Rights Violations in the Ecuadorian Amazon

The Human Consequences of Oil Development

THE CENTER FOR ECONOMIC AND SOCIAL RIGHTS
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ACKNOWLEDGEMENTS

CESR pays tribute to the people of the Oriente, who have sparked greater awareness in Ecuador and abroad of the need to develop natural resources in a manner supported by local communities and consistent with human rights and environmental protection. CESR also gratefully acknowledges the generous financial support of the John D. and Catherine T. MacArthur Foundation, Ping and Carol Ferry and several other donors, as well as the logistical assistance provided by Paul, Weiss, Rifkind, Wharton and Garrison (in particular Robert Arcella and his dedicated staff) and the Harvard Center for Population and Development Studies, for making this report possible.

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PREFACE

For many years, indigenous peoples, community organizations and environmental groups have insistently and systematically denounced the grave impact of petroleum contamination on the human, social, cultural and environmental rights of the inhabitants of the Ecuadorian Amazon.

Oil production, which has caused an environmental disaster in this fragile region, is controlled by Ecuador's government and, as the result of concessions, by some transnational companies. These companies have used technically obsolete methods which damage the environment and are unacceptable to their own governments. Ecuador's government has clearly failed to control Petroecuador, the state oil company. A much more serious case involves Timaco, whose lack of professional and human ethics has caused significant damage in the Amazonian rainforest, and spurred strong reactions in Ecuador and around the world.

Many environmental and indigenous organizations have mobilized to defend the people and environment of the Amazon, in particular FCUNAE, CONFENIAE, FOISE and Acci6n Ecologica. Nevertheless, it is important to remember that in the beginning, accusations against oil development were labeled "exaggerations of the environmentalists and Indians aimed at damaging the country." Government and oil officials have refused to acknowledge the clear evidence of oil-related harms and have instead organized a determined campaign to discredit their critics which is currently in effect. No one can be a prophet in one's own land, but the accumulation of evidence, the preparation of legal, scientific, social and environmental studies, and international pressure have managed to change public perceptions and have achieved small and sporadic opportunities for civil society to participate in relevant government decisions that effect a wide range of social sectors. For example, public pressure has prompted the Minister of Energy and Mines to accept the formation of a Permanent Monitoring Committee for Petroleum Development, comprised of a representative from the Ministry of Energy and Mines, from Petroecuador, from one of the indigenous organizations (CONAIE), and from one of the environmental organizations (CEDEWA).

Despite government declarations about a new era of environmental behavior in Ecuador (corresponding to the 7th round of licensing of oil concessions) the Minister of Energy and Mines has already sought to undermine the formation of the Permanent Monitoring Committee. Despite his actions, the minister's political games will not succeed in the face of rising national pressure. If not this minister, than the next one or the next government will be forced to take steps (such as the formation of this committee) towards the elimination of contamination and environmental damage, towards the consolidation of a sustainable system of petroleum production, towards the defense of the Amazon's biodiverse wealth and genetic resources and towards the profound respect for the life, health and culture of the inhabitants of these regions, part of Ecuador's patrimony. These goals will help our country fulfill its global responsibility to preserve our tropical rainforest, an important environmental service to humanity.

In this context, I am honored to present the extremely important study done by the Center for Economic and Social Rights. This serious and valuable piece of documentation will make a significant contribution to our struggle. With its scientific data, rigorous methodology, and broad-based information, it demonstrates the painful reality that some would rather not see, and promotes the eventual realization of human rights, currently under threat in the Ecuadorian Amazon.

Vicente Polit Montes de Oca
President, CEDENMA
Official Representative of the ecological and
environmental organizations of Ecuador

PREFACE

The interface between human rights and economic development is very rapidly becoming a major focus of attention. It is a “fault line”, where philosophy, politics and economics meet, where confrontation is inevitable.

Not very long ago “human rights” was thought of primarily in political terms –the franchise, free expression, freedom from arbitrary arrest and torture and so on. And these are still issues of profound importance in vast areas of the world. But more and more we have come to understand that human rights has other dimensions, particularly in poorer and developing regions. One of the most crucial of these new questions focuses on the human costs that are borne in profoundly unequal ways by poor and indigenous populations when large-scale intrusive projects are introduced to "develop a region”.

The accompanying report by the Center for Economic and Social Rights on development in the Ecuadorian Amazon is a case in point. It is a powerful indictment of an approach to exploitation of natural resources that can no longer be reconciled with sound social policies, long-term economic strategies or respect for human dignity, health and life; neither can it be reconciled with the respect mankind must pay to nature, not for the romance of preservation, but to achieve the long-term sustainability of the human civilization in a viable natural environment.

These are not simple issues: differing values are at stake; facts are hard to come by and often harder to verify; competing interests must be heard out and balanced. This report provides a strong factual base for analysis and debate. But it does more than that. It moves the debate from one that seeks to balance conflicting economic strategies, to one cast in the vocabulary of human fights. This change of focus is important, because it establishes a more proactive context, one that leads inexorably to political action and legal remedies.

More and more, multinational corporations, international financial institutions and national governments will face some disturbing new realities. First, there is no major economic decision that does not profoundly affect human rights defined in this broader context. Second, in the contemporary international environment (post- Cold War and post-Rio Conference) affected population groups will actively react to major economic decisions that affect their lives and must therefore be recognized as “players” in the decision-making equation. And third, non-governmental organizations like the Center for Economic and Social Rights, with capacity to spotlight issues and gather and analyze facts, will spring up all over, nurtured and influenced by already mature human rights and environmental movements. These non-governmental organizations, working with the public media and indigenous political organizations, will increasingly become important participants in the process of world economic, social and political change. It is in this context that the ruthless exploitation of the Ecuadorian Amazon is becoming an international issue, and the CESR report is an important contribution to that process.

Matthew Nimetz
former Undersecretary of State
for Security Assistance, Science and Technology

STATEMENT

The indigenous peoples of Ecuador, after more than 500 years of being silenced, are here to denounce publicly the continued destruction of our lands and cultures, and what you in the modern world call the environment.

When we indigenous peoples talk about the environment, we are not just talking about the trees, rivers and butterflies. We are also talking about human beings. Likewise, when we talk of human rights, we are not just talking about the right to free speech. We are talking of the political, economic, social and cultural rights of all peoples, and their rights to sustainable development which fulfills the basic needs of human beings.

For many centuries, science has been used against these fundamental rights. In recent years, powerful oil companies have used social scientists to destroy our cultures and lives. They have created studies to justify the destruction of our lands and hide the real social and ecological impacts of oil development. But finally, with this critical CESR report, a new kind of science has been born, a science which promotes true human tights, and promotes the laws of justice for all of the peoples of this earth. This report reveals the truth that for 30 years Texaco and the government of Ecuador have attempted to cover up - that our peoples are dying and our mother earth is sick.

On behalf of the indigenous peoples of the Ecuadorian Amazon, we are here today to demand:

- That Texaco, as a U.S. company, be brought to justice without delay in the courts of the United States.

- That the Cofan and other peoples of Sucumbios be supported in their search for justice against Texaco.

- That the communities affected by oil development plans be guaranteed participation in the design, execution and monitoring of projects in their territories.

- That a find be established to compensate the indigenous and non-indigenous victims of the destruction and contamination caused by 30 years of oil development in the Amazon, and to clean up the polluted territories.

- That an international mediation team from the United Nations and an independent team of scientists visit Ecuador to investigate human tights abuses and destruction of the environment in Ecuador, with special attention to the effects of oil exploitation by Maxus and ARCO oil companies on the Huaorani and Quichua: peoples of the province of Pastaza.

- That the government of Ecuador suspend the seventh round of oil bidding and declare a 15 year moratorium on further oil exploitation until the above conditions are met.

The Ecuadorian government and the oil companies tell us that oil exploitation is the only possible path of development for the people of Ecuador. But we the indigenous peoples say that development which destroys our rivers, our land and our lives is not real development. We have been developing our societies for thousands of centuries. We have created our own plans for alternative development, plans which are born out of the basic necessities of the communities. What we demand is recognition of the economic, social, cultural and political rights of the indigenous peoples.

Rafael Pandam
Vice President, Confederation of Indigenous Nationalities of Ecuador

EXECUTIVE SUMMARY

Over the course of 22 years, oil companies have discharged billions of gallons of toxic contaminants into the Ecuadorian Amazon (the Oriente), threatening the health and welfare of the local population. The Center for Economic and Social Rights (CESR) has prepared this report in the belief that the impact of oil development in Ecuador presents a compelling paradigm of a larger international problem: the frequent clash between development policy and basic principles of human rights. CESR hopes that the report both will contribute to a more complete understanding of the dangers of unregulated oil production in the Oriente and will highlight the overall importance of promoting economic and social rights.

The report concludes that the government of Ecuador's failure to prevent the contamination of the Oriente constitutes a violation of its citizens' human rights to health and a healthy environment. In keeping with human rights law, the report concentrates on the government's obligations. However, this narrow focus should not obscure the responsibilities of other parties for creating the crisis in the Oriente. Private companies like Texaco (which designed, built, and for 18 years operated the facilities that released the bulk of the contamination in the Oriente) may not be charged under human rights law, but can and should be held civilly liable to compensate those injured by their actions. International creditors (who have encouraged Ecuador to maximize oil revenues to repay its foreign debt with little regard to the consequences for the local population) are also immune from human rights liability, but should not escape public pressure to incorporate human rights norms into their lending practices.

The Oriente, one of the most biodiverse regions on earth and home to almost 500,000 indigenous peoples and settlers, has been at the center of Ecuador's oil boom. Since 1972, companies have extracted roughly two billion barrels of crude oil from this region, and in the process have released billions of gallons of untreated toxic wastes and oil directly into the environment. This contamination has sparked a debate in Ecuador between the oil companies and a coalition of indigenous and environmental groups, who charge widespread damage to the environment and the health of the local population. At stake in this debate is not only the future direction of oil development in Ecuador, but the survival of the rainforest and its indigenous inhabitants.

Although limited studies and anecdotal evidence show increases in oil-related diseases among residents of the Oriente, little human rights advocacy or scientific research has been done on the issue. In April 1993, CESR sent a team of doctors, scientists and lawyers from Harvard University to the Oriente. A follow-up mission was conducted in November 1993. The missions were intended to build upon prior work by Ecuadorian and international groups and individuals and were carried out in consultation with local organizations and experts.

CESR's team, had two specific objectives: (i) to collect data on contamination levels and associated health effects and (ii) to integrate these data into a human rights report assessing the conduct and policies of the government of Ecuador. Human rights advocacy has rarely focused on the rights to health and a healthy environment. By promoting these lights through objective scientific studies, CESR hopes to add a new dimension to ongoing efforts to hold the government of Ecuador and the oil companies accountable for their actions in the Oriente.

The CESR team collected samples from drinking, bathing and fishing waters used by local communities and from waste waters released by oil facilities. The team also conducted limited medical examinations of people from these affected communities. Among the findings:

- waste water samples at the point of emission into the environment contained extremely high levels of toxic compounds (polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs));

- drinking, bathing and fishing water samples contained levels of PAHs 10 to 1,000 times greater than the U.S. Environmental Protection Agency's safety guidelines;

- "fingerprinting" analysis matched PAH contaminant patterns in drinking, bathing and fishing waters to waste water sources at nearby oil facilities;

- medical examinations of residents of local communities found cases of dermatitis apparently related to oil contamination.

The presence of high levels of toxic compounds and oil-related injuries indicate that the exposed population faces an increased risk of serious and non-reversible health effects such as cancers and neurological and reproductive problems. These health risks implicate Ecuador in violations of basic human rights in the Oriente.

Both international and Ecuadorian law recognize the human rights to health and a healthy environment. These rights impose three minimum duties on the government of Ecuador. (i) to take reasonable precautions to avoid contaminating the environment in a manner that threatens human health, (ii) to regulate private actors effectively to prevent such contamination, and (iii) to provide potential victims of contamination with judicial remedies and access to relevant information. This report concludes that the government has failed on all three counts.

Direct contamination. Ecuador is responsible for the actions of the state oil company (now called Petroecuador), which since 1972 has been involved in the dominant oil consortium in the Oriente. While Texaco, as the consortium's operating partner, designed, built and managed the oil facilities that have released most of the contamination into the Oriente, Petrocuador assumed management in 1990 and full ownership in 1992 of the consortium and has since used the same substandard technologies and practices inherited from Texaco. Texaco's potential civil liability for its actions does not detract from the government's responsibility under human rights law for the state oil company's role in contaminating the Oriente.

Failure to regulate. For 20 years, Ecuador allowed companies to extract oil from the Oriente virtually without oversight. Relevant (though still flawed) environmental regulations for the oil industry were not enacted until 1992. In addition, state agencies responsible for protecting the environment have lacked the resources, expertise, and political support necessary to enforce their mandate. As a result of these omissions, Ecuador has allowed private companies such as Texaco to contaminate the Oriente with little risk of monitoring or punishment.

Lack of judicial remedies and information. A variety of political and structural defects render Ecuador's legal system inaccessible to private citizens with claims against oil companies, despite the occurrence of numerous contamination-related injuries. While the constitutional court can hear suits against the state agencies responsible for environmental protection, it has yet to provide effective relief for claims related to oil contamination. In addition, citizens have no access to information about oil operations or potential health risks. Without recourse to judicial redress or information, victims have been forced to seek remedies in jurisdictions outside of Ecuador.

In sum, Ecuador's oil development policies in the Oriente have violated the minimum obligations imposed by the rights to health and a healthy environment. The state oil company's irresponsible practices and substandard equipment continue to place local communities at risk, environmental regulations and state protection agencies have proven incapable of preventing oil companies from contaminating the environment, and the state has left potential victims of toxic contamination ignorant of the risks and without effective legal redress.

While CESR recognizes Ecuador's economic need to exploit its natural resources, development must not come at the expense of basic human rights. Future oil policy must take into account the fundamental importance of protecting the rainforest and ensuring the rights of its residents. Accordingly, the government should take immediate action to improve current production practices, bolster environmental monitoring and enforcement, promote indigenous ownership of and participation in the management of their traditional lands, facilitate the compensation of victims of oil-related contamination, and open oil development policies to public participation and debate by making relevant information widely available. These efforts should be encouraged by the international community through technical and financial assistance, debt restructuring, and diplomatic pressure.

GLOSSARY OF TERMS

benthic organism: organism living on the bottom of a sea or lake

black rain: water remnants of varied composition (which degrade) that come from domestic or industrial activities

class action: lawsuit brought by representatives of a large group of persons on behalf of all the members of the group

drilling wastes: wastes produced from exploratory wells containing a toxic mixture of drilling muds (used as lubricants or sealants), petroleum, natural gas, and formation water

eczematic dermatitis: condition of noncontagious inflammation of the skin marked by redness, itching, and the outbreak of lesions that discharge serous matter and become encrusted and scaly

fingerprinting analysis: chemical analysis that traces the source of contamination from one source to another by comparing the chemical composition and distribution of the two sources

formation water: water from deep below the earth's surface, containing various concentrations of mineral salts and heavy metals, separated from crude oil at separation stations

hyperkeratosis: hypertrophy (nontumorous increase in the size of an organ or part, as a result of the enlargement without an increase in the number of constituent cells) of the horny layer of the skin

oil wastes: wastes comprised of formation water, gas, and toxic chemicals used in the extraction and separation stages of oil development

PAHs: polycyclic aromatic hydrocarbons are hydrocarbons containing multiple fused benzene rings (which account for many properties of crude oil linked to adverse health effects)

produced waters: (or toxic brine) untreated toxic wastes which contain large quantities of oil and toxic compounds, discharged from separation stations

separation ponds: (or waste pits) open unlined pits where drilling wastes produced from exploratory wells are deposited

separation station: oil that is extracted from the wells is pumped into separation stations which separate the oils from wastes

VOCS: volatile organic compounds in crude oil include benzene and benzene derivatives (e.g. toluene and xylenes)

INTRODUCTION

The human cost of environmental degradation has spurred a strong international movement to link environmental protection with human rights. This trend can be seen in both the growing acceptance of sustainable development and in the recent emergence of a new right -- the right to a healthy environment.

The Center for Economic and Social Rights (CESR) decided to investigate the human rights implications of oil exploitation in the Ecuadorian Amazon (the Oriente) because it provides a graphic example of the essential interdependence of environmental protection, human rights and economic development. The following report represents one of the first attempts to apply the right to a healthy environment in assessing the human consequences of a country's development policies.

Since 1972, companies have extracted almost two billion barrels of crude oil from the Oriente, and in the process have released billions of gallons of untreated toxic wastes and oil directly into the environment. Indigenous federations and environmental groups in Ecuador have organized in opposition to unregulated oil development, charging that contamination has caused widespread damage to both people and the environment. Yet faced with a weak economy and pressure from foreign creditors, the government is rapidly proceeding with plans to increase oil production by withdrawing from OPEC to avoid export quotas, privatizing the state oil company, offering attractive new concessions to private oil companies, and seeking additional financing from the World Bank and the IMF.

Despite the urgency of the situation, little human rights advocacy or scientific research has been done on the health effects of oil contamination. In April 1993, CESR sent a team of doctors, scientists, and lawyers from Harvard University to the Oriente. The team had two objectives: (i) to collect data on contamination levels and associated health effects and (ii) to integrate these data into a report measuring the government's compliance with its obligations under the human rights to health and a healthy environment.

The report is divided into seven sections in addition to the executive summary and this introduction. Section I outlines the government's minimum obligations to ensure the rights to health and a healthy environment; Section II provides a brief background of the economic, social and political aspects of oil development in Ecuador; Section III describes the health effects of crude oil's toxic constituents; Section IV summarizes the findings of the CESR health and exposure study in the Oriente; Section V details Ecuador's failure to protect the rights to health and a healthy environment; Section VI presents concluding remarks on the importance of the struggle over oil production in the Oriente; and Section VII offers recommendations aimed at resolving the crisis consistent with basic principles of human rights.

I
LEGAL FRAMEWORK

Because of the Oriente's remarkable biodiversity and the presence of indigenous peoples, oil development implicates several treaties and laws covering a broad range of environmental, cultural and indigenous rights [1/] Violations of these rights have been examined in other reports [2/] and are currently being reviewed by the Inter-American Commission on Human Rights (IACHR).[3/] This report focuses specifically on the rights to health and a healthy environment.

