inherent risk of the project is accounted for in this interest rate. Depending on Conoco's perspective, they may choose a higher or lower interest rate.

Based on these assumptions, the base case produces an IRR of 18.5%. Some sensitivity analysis is incorporated in Table 1. Which of the variables affects IRR more significantly? Are these good assumptions to make? What other sensitivities would you run?

In a project of this kind, international oil companies usually expect about a 20% internal rate of return (IRR) to compensate them for production and sovereign risk.²⁰ However, a riskier project may call for a higher hurdle rate' the importance of gaining a foothold in Latin America might merit a lower IRR for the project. Does the "base case" represent an investment opportunity that Conoco should make? Justify your conclusion.

A PRIMER

Ecuador is located on the northwestern coast of South America between Columbia to the north and Peru to the south. The country's landscape comprises of three distinct regions running from north to south: the *Costa* region, by far the most populous and urbanized region, which runs along Ecuador's coastal zone; the *Sierra* region, where the Andean mountains stretch through the middle of the country; and the *Oriente* region, home to the country's rainforests and oil reserves. The country is roughly 284,000 square kilometers, about the size of Colorado. See **Exhibit 1** for a map of Ecuador and its major regions.

For much of the twentieth century, Ecuador's government has alternated between democratic rule and military dictatorship. Ecuador's large number of political parties made it difficult for one group to gain widespread support. Strong military regimes of the 1960s and 1970s gave way to democratic rule in 1979.



ECUADOR'S POPULATION

Ecuador has been inhabited for thousands of years by a large indigenous population with a variety of cultures and languages. The Incas entered the region from neighboring lands and the Spanish from the coast. Ecuador's current population is composed in large part of descendants of marriages between Spanish and Indian ancestors. Over 50% of the population is under the age of 20, and the World Bank estimates that the population will double within the next 25 years. Native peoples make up about one-third of the country's 10.3 million people.

The World Bank estimates that 85 to 100 thousand native peoples inhabit the Amazon region and have retained relatively autonomous and traditional lifestyles.²¹ See **Exhibit 6** for the geographic locations of Ecuador's indigenous peoples. Indigenous peoples live in all of the major regions of the country but are highly concentrated in the eastern, less-densely populated portion of the country.

People of the Oriente

Six main native groups inhabit Ecuador's Oriente region. The Quicha (40,000), Shuar (35,000), and Achuar (2,000) mainly inhabit the southern regions. They were the first to encounter envoys from Ecuadorean society and have adapted to it, adopting many marketplace practices such as cattle ranching and farming. The Quicha have had the greatest financial success and have moved north into new lands to expand their operations. The Quicha and the Shuar are the primary advocates of indigenous rights within the region.

The northern Amazon natives – the Cofan (35-400), Siona Secoya (400-500), and Waorani (850-900) – are much fewer in number and have had only sporadic contact with outsiders. The Cofan, which anthropologists believe once numbered near 15,000 have been decimated by oil roads, storage facilities and settlers. Oil pollution of surrounding regions, foreign diseases, and handouts from oil companies altered their way of life and left them dependent on foreign companies. The Siona-Secoya have had contact with settlers and palm plantation workers for many years but have managed to maintain a way of life relatively separate from these neighboring people.

The Waorani are the most secluded of the indigenous groups. The Waorani traditionally lived in small groups of extended families and isolated themselves deep within the rainforest regions, mainly in the area now designated as Yasuni National Park. Their livelihood and culture depends on hunting, farming, and food collecting. Earliest interactions between the Waorani and oil companies were violent. When Royal Dutch/Shell personnel began exploring the Oriente in the 1940s, the Waorani killed hundreds of workers and looted the camps. In 1968, after years of appeals from the Summer Institute of Linguistics, four groups of Waorani (the Guequetairi, Piyamoiri, Baihuairi, and Huepeiri) moved into the Reserva Waorani, a 1,600 square kilometer protectorate southwest of their traditional lands. Approximately 700 Waornai live in the reserves.

The remaining 100-150 Waorani occupy lands within Yasuni National Park and continue to resist contact from outsiders including the government and foreign companies.

Despite their wishes, increased interest in the region has expanded their contact with outsiders. Over the years, missionary groups have entered the region offering spiritual guidance, education and health services. Today the region's natural resources draw scientists, environmentalists, and tourists to the national parks and wildlife refuges. The Tagairi Waorani, the most isolated and only hostile group of Waorani, gained attention in 1987 when they ritualistically killed two missionaries sent by the oil companies to establish contact. The consortium temporarily suspended operations. Rumors abound that oil representatives killed Tagae, this group's leader, in 1989.

According to the World Bank, the Waorani face "special problems because of their small size and greater dependency upon forest resources (wildlife, fish, gathered products, etc.)."²² Oil spills in water sources, disruptions of wildlife habitat, and colonization threaten their livelihood. Viral infections, brought in by outsiders, are a major cause of death among the Waorani.

ECUADOR'S NATURAL RESOURCES

Beginning with Charles Darwin's research in the Galapagos Islands, Ecuador has long been recognized for its wealth of natural resources. The country is home to some of the most biologically diverse rainforests in the world as well as significant oil reserves.

Biological Diversity

Ecuador contains 25% of all species found in Latin America and the Caribbean. The country contains between 20,000 and 25,000 recognized plant species; North America as a whole contains 17,000 plant species. Ecuador is also home to over 2,400 terrestrial vertebrate species, compared with less than 1,400 similar species found in the continental United States.²³ Ecuador's Oriente region houses the western tip of the Amazon Basin, which scientists deem the world's largest and most important rainforest. See **Exhibits 3 and 4**. The Oriente, which is only one-fifth the size of the Brazilian Amazon, contains 70% of all species found in the Brazilian region.²⁴

Officially created in 1979, Yasuni National Park stands out among Ecuador's protected areas. The park protects nearly 700,000 hectares of tropical rainforest, wetlands, lakes and rivers.²⁵ Home to an estimated 600 species of birds, 500 species of fish, 500 species of flowering plants and 120 species of mammals, the park is listed among the top "conservation priorities" of several leading environmental groups, such as Conservation International and The Nature Conservancy.²⁶ In 1989, the United Nations Man and the Biosphere Program designated the park a U.N. Biosphere due to its biological importance. U.N. Biospheres receive international support for monitoring, but a Yasuni monitoring system has not yet been developed.

Oil Reserves

Oil mining began in Ecuador in 1909 when the state government contracted several British and Italian companies to search for underground oil, providing the state with a percentage of the profits from any discoveries. In the 1930s, a predecessor of British Petroleum began pumping operations on the Santa Elena peninsula, on the southern coast. Though production volumes were small by industry standards, enough was being pumped by British Petroleum that exports from Ecuador outpaced domestic consumption by about four to one.



There was periodic exploration in the country's Oriente region, located in the heart of the Amazon jungle. Although various experts believed that the region was potentially the world's most valuable petroleum reserve, infant technologies and rugged terrain precluded exploration success. In the late 1960s and early 1970s, a Texaco-Gulf Oil Company consortium found five commercially attractive fields which still account for the majority of Ecuador's production. By 1972, the Texaco consortium had completed an 498 km Trans-Ecuadorean Pipeline, which transfers oil from the Oriente region through refining and processing stations in Quito to the port city of Esmeraldas, at a cost of \$150 million.

Ecuador's oil production grew from 3,700 barrels per day (b/d) in 1971 to 208,800 b/d in 1973. The country became a member of the Organization of Petroleum Exporting Countries (OPEC) and the second largest oil producer in Latin America. By the late 1970s, 36 foreign companies were prospecting in 10 million hectares in the Oriente region.

Ecuador's military government established a state oil company – now called *Petroleos del Ecuador* or *Petroecuador* – and reclaimed two-thirds of the Texaco-Gulf concessions. It boosted its production royalties, levied taxes on foreign corporations, and slashed the size of foreign companies' concessions. *Petroecuador* forced Gulf to pull out of Ecuador and took over its partnership with Texaco.

Based on optimistic expectations of oil revenues in the mid and late 1970s, the government borrowed heavily from foreign countries for *Petroecuador's* activities, industry diversification, social programs, and the government's own burgeoning bureaucracy. But falling prices brought on a cash shortfall, and the government was unable to make its required payments on several occasions.

Oil remained the government's major financing tool. However, the rate of extraction quickly sent net reserves plummeting, and state-run exploration efforts failed to stem the reserve loss. By 1981, only five companies were exploring 6,000 hectares.

ECUADOR'S DEVELOPMENT

Population Pressures

Due to population growth, environmental degradation and drought conditions, Ecuadoreans began to migrate out of the rural areas of the country's Costa and Sierra regions.²⁷ Ecuador's 1978 *Ley de Colonizacion de la Region Amazonica* established development and settlement in the Oriente as a national priority. Indian groups see gaining legal title to lands as the only means to protect themselves from colonization and to preserve their way of life. Pressure from groups in the region has strained relations with the Ecuadorean government.

Under current law, the lands occupied by indigenous communities are classified as *tierras baldias*, or unoccupied lands, and are subject to state ownership and regulation. The Ecuadorean Institute for Agrarian Reform and Land Settlement is supposed to set aside lands traditionally occupied by indigenous communities, but these peoples can

obtain legal title to the land only if they organize themselves in cooperatives such as settler populations. As of 1990, only 24 of 78 Quicha communities and 83 of 265 Shuar communities had gained titles to their lands.

