

THE OIL FLOWS, THE FOREST BLEEDS

1. Oil in Fragile, Sacred Lands

The coan-coan, spirits of the subterrean realm, give our shamans power to heal. Our shamans tell us that the coan-coan suffer just like we do as a result of the oil company's presence. The oilmen have destroyed a lot of coan-coan.
Cofan Community, Doreno, Ecuador

2. The Oil Flows, the Seas Bleed

At the beginning all was darkness and silence. Only the sea existed. She protected the memory of all that was to come.
Kogui philosophy

3. Pipelines that Cross Land and Sea

According to the Buddhists, when we feel the desire to possess all natural powers that we have discovered, we are controlled by greed. Unocal and Total are multinational companies who are concerned only about their financial interests, and they are prepared to exploit any and all natural resources in the name of progress. Blinded by greed, they don't care if people suffer as a result of their operations.
Testimony of Sulak Sivaraksa on the Yadana gas pipeline.

4. Opening the Frontier

We all know that oil is a finite resource that one day will run out. That communities and individuals are the object of violence due to petroleum is a concern that doesn't arise. Why doesn't the world call a truce in order to discuss this destructive development model?
Nnimmo Bassey

5. Refineries: The End of the Process

Our law is that no one must take more than he or she needs, we are like the earth that provides nourishment for all living things, but that doesn't eat too much because if it did all things would come to an end. We must care for, not mistreat. For us it is forbidden to kill with knife, machete, bullet. Our arms are thoughts, words; our power is wisdom. We prefer death rather than seeing our sacred elders profaned.
U'wa philosophy.

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THE BEST PLACE IN THE FOREST:
OIL PRODUCTION IN COFÁN TERRITORY

Cofán Community of Dureno, Ecuador

Historically, we lived the along the length and breadth of the Aguarico and San Miguel river basin, all of us being a single people, the Cofán people.

We never had problems with game or fish being scarce. We had our own way of organizing: contact between a person and nature, lead by the chief or curaca, who was in charge of guiding the people.

When Texaco arrived, along with the companies that did the seismic exploration, the irrational destruction of our territory began. They opened roads, destroying immense areas of forest along with plants that provided food and medicines.

Irrational deforestation by the colonizers and contamination by lumber and oil companies brought about the contamination of our rivers, so that the fish were exterminated and the animals of our forest disoriented, and they sexually abused our women.

Now the entire Cofán territory is fragmented. We currently live in five communities along the Aguarico River and another one on the San Miguel.

The communes are called Dureno, Duvuno, Chandia Na'en, Sinangüé, and Zábalo; residents of two have legal title to their land and those of the other three have an agreement with INEFAN (National Forestry Institute). Together, they cover 84,071 hectares.

Dureno covers 9,571 hectares, with the northern border formed by the Aguarico River; the southern, cooperatives established by settlers; the eastern, the Aguarico and Pisurie rivers; and the western, the settler cooperatives of Riberenos and Flor de Mayo.

We marked the boundaries of our territory in 1972 in order to deal with an avalanche of settlers.

The commune of Dureno has four populated centers: Baburoe, Pisurie Canque, Tuta nai'qui (Aguas Blancas), and Dureno.

Today, there are 450 of us living in Dureno. Our diet is based on gathering, hunting, and fishing. We also have 500 hectares planted in crops. Each family has an average of five hectares on which to produce their own food. But the actual area is less due to the damage caused to the land by the Aguarico River.

The basis of our diet is meat, though now we are only able to eat it occasionally. As a result of the loss of our territory, we have been obliged to buy food--sardines, rice,

and noodles--to substitute especially for what hunting and fishing used to provide.

On average, a family spends 200,000 sucres on food per month. In order to depend entirely on gathering, hunting, and fishing, those of us who live in Dureno estimate that we need a clean river and an area of 100,000 hectares.

With oil spills in our rivers and wetlands, and contamination of the air, our people have begun to suffer a variety of skin, respiratory, and stomach infections, as well as bleeding, miscarriages, and stomach and bone cancers.

Our health has been affected to the point that traditional medicine is no longer adequate and, little by little, we have been forced to turn to Western medicine.

OIL ACTIVITY IN THE COMMUNE

The commune is surrounded by oil wells in the Guanta, Atacapi, and Parahuaco fields, and within our territory is the Dureno 1 well.

The Dureno Cofán Commune is the destination of substances discharged by oil activities in three rivers surrounding the commune: the Aguarico, the Pisurie, and the Aguas Blancas.