The recognition of a right to health dates back to the Universal Declaration of Human Rights of 1948 and its two successor International Covenants. [4/] However, while the right to health under the International Covenants includes a reference to environmental protection, the movement to link human rights to environmental concerns is a relatively new one (box 1). In 1972, the United Nations General Assembly unanimously endorsed the principle that "man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being."[5/] As this link between human welfare and environmental destruction has become increasingly clear, national legislatures and international bodies have begun to develop a new standard to protect the environment for the benefit of human health: the right to a healthy environment. This right, which should not be confused with claims to protect the environment for its own sake, now appears in international declarations, regional covenants, and virtually every constitution revised or adopted in the last thirty years. [6/]

Few attempts have been made to interpret the rights to health and a healthy environment; until uniform standards have been developed, violations must be judged on the basis of a minimum set of duties necessary to make these rights meaningful. Because the minimum duties for both rights clearly overlap, this report will use the single term "right to a healthy environment" to encompass both the environmental aspects of the right to health and the more specific right to a healthy environment.

A. Legal obligations

The Ecuadorian government is legally bound by both international treaties and its own constitution to provide for a healthy environment (Appendix II). Under international law, Ecuador must take necessary steps for "the improvement of all aspects of environmental and industrial hygiene," [7/] and must provide all children with "adequate nutritious foods and clean drinking-water, taking into consideration the dangers and risks of environmental pollution." [8/] Ecuador is also bound by the American Declaration on the Rights and Duties of Man, which holds that "every person has the right to the preservation of his health through sanitary and social measures." [9/] Finally, the Protocol of San Salvador, recently ratified by Ecuador, declares that "everyone shall have the right to live in a healthy environment. " [10/]

More significantly, Ecuador's own constitution explicitly guarantees the principle of the right to a healthy environment. Article 19(2) provides Ecuadorians with "the right to live in an environment free from contamination, and underscores the importance of this right by adding that "the law shall establish restrictions on the exercise of specific rights or freedoms in order to protect the environment. ".[11/] The right to a healthy environment is the only right in Ecuador's constitution that creates a hierarchy in which other rights may be subordinated.

box 1

Human Rights and the Environment

The Relationship between human rights and environmental protection is still evolving. International treaties and national constitutions speak of rights to a "clean," "healthy," "decent," "satisfactory" and/or "safe" environment, but no consensus yet exists around the specific shape or meaning of such rights. The three minimum duties elaborated in this report reflect a baseline position common to all sides of the debate, which largely revolves around the extent to which human rights law should be expanded to encompass environmental concerns.

The 1972 Stockholm Declaration established a framework for the debate. On the one hand it recognized that the environment is "essential to [human] well-being and to the enjoyment of basic human rights –even the right to life itself." This provision supports the view that human rights should protect the environment but only to the extend required to ensure established rights, such as the rights to life, health, personal security, suitable work conditions, and private property.

However, the Stockholm Declaration also recognized a duty to "defend and improve the human environment for present and future generations." This broad understanding of the interdependence of humans and their eco-system views environmental destruction of almost any kind as effective human welfare. From this understanding has come a movement to recognize new human rights that cover environmental damage with long-term as well as immediate impacts.

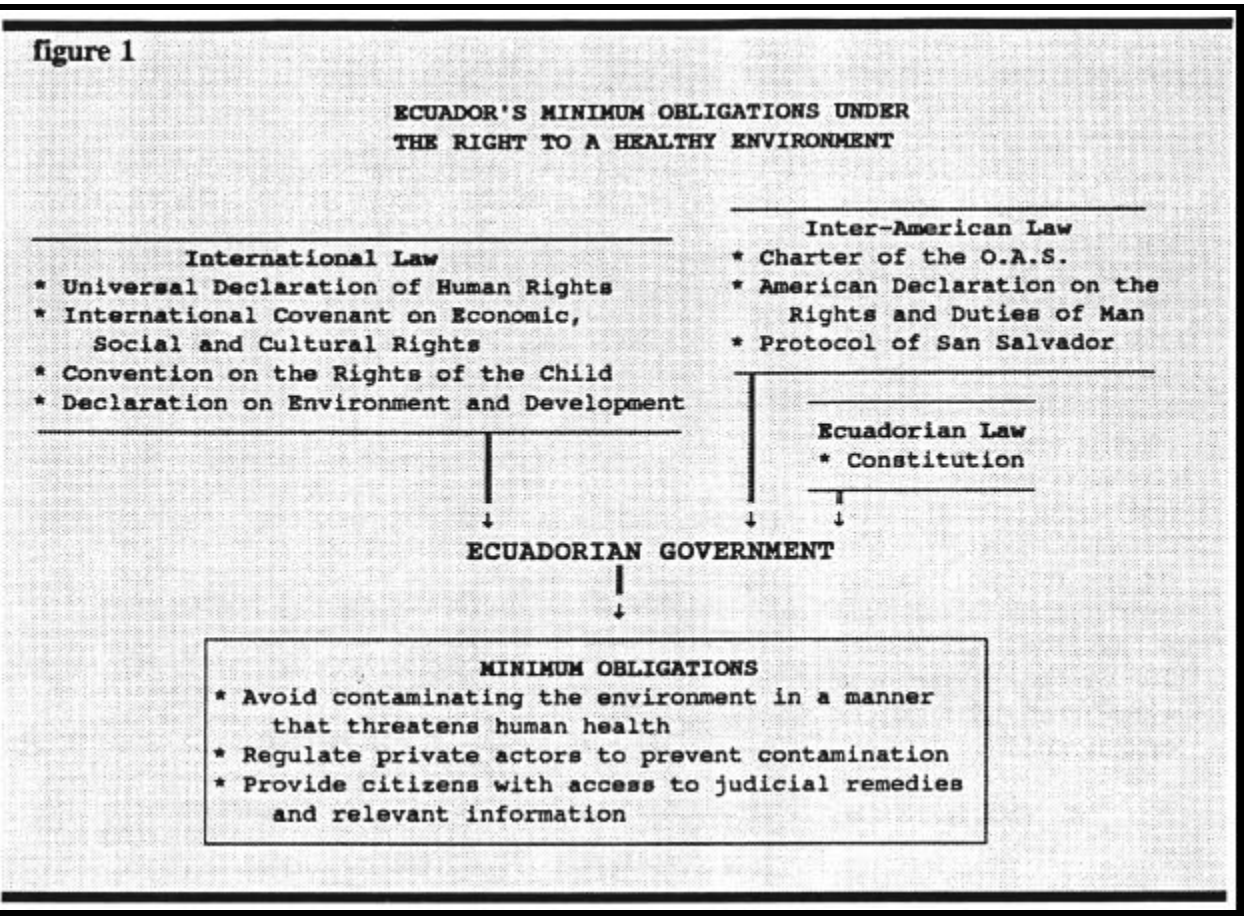
Many environmental advocates would go further, believing that environmental protection should constitute not merely a *means* to human security but an independent good. As the World Charter for Nature declares, " every form of life is unique, warranting respect regardless of its worth to man." Likewise, the Ecuadorian Constitution and the San Salvador Protocol both guarantee a clean environment regardless of risks to human health. These provisions represent the most far-reaching vision of environmental protection, challenging traditional notions of human rights as attaching solely to human beings.

B. Minimum duties

Out of these legal instruments emerge three minimum duties necessary to protect the right to a healthy environment **(figure 1)**. First, Ecuador must take reasonable precautions to avoid contaminating the environment in a manner that threatens the health and welfare of its citizens. As part of this obligation, the government is directly responsible for the acts of the state oil company, legally considered an arm of the state. [12/]

Second, Ecuador must regulate and monitor the activities of private oil companies to ensure that they do not create environmental health risks. As explained by the Inter-American Court of Human Rights (IACtHR), a state violates the rights of its citizens "when the State allows private persons or groups to act freely and with impunity to the detriment of the rights recognized by the Convention."[13/] International law requires states to protect human rights by enacting and enforcing appropriate legislation.[14/] If the government fails to impose regulatory controls on off companies like Texaco, it is responsible for consequent violations of its citizens' human rights.[15/]

figure 1



Finally, the government must provide potential victims of environmental contamination with effective judicial remedies and access to information related to the oil development and the threat of contamination. Without these procedural measures, citizens lack the means to effectively vindicate their rights. The Universal Declaration of Human Rights states that "everyone has the right to an effective remedy by the competent national tribunals for acts violating the fundamental rights granted him by the constitution or by law." [16/] Similar provisions may be found in the American Convention on Human Rights and the Ecuadorian constitution.[18/] As a corollary to this right, the government must also make information about potentially hazardous activities publicly available. Such information is necessary to allow citizens to participate in policy decisions and to hold those who violate rights accountable for their actions. According to the Rio Declaration on Environment and Development, "each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities... States shall facilitate and encourage public awareness and participation by making information widely available." [18/]

These are the minimum duties required of the Ecuadorian government under the right to a healthy environment. This report refers to these duties in assessing the government's oil development policies in the Oriente.

II
BACKGROUND

The Oriente consists of over 13 million hectares of tropical rainforest lying at the headwaters of the Amazon river network. The region contains one of the most diverse collections of plant and animal life in the world, including a considerable number of endangered species. According to noted tropical biologist Norman Myers, the area "is surely the richest biotic zone on earth and deserves to rank as a kind of global epicentre of biodiversity."[19/] The Oriente is also home to eight different indigenous peoples who have lived in the rainforest for thousands of years.

A. The oil boom

In 1967, a Texaco-Gulf consortium discovered a rich field of oil beneath the rainforest, leading to an oil boom that has permanently reshaped the region. While the state has retained dominion over all mineral rights, private companies, Texaco in particular, have built and operated most of the oil infrastructure. The Oriente now houses a vast network of roads, pipelines and oil facilities. Settlers attracted by the roads and encouraged by government land policies have flooded in, clearing vast regions of the rainforest and displacing indigenous inhabitants. This process has contributed to a deforestation rate of almost a million acres a year in the Oriente, one of the highest rates in Latin America.[20/] Half of the Oriente is currently slated for oil development. [21/]

Recognizing the importance of Texaco-Gulf's oil discovery, the Ecuadorian government moved rapidly to nationalize the industry. Through its newly-established state oil company (CEPE), the government joined the Texaco-Gulf consortium and forced most other companies out of the country. By 1977, CEPE (later renamed Petroecuador) had acquired all of Gulf's remaining interest, giving it a 62.5 % stake in the consortium, although Texaco continued to control and operate the oil facilities through 1990. From 1972-92, the consortium was responsible for 88% of total oil production in the Oriente, and Petroproducciones (a Petroecuador affiliate) for another 11 %. [22/] In 1992 Petroecuador assumed Texaco's stake in the consortium and has since controlled over 90% of total oil production in the Oriente [23/] Recent government initiatives to privatize Petroecuador and auction new rainforest concessions ensure that private companies will gradually increase their percentage of this total. [24/]

B. Oil practices in the Oriente

Oil companies, primarily Texaco, have employed substandard practices and technologies that have led to the environmental contamination of the Oriente.[25/] As the *New York Times* reported in 1991, "Ecuador's oil practices have won such a bad reputation in South America that Brazil's oil company, Petrobras, sent a team of scientists here before starting to produce oil so it could avoid mistakes." [26/]

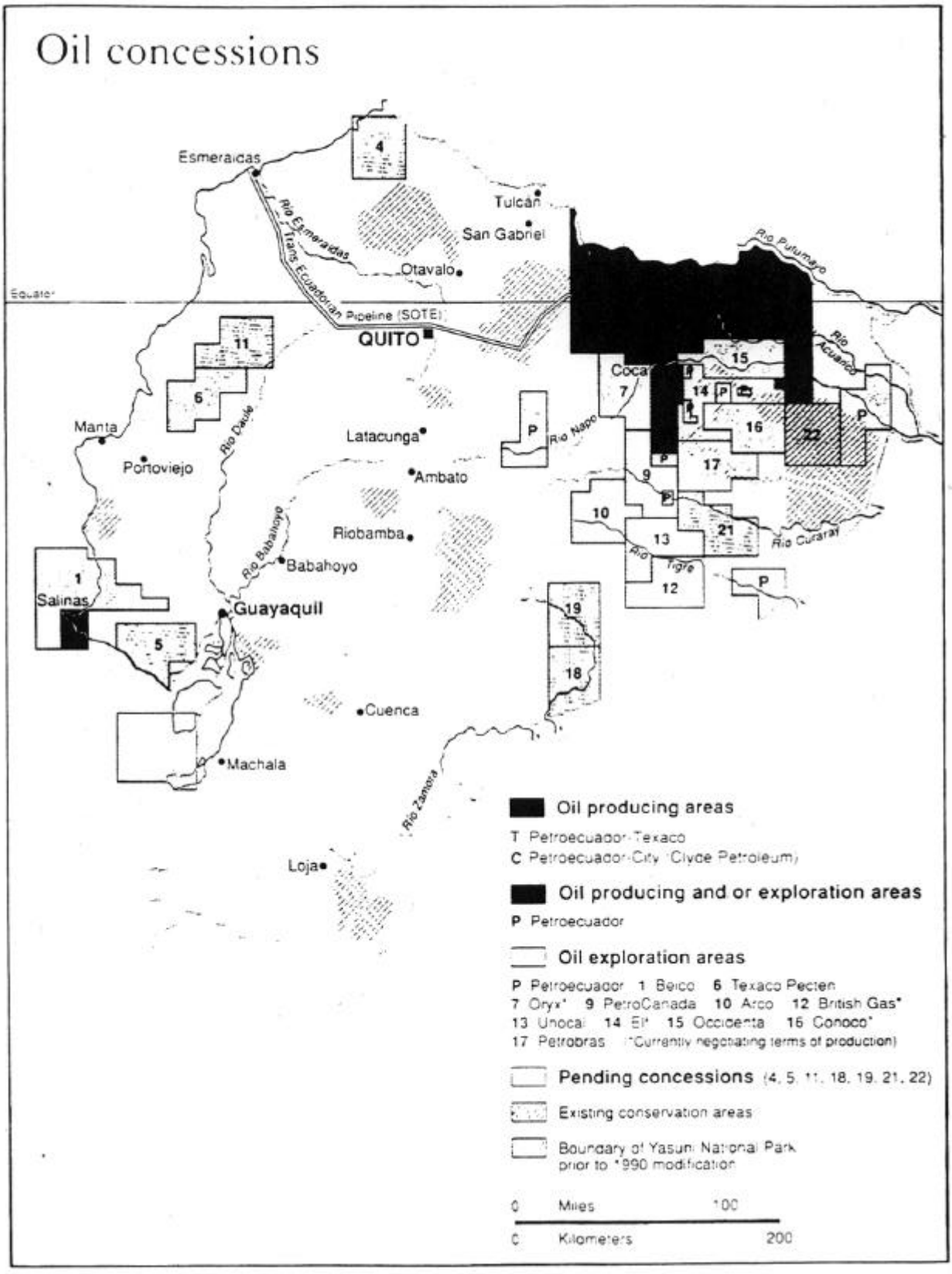
Oil development can be divided into three stages - exploration, production and transportation - each containing the potential for significant environmental degradation. Oil exploration in the Oriente has involved thousands of miles of trail-clearing and hundreds of seismic detonations that have caused erosion of land and dispersion of wildlife. In addition, companies have released millions of gallons of toxic wastes during exploratory drilling. Each exploratory well produces an average of 4,165 cubic meters of drillings wastes containing a toxic mixture of drilling muds (used as lubricants and sealants), petroleum, natural gas, and formation water from deep below the earth's surface (containing hydrocarbons, heavy metals and high concentrations of salt). Most of these wastes are deposited into open, unlined pits (called waste pits or separation ponds) from which they are either directly discharged into the environment or leach out as the pits degrade or overflow from rainwater.[27/] Another five million gallons of toxic wastes are released every year simply from routine maintenance of the wells.[28/]

However, the major contamination begins at the point of production.[29/] As oil is extracted from the wells, it is pumped to separation stations, which separate oil from wastes comprised of formation water, oil remnants, gas, and toxic chemicals used in the extraction and separation stages. L' Every day, these stations discharge over 4.3 million gallons of untreated toxic wastes (called produced water or toxic brine), which includes 2, 100 to 4,200 gallons of oil, into waste pits.[31/] Virtually all of the wastes eventually leach from the pits into the environment.[32/] An additional 1,000 to 2,000 gallons of oil spill from the flowlines connecting the wells to the stations every two weeks.[33/] Furthermore, oil and chemicals are spilled from leaks in tanks and storage drums.[34/] Finally, heavy crude oil is extracted from the waste pits and spread across local roads, contaminating adjoining fields and streams. These practices have discharged over 30 billion gallons of toxic wastes and crude oil into the land and waterways of the Oriente since 1972. [35/]

Two government studies conducted in 1987 demonstrate the extent of the contamination problem. A study of 187 wells operated by Texaco for the CEPE-Texaco consortium found that crude oil was regularly dumped into the woods, farmlands and bodies of water and that 80% of the waste pits were poorly constructed and constituted a permanent source of contamination.[36/] The other study found high levels of oil and grease in all of 36 samples taken from rivers and streams near production sites, and also found that a deficit of dissolved oxygen in the majority of water samples had seriously harmed the aquatic ecosystem.[37/]

Poor construction, maintenance and monitoring of transport pipelines have also caused significant contamination. Through 1989, the Ecuadorian government had reported 30 separate spills in the main trans-Ecuadorian pipeline, with a total of almost 17 million gallons of crude oil dumped into the environment (as compared to the 10.8 million gallons spilled in the Exxon Valdez disaster).[38/] Ruptures in secondary pipelines have released hundreds of thousands more gallons of oil. While some accidental spills are unavoidable, the extent of the spillage in Ecuador is largely attributable to industry negligence, including the lack of spill prevention and response measures.[39/]

Under pressure from local and international organizations, private companies have promised to adopt measures to protect the environment and minimize disruption to indigenous cultures. The