Native populations have increasingly organized themselves into regional indigenous federations in order to reaffirm native culture and pursue land rights. In 1980, the Confederation de Nacionalidades Indigenas de la Amazonia Ecuatoriana (CONFENIAE) formed to represent the natives of the region. Eight local federations with representatives from over 960 group's membership. The group has stressed the importance of "conservation and rational development of the resources of the Amazon Region."²⁸ CONFENIAE is dominated by the Quicha and the Shuar, and certain Waorani groups are not parties to the organization.

Economic Pressures

The country's economy is based mainly on agriculture and oil production. In 1970, bananas accounted for nearly 47% of total export revenues; coffee and cacao followed. But dramatic increases in oil production volumes of the early 1970s catapulted petroleum to the top of the country's export charts, and price shocks in the early and late 1970s compounded oil's importance.

Year	U.S.\$/Barrel	% of Total Export Revenue
1972	2.50	19
1974	13.70	60

Between 1972 and 1982, the government generated \$7.4 billion in oil revenues, which allowed it to expand its operations and invest in new industries and transportation infrastructure. Government expenditures grew by 9.6% and gross domestic product by 9.1% annually over the same period. The country's oil revenues and untapped reserves were used to attract loans from banks in developed countries to further develop the oil industry. Foreign debt spiraled upward from \$600 million in 1973 to \$6.3 billion in 1983. Government efforts to diversify the economy proved unsuccessful.

One observer stated, "In the 1980s, recession among Ecuador's trading partners, rising interest rates, and falling oil prices crippled Ecuador's economy."²⁹ Oil prices fell from a peak of \$45/barrel in the late 1970s to \$15/barrel by the mid- 1980s. By 1987, Ecuador's total external debt had reached \$9.6 billion, split evenly between multilateral development institutions and commercial banks. The government engaged in debt renegotiations throughout most of the 1980s. Payments were temporarily suspended after a 1987 earthquake severely ruptured the Trans-Ecuadorean pipeline and halted oil production.

Oil production has raised average incomes 500% since the 1960s and currently provides over 50% of the country's foreign exchange and 60% of the government's yearly budget. Ecuador's annual economic growth rate is 2.8% and per capita GNP is \$980.³⁰ By 1990, total outstanding debt was \$12.4 billion, 120% of GNP.



Efforts to Increase Oil Production

By 1982, after 10 years of unsuccessful exploration by Petroecuador and Texaco, the country's reserves had fallen far short of production levels. The government took steps to revive foreign interest in exploration and development in an effort to stem losses in its reserves and minimize its financial exposure. The government designed new legislation to allow foreign oil companies to undertake exploration activities under service/risk contracts.

Under the service/risk approach, foreign companies bid to explore particular geographic regions and negotiate contracts with Petroecuador. Contracts detail the service that the foreign company will provide. The risk of exploration is borne entirely by foreign companies. If no commercially-attractive reserves are found, the foreign company loses its investment.

If commercially attractive reserves are found, the Ecuadorean government reimburses the foreign company in crude or cash for investments and production costs. The foreign companies can then negotiate a 20-year production contract with Petroecuador. The government collects royalties based on production levels, as well as taxes.

Since 1985, six bidding rounds have resulted in thirteen new contracts. Thirty companies have undertaken exploration activities at a total investment of \$400 million. Ten of the exploration blocks are located in the Oriente region and four are located in state parks or biological reserves. State officials hope that current development efforts will enable Ecuador to increase its reserves by 1 billion barrels, but “the results have been disappointing with around 250 million barrels discovered.”³¹ **See Exhibit 2.**

After the 1987 earthquake, emergency loans from the World Bank and assistance from Colombia kept some oil flowing, but not before major export revenues had been lost.

By 1990, Ecuador produced nearly 300,000 b/d or 110 million barrels per year. Ninety-nine percent of the country's daily output came from the Oriente region; most of these fields were in decline.³² The U.S Central Intelligence Agency estimates that the country's maximum sustainable production capacity is 330,000 b/d.³³ Petroecuador recently completed expansion of the pipeline's capacity, which can now transport 325,000 b/d. Domestic consumption, buoyed by a growing population, has risen 11% per year, causing exports to fall to approximately 50% of production. Experts predict that, if new fields are not developed, Ecuador will have no oil exports by the end of the century. Government officials are contemplating dropping out of OPEC.

OIL IN THE RAINFOREST

Oil exploration and development in Ecuador has come into conflict with the protection and conservation of the rainforest. Oil development supersedes the protection of natural resources in law and in deed. Special laws govern oil production — any minerals below the surface of the land are the property of the sovereign state, and can be exploited at Petroecuador's will. Oil production is currently underway in the Cuyabeno Wildlife Reserve and Limoncochia Biological Reserve. Production techniques and development

patterns impact the whole of Ecuador's Amazon region and its national parks, including Yasuni:

- **Oil Pollution:** the Trans-Ecuadorean pipeline has pumped 1.5 billion gallons of oil from the Oriente to Esmeraldas; it is estimated that over 10 million gallons have been spilled. A consultant to the Natural Resources Defense Council (NRDC) estimated that 4.3 million gallons of toxics were dumped every day into unlined waste pits.³⁴ According to Ecuador's Ministry of Energy and Mines, these pits overflow into nearby rivers and streams. Pipeline officials estimate that 210,000 gallons of oil have spilled into the watershed areas of four major rivers, destroying plant and animal life for hundreds of miles and jeopardizing local populations dependent on the land and its resources for their sustenance.

Petroecuador claims that such problems will not happen in the future. According to Luis Roeman, President of Petroecuador: "We developed these fields in a hurry. Because our prices were going down and exports were declining, and we need to repay our foreign debt. And I have to be very honest with you, we had money from the World Bank to develop these fields in a hurry. We probably were not very careful when it came to our problems...I think we ought to be very honest and say, 'yes, we've done things very bad.' And what we're trying to do now is to correct whatever damages we've done in the past. From now on we're not going to make these same mistakes."³⁵

- **Deforestation:** exploration and development activities require clearing portions of land to undertake seismic testing and facilitate helicopter transportation. In an average block, the Atlantic Richfield Company reported that it cleared 355 acres and felled some 372,000 trees.³⁶ An independent commission estimated the total to be at least 7 times as much. These numbers rise significantly when a block moves from the exploration phase and into the development and production phase. **See Exhibit 5.**
- **Colonization:** roads may be the greatest long-term threat to the landscape and its people. Data from the country's big 1982 census indicate that 70% of the Oriente's population arrived after 1972, when oil extraction got underway. The Oriente's population growth rate is twice the national average. World Bank experts estimate that for each mile of new road built by the oil industry in the rainforest, 1,600 to 10,000 acres of land are colonized. Colonists clear the forest for farmland to grow cash crops such as coffee, *naranjilla*, and cacao. Land speculators, loggers, and ranchers typically follow. Experts are debating whether well-planned road building can control colonization.

NRDC had previously called on Texaco to establish a \$50 million fund to finance environmental clean-ups within the region. The company stated that its practices were consistent with the rest of the industry, and admitted to no wrong-doing.

A 1990 World Bank study of Ecuador's Amazon region concluded that, if current trends continued, the country could expect the following:

- Irreversible loss of the region's renewable and non-renewable resources and of their potential to produce regional and national economic benefits;



- Diminishing returns of economic activities over time as the fragile resource base is depleted;
- Social conflicts between indigenous and migrant populations; and
- Eventually, reverse migration as people abandon the degraded Amazon region, thus contributing to even greater pressures in non-Amazon regions.³⁷

ENVIRONMENTAL PROTECTION EFFORTS

Fundación Natura, Ecuador's leading environmental non profit organization, was founded in 1978. Since its inception, Natura has focused public attention on environmental conditions in the Oriente, which is experiencing deforestation at a rate of 2.3% per year. Although down from a rate of 3.4% in the early 1980s, the deforestation rate is "more and more shameful," according to Natura.³⁸ The group estimates that 320,000 of Ecuador's rainforests were destroyed by 1980 and the rest will be gone by 2035. The Oriente, Natura believes, will go the way of Ecuador's western region, where over 90% of the original forests have been lost and only 3.4% have been reforested.

In 1984, several individuals left Natura to form Tierra Viva, a more radical environmental organization. Tierra Viva has focused most of its attention on the Oriente and has identified oil development projects as the primary threat to the region. The group accuses the government of "working against the environment" and is opposed to any development within the Oriente.