Upriver from the commune, the Aguarico discharges come from:
--the Bermejo field which discharges its waste products into a number of rivers and wetlands that flow into the Aguarico at Km. 53 on the Via Quito;
--the North Central Station of the Lago Agrio field which discharges into the Teteye river that flows into the Aguarico at Km. 10.5 on the Via Tarapoa;
--the Parahuaco field (wells and station) that discharges into wetlands which, in turn, flow into the Aguarico at Km. 19 of the Via Tarapoa;
--the Atacapi field (wells and station) which discharge their waste products into different wetlands that flow into the Dureno River which, in turn, flows into the Aguarico.

Discharges in the Pisurie River come from:
--The Dureno well and station from which wastes are dumped into a ravine and from there travel to the Pisurie Chico and, eventually, into the Pisurie Grande;
--the Guanta station, located at Km. 24 of the Via Guanta (in the Triunfo pre-cooperative). The wastes from the separation of crude are discharged into a pit by means of four pipes attached to two storage and separation tanks. The wastes from the station pass through a system of three pits and are evacuated directly into the environment, forming a filthy lagoon that is connected to the Aguas Blancas Chico River which, in turn, discharges its waters into the Pisurie;
--wastes from Guanta wells 1, 2, 3, 4, 5, 6, 8, 10, and 11 come from pits and from maintenance activities at the wells, which flow into wetlands which flow, in turn, into the Pisurie.

Discharges into the Aguas Blancas River come from:

--Guanta well 9.

As is evident, conditions in the Aguarico are extremely serious and they can only be solved through a change in the entire oil installation waste discharge system.

However, to assure the well-being of the Cofán people, sources of water must be cleaned up immediately. In this regard, we propose recovery of the Pisurie and Aguas Blancas Rivers.

HISTORY OF THE DURENO WELL/STATION

Texaco-Gulf carried out seismic exploration activities in the Napo concession in the mid-1960s.

Dureno 1 was drilled in 1969. This is one of the first 10 wells opened in the Amazon.

First they drilled the well and, years later, they opened the road connecting Guantas and Dureno with the Tarapoa road.

The well is located 100 m from the Pisurie River and about 1 km from the Pisurie Canque populated center.

There is a small separation station at the well, consisting of two storage tanks, two flares, and a 15 by 13 meter waste reception pit, nearly square with rounded corners. The platform covers 1 hectare.

The pit is connected to a ravine by a trench, and from the ravine the wastes migrate to the Pisurie Chico River which flows into the Pisurie Grande, passing the population of Aguas Blancas.

According to sources at Petroecuador, the well is 10,200 feet deep, a little more than 3 km, and is located on the Napo and Hollin geological formations.

The first production tests took place in July 1969. About 250 barrels of crude were found. Later, the company did more reconditioning tests because there was a lot of water (60%) in the well. In all the tests, crude flowed freely. The well went into production in 1984, when the road was opened.

Before the road was opened, for each reconditioning test they needed helicopters. We were afraid to approach and the animals we hunt were disoriented.

When they came to do tests to see if there was oil, they hired Cofán as guides and hunters. On many occasions, company employees from outside abused our women.

In 1987 Texaco wanted to put into production a well in the center of commune territory. They opened a road that started

at the Via Guanta, at the Guanta 8 well. They opened four km of gravel road and cleared the vegetation for 3 additional kilometers. The community stopped the project.

ENVIRONMENTAL STATUS OF WELL SITES, SURROUNDINGS, AND THE COMMUNITY

A number of studies confirm the contaminated state of the area in which oil activities have taken place (Kimerling, 1993; Acción Ecológica, 1994).

Those who have carried out these studies agree that the following conditions exist:

- contaminated water systems;
- contaminated soil around well sites, stations, and roads;
- deforestation;
- erosion and sedimentation;
- salinization of soils, especially around pits and areas subject to spills;
- air pollution;
- loss of biodiversity;
- extinction of species.

The impacts are critical and cumulative.

In the case, specifically, of impacts produced by the Dureno Well/Station, the studies previously cited and testimony from community residents reveal the following:

--Seismic testing carried out on at least 10 occasions led to the deforestation of about 10 hectares. Further deforestation resulted from settlers encouraged by the possibility of jobs with the oil industry, leading to a reduction of our territory.

--Drilling resulted in tons of wastes in the course of opening a hole 10,000 feet deep with a diameter of ten inches. We estimate that the activity produced 200 cubic meters of dirt and stone containing toxic wastes, that is, enough material to fill 25 dump trucks.