Oil concessions
Esmeraldas
Río Esmeraldas
Trans Ecuadorian Pipeline (SOTE)
Tulcán
San Gabriel
Otavalo
Equator
QUITO
Río Putumayo
Río Aguarico
Coca
Manta
Portoviejo
Río Daule
Latacunga
Ambato
Río Napo
Riobamba
Río Babahoyo
Babahoyo
Río Curaray
Río Tigre
Salinas
Guayaquil
Cuenca
Machala
Río Zamora
Loja
Oil producing areas
T Petroecuador-Texaco
C Petroecuador-City (Clyde Petroleum)
Oil producing and or exploration areas
P Petroecuador
Oil exploration areas
P Petroecuador 1 Belco 6 Texaco Pecten
7 Oryx* 9 PetroCanada 10 Arco 12 British Gas*
13 Unocal 14 Elf 15 Occidental 16 Conoco*
17 Petrobras (*Currently negotiating terms of production)
Pending concessions (4, 5, 11, 18, 19, 21, 22)
Existing conservation areas
Boundary of Yasuni National Park prior to 1990 modification
0 Miles 100
0 Kilometers 200

government has incorporated certain of these measures into contracts and new regulations, including lining the waste pits, reinjecting produced waters into the ground, and restricting the ingress of settlers along the oil roads. The government will also require companies to submit environmental impact statements, and management plans before developing any of the new concessions offered in the seventh round of licensing in January 1994.[40/]

However, given the present combination of depressed oil prices, increased exploitation costs of existing reserves, and inadequate environmental monitoring, it is questionable whether these private and state initiatives will actually be implemented.[41/] It is estimated that environmentally sound technologies and practices add approximately 10% to the costs of producing oil in the Oriente,[42/] and therefore may require financial inducements by the state to oil companies. More importantly, however, Petroecuador, which controls over 90% of current production, has shown little interest in upgrading its facilities and remains largely immune to pressure from state regulatory agencies. Recent field visits by environmental groups, independent observers and CESR's own team confirm that Petroecuador continues to employ the environmentally dangerous equipment and practices inherited from Texaco, including the discharge of toxic wastes directly into the environment.[43/]

C. Economic, social and cultural aspects of oil development

On the whole, oil development has failed to improve Ecuador's economic situation. While the start of the oil boom corresponded to rapid increases in per capita income and GNP, the national debt rose from $200 million in 1970 to over $12 billion today, forcing structural adjustments and cuts in social spending.[44/] The impact on the poor majority is reflected in the rising poverty rate, from under 50% in 1975 to 65% in 1992.[45/] Moreover, the country's overwhelming dependence on oil revenues, which account for roughly half of the national budget, has left it vulnerable to fluctuation in oil prices. As international prices have slumped and reserves have declined, Ecuador has sought to expand production in marginal oil fields and protected natural parks; current production rates will deplete Ecuador's reserves within fifteen years.[46/]

A small segment of the population has disproportionately enjoyed the benefits of oil development; few of the profits have been reinvested in the Oriente.[47/] Settlers lured to the region by the promise of jobs and land now cluster in desperate and squalid oil towns, with little running water, sanitation, or basic health facilities.[48/] According to the World Bank, "field visits to the urban areas of Napo province indicate that local public service levels and coverage in the region are in a calamitous condition."[49/] A government study in 1989 revealed that Shushufindi, a primary oil center that accounts for almost half of national production, lacked public sewers and provided electricity and water to 0.2% of homes.[50/]

The effects of the oil boom have been most severe on the indigenous populations, whose way of life is vitally linked to the environment. Oil development and colonization of the Amazon have brought diseases, contamination of land and water, loss of fish and game, deforestation, and encroachment on traditional lands. Moreover, contact with outsiders and the introduction of a cash economy has undermined traditional cultures and subjected indigenous peoples to racism and discrimination. As one of Ecuador's foremost judges has noted, "Ecuador is a country

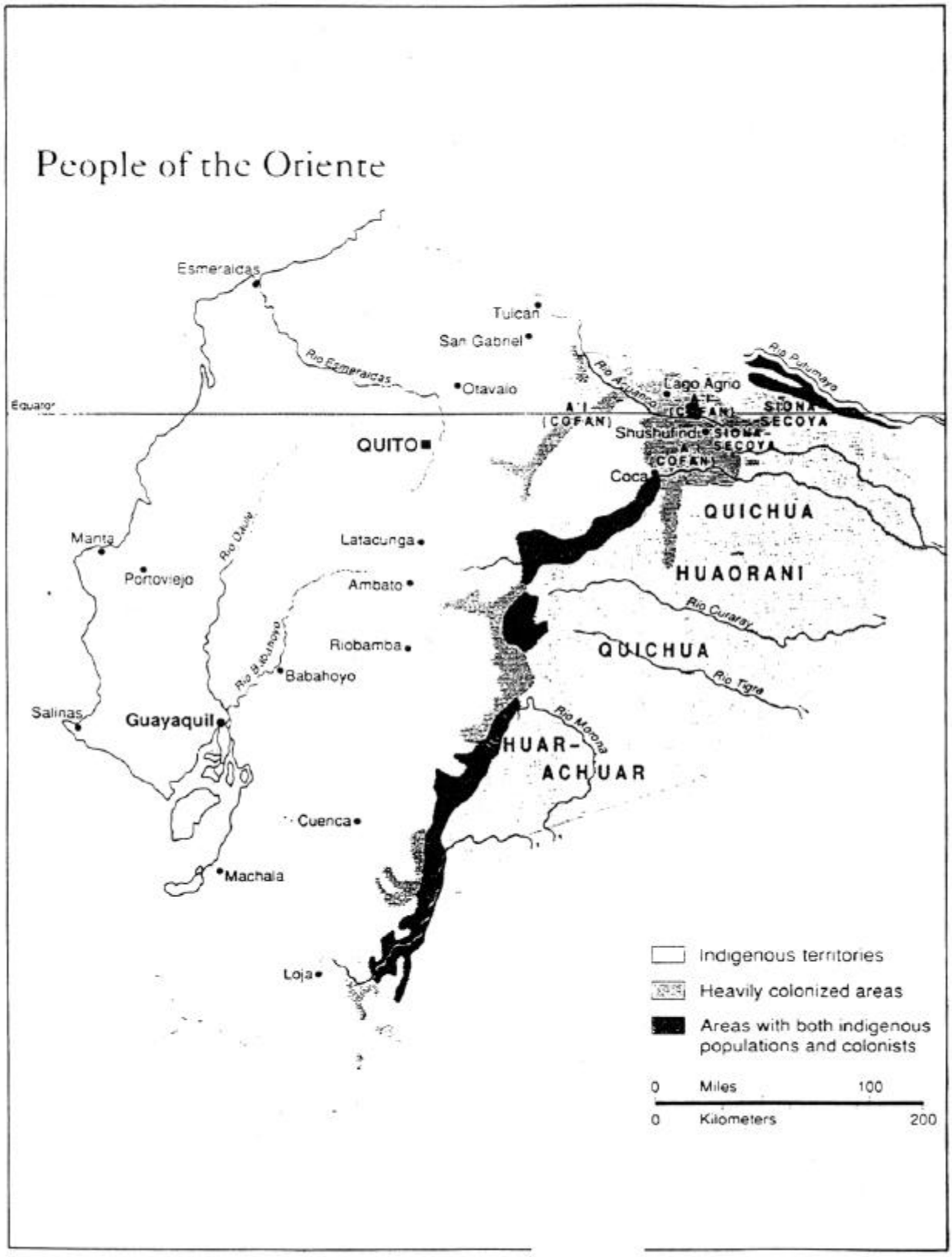
characterized by deep racism against its own indigenous people... This reality supercedes, all constitutional declarations and international conventions on human rights, and there is constant discrimination and unequal application of the law."[51/] These various factors have driven some indigenous nations to the point of extinction **(box 2)**.[52/]

D. Health effects

Local reports that oil contamination has damaged people's health, poisoned their water, and deprived them of fish, game and crops have been supported by observations made by health workers in the region. The physician-director of the largest government hospital in Coca reported a rise in child mortality as a result of oil-related accidents and contaminated drinking waters.[53/] Other health care providers in the area have reported substantial increases in the occurrence of birth defects, child diseases, and skin rashes. Studies and interviews cited in a report written by Judith Kimerling and released by the National Resources Defense Council indicate extremely high rates of child malnutrition in areas impacted by oil development.[54/] As Robert Kennedy Jr. noted in his visit to the region:

> We met with the center's chief clinician and with the representatives of fourteen communities accounting for about 40,000 people from the Aguarico River basin. Each of them told the same story. Sick and deformed children, adults and children affected with skin rashes, headaches, dysentery and respiratory ailments, cattle dead with their stomachs rotted out, crops destroyed, animals gone from the forest and fish from the rivers and streams. [55/]

A health study of oil exposure was recently published by the Ecuadorian Union of Popular Health Promoters of the Amazon (UPPSAE).[56/] The study examined 1,465 people in ten communities, 1,077 who resided in oil-contaminated areas and 388 in non-contaminated areas. Those exposed to the oil had a higher occurrence of abortion, elevated rates of fungal infection, dermatitis, headache, and nausea. Ten percent of these individuals surveyed were ill due to bathing in oil-contaminated waters, occupation-related exposures, or non-occupational accidents.


People of the Oriente
Esmeraldas
Tulcan
San Gabriel
Río Esmeraldas
Otavalo
Río Aguarico
Lago Agrio
Río Putumayo
Ecuador
A I
(COFAN)
SIONA
SECOYA
Shushufindi
QUITO
Coca
QUICHUA
Manta
Latacunga
Río Quevedo
Portoviejo
Ambato
HUAORANI
Río Curaray
Riobamba
QUICHUA
Río Babahoyo
Babahoyo
Río Tigre
Salinas
Guayaquil
Río Morona
HUAR-
ACHUAR
Cuenca
Machala
Loja
Indigenous territories
Heavily colonized areas
Areas with both indigenous populations and colonists
0 Miles 100
0 Kilometers 200

box 2

Indigenous Peoples of the Oriente and Their Legal Rights

Indigenous peoples compromise approximately 45% of Ecuador's total population of 1 million. Eight different nations, with a total population of 100,000 to 25,000, inhabit the Oriente. The Quichua and Shuar account for the majority, with the rest divided among Huaroni, the Secoya, the Siona, the Shiwiar, the Cofan and the Achuar. These peoples have developed distinct cultures and traditions that are inextricably bound to the rainforest, in which they have lived for thousands of years. Their economic and spiritual existence revolves around sustainable management of rainforest resources.

The first encounters with outsiders occurred in the sixteenth century, when Spanish conquistadors and missionaries penetrated the rainforests. However, the greatest changes from the outside have been brought about by rubber extraction in the late 1800s and more significantly by oil development over the past 22 years. Since the discovery of huge oil fields beneath the rainforest, almost 250,000 settlers, mostly poor campesinos, have flooded into the Orientele through new oil roads, displacing the indigenous from traditional areas and creating tension and occasional conflict between two populations. Indigenous lands have also been encroached upon by state and foreign oil companies. To counter these intrusions, the indigenous have organized and pressed the government to recognize their political, cultural and territorial rights and specifically to halt the damage caused by unregulated oil development.

Their struggle is shared by the 300 to 600 million indigenous peoples around the world, who have increasingly resisted national policies that exclude their perspectives and threaten their cultural and actual survival. The primary demands of indigenous peoples –legal right to their land, respect for their cultures and traditions, and protection of their environment- have recently gained the attention and approval of the international community. The united Nations designated 1993 the International of the World's Indigenous Peoples and 195-2005 the International Decade of the World's Indigenous Peoples, and produced a draft Declaration on the Rights of Indigenous Peoples emphasizing their rights to land ownership and environmental protection. The 1993 Convention on Biological Diversity, to which Ecuador is committed, also recognizes the need to preserve and promote indigenous lifestyles linked to the sustainable use of natural resources, and Principle 22 of the 1992 Rio Conference on Environment and Development underscores the indigenous peoples' "vital role in environmental management and development."

Within the Inter-American system, these legal principles have been affirmed by the IACHR. In a case with many parallels to the situation in the Orientele, the IACHR found that Brazil's construction of a highway through Yanomami Indian territory violated the human rights of the Yanomami, in particular their rights to life and the preservation of health. The U.N. Commission on Human Rights reached a similar conclusion in a case involving the right of indigenous people in Canada to control resources within their territory.

Despite this trend towards legal recognition of indigenous rights and cultures, the government Ecuador has actively sought to assimilate the indigenous peoples of the Oriente into a crash economy based on crop cultivation and manual labor in the oil industry. Ill-prepared for such changes and neglected by the government, the indigenous invariably end up at the bottom rung of the socio-economic ladder. Most importantly, the government has refused to recognize indigenous ownership of lands they have inhabited for centuries, and instead have encouraged a stream of immigration by granting title to any settler who clears and cultivates the land. While the government has begun to grant communal title to indigenous peoples in small pieces of their traditional lands, it has explicitly retained the right to develop oil in these areas irrespective of the consent and participation of the indigenous land "owners." In these ways, the government's oil policies have greatly accelerated the destruction of indigenous traditions and ways of life, and now threaten their very existence as separate peoples and cultures. As a government study admitted several years ago, the activities of the Texaco-CEPE consortium had placed local indigenous groups "at the edge of extinction as a distinct people." (DIGEMA 1987)

III
HEALTH EFFECTS OF EXPOSURE TO CRUDE OIL

Numerous studies have established that human exposure to both crude oil and its toxic constituents can adversely affect health, from short-term, local effects (e.g., dermatitis) to longterm, life-threatening diseases (e.g., cancers). Information on the health effects of oil exposure includes studies of exposure to crude oil itself as well as more extensive studies of exposure to specific crude oil constituents. This section summarizes the current state of scientific knowledge regarding the toxicology of crude oil and its constituents.

A. Exposure Routes

Exposure to crude oil is not limited to the immediate area of contamination. When discharged into the environment, the heavier, less volatile constituents of crude oil tend to sink into sediments from which they may repeatedly contaminate the water column or be consumed by benthic organisms, enter the food chain, and eventually come into contact with humans.[57/] Lighter compounds (15 or fewer carbons per molecule) may evaporate in a matter of hours and be deposited far from the original source via air or rain.[58/]

Crude oil may enter the human body through three primary routes: (i) skin absorption, (ii) ingestion of food and drink and (iii) inhalation of oil on dust or soot particles. Residents of the Oriente face potential exposure from all three routes.

The fat solubility of most oil constituents allows them to be absorbed into and through the skin. Repeated or prolonged skin contact with crude oil or water containing crude oil constituents can cause skin loss, dryness, cracking, changes in skin pigmentation, hyperkeratosis, pigmented plane warts, eczematous reactions and secondary infections.[59/] Oil exposure can also cause skin cancers.[60/] In the Oriente, the heavy fraction of crude oil has been spread on roads where people walk barefoot, and local workers are often required to submerge themselves in oil to clean spills.

Oil ingested in food and water is absorbed through the gut and distributed to other parts of the body. Drinking water contaminated with oil has been associated with increased incidence of esophageal cancer.[61/] The practice of depositing untreated wastes in open pits throughout the Oriente has resulted in the contamination of many waterways used for drinking, bathing and fishing.

Inhalation of high levels of crude oil fumes can lead to adverse effects on the nervous and respiratory systems and cause life-threatening chemical pneumonitis and other systemic effects.[62/] In the Oriente, oil particles have been emitted into the atmosphere from burning waste pits. These pits also contain drilling fluids with pentachlorophenols, which when burned are a formation pathway for tetraclorodibenzo-dioxins (TCDDs), a major health risk for exposed residents in the region.[63/]

In addition, exposure to crude oil may also lead to adverse reproductive and developmental effects.[64/] A positive relationship has been reported between oil-contaminated water and the percent of low birth weight infants (under 2,500 grams).[65/] Associations have also been found between parental occupational exposure to petroleum products and risk of childhood cancers, including leukemia and brain cancer.[66/]

B. Toxic constituents

Crude oils are mixtures of 100 or more hydrocarbons, sulfur compounds, and a range of other chemicals, metals, and salts in smaller quantities.[67/] Radioactive substances, hydrogen sulfide, and other toxic substances are usually present in sour crudes. In addition, a variety of other toxic pollutants are typically generated during oil drilling and production operations, including drilling fluids, drilling cuts, and treatment chemicals that contain heavy metals, strong acids, and concentrated salts.[68/]

CESR's study analyzes water samples for polycyclic aromatic hydrocarbons and volatile organic compounds, some of the most toxic and carcinogenic constituents of crude oil, although other constituents also pose a threat to human health.

1. Polycyclic aromatic hydrocarbons (PAHs)

PAHs are hydrocarbons containing multiple fused benzene rings (which account for many of the toxic properties of crude oil). A prototypic group of 17 PAHs has been linked to adverse health effects ranging from skin irritation to cancers and toxic effects on reproduction and cellular development.[69/] Because of the high carcinogenic potential, the U.S. Environmental Protection Agency (EPA) recommends a concentration level for PAHs in ambient water of zero,[70/] and estimates that exposure to a PAH water concentration of 2.8 nanograms per liter (ng/L) corresponds to a lifetime risk of cancer of 1/1,000,000 (this ratio is linear, so that a concentration of 28 ng/L corresponds to a risk of 1/100,000).[71/] The EPA bases this risk on the ingestion of only two liters of water and 6.5 grams of fish per day. The risk estimate would be significantly increased by including skin and inhalation exposures, both of which are present in the Oriente.

2. Volatile organic compounds (YOCs)

The most common VOCs in crude oil include benzene and benzene derivatives (e.g. toluene and xylenes).[72/] Prolonged exposure to benzene can harm the skin and nervous system, damage the bone marrow leading to anemia and other blood disorders, and cause leukemia.[73/] Benzene also crosses the placenta and may harm a developing fetus.[74/] The EPA has proposed a maximum concentration level for benzene in drinking water of 5 micrograms per liter (mcg/L),[75/] while the World Health Organization has recommended a maximum level of 10 mcg/L, which corresponds to an excess lifetime cancer risk of 1/100,000.[76/]

3. Other compounds

Some crude oils release high concentrations of hydrogen sulfide gas. Inhalation of this gas can affect the nervous system, causing headaches, dizziness, loss of consciousness, respiratory arrest, and death.[77/] Other toxic substances typically present in crudes, including metals, heavy metals, and radioactive materials, pose hazards ranging from skin irritation to reproductive harms and cancer.[78/]

IV
EXPOSURE AND HEALTH STUDY

Oil contamination and the existence of health problems in the Oriente have been widely reported in the press and in investigative reports. CESR's study was intended to address exposure to crude oil by measuring levels of oil-related contaminants in drinking, bathing and fishing, and produced water samples, and examining nearby residents for signs of contamination-related illnesses (a detailed description of study methodology is presented in Appendix III).