The Ecuadorean government has recently undertaken several actions with regard to environmental protection:

- In 1989, the Subsecretario de Medio Ambiente (SMA), Ecuador's environment agency, was established. SMA has an annual budget of \$10,000 and full-time staff of four. Oversight of the oil industry is a primary responsibility.
- In 1989, staff within the Ministry of Energy and Mines began to design a comprehensive set of guidelines for oil development in the country. After several months of work, this staff was instructed to stop its work. As a substitute, eleven major oil companies, Petroecuador, and Fundación Natura signed an Act of Commitment (voluntary agreement) with the Ministry of Energy and Mines in August of 1990. The main element of the two-year accord is a commitment by the companies "to ensure the rational management of oil activities and to undertake environmental impact studies."³⁹

Fernando Santos, former minister of the Department of Energy and Mines, is not confident that environmental laws or voluntary agreements will have any impact: "I see an attitude of hypocrisy. If Texaco is guilty of causing harm to the environment, Petroecuador is 10 times worse. For the new companies, they have been very strict, demanding guarantees that the environment will be protected. I can assure you that Petroecuador will laugh at this rule. They operate under no rule of environmental protection."⁴⁰

In April of 1990, the government altered the boundaries of Yasuni National Park. See **Exhibit 7**. Prior to the changes, Block 16, a major oil development site, was entirely within Yasuni. Afterward, Yasuni and Block 16 overlap only in a small area that is not planned for development. The scientific community was outraged at the government's actions. A draft management plan for Yasuni, developed by an American environmental group and the government and financed by Conoco, designated up to 50% of the park for industrial use. Tierra Viva and others have sharply criticized the plan for its pro-development bent.

In October 1990, the Ecuadorean Tribunal of Constitutional Guarantees ruled that new oil development within park boundaries was illegal, but that existing concessions could continue. Later that month, the Tribunal reversed its earlier decision, stating that new development was permissible.⁴¹ Indigenous peoples were instructed not to "impede or obstruct" oil or mining activities on those lands. Currently, nine oil fields are in operation in the Cuyabeno Wildlife Reserve, which overlap with national park land are slated for exploration. Shortly after the Tribunal's ruling, the government instituted a \$100,000 environmental tax on each company involved in oil exploration to fund the clean-up of past environmental damages.

BLOCK 16

Block 16, 160 miles southeast of Quito in the heart of the Oriente, is the most promising of the contracts negotiated since 1982. The various economic and environmental pressures Ecuador's policy makers must face are all relevant to the proposed development of this region.

In 1986, a consortium led by Conoco, Inc. entered into a contract with the Ecuadorean government to conduct oil exploration in Block 16. These efforts have yielded five commercially attractive fields with estimated reserves of 200 million barrels, 20% of Ecuador's proven resources. Conoco and Petroecuador believe Block 16 will support 45,000 b/d for 20 years. No further exploration work is scheduled until Conoco receives official approval for its development plans.

The oil extracted from the Oriente region is relatively heavy and very viscous. This type of oil is considered inferior to Brent North Sea crude and sells for approximately \$4 per barrel less. The average long-term price for Ecuador's oil has been estimated at \$15 per barrel.⁴²

To date, the Conoco-led consortium has invested \$90 million in the exploration of Block 16. Conoco's exploration activities have been disrupted by Waorani tribesmen on two occasions. During their first "raid," unarmed Waorani warriors entered the Conoco camp, stopped operations, and took a chainsaw upon their departure; during the second, they came armed with shotguns and automatic rifles and left with another chainsaw. Ecuadorean conservationists speculate that these men are not the same as those responsible for the death of the Catholic missionaries in 1987.

The company's proposed development plan would require an up-front investment of \$600 million for production equipment, two parallel 160 km pipelines and a 140 km road.



The Conoco plan states that the environmental impacts will be low to moderate and will be reversible. This is the “base case” presented in **Appendix 2**.

Conoco’s development plans call for \$60 million for environmental protection initiatives. The company originally allocated this percentage to its plans because, in the words of Alex Chapman, manager of environmental projects in Ecuador, “If we designed for a low standard and then later had to upgrade to higher standards, costs could be excessive.”⁴³ One challenge that Conoco faces is ensuring that this level of investment is supported by Petroecuador. Petroecuador ultimately will pay the sum under the service/risk contract structure. Conoco managers included the following environmental investments and initiatives in its original development proposal to Petroecuador:

- Reinject formation water and other wastes.
- Engage in directional drilling in a number of areas.
- Use synthetic materials, rather than felled trees, for new road areas.
- Construct four “police stations” along the new roads to protect Yasuni National Park.⁴⁴

Conoco expects that environmentally sound production will raise its operating and maintenance costs by approximately 15%.

The government has designated Block 16 land as a new addition to the Waorani protectorate, but with the explicit mandate that the group cannot “impede or obstruct” oil or mining activities. James Yost, an anthropologist later hired as a consultant to Conoco, has warned Conoco that further loss of land will result in harm to the Waorani – “deculturation and ethnocide.”⁴⁵

Petroecuador needs cash to meet the financial obligations of the service/risk contract it has with Conoco. The World Bank is considering a \$100 million loan to Petroecuador, which could total \$450 million with co-financing from other sources. Petroecuador’s most recent loan from the World Bank required the creation of an environmental management program for the Oriente and the pipeline. Petroecuador has not yet fulfilled this requirement.

CONFENIAE has attacked the World Bank from considering the loan. CONFENIAE has issued demands that “must be met” before any further actions are taken in Block 16. Among them, the organization wants guaranteed land rights for Indians, including the WAorani, and a 10-year moratorium on oil exploration and production within the Oriente. **See Appendix 1.**

Local groups are concerned that revenues from oil generation are not helping the people of Ecuador. In the words of Ecuadorean ecologist Eduardo Asanza: “Ecuador is a poor country and we need the oil, but I have lived here for fifteen years and have seen this area grow poorer and poorer. Now when I go to Lago Agrio [a town located near a large oil field], I wonder, how can those people survive? We were all told that the oil would help the country, but sometimes we wonder, ‘Who is being helped?’”⁴⁶

NOTES

² Ann Blumberg, "How Conoco is Working to Minimize Damage to Ecuador's Rain Forest," *Business International*, June 23, 1990.

³ *Ibid*

⁴ James Brooke, "New Effort Would Test Possible Coexistence of Oil and Rain Forest," *New York Times*, February 26, 1991.

⁵ Robert F. Kennedy, "Amazon Sabotage," *Washington Post*, August 24, 1992.

⁶ Brooke, *op cit*.

⁷ Blumberg, *op cit*.

⁸ Brooke, *op cit*.

⁹ *Ibid*.

¹⁰ *Ibid*.

¹¹ Douglas Southgate, "The Economics of Pollution Control in Eastern Ecuador," *Ecodesign*, June 1992

¹² Brooke, *op cit*.

¹³ Judith Kimerling with the Natural Resource Defense Council, *Amazon Crude* (New York: NRDC, 1991.)

¹⁴ Martha M. Hamilton, "Sierra Club, Law Firm Allege Oil Firm Misdeeds in Ecuador," *Washington Post*, May 16, 1991.

¹⁵ Brooke, *op cit*.

¹⁶ *Ibid*.

¹⁷ Southgate, *op cit*.

¹⁸ Based on data provided by Douglas Southgate, Department of Agricultural Economics and Rural Sociology, Ohio State University.

¹⁹ Douglas Southgate and Morris Whitaker, **Economic Progress and the Environment: One Developing Country's Policy Crisis**. (New York: Oxford University Press, 1994)

²⁰ Southgate, *op cit*

²¹ James F. Hicks, *Ecuador's Amazon Region: Development Issues and Options*, World Bank Discussion Paper #75 (Washington, DC: World Bank Publications, 1990)

²² *Ibid*.

²³ *Ibid*.

²⁴ World Resources Institute, **The 1992 Information Please Environmental Almanac** (Boston: Houghton Mifflin Company, 1992)

²⁵ James D. Nations, "Road Construction and Oil Production in Ecuador's Yasuni National Park," author's files, May 1988.



²⁶ Brooke, *op cit.*

²⁷Hicks, *op cit.*

²⁸*Ibid.*

²⁹ Kimerling, *op cit.*

³⁰ World Bank, **World Development Report 1992: Development and the Environment** (Oxford, England: Oxford University Press, 1992)

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³² Christopher Brogan, "Concern over Export Capacity," *Petroleum Economist*, July 1990

³³ "Ecuador boosts E & D to stem reserves slide," *Oil & Gas Journal*, 1990

³⁴ Kimerling, *op cit.*

³⁵ National Public Radio, *op cit.*

³⁶ Kimerling, *op cit.*; Joe Kane, "With Spears from All Sides," *The New Yorker*, September 27, 1993

³⁷ Hicks, *op cit.*

³⁸ Leslie Ware, "Suces of Cecropias?" *Audobon*, January 1985.

³⁹ Brogan, "Struggle to Replace Reserves," *op cit.*

⁴⁰ National Public Radio, *op cit.*

⁴¹ Dianne Dumanoski, "Probe of Oil Firms Asked in Reversal of Amazon Drilling Curb," *The Boston Globe*, May 16, 1991; Martha M. Hamilton, "Sierra Club, Law Firm Allege Oil Firm Misdeeds in Ecuador," *Washington Post*, May 16, 1991; "Oil Companies Pressured Ecuador on Amazon Project, Sierra Club Charges," *Platt's Oilgram News*, May 15, 1991.