--Operation of the well has produced approximately 800,000 barrels of waste in the form of production water. In addition, around 3,000 barrels of crude were spilled before the well went into production, and another 3,000 barrels of wastes were produced by 12 reconditioning tests.

--The opening of 20 km of road destroyed 5 areas of permanent wetlands and 10 of seasonal wetlands.

--Oil company employees regularly spread crude on the road to keep the dust down.

IMPACTS ON THE FAUNA IN THE PISURIE RIVER

According to community residents, the Pisurie River used to contain 18 species of edible fish. Three species remain (a

reduction of 83%).

Of the five bird species that used to live along the river, only two are there today. Among large birds, 48% have disappeared. As for other animals, such as the capybara and the tapir (which has virtually disappeared), they come out of the river covered with oil.

IMPACTS ON VEGETATION

Deforestation has led to the destruction of edible and medicinal plants as well as those used for crafts. Cofán territory has always been characterized by its high biodiversity. In Cofán territory alone, 292 species belonging to 200 genera and 84 families have been identified (Cerón, 1988).

By way of example, in one hectare of natural forest, we found 20 edible plants and 50 medicinal plants.

There are products like the Chirisi which is no longer available and which we used to use for hunting.

Itinerant agriculture is no longer possible because our territory is small and we are being pressured on all sides. This leads to poor soils.

The frequency of harvests and the yields of fruit trees have diminished notably as a result of oil activities. Fruit-bearing species produce for a short period and then their leaves begin to dry up and turn yellow. In addition, pests affecting plantain, papaya, guava, coffee, cacao, and citrus trees have been introduced.

The Dureno well directly affects the community in various ways due simply to its location:

- 1 km from dwellings;
- 1 km from school;
- 20 meters from water sources;
- 1 km from agricultural areas;
- 1 km from recreation sites (soccer field).

According to international norms, oil activities one kilometer or less from sites of human activity represent a high risk.

ECONOMIC ANALYSIS OF OIL PRODUCTION AT THE DURENO WELL/STATION

According to industry sources, seismic studies are the most costly part of the oil production process. In Peru, for example, Shell invested 12 million dollars in the drilling of a single well.

It cost 653,970 dollars to drill the Dureno well, and more than 2 million dollars were spent on 14 reconditioning

operations.

The opening of roads is an additional expense.

Cumulative production has reached 2.5 million barrels of oil, approximately 1 million barrels of wastes (40% of oil production), and 700,000 cubic feet of gas.

The real figures for this well are as follows:
--approximately 16 million dollars invested;
--approximately 35 million dollars in earnings;
--costs unaccounted for (waste management).

The Dureno well has created tremendous problems for the Cofán, threatening their very survival. Nevertheless, total production from the well accounts for a mere 6 hours of oil consumption in the United States, where Texaco is based.

The Cofán Dureno well is nearing the end of its productive life. Based on dates for reconditioning, it will function for one more year after which time, in order to maintain production, a mechanical system would have to be added that operates on electrical energy or its equivalent in diesel amounting to about 50 gallons a day (figure based on the Guanta well rig).

ANALYSIS OF OUR RIGHTS

The principal right on which the existence of the Cofán people is based is the First Right, also known as the right of primogeniture. That is, we have acquired rights over our territories because they have belonged to us before the establishment of the Ecuadorian state.

The First Right covers rights to territory, its use, its conservation, and its administration; the conservation and development of our own forms of social, political, legal, and collective organization. It also includes the right to maintain and strengthen our own spiritual and material relationships with the land, territory, water, resources, biodiversity, and subterranean world.

We are a forest people in need of a vast territory in order to develop according to the dictates of our culture and our knowledge.

According to the nation's laws, the state must guarantee the right of all citizens to a healthy environment. And according to a series of laws, no one has the right to contaminate the environment or to destroy the place upon which other citizens depend for their well being.

The various laws and contracts which prohibit contamination of the environment are as follows:

--Constitution of the Republic, Article 82;
--Concession agreement, Decree No. 205 A Ord. No. 186 (February 1964);

- Law of Hydrocarbons No. 1459 (September 1971);
- Texaco-Gulf contract (June 1972);
- Supreme Decree No. 925 (August 1973);
- Reform of the Hydrocarbon Exploration and Production Law, No. 530 (April 1974);
- Law for the Prevention and Control of Environmental Contamination, Supreme Decree No. 374 (May 1976);
- Hydrocarbon Code, Decree No. 2967 (November 1978);
- Hydrocarbon Law Reform, Decree No. 101 (August 1982);
- Hydrocarbon Law No. 19775 (June 1983);
- Hydrocarbon Law No. 19779 (June 1983);
- Regulations for the Prevention and Control of Environmental Contamination Related to Water Resources, Decree No. 2144 and No. 204 (June 1989)
- Environmental Law (recently approved).