A. Objectives and methods

The team defined the following two objectives for its study:

(1) to measure exposure levels of PAHs and VOCs faced by residents of the Oriente living in proximity to oil producing areas.

(2) to determine whether residents are experiencing observable health problems associated with oil exposure.

1. Exposure

Exposure to toxic contaminants was assessed through observation, interviews, and analysis of samples from the most obvious and easily measurable exposure routes (e.g. drinking water as opposed to "black rain" and air pollution). Levels of PAHs and VOCs were measured in samples from drinking, bathing, fishing, and waste waters (including produced waters). "Fingerprinting" analysis comparing specific levels of PAHs from different samples was used to determine the source of contamination in the waterways.

The two classes of constituents measured, PAHs and VOCs, were chosen for the following reasons: (i) they are both present in essentially all crude oils (crude oils vary widely in composition and the composition of Oriente crude was unknown to CESR's team); (ii) toxicity of PAHs and VOCs can be acute and reversible, related to readily observable health effects such as dermatitis, and can also cause chronic and life-threatening illnesses such as cancers; and (iii) PAHs are likely to persist in the environment, and would therefore be measurable for some time after emission. Because of budget, time and feasibility limitations, the team did not measure metals, radioactivity, or exposure to other potential hazardous compounds related to crude oil production.

2. Health effects

An occupation and environmental medicine physician interviewed and examined residents in areas reportedly contaminated by oil in order to identify adverse health effects attributable to oil exposures. The case finding approach was used to detect readily observable health problems. Cancers, neurological and reproductive problems, or other chronic diseases associated with oil exposure could not be detected during such brief, cross-sectional surveys. However, oil-related health problems, even if reversible and non-life threatening such as dermatitis, can demonstrate significant exposure to crude oil and therefore indicate increased risk of more serious, chronic diseases.

B. Findings of water study

A total of 33 water samples were collected **(figure 2):** 32 were analyzed for VOCs and 23 for each PAH constituent and total concentration. **Figure 3** provides contamination levels found at each sample site. VOC levels were detected only for samples from produced water sources.

figure 2

Water Sample Sites (April 1993)

Waste pits (last production pond)
- Dureno, Petroecuador Station (drainage 3rd separation pond)
- Cuyabeno Reserve, City Investing (Fanny 1)
- Cuyabeno Reserve, City Investing (Fanny 1b)
- Shushufindi North Station (drainage 3rd separation pond)
- Shushufindi South Station (drainage ditch)
- Sachas Central Station (drainage ditch)
- Oil-lined lagoon, Dayuma*

Drinking Water Resources
- Underground spring (San Pablo)
- Surface spring (San Pablo)
- Rain Water in Texaco drum (San Pablo)
- Underground spring (128km south of Coca)
- Well water (near Shushufindi Southeast production station)
- Stream (near Shushufindi Southeast production station)
- Well water (Sachas)
- Rain water in black drum (Sachas)
- Rain water in beige drum (Sachas)

Bathing water sources
- Dureno River
- Aguarico River
- Nenena River
- Shushufindi River
- Eno River
- Collected pool water (6 km South of Coca)
- Pond water (6 km South of Coca)
- Pond water (drainage from waters upstream Dayuma)
- Surface stream (128 km South of Coca)
- El Dorado River
- Shushufindi stream (near North Station)
- Quinchayacu River, undisturbed (Sachas)
- Quinchayacu River, disturbed (Sachas)
- Oil-lined stream (Sachas)
- Quinchayacu River, undisturbed (near Central Station, Sachas)
- Quinchayacu River, disturbed (near Central Station, Sachas)

* sample taken from a natural water source contaminated by waters leaching out from a nearby separation pond

The study found that drinking water, and produced water samples contained levels of toxic oil water, bathing and fishing constituents many times greater than the EPA's safety guidelines for drinking water of 5 mcg/L for benzene and 0 ng/L for PAHs.

figure 3

Contaminants Detected in Water Samples

Production water sites (.. = not detected)

#	Site Name	Total PAH (ng/L)†	Benzene (mcg/L) ‡	Toluene (mcg/L)	Ethyl-benzene (mcg/L)	Xylenes (total) (mcg/L)
1	Fanny, City Investing*	46,423	96.0	57.0	7.2	26.0
1a	Duplicate sample of 1	46,523	120.0	70.0	10.0	39.0
2	Shushufindi, North Station	263,119	1,800.0	1400.0	170.0	680.0
3	Shushufindi, South Station	91,303	1.100.0	840.0	110.0	490.0
4	Sachas, Central Station	405,634	2,500.0	110.0	12.0	54.0
5	Dayuma, oil-lined lagoon	49,931	..	..	..	..

Drinking water

#	Site Name	Water Source	Total PAH (ng/L)
6	San Pablo	Spring	233.27
7	San Pablo	Spring	108.08
8	128 km South of Coca	Spring	32.8
9	Shushufindi	Well	448.62
10	Sachas, Pimampiro	Well	44.23
11	Sachas Central (black drum)	Rain water	696.09
12	Sachas Central (beige drum)	Rain water	2,798.93
13	San Pablo (Texaco drum)	Rain water	55.21

Bathing and fishing water sources

#	Site Name	Total PAH (ng/L)
14	Dureno River	137.46
15	Shushufindi River	37.22
16	Eno River	40.93
17	El Dorado River	134.26
18	Qinchayacu River, (undisturbed)	152.92
19	Dayuma, bathing pool	40.62
20	128 km south of Coca, former bathing pool	306.22
21	Shushufindi North Station stream, former bathing pool	1,486.53
22	Sachas stream, former bathing site	129.35

† EPA recommended level of total PAH concentration = 0 ng/L.
‡ EPA recommended level of benzene concentration = 5 mcg/L.
* sample from Fanny was initially mislabelled Dureno River during analysis by ENSECO laboratories.

The actual levels of toxic contaminants in these waterways and the associated health risks are likely to be much higher than indicated by these findings for two main reasons: first, samples were collected during the rainy season, when contaminants are at their most dilute, and at a time following a long period (ten months) without a spill or other hazardous discharge, which are regular events in the region. Second, while the EPA's exposure guidelines for PAHs are the most relevant standards available, they underestimate risk by (i) neglecting other major sources of exposure (e.g. skin contact and inhalation), (ii) excluding other non-cancer health risks, and (iii) basing risk on U.S. consumption levels of water and fish (Oriente ingestion rates are likely to be higher given the hot climate and limited protein sources). Thus, while the sampling results point to significant health risks, they should be viewed as extremely conservative estimates of the actual dangers posed by oil-related contamination to residents of the Oriente.

1. Drinking water sample

The team collected drinking water samples from spring, well, and rain sources. Rain water was sampled because local inhabitants considered it the safest source of drinking water given the widespread oil contamination of other sources. It is usually collected in plastic or metal drums, previously used by oil companies, which are likely to have once contained chemicals or other oil-related materials. Families in the regions of Shushufindi and Sachas complained of black rain, or rain contaminated by particles from burning waste pits. The rain water collected was therefore potentially exposed to contamination from the drum itself, from black rain, or from runoff sources (e.g., the roof, human hands).

The total concentration of PAHs found in drinking water ranged from 32.8 to 2,792.9 ng/L These levels far exceed the EPA's safety guideline of 0 ng/L and correspond to an estimated excess risk of developing cancer between 1/100,000 and 1/1,000. VOCs were not detected in most drinking water samples. However, small amounts of toluene were present in samples from San Pablo (6 & 7), Coca (8), and Sachas (10 & 11).

Fingerprinting analysis of hydrocarbon distribution indicated that the contamination source of drinking water samples from the San Pablo spring (6) and Shushufindi well (9) matches the PAH distribution found in produced water from the Shushufindi North Station (2) **(Appendix VI(a))**.

2. Produced water samples

Produced waters from the final separation pond were sampled because they drain directly into the river system and contaminate nearby water sources. Produced water samples were generally taken from the pipe discharge.

Produced waters from most separation ponds contained extremely high levels of VOCs and PAHs. Samples from Fanny Station, Shushufindi North Station, Shushufindi South Station, and Sachas Station all showed strong concentrations of benzene, toluene, ethylbenzene and xylenes. The total PAH concentrations ranged from 46,500 ng/L at Fanny in Cuyabeno Reserve to 405,634 ng/L from a stream 500 meters from the actual effluent discharge at Sachas Central THE Station. The sample from Dayuma, situated below separation ponds that had been covered with

dirt, revealed a total PAH concentration of 49,931 ng/L. Crude oil and its by-products had leached into the stream downhill of the Dayuma site, resulting in visible contamination of a former drinking water source. Human exposure to these extraordinarily high concentrations of VOCs and PAHs would pose severe health risks.

The fingerprinting pattern of PAHs from samples at Fanny (1a), Shushufindi (2), and Sachas (4) provides a graphical match to oil taken from Shushufindi **(Appendix VI(b))** indicating that the source of contamination is crude oil.

3. Bathing and fishing water- samples

Samples of bathing and fishing water were usually collected from the edge of the river or pond identified by the community as a water source. The study was unable to confirm whether these sources were also used for drinking water.

The concentration level of PAHs found in bathing and fishing water sources ranged between 40 and 1,486 ng/L. A sample of bathing water collected from the Qinchayacu river during rainy season ten months after a 5,000 barrel spill of crude oil still showed a total PAH concentration of 153 ng/L.[79/] The Dureno river showed total PAHs at 137.5 ng/L and the El Dorado river was at 134 ng/L. Observation indicated that these two sites were used for drinking as well as for bathing and fishing. Human ingestion of water or fish from these water sources therefore poses a significant increased risk of cancer and other serious health problems. Oil sheens on water were observed in the cases of Qinchayacu river and Dayuma bathing pool, indicating likely routes of exposure to contaminants.

Fingerprinting analysis matches hydrocarbon distribution of produced water at the Sachas Central Station (4) with that of bathing and fishing waters from the Dureno river (14) and the Sachas stream (22) **(Appendix VI(c))**.

C. Findings of medical examinations

Cases of dermatitis apparently associated with oil contamination were identified in medical examinations. Through interviews it was determined that these exposures were not related to occupational environments. Summarized below are brief descriptions of case histories of 12 persons with apparent oil-associated health problems, ranging in age from eight months to 57 years (more detailed descriptions of several case histories are presented in **Appendix IV**).

Eight individuals from the Pimampiro community on the Qinchayacu river near Sachas and a family residing on the banks of the Napo river near Coca were found with skin rashes, dermatitis, chronic papulovesicular lesions, and hypopigmented scars. Two sisters from another family had for the past six years experienced chronic pruritic eruptions with small vesicles, a type of dermatitis commonly associated with crude oil. The eight month old girl of one of the sisters had suffered from dermatitis for the past three months. While the bathing water source for this family had a total PAH concentration of 40.62 ng/L, exposure was more likely due to the oil-covered road, as residents usually walk barefoot.

The medical and exposure histories of the persons interviewed and examined suggest crude oil exposures as the cause of the dermatoses observed. The dermatoses may be attributable to either high dose episodic exposures, from spills, or to low dose long-term exposures, from the regular release of contaminants during oil exploitation processes.

D. Conclusions of exposure and health study

This limited study set out to answer two critical questions about oil exposure and potentially related health problems in the Oriente: what is the exposure level to toxic oil constituents, and what are the potential health effects. The study makes the following conclusions: (1) residents of the Oriente are exposed to levels of oil-related contaminants significantly exceeding internationally recognized safety limits and (2) dermatoses and other skin problems apparently related to oil contamination were observed in residents near oil facilities. Such levels of exposure and potential health effects suggest increased risk of more serious health consequences, including cancers and neurological and reproductive problems. These findings underscore the need for further studies as required to determine the full range of health, socio-economic and other impacts arising out of exposure to crude oil and its constituents in the Oriente.

V

VIOLATIONS OF THE RIGHT TO A HEALTHY ENVIRONMENT

The well-documented record of unsafe oil industry practices in the Oriente and the emerging evidence of contamination-related health problems strongly indicate that the government has failed to comply with the minimum duties derived from the right to a healthy environment: (i) to take reasonable precautions to avoid contaminating the environment in a manner that threatens human health, (ii) to regulate private actors effectively to prevent such contamination and (iii) to provide potential victims of contamination with judicial remedies and access to information on oil development.

A. Direct contamination

Under international and Ecuadorian law, the Ecuadorian government is liable for any contamination caused by its state oil company in the Oriente. Since 1992, Petroecuador has owned and controlled almost all oil production in the Oriente. For the 20 preceding years, Petroecuador was part of a consortium whose operating partner, Texaco, released roughly 30 billion gallons of toxic wastes and 17 million gallons of crude oil into the environment. During this time, Petroecuador was also the operator of its own facilities accounting for roughly 11 % of total production. Accordingly, the state has been involved in the bulk of past contamination released in the Oriente and is responsible for almost all of the continuing contamination.

Reasonable precautions, such as safe disposal of toxic wastes, use of water-based instead of oil-based drilling muds, reinjection of produced waters deep into the ground, proper maintenance and monitoring of the pipelines and production facilities, and spill prevention and response measures could have prevented much of the contamination and its health impacts.[80/] Such measures would have added only a small percentage to overall production costs.[81/] Interviews with environmental and industry experts, and recent field visits to Petroecuador facilities by environmental groups, independent observers and CESR's own team confirm that Petroecuador has not upgraded the equipment or altered the environmentally dangerous practices inherited from Texaco **(box 3)**.[82/]

B. Ineffective regulation

The government is also responsible for contamination by private companies that results from a lack of effective regulation (as opposed to accidents or random acts). Although the constitution calls for legislation to effectuate the right to a contamination-free environment, the government has enacted a confusing and ambiguous set of laws with weak environmental provisions.[83/]

box 3

Government Role In Shielding Texaco from Liability

Although Texaco departed from Ecuador in 1992, controversy remains over its environmental legacy and the government's role in obscuring it. The controversy has centered upon backroom negotiations between the government and Texaco over the much-anticipated environmental audit of Texaco's activities and the government's intervention in a pair of lawsuits brought in U.S. courts on behalf of affected indigenous communities.

The audit of Texaco's practices was commissioned jointly by Petroecuador and Texaco in 1992 as part of the process of turning control of the consortium over to Petroecuador. The audit was presumably intended to fix a price on any damages caused by Texaco's two decades of oil activities. However, the audit was designed and conducted without any input from environmental groups, indigenous federations, or the communities most affected by contamination, raising concern that the entire procedure was intended to minimize the extent of Texaco's potential liabilities. These concerns were heightened after independent experts from the United States found that a leaked version of the audit criteria completely excluded possible health impacts and failed to list potential toxic contaminants (Loring, Rubin).

Meanwhile, in the fall of 1993 two suits were brought in U.S. courts by Ecuadorian indigenous plaintiffs charging Texaco with causing extensive damage to persons and property in Oriente. The suits argued that because Ecuadorian courts could not assert jurisdiction over Texaco, U.S. courts were the only forum which people injured by Texaco's activities in the Oriente could seek justice. The publicity generated by these lawsuits embarrassed the government, which was trying to attract foreign bids for an impending auction of oil concessions in the Oriente. The government responded to the suits first by issuing public statements in support of Texaco's record and then by sending a formal letter requesting the U.S. State Department to intervene in favor of Texaco's efforts to have the cases removed from U.S. courts.

When the letter surfaced publicly in January 1994, the government was under public pressure for withholding the results of the recently-completed audit of Texaco while apparently negotiating a secret settlement with Texaco that did not require any compensation to victims of contamination. Indigenous and environmental groups and congressional leaders denounced the government for undermining efforts to hold Texaco accountable for its many years of environmental and social harms. The administration's letter drew particular fire for first siding with Texaco against its own citizens and then referring to the indigenous plaintiffs as "persons claiming to be citizens". The President of Congress publicly responded by supporting the right of the plaintiffs to seek justice in the U.S. Subsequently, congressional committees summoned the Minister of Energy and Mines to demand that the audit be made available for review.

While the U.S. State Department issued no public response to the letter, the court made note of it in dismissing one of the two cases against Texaco. As this report goes to print, Texaco's request for dismissal in the second case under review and the audit has still not been publicly released.