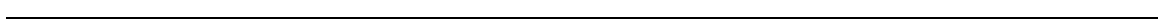
⁴²Southgate and Whitaker, *op cit.*

⁴³ Susan E.A. Hall, "Conoco's Green' Oil Strategy," (Cambridge, MA: Harvard Business School, 1992), Case # 9-394-001

⁴⁴ Brooke, *op cit.*

⁴⁵ Kane, *op cit.*

⁴⁶ Kimerling, *op cit.*





APPENDIX 1

Confeniae's Demands of the Ecuadoran Government and the World Bank

January 27, 1990

1. The Government of Ecuador must do the following, in consultation with and to the satisfaction of Amazonian indigenous peoples, through their respective organizations:

a. Legalize all Amazonian traditional indigenous territories by granting Indigenous peoples communal and/or tribal land titles, and on a priority basis, legalize Huaorani territory.

b. Guarantee respect for the human rights of indigenous peoples, both as individuals and peoples, including the right to self-determination.

c. Comply with the Treaties of Sarayacu, signed by representatives of the Government of Ecuador and Indigenous organizations in May, 1989, and with subsequent agreements between these parties. (Attachment 1).

d. Adopt and implement the "Ley de Nacionalidades Indigenas" proposed by CONAIE to the Ecuadorian National Congress.

2. The World Bank, having this responsibility, must undertake a study of environmental, socio-cultural and economic impacts of petroleum development in Ecuador, including those resulting from exploration, exploitation, extraction, separation, industrialization (refineries and gas plants), marketing and transportation. The study must evaluate both existing and potential impacts, as well as cumulative and aggregate impacts.

In order to properly evaluate the impacts of petroleum development, the World Bank must obtain and evaluate, among other information, detailed plans and specifications for drilling, operational and closure activities of each petroleum company. The study must include an evaluation of measures to prevent potential adverse impacts, as well as plans for remediation of damaged areas. This study must be approved by the NGOs that sign this document and CONFENIAE, according to the stipulation in condition #5.

3. Petoecuador (CEPE) or its successor corporations must complete the environmental impact studies required as part of the 1987 World Bank loan, 2803-EC.

4. The Government of Ecuador must require studies of environmental, socio-cultural and economic impacts from each petroleum company operating in Ecuador. Such studies must be completed before plans and specifications for seismic surveys, drilling, operational and/or closure

Source: Judith Kimerling with NRDC, Amazon Crude (New York: NRDC, 1991)

APPENDIX 1 (CONTINUED)

activities are finalized, and before any activities begin in any new stage of petroleum development. Such studies must also be completed before any new petroleum concessions are granted. Each study must include evaluations of possible aggregate and cumulative impacts that might result from other activities both in the concession that is the subject of the study and in other areas, such as agro-industry, colonization, mining, ranching, deforestation, activities of other petroleum companies, etc.

5. The World Bank and the Government of Ecuador must establish a process by which affected and interested parties participate in the revision and evaluation of the above studies and in decision-making regarding the management, development and use of natural resources. Each of the above studies must be approved by the NGOs that sign this document and CONFENIAE.

In addition, the World Bank and the Government of Ecuador must make each of the above studies, together with all supporting data and documentation, available to the general public and particularly to the Indigenous organizations represented by CONFENIAE.

6. Based on the findings of the above studies, a substantial and adequate percentage of this loan (the amount satisfactory to CONFENIAE and other NGOs), must be used for environmental controls, monitoring and oversight of petroleum development activities; and for remediation and rehabilitation of damaged areas so as to permit long term sustainable management of those areas, and for payment of compensation for damages caused by petroleum development in indigenous territories.

7. The World Bank must respect and abide by the position presented by the Coordinating Body of indigenous Organizations of the Amazon Basin (COICA) in the document entitled "The Coordinating Body to the Bilateral and Multilateral Funders of Amazonian Development: Our Agenda." (Attachment 2).

8. The Government of Ecuador must stop all petroleum exploration and exploitation in Huaorani territory, unless and until both Huaorani territory is legalized and prior consent of the Huaorani for such activities is obtained. Such consent must be recognized in an agreement between the Huaorani, Petroecuador and CONFENIAE. Said agreement must be based on meaningful understanding by the Huaorani of all environmental, socio-cultural and economic impacts that would or might possibly accompany and/or be caused by petroleum development. This provision overrides any conflicting development rights granted by existing (petroleum development) concessions.

9. The Government of Ecuador must stop all petroleum exploration and exploitation in the traditional territories of Amazonian indigenous peoples in the absence of:

a. legalization of traditional territories of all Amazonian Indigenous peoples by granting communal and/or tribal land titles;

b. guarantees to the satisfaction of the Indigenous peoples who live in areas that could possibly be affected by petroleum development that such development will not cause, directly or indirectly, any type of pollution or environmental degradation, or adverse economic or socio-cultural impacts;



APPENDIX 1 (CONTINUED)

c. remediation and rehabilitation of areas that have been affected by any type of pollution, environmental degradation or other negative impacts and the payment of just compensation for damages caused (by petroleum development); the above to be confirmed by the Indigenous peoples in the affected areas; and

d. a written agreement between the petroleum company (operator) and the indigenous organizations (at the levels of the federation and CONFENIAE) that represent the communities in the concession.

This provision overrides any conflicting development rights granted by any existing concessions.

10. The Government of Ecuador must stop all petroleum exploration and exploitation in Yauri National Park and other areas that are protected under the current "Ley Forestal y de Conservación de Áreas Naturales y Vida Silvestre," because such activities violate express legal and constitutional provisions. In addition, petroleum development rights that have been granted under existing concessions in protected areas must be cancelled.

11. The Government of Ecuador must adopt and implement laws and regulations to prevent any and all pollution or environmental degradation that could result from any stage of petroleum development. In addition, such laws and regulations must penalize the acts and actors responsible for any type of environmental degradation or adverse socio-cultural impacts.

12. the World Bank and the Government of Ecuador must provide detailed information to indigenous organizations and the NGOs that sign this document regarding all existing and proposed loans for development activities in Amazonian Ecuador.

13. The Government of Ecuador must require that all foreign petroleum companies leaving the country prepare a detailed study of both environmental impacts caused by their activities and the condition of their facilities and equipment before departing. In addition, it must require remediation and rehabilitation of damaged areas, adequate closure of abandoned facilities and the transfer of operating facilities (to Petroecuador) in good working condition, with a previous inventory. All of this information must be available to the public.

This condition must be applied immediately to the company Texaco.

APPENDIX 1 (CONTINUED)

Condiciones exigidas por las organizaciones no gubernamentales (ONGs) del Ecuador al Estado ecuatoriano y al Banco Mundial

27 de enero, 1990

Beatriz Trujillo

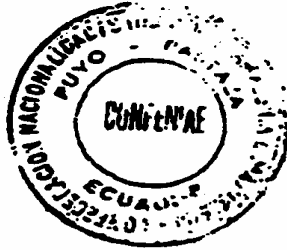
Beatriz Trujillo
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TIERRA VIVA
Cuenca

LUIS VARGAS

Carlos Carpio
JANAN URIN
Defensa Cultural y
Ecológica

Esperanza
Esperanza Martínez

eccológica
Quito



Leonardo Viteri
ONG. PUEBLOS INDIGENAS PASTAZA
Dpto. Territorio, Ecología
y Recursos Naturales

Gina
Gina Chávez

Acción
Ecológica
Chimborazo

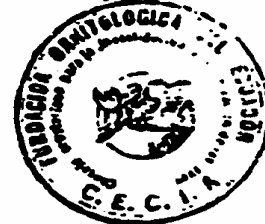
María Laura Patiño
FUNDACION ECOLOGICA
CONSERVACION...SERIELA DE LA VIDA
Coordinadora Quito

Xavier Guachamán
MOVIMIENTO POR LA PAZ
NOMB. LEONIDAS PROANO

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Yolanda Kachabos
Directora Ejecutiva Nacional
FUNDACION NATURA
Fundación Nativa

Nancy Hilgert



Virgilio
Virgilio Benavides
Presidente



Tierra Viva
Quito

Lucy Ruiz M.
Arae Amazonia
CEDIME

APPENDIX 2

Basic Assumptions

	Daily Production (barrels)		Capital Expenditures:	
	With Pollution Control	Without Pollution Control	With Pollution Control	Without Pollution Control
1988-1990	0	0	\$90,000,000	\$90,000,000
1991	0	0	0	0
1992	0	0	\$150,000,000	\$135,000,000
1993	0	0	\$210,000,000	\$189,000,000
1994	5,000	5,000	\$180,000,000	\$162,000,000
1995	15,000	15,000	\$60,000,000	\$54,000,000
1996	30,000	30,000	0	0
1997	35,000	35,000	0	0
1998	40,000	40,000	0	0
1999-2011	45,000	45,000	0	0
2012	40,000	40,000	0	0
2013	35,000	35,000	0	0
2014	30,000	30,000	0	0
2015	25,000	25,000	0	0
2016	20,000	20,000	0	0
2017	10,000	10,000	0	0
2018	5,000	5,000	0	0

Debt Payments in 1996-2005
(Principal + Interest): 92,948,875

Loan Financing:
Loans (amortized in 1996-2005) 66.67%
Equity 33.33%

Depreciation: Straight-line over 10 years

Royalties (based on production levels)
<30,000 0
30,000-40,000 3.00%
40,000-50,000 4.00%
50,000+ 5.00%

Income Taxes (%) 42.5%

O&M Costs
w/Pollution control measures \$3.00
w/out Pollution control measures \$2.55

Oil Price \$15.00
Interest Rate 10%

* based on data provided by Douglas Southgate, Ohio State University



APPENDIX 2 (CONTINUED)

Financial Analysis With Pollution Controls: Oil Price 15/Interest Rate 10

Year	1990	1991	1992	1993	1994	1995	1996
Production	0	0	0	0	5,000	15,000	30,000
Annual Production	0	0	0	0	1,825,000	5,475,000	10,950,000
Revenues (\$)	0	0	0	0	27,375,000	82,125,000	164,250,000
O&M	0	0	0	0	5,475,000	16,425,000	32,850,000
Gross Margin	0	0	0	0	21,900,000	65,700,000	131,400,000
Interest Expense	0	0	0	0	0	0	57,113,060
Depreciation	0	0	0	0	0	0	69,000,000
Royalties	0	0	0	0	0	0	4,927,500
Profit Before Taxes	0	0	0	0	21,900,000	65,700,000	359,440
Income Taxes	0	0	0	0	9,298,740	27,896,220	152,618
Net Income	0	0	0	0	12,601,260	37,803,780	206,822
Capital Investment	90,000,000	0	150,000,000	210,000,000	180,000,000	60,000,000	0
Principal on Debt	0	0	0	0	0	0	35,835,815
Add Depreciation	0	0	0	0	0	0	69,000,000
Additional Borrowings	60,000,000	0	100,000,000	140,000,000	120,000,000	40,000,000	0
Equity	30,000,000	0	50,000,000	70,000,000	60,000,000	20,000,000	0
Cash Flows	(30,000,000)	0	(50,000,000)	(70,000,000)	(47,398,740)	17,803,780	33,371,007
Net Present Value	185,844,232						
Internal Rate of Return	19.17%						
Targeted Rate of Return	20.00%						

APPENDIX 2 (CONTINUED)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	35,000	40,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000
	12,775,000	14,600,000	16,425,000	16,425,000	16,425,000	16,425,000	16,425,000	16,425,000	16,425,000	16,425,000	16,425,000
	191,625,000	219,000,000	246,375,000	246,375,000	246,375,000	246,375,000	246,375,000	246,375,000	246,375,000	246,375,000	246,375,000
	38,325,000	43,800,000	49,275,000	49,275,000	49,275,000	49,275,000	49,275,000	49,275,000	49,275,000	49,275,000	49,275,000
	153,300,000	175,200,000	197,100,000	197,100,000	197,100,000	197,100,000	197,100,000	197,100,000	197,100,000	197,100,000	197,100,000
	53,529,479	49,587,539	45,251,405	40,481,658	35,234,937	29,463,543	23,115,010	16,131,623	8,449,898	0	0
	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000
	5,748,750	8,760,000	9,855,000	9,855,000	9,855,000	9,855,000	9,855,000	9,855,000	9,855,000	9,855,000	9,855,000
	25,021,771	47,852,461	72,993,595	77,763,342	83,010,063	88,781,457	95,129,990	102,113,377	109,795,102	187,245,000	187,245,000
	10,624,244	20,318,155	30,993,080	33,018,315	35,246,073	37,696,607	40,392,194	43,357,340	46,619,000	79,504,227	79,504,227
	14,397,527	27,534,306	42,000,514	44,745,027	47,763,990	51,084,851	54,737,797	58,756,037	63,176,102	107,740,773	107,740,773
	0	0	0	0	0	0	0	0	0	0	0
	39,419,396	43,361,336	47,697,470	52,467,217	57,713,938	63,485,332	69,833,865	76,817,252	84,498,977	0	0
	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000	69,000,000
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	43,978,131	53,172,970	63,303,045	61,277,810	59,050,052	56,599,518	53,903,931	50,938,785	47,677,125	107,740,773	107,740,773

APPENDIX 2 (CONTINUED)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	45,000	45,000	45,000	45,000	40,000	35,000	30,000	25,000	20,000	10,000	5,000
	16,425,000	16,425,000	16,425,000	16,425,000	14,600,000	12,775,000	10,950,000	9,125,000	7,300,000	3,650,000	1,825,000
	246,375,000	246,375,000	246,375,000	246,375,000	219,000,000	191,625,000	164,250,000	136,875,000	109,500,000	54,750,000	27,375,000
	49,275,000	49,275,000	49,275,000	49,275,000	43,800,000	38,325,000	32,850,000	27,375,000	21,900,000	10,950,000	5,475,000
	197,100,000	197,100,000	197,100,000	197,100,000	175,200,000	153,300,000	131,400,000	109,500,000	87,600,000	43,800,000	21,900,000
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	9,855,000	9,855,000	9,855,000	9,855,000	8,760,000	5,748,750	4,927,500	0	0	0	0
	187,245,000	187,245,000	187,245,000	187,245,000	166,440,000	147,551,250	126,472,500	109,500,000	87,600,000	43,800,000	21,900,000
	79,504,227	79,504,227	79,504,227	79,504,227	70,670,424	62,650,261	53,700,223	46,493,700	37,194,960	18,597,480	9,298,740
	107,740,773	107,740,773	107,740,773	107,740,773	95,769,576	84,900,989	72,772,276	63,006,300	50,405,040	25,202,520	12,601,260
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	107,740,773	107,740,773	107,740,773	107,740,773	95,769,576	84,900,989	72,772,276	63,006,300	50,405,040	25,202,520	12,601,260

APPENDIX 2 (CONTINUED)

Balance Sheet

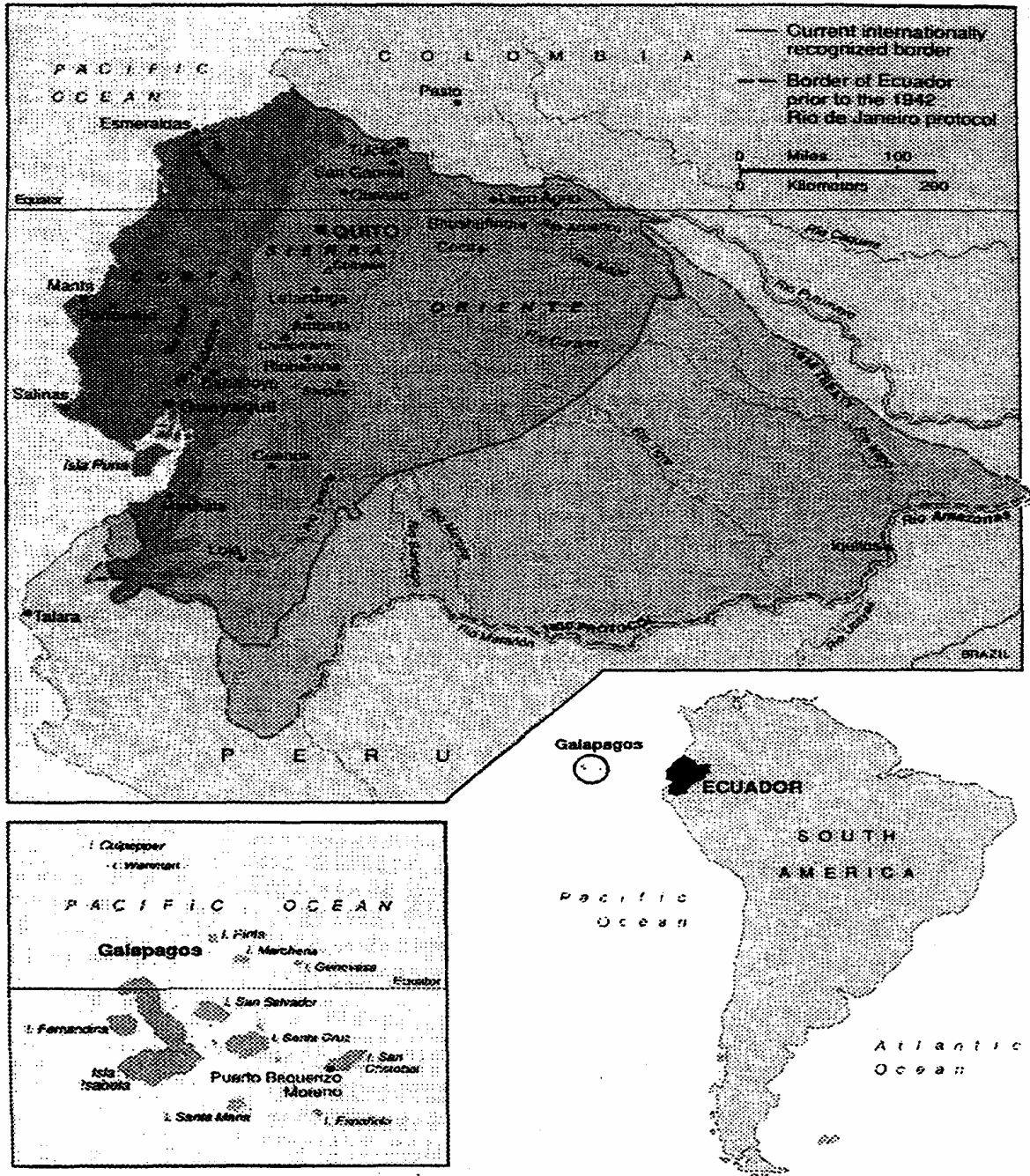
Year	1990	1991	1992	1993	1994	1995	1996				
Assets:											
Cash	0	0	0	0	0	0	0				
PPE	90,000,000	90,000,000	240,000,000	450,000,000	630,000,000	690,000,000	621,000,000				
Total	90,000,000	90,000,000	240,000,000	450,000,000	630,000,000	690,000,000	621,000,000				
Liabilities:											
Long Term Bank Debt	60,000,000	66,000,000	172,600,000	329,860,000	482,846,000	571,130,600	535,294,785				
Contributions from Conoco	30,000,000	30,000,000	80,000,000	150,000,000	197,398,740	179,594,960	146,223,953				
Project Equity	0	(6,000,000)	(12,600,000)	(29,860,000)	(50,244,740)	(60,725,560)	(60,518,738)				
Total	90,000,000	90,000,000	240,000,000	450,000,000	630,000,000	690,000,000	621,000,000				
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	0	0	14,230,192	75,508,002	134,558,054	191,157,573	245,061,504	296,000,289	343,677,413	451,418,186	559,158,959
	552,000,000	483,000,000	414,000,000	345,000,000	276,000,000	207,000,000	138,000,000	69,000,000	0	0	0
	552,000,000	483,000,000	428,230,192	420,508,002	410,558,054	398,157,573	383,061,504	365,000,289	343,677,413	451,418,186	559,158,959
	495,875,389	452,514,052	404,816,583	352,349,366	294,635,427	231,150,095	161,316,230	84,498,978	0	0	0
	102,245,822	49,072,852	0	0	0	0	0	0	0	0	0
	(46,121,211)	(18,586,905)	23,413,610	68,158,637	115,922,627	167,007,478	221,745,274	280,501,311	343,677,413	451,418,186	559,158,959
	552,000,000	483,000,000	428,230,192	420,508,002	410,558,054	398,157,573	383,061,504	365,000,289	343,677,413	451,418,186	559,158,959