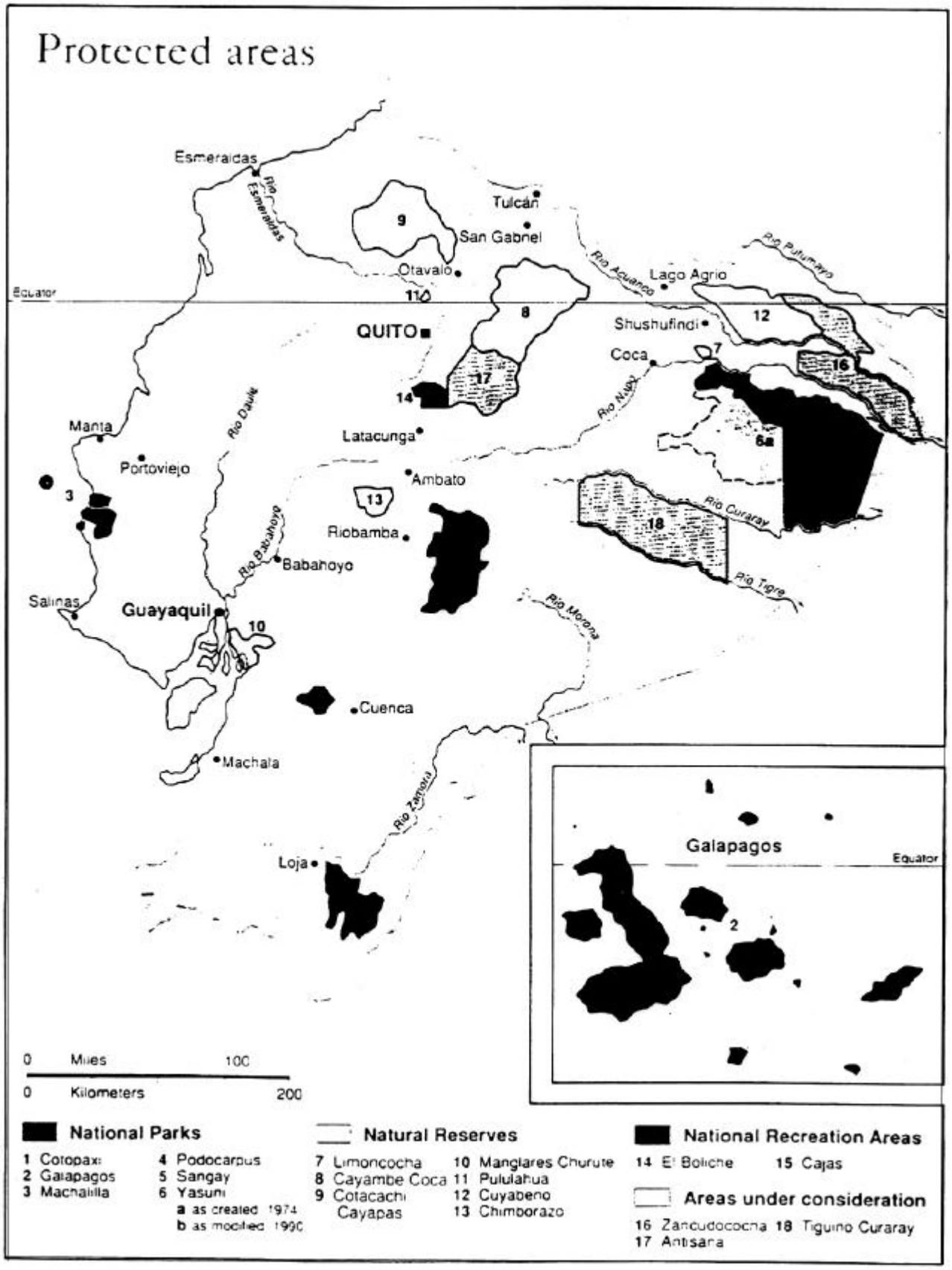
Moreover, state agencies responsible for environmental protection have lacked the necessary resources, expertise, and political support of their respective ministries to effectively enforce their mandates. Interviews with independent industry experts, legal scholars, and environmentalists confirmed the view that these agencies, in the words of one legal authority, "have functioned like silent spectators to the environmental problems of the country."[84/] Dr. Alberto Wray explains, "if an entire system for oil development is inefficient, this inefficiency acquires absolute proportions. This is difficult to change, because, first of all, oil is the principal source of revenues for the state budget and secondly, the state has a vested interest in oil development mainly with Petroecuador or one of its affiliates. As a result, technical regulations to preserve the environment and control contamination caused by oil development are lenient and extremely flexible."'

The three primary laws relevant to the environmental impact of petroleum development in Ecuador have done almost nothing to prevent oil-related contamination. Ecuador's first petroleum law, adopted in 1971, included a provision requiring oil companies "to prevent pollution of the water, the atmosphere, and the land," but contained no specific standards to give the law substantive content.[86/] A draft of the official audit criteria for measuring Texaco's environmental record, approved by the Ecuadorian government, Texaco and Petroecuador, reported that because of the absence of standards, "no environmental compliance was necessary until August 19th, 1982."[87/] This date merely refers to an amendment of the petroleum law stating that oil companies were to operate "in accordance with international practices in these matters." Specific environmental regulations for the oil industry were not in fact passed until 1992.[88/]

A second law, the 1976 Law of Prevention and Control of Environmental Contamination (LPCCA), has had no impact on oil operations in the Oriente.[89/] Regulations interpreting this law were not elaborated until 1989, and then only covered water quality.[90/] Moreover, neither the Ministry of Health, charged under the LPCCA with ensuring the safety of Ecuador's water supplies, nor the Interinstitutional Committee for Environmental Protection, established as an enforcement agency under the LPCCA, has taken action to address the problem of contamination in the Oriente.[91/]

The 1981 Law of Forestry and Conservation of Natural Areas and Wildlife, the third significant piece of legislation regulating oil development, was intended to protect certain areas designated as natural reserves and national parks. However, Petroecuador and private companies have circumvented the law's strict decree that natural areas must be "inalterably preserved" by interpreting the law to permit exploitation of sub-surface minerals like oil.[92/] Ecuador's courts have upheld this position, allowing oil companies to construct new roads and facilities and exploit oil in all of the protected areas with known deposits.[93/]

The lack of effective legislation is compounded by the lack of monitoring and enforcement resulting from insufficient resources, expertise, and political support for the state environmental agencies charged with monitoring compliance with laws.[94/] The main environmental agency, DINAMA, answers to the Ministry of Energy and Mines, which is also responsible for planning oil development policy. Not surprisingly, DINAMA has received little support from the Ministry. Since 1989, DINAMA's staff has been reduced from 35 to 14 (only four of whom monitor the


Protected areas
Esmeraldas
Río Esmeraldas
Tulcán
San Gabriel
Otavalo
Río Aguarico
Lago Agrio
Río Putumayo
Equator
QUITO
Shushufindi
Coca
Río Napo
Manta
Río Daule
Latacunga
Portoviejo
Ambato
Río Curaray
Riobamba
Río Pastaza
Babahoyo
Río Tigre
Salinas
Guayaquil
Río Morona
Cuenca
Machala
Río Zamora
Loja
Galapagos
Equator
0 Miles 100
0 Kilometers 200
National Parks
1 Cotopaxi
2 Galapagos
3 Machalilla
4 Podocarpus
5 Sangay
6 Yasuni
a as created 1974
b as modified 1990
Natural Reserves
7 Limoncocha
8 Cayambe Coca
9 Cotacachi Cayapas
10 Manglares Churute
11 Pululahua
12 Cuyabeno
13 Chimborazo
National Recreation Areas
14 El Boliche
15 Cajas
Areas under consideration
16 Zancudococha
17 Antisana
18 Tiguino Curaray

environmental impact of oil development).[95/] According to DINAMA personnel, the agency now lacks the capacity even to review all the environmental impact statements received from oil companies, let alone to monitor compliance in the field.[96/] Nonetheless, in an interview with CESR, the current Sub-secretary for the Environment, in charge of DINAMA, disavowed any environmental problems within the oil industry, and challenged the need for independent studies or further investigations of oil damages in the Oriente.[97/]

In 1992 Congress established a separate body, the Institute for Forestry, Natural Reserves and Wildlife (INEFAN) to manage and monitor activities in the protected areas. Congress mandated that INEFAN reserve a seat on its board for a representative of environmental organizations, Ecuadorian Committee for the Defense of Nature and the Environment (CEDENMA). Although INEFAN did challenge illegal drilling by Petroecuador in the Cuyabeno reserve, it eventually reversed itself, despite CEDENMA's objection **(box 4)**. Moreover, INEFAN has permitted oil development in protected areas such as Limoncocha, and Yasuni National Parks. Staff members also report that the agency lacks adequate resources to monitor oil companies effectively,[98/] and that its efforts have been hampered by the government's lack of support.

Finally, Petroecuador's internal environmental unit (UPA) lacks any independent authority to monitor industry practices. Experts generally agree that the UPA exists purely to boost Petroecuador's public image; the UPA has not acted to prevent Petroecuador's frequent violations of environmental laws.[99/] In an interview with CESR and other environmental groups, UPA's current director dismissed reports of oil contamination and health problems by suggesting that the Oriente's inhabitants deliberately inflicted these harms on themselves to harass the oil companies.[100/] The government plans to abolish or significantly reduce the unit in the near future.

C. Lack of judicial remedies and information

The right to a healthy environment requires Ecuador to provide citizens with access to both judicial remedies and relevant information regarding the threat posed by oil contamination. However, Ecuador's judicial system provides no practical means to redress environmental harms and private citizens have no standing to compel information from either state agencies or private companies.

Due to a variety of factors, Ecuador's tort system is inhospitable to environmental suits.[101/] The archaic civil code, relatively unchanged from laws introduced by the Spaniards in the seventeenth century, places significant procedural barriers before potential plaintiffs.[102/] First, courts lack jurisdiction over defendants with foreign domiciles, forcing Ecuadorian plaintiffs to sue foreign companies like Texaco outside of Ecuador.[103/] Second, plaintiffs may not join together to bring class action environmental suits, rendering the costs to each individual plaintiff prohibitively expensive.[104/] Third, compelled document production, an essential element of any suit against a major oil company, is extremely limited in Ecuador; plaintiffs may only request documents whose existence is known beforehand, and company refusal to produce such documents results only in a nominal fine.[105/] Fourth, plaintiffs may not call their own expert witnesses, but instead must rely on a court-appointed expert whom they may not cross-examine orally;[106/] most Ecuadorian experts in the oil industry and environmental science are affiliated with or dependent upon either the

government or oil companies. Finally, most judges are appointed by Congress for short, renewable terms, rendering them highly susceptible to political pressure, especially in an issue with national security implications such as oil development.[107/] According to local lawyers and former judges, the corruption that accompanies such politicization has reached alarming proportions throughout the judicial system. In a representative comment from a speech given last year, Alejandro Ponce Martinez, a distinguished professor of law, observed that "corruption has reached absolutely unimaginable levels, judicial norms and principles lack effectiveness, and new problems facing the judicial system are avoided, hidden, not confronted or completely ignored. Ernesto Lopez Friere, Minister of the Tribunal of Constitutional Guarantees, has concurred in this assessment, recently stating that "according to the Constitution there is an independent judiciary. In reality, it is weak, inefficient, vulnerable to political and economic pressure, lacking in human and economic resources, and characterized by a high level of corruption and ill-repute.[109/]

box 4

Illegal Drilling in the Cuyabeno Reserve

The government's commitment to environmental and health precautions has been put into question by recent events in the Cuyabeno Reserve. In 1979, the government declared the Cuyabeno a protected area because of its incredible welath of biodiversty, which includes 18,000 plant species and numerous endangered animal species, such as manatees, freshwater dolphins, and caimans. The reserve is also home to four indigenous peoples, the Siona, Secoya, Quicha and Cofan. Since the early 1980s, Texaco, City Investing (Clyde Petroleum), and Petroecuador have exploited oil in the reserves, causing significant environmental damage through repeated oil spills and releases of toxic wastes.

In early 1993, Petroecuador quietly expanded its operations in the reserve without obtaining authorization from the appropriate regulatory body or filing an environmental impact statement. After a series of protests by local indigenous groups captured the media's attention, the Institute or Forestry, Nature Reserves and Wildlife (INEFAN) took the unprecendent step of suspending Petroecuador's illegal drilling in April 1993.

President Sixto Duran intervened in the controversy by creating an independent comission to study the likely environmental effects of continued drilling in the Cuyabeno. Before the independent commission released its report, the President publicly stated that drilling posed no environmental dangers, gave written authorization to Petroecuador to continue, and privately pressed INEFAN to reverse its decision. Although the independent commission subsequently released a report condemning the environmental impacts of such drilling, INEFAN reversed its decision and allowed Petroecuador to resume operations in two of the wells.

As an alternative to the tort system, Ecuadorian lawyers have tried to sue the government before the Tribunal of Constitutional Guarantees (TCG). However, the TCG has limited ability to influence state agencies and has demonstrated susceptibility to oil industry pressures.[110/] In October 1990, one month after holding unanimously that plans by Petroecuador and Conoco to exploit oil in the Yasuni National Park violated Article 19(2) (the right to a contamination-free environment), the TCG abruptly reversed itself without explanation.[111/] A judge subsequently revealed that the reversal had come in response to threats by foreign oil companies to freeze further investments in the country **(box 5)**.[112/] In a case brought two years later, the TCG again found violations of Article 19(2), this time based on drilling in the Cuyabeno.[113/] However, because the TCG lacks a

box 5

Oil and the Courts

In 1989 environmental lawyers appealed to the Tribunal of Constitutional Guarantees (TCG) to halt government plans to permit oil exploitation in the Yasuni National Park. This was the first case on oil development brought before the TCG; the verdict tarnished the Court's reputation and underscored the difficulty of finding justice in the Ecuadorian legal system.

The Yasuni National Park, designated as a World Biosphere Reserve by UNESCO and recognized as perhaps the most biodiverse territory in the world, is home to a number of Huaroni communities, some of whom have never been contacted by outsiders. The government established the park as a protected area in 1979, but soon thereafter granted concessions within it to foreign oil companies through Petroecuador, the state oil company. In the late 1980's Conoco discovered oil in the Yasuni (Block 16) and received approval from the government and Petroecuador to begin drilling operations.

Environmental groups brought suit before the TCG, charging the government and Petroecuador with violating Article 19(2) of the Constitution (right to a contamination-free environment) and the Forestry Law (no exploitation in protected areas). Petroecuador argued that the national petroleum law supersedes environmental laws and grants it the right to exploit oil in any part of the country, either on its own or through concessions to private companies. Petroecuador also asserted that the Forestry Law's prohibition on "any kind of exploitation or occupation" in protected areas did not apply to sub-surface mineral development.

While the TCG was reviewing the case, the government took steps to circumvent any negative decision. First the government redrew the park's boundaries to exclude the area containing Conoco's Block 16 (Acuerdo Ministerial 191). It then granted legal title to a large section of the park to the Huaorani under the stipulation that oil exploitation and mining would not be impeded (Providencia No 90-1772 IERAC).

Later that year, the Tribunal held that under Article 19(2), no further concessions could be granted in protected areas. However, less than a month later, without either side bringing further petitions, the Tribunal inexplicably reversed itself and issued a new ruling that permitted the development of the protected areas.

A judge from the Tribunal revealed that the reversal came in response to government pressure after foreign companies threatened to freeze further investment in the country. Although Conoco eventually responded to the protests from environmental and indigenous organizations by withdrawing its stake, its consortium partner, Maxus Energy Company, has moved rapidly to develop the Yasuni site.

mechanism to enforce its decisions, the government has allowed this drilling in the Cuyabeno to continue.[114/]

Members of Ecuador's government have acknowledged that victims of oil contamination cannot receive justice from domestic courts. The Congressional Commission on Mining Affairs has publicly approved of recent cases brought against Texaco in U.S. federal courts by Ecuadorian plaintiffs, stating that "the Ecuadorian judicial system does not offer sufficient guarantees of justice to the petitioners. "[115/] As a judge on the TCG recently observed, "considering all the obstacles surrounding the Ecuadorian judiciary and taking into account that Amazonian peoples are among the most marginalized peoples in the country, there are no realistic possibilities to obtain a just and impartial decision in a lawsuit against Texaco [in Ecuador]."[116/]

Those affected by oil development are also severely handicapped by the lack of available information, While Ecuador requires oil companies to provide environmental impact statements to state environmental agencies,[117/] the agencies are not obliged to make the statements public. With no legal incentive to share information, agencies ad of companies have created a wall of secrecy around their operations Mitered by claims of national security. Affected communities have no access to information regarding development plans quantity ad types of chemicals used and discharged during production a potential health hazards from exposure to oil ad related toxic wastes. For example, the unprecedented two-year audit of Texaco's environmental damages, commissioned by Texaco and Petroecuador, has been withheld from communities in the Oriente and private organizations. 118/ Without such basic information people are left Ignorant of potential risks and cannot participate meaningfully in public policy a hold companies accountable for their actions.

All these obstacles to judicial remedies and access to information faced by Ecuadorian citizens are significantly compounded for indigenous peoples. In addition to widespread racism in Ecuadorian politics and society indigenous peoples a politically, culturally, and logistically removed from the centers of decision-making power. 119/

D. Legal Conclusions

Ecuador's government has imposed significant harms on thousands of its citizens by failing to prevent, or provide remedies for, hazardous oil contamination in the Oriente. in view of this failure, as a conservative interpretation of the scope of Ecuador's legal obligations suggests that it has violated the right to a healthy environment under both international and constitutional law. The state oil company continues to place local communities at risk through irresponsible practices, environmental regulations and state protection agencies have proven incapable or unwilling to monitor oil development effectively and the state has left potential victims of toxic contamination ignorant of the risks and without legal redress, forcing them to seek relief in courts outside of Ecuador. While CESR recognizes Ecuador's need to exploit natural resources for economic development, nothing can justify these violations of fundamental human rights.

VI

CONCLUSIONS

Human rights can play an essential role in the search for solutions in the Oriente, providing moral standards, public and political pressure and the possibility of legal avenues through which Ecuadorian citizens may take action against the state. However, human rights advocacy must be viewed a only one aspect of a broader struggle b protect the people ad environment of the Ecuadorian Amazon **(box 6)**.

Under international law, private citizens can bring human rights claims against the Ecuadorian government before various legal bodies within the United Nations and the Inter-American system.[120/] While these bodies may place international pressure upon governments, they share two basic limitations. First, their enforcement capabilities are generally limited to making recommendations, ,offering victims few tangible benefits in the short-term. Second, these bodies ignore the roles of non-state actors such as private companies, which have bent ad operated the Oriente's oil facilities, ad international lenders, who have encouraged oil development regardless of the human or environmental costs.

It is therefore necessary to look beyond narrow legal mechanisms. Human rights advocacy is most effective when conceived broadly a means to educate citizens of their rights, bring violations to light, ad apply public pressure to governments. This report is intended to complement local ad international efforts in all three of these areas.

Resolving the crisis in the Oriente should be a matter of vital interest to the entire international community The recent Rio Conference ad the World Conference on Human Fights underscore the growing importance ad interdependence of human rights, environmental protection, ad economic development. These concerns are joined in the debate over Ecuador's Amazon; promoting Be human rights of the local population is essentially linked to protecting their environment. The outcome of the clash between short-sighted oil exploitation ad human rights a the Oriente will provide a litmus test for the future direction of global development.

box 6

The Limits of Exclusive State Responsibility for Human Rights Violations

The goal of human rights is to protect the fundamental dignity and integrity of human beings against the abusive exercise of power. Human rights law is premised on the assumption that sovereign states are the most powerful actors in the global system, particularly within their own borders. In this view, each government exercises ultimate control over domestic matters and therefore has sole responsibility for preventing human rights violations. Accordingly, regardless of who destroys the environment and harms human health in Oriente, human rights law holds the Ecuadorian government ultimately responsible.