APPENDIX 2 (CONTINUED)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
666,899,732	774,640,505	882,381,278	990,122,051	1,085,891,627	1,170,792,616	1,243,564,893	1,306,571,193	1,356,976,233	1,382,178,753	1,394,780,013	
0	0	0	0	0	0	0	0	0	0	0	0
666,899,732	774,640,505	882,381,278	990,122,051	1,085,891,627	1,170,792,616	1,243,564,893	1,306,571,193	1,356,976,233	1,382,178,753	1,394,780,013	
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
666,899,732	774,640,505	882,381,278	990,122,051	1,085,891,627	1,170,792,616	1,243,564,893	1,306,571,193	1,356,976,232	1,382,178,752	1,394,780,012	
666,899,732	774,640,505	882,381,278	990,122,051	1,085,891,627	1,170,792,616	1,243,564,893	1,306,571,193	1,356,976,233	1,382,178,753	1,394,780,013	

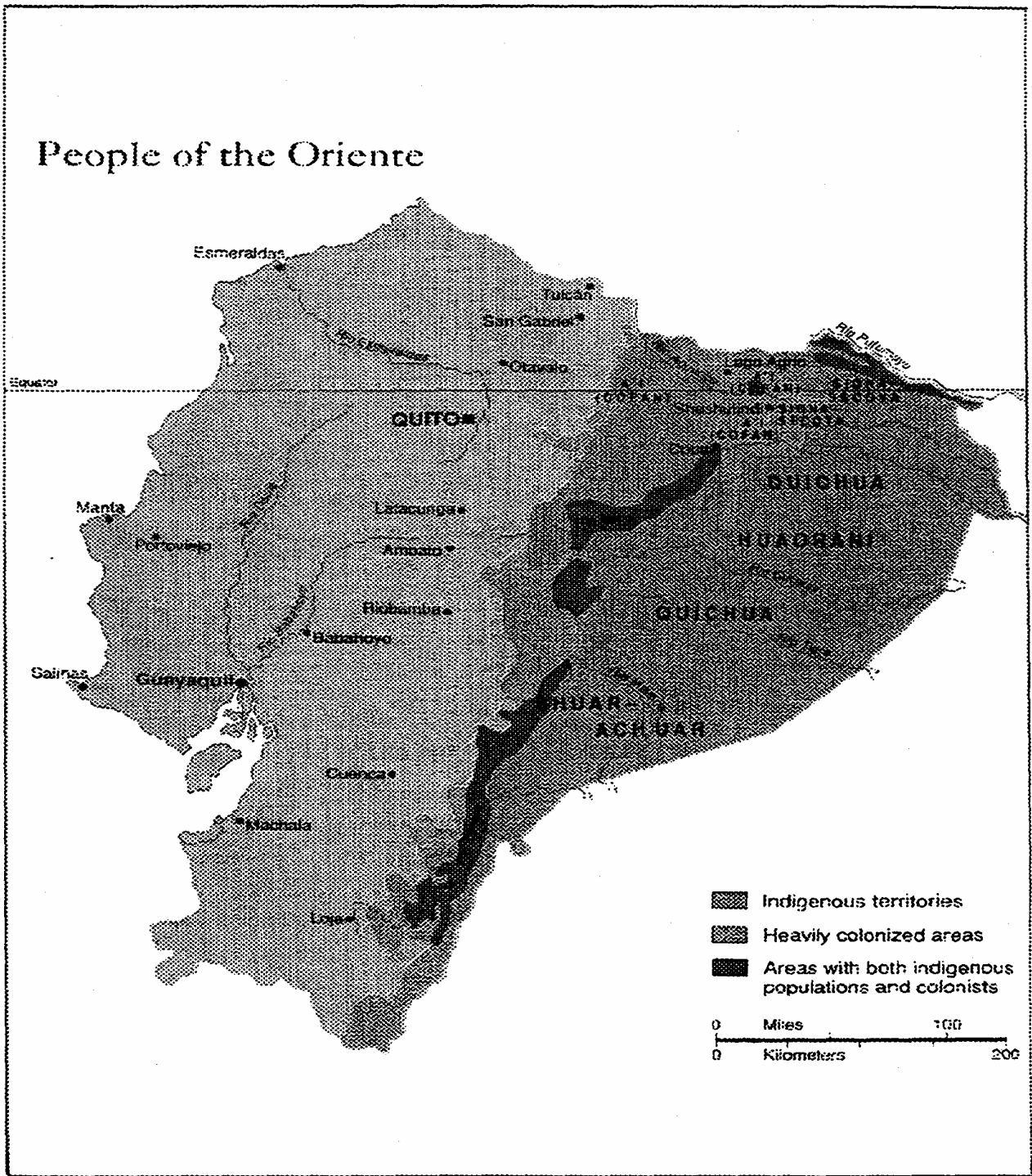


EXHIBIT 1 - Ecuador's Major Regions



Source: Judith Kimerling with NRDC, Amazon Crude (New York: NRDC, 1991)

EXHIBIT 2 - Indigenous Peoples and Colonized Areas of the Oriente

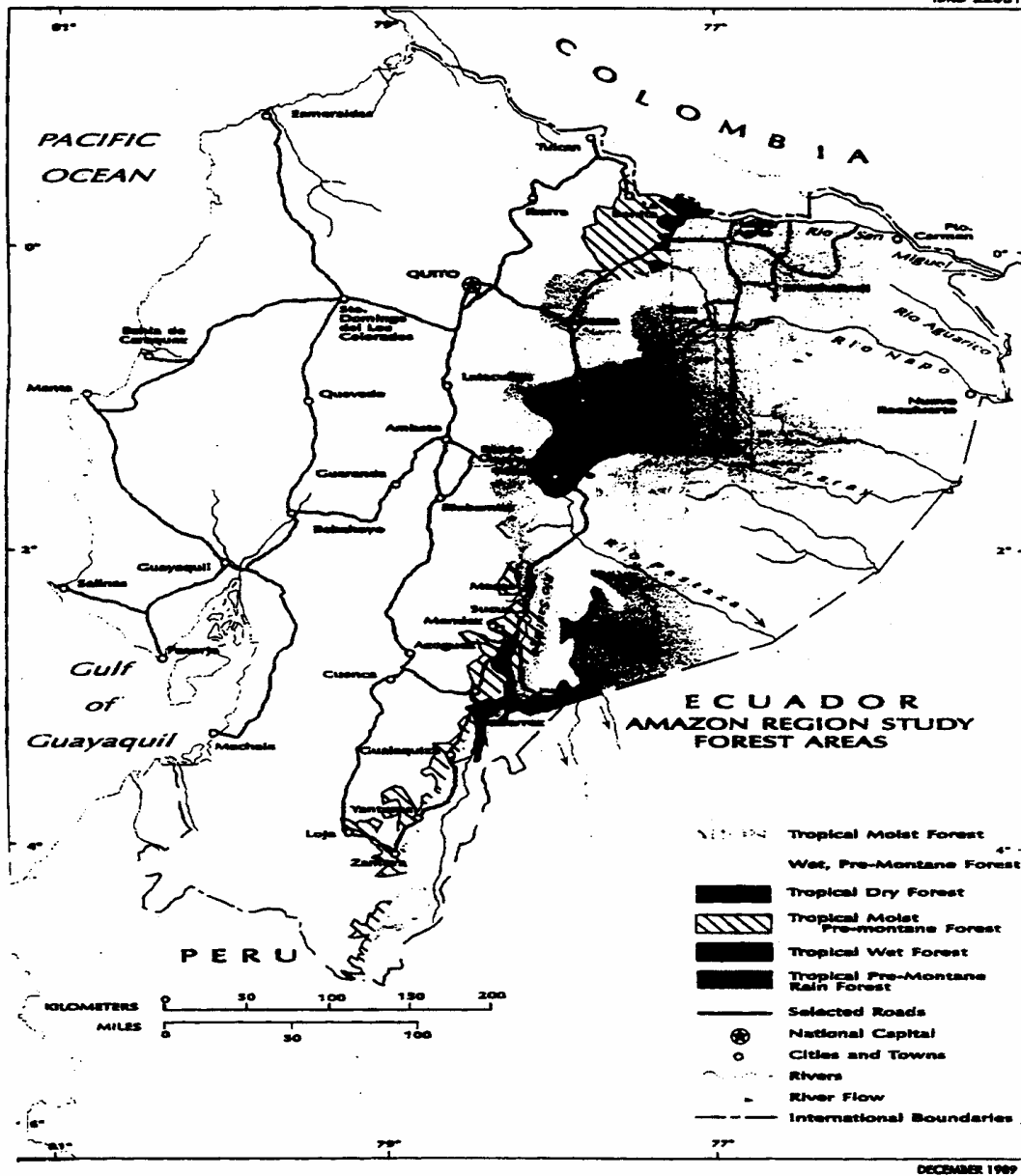


Source: Judith Kimerling with NRDC, *Amazon Crude* (New York: NRDC, 1991)



EXHIBIT 3 - Forest Land, by Type

IBRD 220.51



Source: James F. Hicks. "Ecuador's Amazon Region: Development Issues and Options," World Bank Discussion Paper #75. (Washington, D.C.: World Bank Publications, 1990.)

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EXHIBIT 4 - Ecuador's Environmental Profile

ECUADOR



Total Area: 109,481 sq. miles	
Global Rank: 67	Per Capita: 6.6 acres
Population: 10,587,000	
Global Rank: 61	Growth Rate: 2.6%
Gross National Product: \$11,271 m.	
Global Rank: 65	Per Capita: \$1,110
Greenhouse Gas Emissions: 143 m. tons CO₂ equivalent	
Global Rank: 36	Per Capita: 14.1 tons

Ecuador is approximately the size of the state of Colorado and includes, in addition to the ecologically unique Galapagos Islands, three geographically distinct regions: the Amazonian jungle in the east (Oriente), the Andean highlands in the center (Sierra), and the coastal region in the west (Costa).

Ecuador is an oil exporter and receives most of its foreign exchange from its petroleum sales. Other major exports include shrimp, bananas, and flowers.

According to many botanists, Ecuador has the greatest number of plant species of any South American country—more than twice that of the entire continental United States. The Oriente contains 70 percent of all species found in Brazilian Amazonia, though it is only one fifth the size. The Costa has been designated by ecologist Norman Myers as one of the world's 10 "hot spots" in terms of extinctions because of its high number of endemic species and rapid rate of deforestation. The clearing of mangrove forests to make ponds for growing shrimp is also reducing biodiversity and degrading coastal ecosystems.

Positive factors include a successful ecotourism trade in the Galapagos Islands and a debt-for-nature swap in 1987 that channeled \$10 million toward environmental protection organizations and activities.

Major Environmental Problems

Deforestation. Ecuador's major ecological problem is deforestation. In the Costa approximately 95 percent of the forests have been cut down, and the remaining forests will disappear within 10 to 15 years if the rate of destruction continues unabated. The Sierra is already almost completely devoid of natural forest cover. It is estimated that all the Oriente's forest cover will be gone within about 40 years if destruction continues.

Land degradation. A direct result of Ecuador's high deforestation rate is land degradation. The damage includes soil erosion, flooding, devegetation, and desertification. In the past 25 years, land degradation has increased about 30 percent, and the trend continues. Demographic pressures from rapid population growth have pushed people into previously uninhabited areas, leading to more intensive use of lands and to overgrazing. Government policies encourage timber felling and colonization.

Industrial and urban pollution. Other significant ecological problems facing Ecuador include inadequate water and sewage facilities in urban areas and contamination caused by oil spills in the Oriente and by improper mining practices in the Costa.

Land

Land use, total (sq. miles):	106,888
cropland	10,332
permanent pasture	19,498
forest and woodlands	44,402
other lands	32,656
Cropland per capita (acres):	0.7
global rank	67
Protected areas (sq. miles):	41,001
percent of total	38%
Deforestation (sq. miles/year):	1,313
Land constraints:	
steep slopes	31%
aluminum toxicity hazard	29%
some constraint	93%
acid zone	5%

Energy

Energy production:	
solids (trillion BTUs)	0
liquids (trillion BTUs)	580
gas (trillion BTUs)	4
biomass (trillion BTUs)	69
nuclear (gigawatt-hours)	0
hydroelectric (gigawatt-hours)	4,917
Energy consumption:	
total (trillion BTUs)	190
per capita (million BTUs)	28
per capita (global rank)	65
Energy intensity:	
(BTUs/\$1987 GNP)	25,655
global rank	57

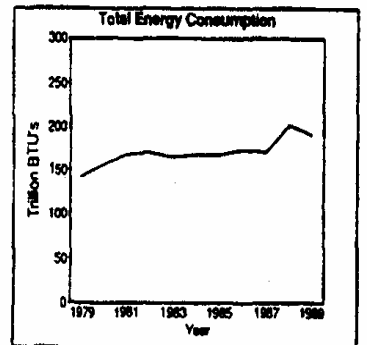
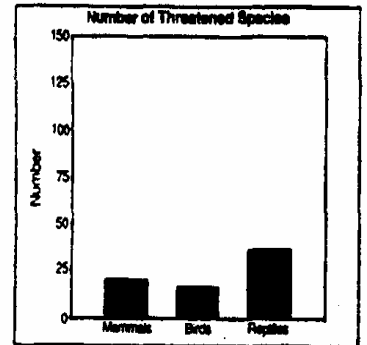
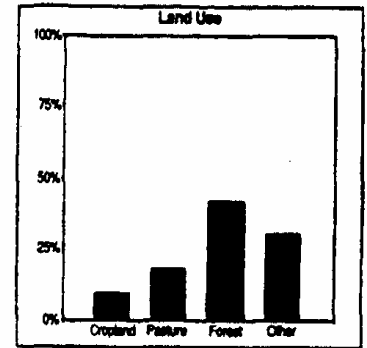
Water

Water demand:	
renewable supply (cubic miles)	75
total use (cubic miles)	1
agricultural use	90%
industrial use	3%
domestic and municipal use	7%
Access to safe water:	
urban population	83%
rural population	33%

Waste

Access to sanitation services:	
urban population	79%
rural population	34%
1988 Greenhouse emissions:	
carbon dioxide (000 tons)	51,000
methane (000 tons)	350
CFCs (000 tons)	1
share of world emissions	0.5%
global rank (per capita)	15