In less than fifty years, the human rights movement has had tremendous success in foreign states to account to international legal standards for the protection of their citizens. However, the image of the strong sovereign state upon which human rights law rests is less valid today than it was fifty years ago. The growing prominence of international law, in particular free trade arrangements like GATT and NAFTA, has shifted significant power away from states to both international regulatory and financial bodies and multinational corporations (MNCs). These latter actors now exert tremendous power over human beings; the annual revenues of MNCs are often greater than the gross domestic product of developing countries (Texaco's annual earnings of about $ 40 billion dwarf Ecuador's $ 12 billions GDP). As a result , the basic human rights goal of protecting human dignity is no longer well served through the exclusive focus on states and quasi-state actors (i. e., governments-in-exile, guerilla movements).

The problem associated with Ecuador's oil development underscore the limitations of the current human rights framework. When the Texaco-Gulf consortium first discovered oil in the Oriente, the Ecuadorian government had neither the expertise nor the resources to develop it. As a result, the government relied wholly upon foreign companies to do the exploration, built the infrastructure, and extract the oil. Texaco has defended its use of unsafe technologies and practices as complying with Ecuador's permissive environmental laws/. However, placing full blame on the Ecuadorian government for failing to adopt and enforce stronger environmental regulations disregards the tremendous influence on national oil policy enjoyed by foreign companies like Texaco. For example, in 1990 a judge on the constitutional court revealed that the court had reversed a decision limiting oil development in a national park after oil companies threatened to leave the country.

In addition, the exclusive focus on Ecuador's responsibility obscures the critical influence of the international community in shaping the country's oil development policies. Like many other developing countries, Ecuador is caught in a financial vise in which it must weigh the costs of any added environmental measures against the need to maximize oil revenues to repay foreign debt. In 1991, more than a quarter of every dollar earned through exports went to repay foreign creditors, primarily international banks and other nations. Rather than insist upon compliance with human rights or environmental norms a condition for these enormous loans or for structuring debt, these creditors have encouraged Ecuador's single-minded pursuit of higher oil revenues.

None of these factors can relieve Ecuador, or any sovereign state, from its fundamental obligation to protect human rights. At the same time, the role played by MNCs and the international community in contributing to human rights violations in the Oriente carries a corresponding responsibility to help resolve them. The recent Rio Conference recognized both domestic and international causes underlying environmental destruction, and its resolutions sought to address all relevant parties. Similar efforts must be made towards extending human rights law beyond individual governments to include MNCs and other powerful international actors.

VI

RECOMMENDATIONS

This report is intended to support the view that development need not and must not disregard basic issues of human rights and environmental protection. Accordingly, the following list of recommendations attempts to reconcile human rights and environmental concerns with Ecuador's need to develop its natural resources in a sustainable manner.

1. Information. The government should open up the process of oil development to public scrutiny. Environmental assessment plans, including information on oil company activities and potential health and environmental risks, must be made widely available in order that decisions on future development reflect an informed national consensus. Reasoned discussion about oil development in the Oriente is simply not possible without access to this basic information, for example the recent audit of the effects of Texaco's oil operations. A "right-to-know" law should be enacted, modeled on similar laws in the U.S., Europe, and other Latin American countries. Such a law should take account of the particular need for information of indigenous groups and local communities who face immediate risks from oil development. The government can implement these measures quickly at very little cost.

2. Participation. The government should include the general public, and particularly affected communities, in policy decisions concerning oil development in the Oriente. Oil activities in indigenous lands must be conditioned upon the participation and informed consent of the indigenous peoples who live there. Likewise, development should not proceed in protected areas without the active participation of environmental groups, local communities and the general public. While the government should be lauded for its decision to exclude protected areas from the new oil blocks being auctioned, this new round of licensing has been organized without any public participation. While it is positive that INEFAN has included a representative of environmental groups on its board, the government must go further to encourage participation by citizens and NGOs in a broad range of decisions concerning oil development, including resource management and industry regulation. Such measures will encourage more responsible and widely-supported development policies.

3. Monitoring and Regulation. Private initiatives and government measures to design stricter environmental standards for oil activities must be supported by effective monitoring and enforcement. Ecuador's environmental protection agencies currently lack sufficient political and financial support and have confusing and conflicting mandates. The government should replace these various entities with a single agency with a comprehensive environmental, mandate covering both Petrocuador and private companies. This agency should be independent of the Ministry of Energy and Mines and should be granted sufficient political and material support to ensure its effectiveness. As contemplated in the current round of bidding, this agency should be financed through a special tax on oil companies, whose environmental commitments will always be subject

to question without an effective watchdog to monitor their activities. The government should also recognize the potential contribution of independent monitoring and should support the existing efforts of environmental and indigenous groups to conduct local workshops and form a commission aimed at ensuring industry compliance with environmental and social regulations. Finally, regulatory agencies must be given clear authority over Petroecuador. This is imperative in light of the fact that Petroecuador not only controls the vast bulk of current oil production, but also relies upon the environmentally dangerous technologies and practices inherited from Texaco's operations. State agencies should compel Petroecuador to make public its plans for upgrading existing oil infrastructure and technologies and to take immediate measures to address any environmental, social or cultural harms generated by past and current operations.

4. Legal Remedies. Private litigation against polluters provides more than compensation for victims; it offers one of the most effective mechanisms for regulating industry behavior. Ecuadorian jurists involved in efforts to reform the administration of justice relating to environmental harms have concluded that new laws will have little impact without sweeping changes in the entire legal system. Government reforms of the judicial system should consider the following measures: facilitating class action suits, broadening discovery rules related to document production, allowing parties to choose their own experts, empowering the constitutional court to enforce its decisions, and granting judges long-term or permanent tenure to counter judicial dependence on the political branch. Combined with efforts to root out corruption and increase judicial competence, these measures should constitute a high priority for the government as a means of strengthening its commitment to the rule of law and enabling its citizens to vindicate their rights.

5. Compensation Fund and Independent Study. A multi-million dollar fund both to clean-up existing environmental damage and to compensate victims of oil contamination should be established. Revenues for the fund should come from companies responsible for causing past damage and from a broad-based tax on petroleum production and other environmentally hazardous activities. As a first step, the fund should be used to commission a comprehensive survey by independent experts of all past and present environmental, social and cultural impacts of oil production in the Oriente. The results should be widely disseminated and used to direct resources towards compensation and prospective remedial purposes.

6. Restructure Foreign Debt. The World Bank, the EMF, and large creditor nations such as the United States should promote sustainable development of Ecuador's natural resources by restructuring current debts and providing new loans conditioned on implementation of concrete reforms to preserve the environment and respect indigenous cultures. These loans should also encourage the promotion of alternative development models, particularly in light of Ecuador's rapidly diminishing oil reserves and prospects of other economic resources. Although the World Bank has produced studies underscoring the dangers of Ecuador's short-sighted dependence on oil revenues and has policies requiring environmental impact statements for projects with significant potential environmental impacts, its proposed $13 million loan to modernize Ecuador's energy and petroleum sectors does not require an environmental impact statement. To prevent further damage in the Oriente, the World Bank should ensure the full implementation and enforcement of its

operational directives regarding the environment and affected communities; other multilateral lending institutions should adopt and enforce similar policies.

7. International Efforts. Environmental degradation can no longer be considered solely a national concern; the causes and the effects of the Oriente's destruction spread far beyond Ecuador's borders. The international community has both moral and pragmatic reasons to take active steps to help ensure the survival of Ecuador's rainforest and its inhabitants. Developed countries (particularly the United States) should carry the largest obligation because they consume most of the world's oil and also possess the financial and technological resources to make the most substantive difference. These countries can contribute to solutions in the Oriente by seeking other sources of energy and offering constructive assistance to make feasible the implementation of state of the art environmental technologies and alternative development models.

ENDNOTES

1. Environmental instruments to which Ecuador is a party and relevant to petroleum development in the Oriente include: the World Charter for Nature, G.A.Res. 37n, U.N. Doc. A/37/51 (1982); the Amazon Declaration 28 I.L.M. 1303 (1989) under the Treaty for Amazonian Cooperation 17 I.L.M. 1045 (1978); the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere, 161 U.N.T.S. 229 (1940); the Rio Declaration on Environment and Development (infra); the Convention on Biological Diversity, 31 I.L.M. 818 (1992). International instruments concerning indigenous rights to which Ecuador is a party include: the International Covenant on Economic, Social and Cultural Rights (infra); the International Convention on the Elimination of all Forms of Racial Discrimination, 660 U.N.T.S. 195 (1965); International Labor Organization, Convention 107 on the Protection and Integration of Indigenous and Other Tribal and Semi-Tribal Populations in Independent Countries (1957).

2. Various reports have studied Ecuador's obligations under environmental and indigenous rights treaties. See e.g. Fabm 1992; Real; Enriquez; CONFENIAE/ONHAE Petition; Kimerling 1991b; Mannina; Shutkin.

3. In 1993, two independent law suits on behalf of affected communities from the Oriente were filed in the United States, one in Texas state court and the other in the Southern District federal court of New York. In addition, on June 1, 1990, the Confederation of Indigenous Nationalities of the Ecuadorian Amazon (CONFENIAE) submitted a petition, through the Sierra Club Legal Defense Fund (SCLDF), to the IACHR on behalf of the Huaorani people.

4. The Universal Declaration of Human Rights, G.A. Res. 217A (IM, U.N. Doc. A/810, at 71 (1948) [hereinafter Universal Declaration); The International Covenant on Economic, Social and Cultural Rights, G.A. Res. 2200 (XXI), 21 U.N. GAOR, Supp. (No. 16) 49, U.N. Doc. A/6316 (1966) [hereinafter ICESCRI; The International Covenant on Civil and Political Rights, G.A. Res. 2200 (XXI), 21 U.N. GAOR, Supp. (No. 16) 52, U.N. Doc. A/6316 (1966). Over 120 countries have now ratified the ICESCR including all the major western democracies with the exception of the United States, which has signed but not ratified it. As the World Health Organization's Constitution notes, "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being." WHO Constitution, adopted July 22, 1946.

5. Declaration of the United Nations Conference on the Human Environment, princ. 1, U.N. Doc. A/Conf.48/14/Rev. 1 (1972) [hereinafter Stockholm Declaration].

6. In 1990, the U.N. General Assembly passed a resolution asserting that "all individuals are entitled to live In an environment adequate for their health and well-being" U.N.G.A. Res 45/94, U.N. Doc A/45/49 (1990). A similar principle is recognized in the Rio Declaration on Environment and Development 31 I.L.M. 974 U.N. princ. 1 (1992), and in the World Charter for Nature. Regional treaties and declarations in the Americas, Africa, and Europe all recognize some form of the right to a healthy environment. African Charter of Human and Peoples Rights, art. 24, O.A.U. Doc. CAB/LEG/67/3/Rcv.5 (1981); Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights, O.A.S.T.S. No. 69, art. 11 (1989) [hereinafter Protocol of San Salvador]; Draft United Nations Economic Commission for Europe Charter on Environmental Rights and Obligations, Experts Meeting of the ECE, princ. I (adopted Oct. 29-31, 1990). By 1989, over fifty national constitutions recognized some form of the right to a healthy environment. Edith Brown Weiss, In Fairness to Future Generations 297-327 (1989) (listing countries). The SubCommission on Prevention of Discrimination and Protection of Minorities of the U.N. Commission on Human Rights has assigned a Special Rapporteur to review the link between human rights and the environment. After three years of research, the Special Rapporteur has found "universal acceptance of the environmental rights recognized at the national, regional and international levels." Second Progress Report Prepared by Mrs. Fatma Zohra Ksentini, Special Rapporteur, Economic and Social Council, E/CN.4/Sub.2/1993n (26 July 1993), 1122.

7. ICESCR, art. 12.

8. United Nations Convention on the Rights of the Child, G.A. Res. 4/25, U.N. Doc. A/RES/44/25, art. 24 (1989).

9. The American Declaration on the Rights and Duties of Man, (Final Act of the Ninth International Conference of American States, Bogota, Colombia, 1948) [hereinafter American Declaration], art. 11. Rights recognized by the Declaration are considered to constitute, the "fundamental rights of the individual" guaranteed under the OAS Charter, making them obligatory upon the states. Charter of the Organization of American States, art. 56) (as revised). See Inter-American Commission on Human Rights, "Report on the Situation of Human Rights in Chile," OAS/Ser.LN/B.66, doc.17 (1985).

10. Protocol of San Salvador, art. 11. Ecuador ratified the Protocol on February 10, 1993, the Protocol has not yet come into force.

11. Ecuadorian Constitution, Article 19(2). The Regulations to the Law of the Prevention and Control of Environmental Contamination Relative to Water Resources list the following definition for contamination: "all water running or not, that presents deterioration of its physical, chemical or biological characteristics, owing to the influence of any solid, liquid, gaseous or radioactive element or material, or any other substance, which results in partial or total limitations of that water for domestic, industrial, agricultural, fishing, recreational or other uses." Title 1, ch. 11, art. 3, excerpted in Corporacion Financiera Nacional.

12. According to the IACHR, "any impairment of [human] rights which can be attributed under the rules of international law to the action or omission of any public authority constitutes an act imputable to the State, which assumes responsibility in the terms provided by the [American) Convention." Velasquez Rodriquez Case, Inter-Am Ct. H.R. OEA/Ser. LIVIIII.19, doc. 13 1164 (Aug. 31, 1988) [hereinafter Velazquez Rodriguez Case].

13. Velazquez Rodriguez Case, 1166. In a case involving resource development in the Brazilian Anumn, the IACHR held the government accountable for widespread violations of human rights arising from the encroachment of private oil workers and colonists onto indigenous lands. Case 7615 Inter-Am. C.H.R. 24, OEA/Ser. L/V/11.66, doc. 10 rev. 1 (1995) [hereinafter Yanomami Case].

14. See e.g. ICCPR, art. 2; American Convention on Human Rights, O.A.S. Treaty Series No. 36, at 1, O.A.S. Off. Rec. OEA/Ser. L/V/U.23 doc. rev. 2 (1969) [hereinafter American Convention], art 2.

15. See e.g. Velazquez Rodriguez Case; Yanomami Case.

16. Universal Declaration, art. S.

17. American Convention, art. 25. no IACHR has held that where rights have been violated, "States must... if possible attempt to restore the right violated and provide compensation as warranted for damages resulting from the violation.' Velazquez Rodriguez Caw, 1166. no Ecuadorian constitution provides that all persons "have the right to address complaints and petitions to authorities and to receive due attention or replies in a suitable place in accordance with the law." Ecuadorian Constitution, art. 19(10). The Rio Declaration also exhorts governments to develop legislation for victims rights. Rio Declaration, princ. 13.

18. Rio Declaration, princ. 10. Similar provisions am recognized in the World Charter for Nature, art. 18.

19. Myers, 194.

20. Smith 1989; Jukofsky, 48.

21. This includes the concessions offered in the 7th round of licensing in January, 1994, which has almost doubled the amount of rainforest under development. OU A Gas Journal (February 7, 1994).

22. Cornejo; EIU Report 1993a.

23. Id.

24. *Oil and Gas Journal* 1993.

25. Background information on oil development technologies and practices in the Oriente is based largely on interviews with and written materials from Judith Kimerling as well as on interviews with Comejo, Coello, Divila, Southgate, Troya and officials from Petrocuador, DINAMA and private companies (Elf and Maxus).

26. Brooke 1991.

27. Kimerling 1991b, 867-871; Southgate, 4.

28. Kimerling interview with DINAMA; Kimerling 1991a, 63.

29. In a recent case brought against Texaco for contaminating the Oriente, the International Water Tribunal declared that "insufficient and at most superficial measures were taken for retaining and minimalizing spillage of oil and contaminating substances and leakages from pits" leading to "deterioration in the quality of the river water which is essential for the sustainable livelihood of the local population." Ruling of the International Water Tribunal, reprinted in La Campans, Amazonia por Is Vida, 55-56. Until 1992, oil operations in the Oriente produced 1.7 billion barrels of oil, 499 million barrels of formation water, and more than 355 trillion feet of cubic gas. Comejo, 1993. Virtually all of the formation waters and much of the gas have been released into the environment. According to a World Bank Paper: "During the petroleum production phase, water systems surrounding extraction sites frequently am devastated through uncontrolled petroleum drainage pools and emulsion processes." World Bank (Hicks), 9.

30. Kimerling 1991a, 63-65.

31. Id. at 63.

32. Produced water is comprised of chemicals used to separate the oil and the wastes resulting from the separation.

33. Kimerling interviews with Ministry of Energy and Mines and DINAMA; Kimerling 111a, 63-65.

34. Id.

35. Ministry of Energy and Mines, "La Producciones de Petroleo, Agua de Formacion y Gas Natural" (1999) (figure based on calculations of only the discharge from separation stations, Kimerling 1991b, 867, plus average daily discharge since 1991).

36. DIGAMA, cited in Fundacion Natura 1991b, 13.

37. CEPE report, cited in Kimerling 1991a, 67; Southgate, 5.

38. Kimerling 1991a, 69.

39. Kimerling 1991b, 871-74.

40. *Oil and Gas Journal* (Feb. 7, 1994).

41. Prof. Southgate's leading study on the feasibility of pollution control in the Oriente suggests that under current depressed oil prices, environmental measures will render oil production uneconomical without tax reductions or other concessions to producers. Southgate, 14-19. The government has in fact made such concessions in order to attract companies to the most recent auction of new blocks. *Oil and Gas Journal* (Feb. 7, 1994).

42. Southgate, 11. Prof. Southgate explains that the figure of 10% may overestimate the cost because it does not account for certain benefits that accrue to the environmentally sounder technologies (e.g. reinjection of production waters helps to maintain well pressure). He has confirmed his figure of 10% in discussions with both state and private industry officials in Ecuador. Interview with Southgate.

43. Interviews with Petroproducciones official, Divila, Kimerling, Comejo, Troya, Southgate, Accion Ecologica, Ruybal, Coello. A recent article by Efrain Perez, a leading professor of law and environmental expert in

Ecuador, describes how environmental regulations “are infringed in a consistent manner by Petroccuador and its affiliates in all phases of the petroleum industry." Perez, 58.