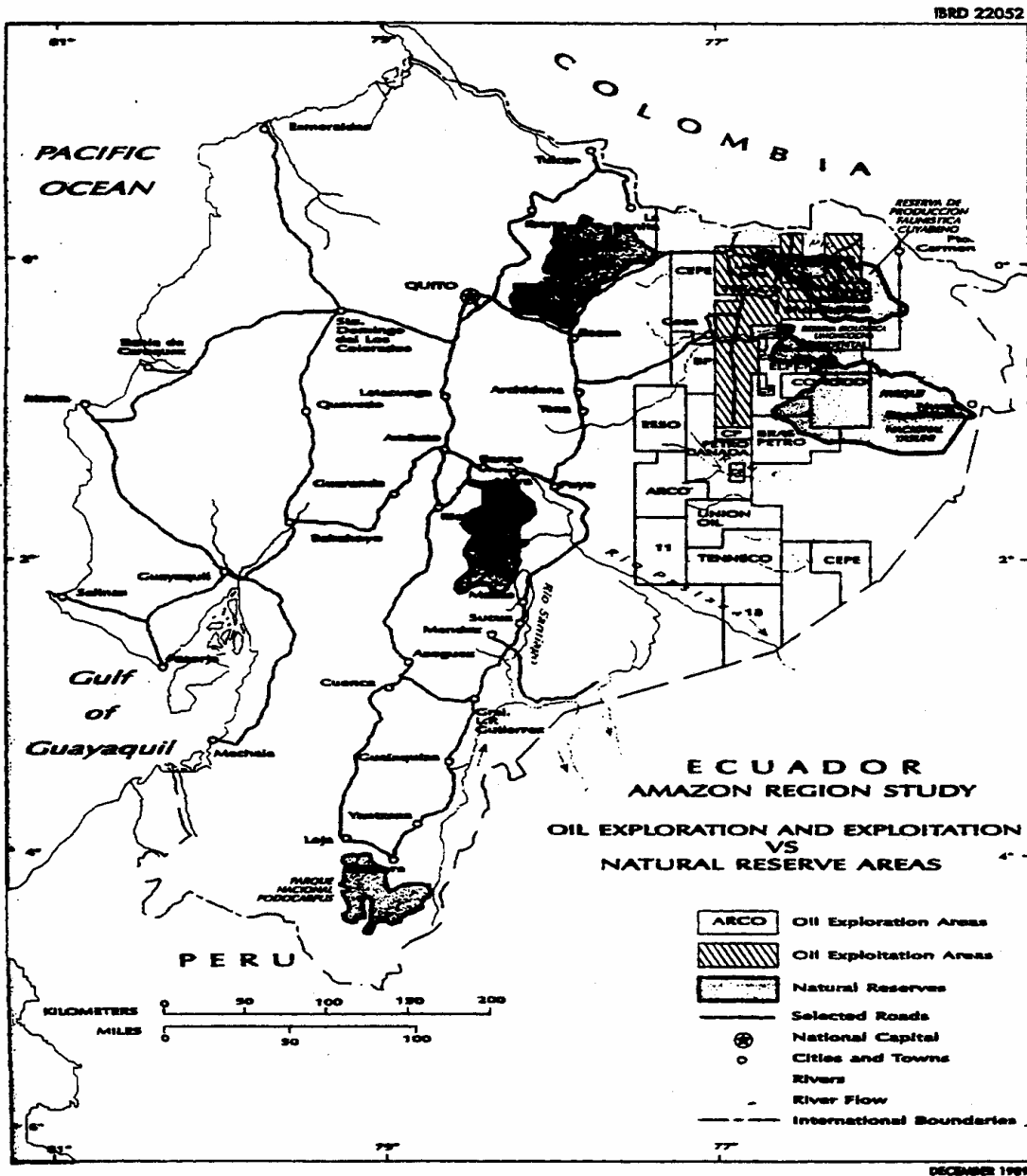
ECUADOR



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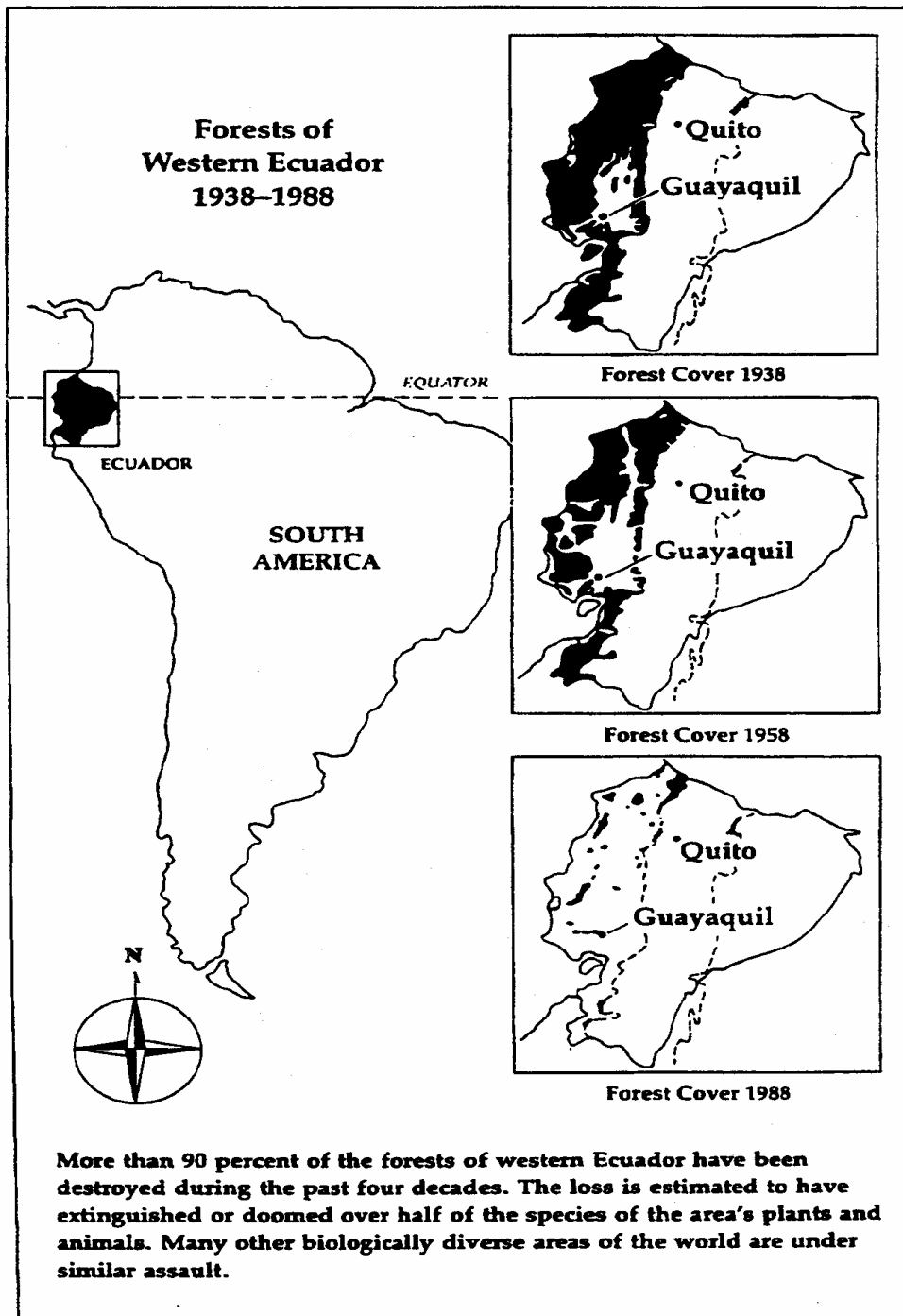
EXHIBIT 5 - Oil Exploration Areas and Natural Reserve Areas, December 1989



Source: James F. Hicks. "Ecuador's Amazon Region: Development Issues and Options," World Bank Discussion Paper #75. (Washington, D.C.: World Bank Publications, 1990.)

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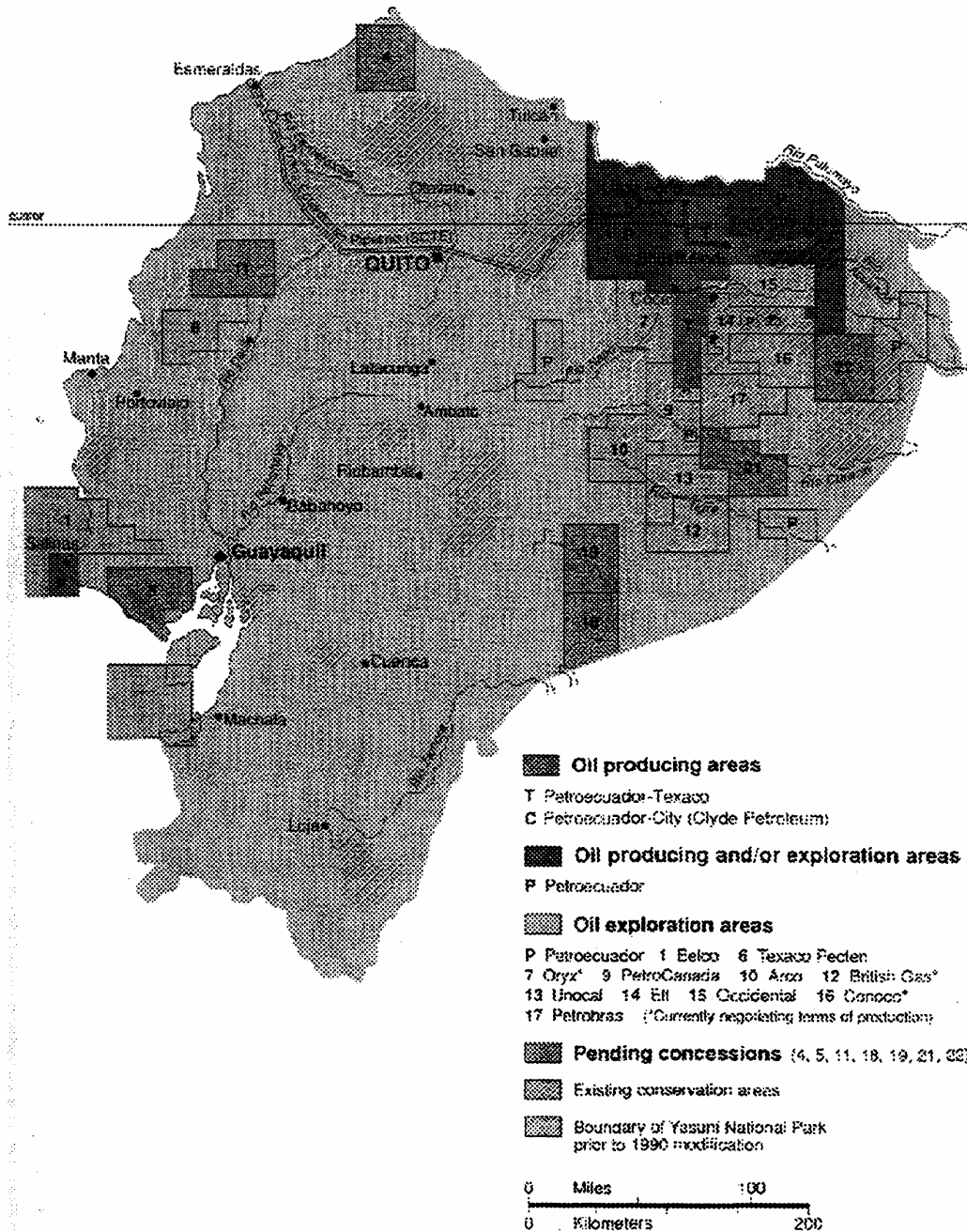
EXHIBIT 6- Forests of Western Ecuador, 1938-1988



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EXHIBIT 7 - Block 16 and Yasuni Park After Boundary Adjustments, December 1990



Source: Judith Kimerling with NRDC, Amazon Crude (New York: NRDC, 1991)