44. The World Bank 1991.

45. Menacho, Diego "La politica do la superlativa pobreza" El Comercio, Sept. 21, 1993, cited in Kimerling 1994.

46. EIU Country Profile 1993/94, 19.

47. The majority of the benefits have been captured by the elite and the military, while the urban poor, colonists and indigenous groups have almost uniformly suffered worsening conditions. World Bank 1991; Fabm 1994, 5-7.

48. According to the former head of the environmental unit of the state oil company, "Petroleum development has created a group of 'artificial' population centers characterized by distorted economic and cultural consumer patterns, near-total dependence on basic supplies imported into the region, and a high incidence of social problem, together with a general cultural deterioration." report by Fabian Sandoval, 1995, cited in Kimerling 1991a, 117.

49. World Bank (Hicks), 19.

50. DIGEMA (1989), cited in Kimerling 1991a, 81.

51. Unsworn Declaration under penalty of perjury by Dr. Emesto Lopez Freire, Minister of the Tribunal of Constitutional Guarantees since 1990, prepared for an amicus brief of the Fedemtion of Communities Union of Natives of the Ecuadorian Amazon (FCUNAE) and the Indigenous Organization of the Cofan nation of Ecuador (OINCE) (represented by Judith Kimerling and Cohen, Milstein, Hausield & Toll) for Aguin v. Texaco (3 October, 1993) [hereinafter 'Lopez Declaration"].

52. See e.g. Wifitten; CONFENIAE/ONHAE Petition; DIGEMA (Reyes); Viteri; Kimerling 1993, 60-66.

53. Interview with Dr. Ribadeniera.

54. Kimerling 1991a, 96.

55. Kimerling 1991a, preface.

56. UPPSAE.

57. Malins and Hodgins; Robotham and Gill; Kimerling 1991a, 73.

58. Robotham and Gill.

59. LARC; Hansbrough.

60. Hansbrough; IARC; CCOHS 1991. Increases in skin cancers have been observed in mice and rabbits treated with crude oil. LARC, Wilson 1988.

61. Amer et al.

62. Eckardt; CCOHS 1991.

63. HBT Agm Preliminary Audit, Table 7.2.

64. IARC.

65. Witkowski and Johnson. This relation has only been found for chlorinated hydrocarbons.

66. O'Leary et al.

67. On average, crude oils are composed of approximately 30% paraffins, 50% naphthenes, 15% aromatic hydrocarbons, and 5% nitrogen, sulfur, and oxygen compounds. Wilson and Hunt 1975.

68. Boesch and Rabalais. Oil companies in the Oriente have not M& chemical data about their operations available. However, it may be presumed that the wastes being released into the Oriente's environment include many of the toxic pollutants typically found in such operations, including aluminum, antimony, arsenic, barium, cadmium, chromium, copper, lead, magnesium, mercury, nickel, zinc, benzene, naphthalene, phenanthrene, sodium and chlorides. Kimerling 1991a, 59.

69. USDHHS 1993; LARC 1988. A recent study estimated that 20-56% of low dermal doses of PAH are absorbed from coal tar ointment applied to the skin of workers. Van Rooij et al.

70. USEPA.

71. Id.

72. IARC.

73. Lowe.

74. CCOHS 1991.

75. USEPA.

76. WHO.

77. Duck, CCOHS 1991.

78. Duck; Eckardt; Lewis et al. An oil industry consultant to the government recently confirmed that well drilling activities in the Oriente pass through a radioactive geologic formation, generating radioactive drilling wastes. Kimerling interview with Giovani Rosania (Oct. 18, 1993), Kimerling 1994.

79. On July 26, IM, 5000 barrels (a conservative government estimate) of crude oil spilled into the Qinchayacu river which joins the Napo river from the Central Station in Sachas. According to Dr. Ribadeniera, physician-director of the area hospital, the spill spread as far as the Napo River, and left the Qinchayacu with an oil slick covering the width of the river, from bank to bank. This was only the latest of a series of spills, in addition to continual discharge from nearby oil stations, to pollute the river.

80. Interviews with Divila, Petroproducciones official, Cordero, Rosania, Kimerling, Southgate, Coello, and Cornejo.

81. See supra, note 42.

82. See supra, note 43.

83. See generally, Real; Serrano; Perez; Enriquez; Kimerling. A study done by the U.S. Agency for International Development characterized Ecuador's environmental legislation as suffering from “conflicting jurisdictions, ill-defined policies, unclear objectives and the failure to systematically apply even the best of environmental laws." Cited in Smith.

84. Real, 91. Virtually every non-governmental person interviewed agreed with this assessment. In an interview with CESR, a top official of Petroproducciones, the Petroecuador affiliate responsible for oil production, dismissed the state environmental agencies (DINAMA and INEFAN) as useless owing to their lack of expertise and resources. See generally Serrano, 255-337; Real 85-135; Kimerling 1993, 7988.

85. Unsworn Declaration under penalty of perjury by Dr. Alberto Wray (law professor of the Papal Catholic University of Ecuador) prepared for Aguinda v. Texaco (3 October 1993) [hereinafter "Wray Declaration"].

86. Hydrocarbon Law (1971), Chap. III, art. 24(s) and (t). This law was subsequently supplemented by a decree ordering companies "to prevent the escape and waste of hydrocarbons in order to avoid loss, damage and pollution." (R.O. 530, Ch. V11, April 10, 1974). A similar provision was inserted into the CEPE-Texaco/Gulf contract of 1973 (under which most of the Oriente's development was subsequently carried out): 46.1 “Contractors will adopt fitting measures for protecting the flora, fauna and other natural resources as well as avoiding pollution of waters, the atmosphere and land under the control of state agencies." The decree and the contract clause, like the law, lacked any specific standards.

87. HBT AGRA Limited, 28.

88. Ministry of Energy and Mines, "The Environmental Regulations for Hydrocarbon Activities in Ecuador" (1992). The preface states that, "after twenty years of exploiting petroleum in Ecuador, it is time to rely on a document that dictates the necessary policies to minimize the environmental impact of the activity..." While it is still early to gauge the effectiveness of this regulation, it has been critiqued for omissions and inadequate standards. See e.g. Kimerling 1993, 92. A law covering the specific operations of Petroecuador also contains some environmental provisions. "no Special Law of the State Petroleum Company of Ecuador (Petroecuador) and its Affiliate Companies," R.O. 283, (1989). However, environmentalists put little stock in this law, without independent monitoring. Interviews with Benitez, Accion Ecologica, Polit, Real.

89. Supreme Decree 374, May 1976. A recent study by the Inter-American Development Bank underscored the laws' ineffectiveness. Inter-American Bank (Morcillo).

90. Regulations for the Prevention and Control of Contamination related to Water Resources, R.0 204 (1989).

91. Interview with employees of IEOS, the agency responsible for water safety under the Ministry of Health and with official from Petroproducciones. The Interinstitutional Committee has shown an indifference to environmental protections and met no more than five times in its first fourteen years, according to ex-members. Eariquez, 24. See also V. Serrano, 268.

92. Environmental lawyers have unsuccessfully litigated against the government's policy of allowing oil exploitation within the parks. Caso No. 338/89-7, Corporacion Para la Defense de Vida (CORDAVI) v. Petroccuador, Ministro do Agricultura y Ganaderia, y Ministro do Energia y Minas (Tribunal do Garantias Constitucionales, Oct 2, 1990, overwrned Oct 30, 1990) (see box 4). The state oil company his argued that it has the legal prerogative to exploit oil in any area of the country, regardless of opposing laws or regulations. The Constitution and the Law of Hydrocarbons grant the state control over all sub-surface mineral rights within the country and leaves it to the state oil company to exploit the oil either on its own or jointly with private companies. Constitution, Art. 46(l); Law of Hydrocarbons, Decree No. 1459 (1971) (as revised, Chap 1, arts. 1, 2).

93. Five of the six protected areas touching the Oriente am under some form of oil development. Kimerling 1993, 1.

94. In 1993, a new presidential commission on the environment was established. Environmental groups are hopeful that the commission will spur further action; however, the commission has no independent authority to issue regulations or to monitor industry practices. Interviews with do la Torre, Comejo, and Troya.

95. Interviews with Comejo, Troys, and DINAMA employees. By contrast, the agency within the same ministry responsible for monitoring oil quality and production rates (sub-Secretariat of Hydrocarbons) has a staff of over 150 in offices throughout the country.

96. Interview with employees of DINAMA.

97. Interview with Solorzano.

98. Interviews with Cordero and Rosarua.

99. Interviews with Troya, Southgate, Comejo, Coello, and Merino.

100. Interview with Maldonado (UPA). By contrast, Ing. Maldonado's predecessor, Ing. Rodrigo Divila, was surprisingly candid about environmental problems in an earlier interview with CESR; he was replaced only several months into his term.

101. Interviews with Kimerling, Perez, Troya, Real, and Morino.

102. Although the most recent version of the judicial code was enacted in 1987, most provisions derive from seventeenth century Spanish laws. Unsworn Declarations under penalty of perjury by Dr. Julio Cesar Trujillo Vasquez (ex-President of the Tribunal of Constitutional Guarantees) [hereinafter Trujillo Declaration, Dr. Ramiro Larma. Santos (ex-President Supreme Court of Justice of Ecuador) [hereinafter Larrea Declaration], and Dr. Ricardo Crespo Plaza submitted in connection with the lawsuit Aguinda vs. Texaco (10-3-94); Lopez Declaration; Wray Declaration.

103. Article 25, Ecuadorian Civil Procedure Code (CPC); Wray Declaration.

104. Suits for personal damage may only be brought by those individuals directly affected; individuals may not represent a class of persons seeking compensation. Articles 47, 78, CPC. The main exemption to this rule, “popular action" lawsuits, may not be brought in tort or negligence suits seeking damages for a class. Unsworn Declaration under penalty of perjury by prepared for Aguinda v.- Texaco (3 October, 1993) [hereinafter "Trujillo and Larrea Declaration"].

105. Articles 68-69 and 121-123, CPC; Wray Declaration.

106. Articles 254, 258, 261 and 267 CPC; Wray Declaration.

107. Congress, currently represented by 15 different political parties, appoints judges on the Tribunal of Constitutional Guarantees to six year terms (Article 14 of the Constitution). Judges from superior civil and penal courts are also chosen by Congress, and these judges choose inferior court judges (Articles 13 and 23 of the Judicial Code). Trujillo and Larrea Declaration.

108. Speech given at seminar, "The Professional of the 21st Century" (Quito, Oct. 18, 1993).

109. Lopez Declaration.

110. Trujillo and Larrea Declaration.

111. The Tribunal declared that the government was bound "to take maximum protective and controlling measures for the, ecosystem and the environment." CORDAVI v. Petroecuador, supra, note 84.

112. Jugo Ordenez, a judge on the Tribunal of Constitutional Guarantees, publicly described threats made to Ecuadorian officials by foreign oil companies intent on exploiting oil within the reserves. He attributed the Tribunal's reversal to these threats. Dimanowski. The Sierra Club and CORDAVI subsequently filed charges with the U.S. Attorney General against U.S. oil companies for violating the Foreign Corrupt Practices Act. Id. See also Chinchilla & Schodt.

113. Case Nos. 377/90, 378/90, 379/90, 390/90 combined, Fundacion Natura v. Petroccuador, Ministry of Agriculture and Livestock, Ministry of Energy and Mines and the Ecuadorian Institute of Hydraulic Resources, Resolution No. 230-92-CP (Tribunal of Constitutional Guarantees, Oct. 15, 1992).

114. Following ten months with no compliance, Fundacion Natura brought another formal demand before the Tribunal, with no response yet given. Correspondence with Fundacion Natura; Interview with Troya.

115. I.P.S. 1994.

116. Lopez Declaration.

117. CFN, 278-289; Trujillo and Larrea Declaration.

118. As part of the contract governing the audit, the final reports, all documents and data generated, and the contract itself am to remain confidential unless all parties to the contract agree to their release. Service Lending Contract for the Environmental Audit of the CEPE-Texaco Consortium, April 15 1992, art. 27, cited in Kimerling 1994.

119. A judge has noted that "the Amazonian indigenous peoples live in areas that are far from the centers of power from the seat of government and the judiciary, from the headquarters of the petroleum companies and from cities where the most experienced and most influential lawyers work. The geographical distances are increased because of bad roads, near absence of telephone and radio communication. In addition, there is an even greater historical, cultural and linguistic distance." Lopez Declaration.

120. These bodies include the Inter-American Commission on Human Rights,- the U.N. Committee on Economic, Social and Cultural Rights (under ICESCR, art. 16); the Committee on the Rights of the Child; and the newly-established Commission on Sustainable Development (under Agenda 21, Rio Conference).

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APPENDIX 1:
INTERVIEWS AND REVIEWERS/ADVISERS

I. Interviews[1]

Ecuadorian Government

Aviles, Juan Carlos, Sub-secretary of Hydrocarbons, Ministry of Energy and Mines
Cordero, Miguel, staff, INEFAN
Davila, Rodrigo; former Director, Environmental Unit, Petroecuador
de la Torre, Luis Carreca, Director, Presidential Commission on the Environment
DINAMA; staff (anonymous)
IEOS; staff (anonymous)
Maldonado, Patricio, Director, Environmental Unit, Petroecuador
Petroproducciones, high level official, (anonymous)
Rosania, Giovanni, technical consultant, INEFAN
Solorzano, Lucia, Sub-secretary of the Environment, Ministry of Energy and Mines

Non-government

Benitez, Lilyan, Fundacion Natura
Black, Juan, SUBIR
Bonifaz, Neptali, IDEA
Cayaguj, Ricardo, Secoya
Coello, Flavio, oil and environmental consultant
Cornejo, Marco, CLAVE Comunicaciones Empresariales, Editor, Energia Informacion
Drumm, Andrew, Coordinator, Cuyabeno Project
Federacion de Comunas Union de Nativos de la Amazonia Ecuatoriana (FCUNAE), Coca
Garzon, Paulina, Accion Eccologica
Gomez, Winston, Director of Environment, ELF Equitaine
Houghton, Barbara, I.C.D.,
Kimerling, Judith, author, Amazon Crude and Crudo Amazonico
Loring, Deborah, Loring Associates
Mack, Jim Charge D'Affairs, U.S. Embassy, Quito
Maldonado, Dr. Adolfo, Dureno Clinic
Martinez, Esperanza, Accion Eccologica
Merino, Valeria, Corporacion Latinoamericana para el Desarollo
Perez, Efrain,.ESTADE, professor, Catholic University, Quito
Polit, Vicente, Comite Ecuatoriana de Defensa del Naturaleza y Medio Ambiente
Real, Byron, Corporacion de Defensa de la Vida
Ribadeneira, Dr. Ruben, Director, civil hospital, Coca
Southgate, Douglas, Professor, Natural Resources, Ohio State
Troya, Roberto, Fundacion Natura
Villamil, Hector, President, Organizacion de Pueblos Indigens de Pastaza (OPIP) (Feb. 1994)
Viteri, Leonardo, Director, Amazanga Institute of Indigenous Science and Technology (Feb. 1994)

[1] Unless otherwise indicated, all interviews were conducted in Ecuador from April 25 - May and from October 27 - November 11, 1993.

II. Reviewers and Advisers

Aulestia, Juan, Oxfam America
Barnes, Harry, Interim Director, Human Rights Program, Carter Center
Bok, Sissela, Distinguished Fellow, Harvard Center for Population and Development Studies (HCPDS)
Brody, Reed, International Hilawn Rights Law Group
Christiani, David C., Associate Professor, Occupational Medicine, Harvard School of Public Health (HSPH)
Dahlen, Deirdre, Battelle Ocean Sciences
Douglas, Greg, Battelle Ocean Sciences
Evans, John, Associate Professor, Environmental Science, HSPH
Fabra, Adriana, Sierra Club Legal Defense Fund
Ford, Tim, Assistant Professor, Environmental Microbiology, HSPH
Garzon, Paulina, Accion Ecologica
Hechscher, Joan, Community Action International Alliance
Hu, Howard, Assistant Professor, Occupation Medicine, HSPH
Johnston, Dr. Paul, Earth Resources Center, U. Exeter, U.K.
Kimerling, Judith, Author Amazon Crude, Crudo Amazoni
Koutrakis, Petros, Associate Professor, Occupational Medicine, HSPH
Leong, Jean, Comitd Universitario en Solidaridad con los Pueblos Indigenas (CUSPE)
Uvins, Richard, John Rock Professor of Population Science, HSPH
Loring, Debbie, Loring Associates
Mann, Jonathan, Francois Xavier Bagnoud Professor in Health and Human Rights, HSPH
Martinez, Esperanza, Accion Ecologica
Nimetz, Matthew, former Undersecretary of State
Pacari, Nina, Confederacion de Organizaciones Indigenas del Ecuador (CONAIE)
Posner, Michael, Executive Director, Lawyers Committee for Human Rights
Ravens, Tom environmental engineering, Massachussetts Institute of Technology
Ross, Cathy, Oxfam America
Roth, Ken, Executive Director, Hun-n Rights Watch
Rowe, Andrew, Greenpeace
Ruybal, Ron F., Natural Resources Officer, USAID-Ecuador
Ryan, Barry R., Associate Professor, Occupational Medicine, HSPH
Shelton, Dinah, Professor, Santa Clara School of Law
Sirkin, Susannah, Associate Director, Physicians for Human Rights
Southgate, Douglas, Professor, Natural Resources, Ohio State University
Steiner, Henry, Professor of Law and Director of Hilawn Right Program, Harvard Law School
Switkes, Glenn, Rainforest Action Network
Troya, Roberto, Fundacion Natura
Zeidenstein, George, Distinguished Fellow, HCPDS

APPENDIX II:
PROVISIONS OF INTERNATIONAL LAW

1. Universal Declaration of Human Rights

Art. 8 Everyone has the right to an effective remedy by the competent national tribunals for acts violating the fundamental rights granted him by the constitution or by law.

Art. 25(l) Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services...

2. International Covenant on Economic, Cultural and Social Rights

Art. 12(l) The States Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health.

Art. 12(b,c) The steps to be taken by the States Parties to the present Covenant to achieve the full realization of this right shall include those necessary for:

The improvement of all aspects of environmental and industrial hygiene;

The prevention, treatment and control of epidemic, endemic, occupational and other diseases.

3. United Nations Convention on the Rights of the Child

Art. 24 States Parties recognize the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health. States Parties shall strive to ensure that no child is deprived of his or her right of access to such health care services.

States Parties shall pursue full implementation of this right and, in particular, shall take appropriate measures:

To diminish infant and child mortality...

To combat disease and malnutrition, including within the framework of primary health care, through, inter alia, the application of readily available technology and through the provision of adequate nutritious foods and clean drinking-water, taking into consideration the dangers and risks of environmental pollution...

4. Rio Declaration on Environment and Development

Princ. 10 Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision making processes. States shall facilitate and encourage public awareness

and participation by nmking information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

Princ. 13 States shall develop national law regarding liability and compensation for the victim of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.

5. Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration)

Proclam. 1 Both aspects of man's environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic human rights - even the right to life itself.

Princ. 1 Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations. In this respect, policies promoting or perpetuating apartheid, racial segregation, discrimination, colonial and other forms of oppression and foreign domination stand condemned and must be eliminated.

6. American Declaration on the Rights and Duties of Man

Art. XI Toda persona tiene el derecho a que su salud sea preservada, por medidas sanitarias y sociales, relativas a la alimentacion, el vestido, la vivienda y la asistencia m6dica, correspondientes al nivel que permitan los recursos pdblicos y los de la comunidad.

7. Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights (Protocol of San Salvador)

Art. 11 Right to a healthy environment:

> Everyone shall have the right to live in a healthy environment and to have access to basic public services.
>
> The States Parties shall promote the protection, preservation and improvement of the environment.

8. Charter of the Organization of American States (as revised)

Art. 43(f) The Member States, convinced that man can only achieve the full realization of his aspirations within a just social order, along with economic development and true peace, agree to dedicate every effort to the application of the following principles and mechanisms.

> The incorporation and increasing participation of the marginal sectors of the population, in both rural and urban areas, in the economic, social, civic, cultural, and political life of the nation, in order to achieve the full integration of the national community, acceleration of the process of social mobility, and the consolidation of the democratic system. The encouragement of all efforts of popular promotion and

cooperation that have as their purpose the development and progress of the community.

9. American Convention on Human Rights

Art. 2 ... Los Estados Partes se comprometen a adoptar, con arreglo a sus procedimientos constitucionales y a las disposiciones de esta convenci6n las medidas legislativas o de otro carkur que fueren necesarias Pam hacer efectivas tales derechos y libertades.

Art. 25 Toda persona tiene derecho a un recurso sencillo y rapido o a cualquier otro recurso, efectivo ante los jueces o tribunales competentes, que la ampare contra actos que violan sus derechos fimdamentales reconocidos por la Constitution, la ley o la presente Convencion, aun cuando tal violacion sea sometida por personas que actuen en ejercicio de sus funciones oficiales.

10. Constitution of the Republic of Ecuador

Art. 19(2) The right to live in an environment free of contamination. It is the duty of the State to be vigilant so that this right should not be affecW and to guard nature's preservation. The law will establish the restrictions to exercise certain rights or liberties so as to protect the environment.

11. Convention Conceming Indigenous and Tribal Peoples in Independent Countries (ILO Convention 169)

Art. 3(l) Indigenous and tribal peoples shall enjoy the full measure of human rights and freedoms without hindrance or discrimination. The provisions of the Convention shall be applied without discrimination to male and female members of these peoples.

Art. 13(l) In applying the Provisions of this Part of the Convention governments shall respect the special importance for the cultures and spiritual values of the peoples concerned of their relationship with the lands or territories, or both as applicable, which they occupy or otherwise use, and in particular the collective aspects of this relationship.

Art. 13(2) The use of the term “lands" in Articles 15 and 16 shall include the concept of territories, which covers the total environment of the areas which the peoples concerned occupy or otherwise use.

Art. 15(l) Ile rights of the peoples concerned to the natural resources pertaining to their lands shall be specially safeguarded. Ilese rights include the right of these peoples to participate in the use, management and conservation of these resources.

Art. 15(2) In cases in which the State retains the ownership of mineral or sub-surface resources or rights to other resources pertaining to lands, governments shall establish or maintain procedures through which they shall consult these peoples, with a view to ascertaining whether and to what degree their interests would be prejudiced, before undertaking or permitting any programmes for the exploration or exploitation of such resources pertaining to their lands. The peoples concerned shall wherever possible participate in the benefits of such activities, and shall receive fair compensation for any damages which they may sustain as a result of such activities.

12. International Covenant on Civil and Political Rights

Art. 1 (1) All peoples have the right of self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development.

Art. 6(1) Every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life

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APPENDIX III:
Methodology of the Health and Exposure Study

A. Study Population and Area

The Amazon region provinces of Napo and Sucumbios are the primary centers of oil-related activities. Inhabitants of these two provinces include members of several indigenous nations and colonists (indigenous and mestizo) who have moved from other areas of Ecuador, mostly from the highlands, within the last few decades. All groups have reported adverse oil-related health effects. CESR's team visited the oil-producing towns of Shushufindi, Sachas, and Coca as well as the indigenous Secoyan community in San Pablo, Sucumbios.

B. Selection of Water Samples

The team sampled potential sources of human exposure to crude via dermal contact and ingestion. These sources included water used for drinking, cooking, or bathing. The team also took water samples from separation pond waters. Information pertaining to each sample, including day, time, site where the sample was taken, possible route of exposure, and the nearest oil drilling activity, were recorded on a separate form. The tables in Appendix V describe the water sites from which samples were collected. Soil samples and samples of degraded crude from road surfaces were also collected. A sample of crude oil taken at Shushufindi was also analyzed for its polycyclic aromatic hydrocarbon constituents.

1. Produced water

Produced waters from the last separation pit were sampled because they drain directly into the ground and surfaces waters, contaminating nearby water sources. In addition, the team took one sample from a water source situated below a production station with separation ponds covered with dirt, a common practice in the region. A highly viscous, tar-like substance had seeped up onto the surface of the buried separation ponds and had also leached into the water downhill, formerly used for drinking.

2. Drinking water

Each household that was visited identified its drinking water sources: well water, surface spring, underground spring, or rain water. Rain water was sampled because it is considered the safest source of drinking water by local inhabitants. It is usually collected from the runoff of roofs of dwellings in plastic or metal drums left behind by the oil conpanies. These drums are likely to have once contained chemicals or other oil-related materials. Families in the regions of Shushufindi and Sachas complained of black rain, or rain contaminated by particles from burning waste pits. The rain water collected was therefore potentially exposed to contamination from the drum itself, from black rain, and from runoff sources (e.g. the roof, human hands).

3. Bathing and fishing water

The team sampled bathing and fishing water sources, identified as such through interviews or observation.

C. Water sample collection and analysis

All materials for collecting samples were obtained from ENSECO Laboratories in Cambridge, Massachussetts (for measurement of volatile organics) and from Battelle Ocean Sciences, Duxbury, Massachussetts (for measurement of PAHs). For PAH measurements, 500 ml of water were collected at each site. Each sample was stabilized with 1/2 ml hydrochloric acid to kill bacteria and other organisms. For measuring volatile organic concentration in the environment, triplicate water samples were collected. Samples were stored in ice chests containing dry ice and kept at an estimated 40 degrees Fahrenheit.

1. Quality control and quality assurance

A sample of water from the United States was carried throughout the trip and analyzed with the volatile organic samples as a field blank. One team member collected all samples to minimize variability in collection technique. All samples were coded on the collection bottle and on specialized forms, and chain-of-custody procedure was maintained throughout. Samples were delivered immediately on arrival in Boston to Enseco and Battelle Ocean Sciences Laboratories for analysis.

2. PAH analysis (Battelle Ocean Sciences)

Water samples for PAH analysis were extracted in two analytical batches. One liter of water ample was spiked with the appropriate surrogate compounds and serially extracted three times with methylene chloride (U.S. EPA Method 3510). The final extract was then spiked with internal compounds for quantitation and analyzed by gas chromatography/mass spectometry (GC/MS). A reference oil (North Slope Crude oil) was analyzed in the same batch as the samples for quality control. A procedural blank was also processed with each analytical batch.

Target PAHs, alkylatad PAH compounds, dibenzothiophenes and C_{30}17 (H),21 (H)-hopane were analyzed by GC/MS in the selected ion mode (SIM), modified EPA Method 8270 **(Appendix VI)**. A 2 microliter aliquot of the sample extract was injected into a gas chromatograph equipped with a high resolution capillary column (J&W fused silica DB5 column, 30 meters, 0.25 mm internal diameter, 0.25 micrometer film thickness) operated in the splitless mode. The temperature program and capillary column were selected to achieve near-baseline separation of all PAH compounds. Prior to sample analysis, a 5 point initial calibration composed of the 16 priority pollutant compounds was established, demonstrating the linear range of the analysis. Check standards were analyzed with every 10 samples to validate t6 integrity of the initial calibration. The method of internal standards using the average relative response factors (RRF) generated from the linear initial calibration as used to quantify the target PAH compounds. PAH alkyl homologues were quantified using the straight baseline integration of each level of alkylation and the RRF of the respective unsubstituted parent PAH compound.

3. VOC analysis (Enseco Laboratories)

Samples were analyzed at Enseco Laboratories in Alewife, Massachusetts by EPA method 8020. Ile data were certified by Enseco to have met its quality control standard, with recovery of a,a,a-Trifluorotoluene on average 90% or better.

D. Oil Related Human Health Effects

A physician specializing in Occupational and Environmental Medicine recorded the case histories and examined 12 family members living in the Napo region near Coca and in Sachas for health effects potentially related to oil exposure. Each person examined was asked about the duration of stay in region, age, gender, smoking habits, alcohol use, and source of drinking and bathing water, and then was physically examined by the physician. An attempt was made to select cases from those households whose drinking or bathing water had been sampled. Emphasis was placed on health effects relating to dermatosis and other skin rashes.

APPENDIX IV:
Detailed Case Studies

Description of selected cases is presented below:

Cooperativa Pimampiro - Oinchayacu River

On 26th July 1992, 5000 barrels of oil were spilled from the Central Station in Sachas into the Qinchayacu River. The Pimampiro community resides on this river near La Joya de los Sachas. Five individuals with a history of skin conditions were identified. Two experienced dermatitis after exposure to grossly contaminated water after the spill. A 22 year old mestiza female fell up to her waist into an oil-covered pool. By history, a vesicular eruption of her legs occurred two months later which resolved without treatment. A four year old mestizo male bathed in contaminated river water and 15 days later developed eruptions. He was treated with topical steroids. After six weeks the rash resolved. On examination in April, hypopigmented scarring of the back and buttocks was present. The other three individuals examined were 6, 35, and 57 years of age and had complained of chronic papulovesicular lesions of varying durations. All bathed in the contaminated river. While the first two appeared to be chronic, the 57 year old woman described recurrent episodes with vesiculation since the July spill. She reported sunilar rashes in the past with previous oil spills. On examination of her upper body fine papulovesicular lesions were present on the arms, back, chest, and breasts. By history, the legs and buttocks were also involved.

El Descano del Rio Sichillacuo

The family examined was residing on the banks of the Napo River and had been exposed to the July 1992 oil spill. According to Dr. Ruben Ribadeniera, director-physician of the regional government hospital (in Coca), the Napo river was covered from bank to bank for hours of navigation. During the spill a mother bathing her infant daughter in the river emerged covered with oil. Ile daughter was washed with soap to remove the oil, but shortly thereafter went on to develop prurutic, erythematous eruptions. Healing was slow, but eventually occurred with diffuse hypopigmentation over the buttocks and thigh. On examination in April 1993, diffuse hypopigmentation of the buttocks and posterior thighs was still present as were several healing papules. The families living in this area drank river water before the oil spill. Following the spill they were given large plastic barrels and metal roofing to create an alternative system for (rain) water collection.

Comuna Rumipamba (Daygma. 156 km)

Eighty adults and 140 children reside in this community, which contains three severely contaminated pools including sample 5, with 49,930 ng/L of total PAHs and sample 19, a bathing water source with 40.62 ng/L of total PAHs. The family interviewed reported death of livestock after the drinking from contaminated pool (sample 5). In addition, the family examined complained of chronic dermatitis. The two adult sisters had lived in the region for ten years. For the last six years each had a chronic pruritic eruption with small vesicles on the arms and legs. Case one was a 45 year Quecha female exposed by bathing in contaminated water and by walking barefoot on the oil-covered road. Her extremities were examined and revealed a papulo-vesicular dermatitis. Her 32 year old sister had the same exposure history with the exception that she used diesel to remove oil from her feet once a month. On examination, she had a similar rash on her lower legs and arms. Her eight month old daughter had been suffering from dermatitis since three months of age. On examination, the infant was found to have a papulovesicular dermatitis most prominent on her upper back and chest and less marked on her arms.

APPENDIX V:
DESCRIPTION OF WATER SAMPLE SITES

Produced waters sources:

#	Site Name	Description
1	Fanny, City Investing (effluent from third pond)	Near Mariann in Cuyabeno Reserve. There were three large separation ponds; on the first two there was a layer of foam. Discharge from the last pond was into wetlands which joined the Tarapoa River. A strong sulfur smell was present in the area, and natural gas was being burned.
1a	Duplicate sample of 1	Same as 1.
2	Shushufindi, North Station (effluent fi-om third pond)	Contained three separation ponds with oil layer being burned in the second pond, effluent from third pond flowed into wetlands; large amounts of salt-like substance attached to pipes and areas of discharge. Burninng of natural gas and strong sulfur smell.
3	Shushufindi, South Station (ditch)	Unable to enter production station, but effluent ftom last separation pond drained into a ditch. Ile drainage ditch was lined with a thick layer of oil, and the water drained into a nearby stream used for irrigation and drinking.
4	Sachas, Central Station (ditch)	Unable to enter production station, but collected water from ditch about 500 m from the separation pond. There was a concrete pond in the middle which was built after the July 26, 1992 oil spill into the Qinchayacu River.
5	Dayuma, oil-lined lagoon	This former water lagoon was situated below a Petroecuador station (previous owner was Texaco); the separation ponds had been covered but crude oil had been seeping into the water source for three years.

Drinking water sources (indicated by households)

#	Site Name	Water Source	Description
6	San Pablo	Spring	Situated on the east side of the Aguarico River; closest oil well 4km.
7	San Pablo	Spring	On the opposite side of sample 6.
8	128 km South of Coca	Spring	Used for drinking when there is no rain water.
9	Shushufindi	Well	Situated near the Southeast Station; the well was concrete and 20 feet deep; in 1990 hydrogen sulfide gas flooded the area.
10	Sachas, Pimampiro	Well	Near the Qinchayacu River; concrete well.

11	Sachas Central (black drum)	Rain water	Situated near Sachas North Station; both this and sample 12 containers were purchased from oil workers and contained chemicals; they were washed prior to holding rain water; the household was part of a garage.
12	Sachas Central (beige drum)	Rain water	Same as sample 11.
13	San Pablo (Texaco drum)	Rain water	Secoyan household; water was collected in a old Texaco drum through a thin cloth that acted as a filter.

Bathing and fishing water sources (samples collected from edge of each source)

#	Site Name	Description
14	Dureno River	Sample collected under bridge a few km from Dureno, Petroecuador station; there was no visible oil contamination, nearest source was the road; conflicting description of contamination from users; some people drink water from the river.
15	Shushufindi River	Sample collected 200-300 feet beyond where Reiiefia crosses the Shushufindi river; soil was dark with oily sheen and dead plants lined the edges of the river, Secoyan elder said that these dying plants are sew only on this river.
16	Eno River	Half hour north of Shushufindi; the, bridge was common docking site for indigenous groups who purchased goods from nearby store; nearest source of oil was the road and boats with diesel engines.
17	El Dorado River	Sample collected 5 km south of Coca near a bridge; nearest oil source was the road; closest production station was 9 km south; people used this river for drinking, bathing, and fishing.
18	Qinchayacu River, (undisturbed)	Pimampiro community in Sachas; in July 1992, there was an oil spill and according to the government 5000 barrels of crude were discharged into the river, oil also on road.
19	Dayuma, bathing pool	This pool was 100 yards south of sample 5 and was utilized by the same family for bathing.
20	128 km south of Coca, former bathing pool	Situated right below a Petroecuador production station and diesel processing plant, this body of water had not been used as a bathing site for 1.5 years.
21	Shushufindi North Station stream, former bathing pool	Produced waters from North Station from 1 km upstream drained into this pool; there was an oil sheen on water surface and households reported high salt content.
22	Stream, former bathing site	Stream behind sample 10; plants and water surface were covered with oil; household reported regular oil spills.

APPENDIX VI

Target organic analytes, and reporting limits for water (compounds in bold are EPA priority pollutant PAHs)

GC/MS Target Analytes	Spiking Compounds and Reporting Limits
Napthalenes C_1-napthalenes C_2-napthalenes C_3-napthalenes C_4-napthalenes Biphenyl **Acenaphthylene** Dibenzofuran **Acenaphathene** **Fluorene** C_1-fluorenes C_2-fluorenes C_3-fluorenes **Anthracene** **Phenanthrene** C_1-phenanthrenes/anthracene C_2-Phenanthrenes/anthracene C_3-phenanthrenes/anthracene C_4-phenanthrenes/anthracene Dibenzothiophene C_1-dibenzothiophenes C_2-dibenzothiophenes C_3-dibenzothiophenes **Fluoranthene** **Pyrene** C_1-fluoranthenes/pyrenes **Benzo[a]anthracene** **Chrysene** C_1-chrysene C_2-chrysene C_3-chrysene C_4-chrysene **Benzo[b]fluoranthene** **Benzo[k]fluoranthene** **Benzo[a]pyrene** Perylene **Indenol[1,2,3-c,d]pyrene** **Dibenz[a,h]anthracene** **Benzo[g,h,i]perylene**	GC/MS SIS compounds: naphthalene-d_8 fluorene-d_{10} chrysene-d_{12} GC/MS RIS compounds: acenaphthene-d_{10} phenanthrene-d_{10} benzo[a]pyrene-d_{12} <u>Reporting limit</u> PAH: 10 ng/L

APPENDIX VI(a)

PAH fingerprinting patter of production waters from Shushufindi North Station (2) compared to samples from San Pablo stream (6) and Shushufindi well (9)