According to the following international laws, States must guarantee environmental equilibrium, conservation of biodiversity, and the rights of peoples:

- Biological Diversity Agreement;
- Framework Agreement on Climate Change;
- Agreement 169 of the International Labor Organization (ILO).

In the past, we never had to prohibit contamination or the destruction of nature as our cultural practices were based on respect for nature and the subterranean world. However, we have now had to establish laws and norms to maintain our culture and our territory, including prohibitions on hunting and the exploitation of lumber for sale, and, in particular, the prohibition of petroleum production in our territory.

COFÁN CULTURE AND COSMOVISION

We have maintained our own culture and our way of remaining in touch with nature through myths, rituals, and beliefs.

The presence of this well in our territory, besides affecting our health and wellbeing, wounds us deeply because it is a violation of the underworld where the Coancoan, with their magic power, live.

In the past we made contact with the Coancoan through yaje [a hallucinogen prepared from the bark of a tree]. One time a Cofán was hunting, following a herd of peccaries, getting farther and farther away, when he saw that they disappeared because they had gone into a hole. He followed them into the hole and there he found beautiful trees, rivers with plentiful fish, lots of game such as monkeys, tapirs, peccaries, deer, turtles, etc. The Coancoan are masters of the animals of the forest.

When the oil company came, it destroyed almost all the Coancoan. The Coancoan gave all the Shamans the power to turn into Coancoan and to bring game to the people. The Coancoan gave the Shaman the spiritual power to heal.

The effect on the world of the Coancoan weakened the power of our Shamans and the cultural dignity of all Cofán.

The oil that is in natural form under the earth is like the body's blood or like the energy that keeps the earth alive. By bleeding our territory, we are all weakened and our life and that of our children is endangered.

In order to close the well, the Shamans have to undertake the great task of healing the earth and recovering their contact with the wisdom and power of the Coancoan.

Note: On October 12, 1998, residents of the Dureno community, and 500 persons from other communities, took over the well, demanding that it be closed. Their demands were:

1. Closing of the well site and removal of infrastructure and waste materials.

The state, the municipal government, and the state oil company Petroproduccion, should immediately proceed to remove the infrastructure and materials from the Dureno well-station. This includes tubes, metal, cement, stones, fencing material, and garbage.

All wastes from the pit should be removed, and said pit should be cleaned to remove all toxins and salt, and should then be covered.

2. Declaration of a State of Emergency for the Pisurie and Aguas Blancas Rivers, and the corresponding cancellation of sources of contamination.

The discharge of all types of wastes into the Pisurie and Aguas Blancas rivers is absolutely prohibited. Discharge from the stations and wells of wastes washed into the Pisurie and Aguas Blancas must be suspended.

A Vigilance Commission will be created, made up of members of OINCE and community leaders, in order to verify compliance with this disposition.

Physical and chemical studies of sediments and bioaccumulation will be undertaken in order to verify the health of the river.

3. Restoration of the well site and surrounding area

The restoration of affected areas requires a number of activities. First, all infrastructure and materials foreign to the zone must be removed. The soils at the well site, and in the waste pit and the ravine, must be cleaned in order to eliminate oil residues and salts.

The surrounding area will be reconditioned so that the natural vegetation of the zone will return. No one, except

for us and persons expressly authorized by us, will be allowed to enter the former well site.

The road providing access to the well will be closed beginning at the boundary of our territory.

4. The Social and Economic Recovery of the Cofán People

We have a history others would like to forget, a past that must be respected. We have given land, food, materials, and labor to what they call the development of the country. In this process, we have become impoverished, threatened with the possibility of ceasing to exist as a people.

The territory of the Dureno Cofán Commune must be expanded and, to that end, the state must earmark sufficient funds for the purchase of land. In order to accomplish this, a study must be carried out to identify in what manner and in what area our territory will be extended. This study must be undertaken with the full participation of OINCE and the authorities of the Dureno Cofán Community.

The social and economic recovery of the Cofán people requires two types of activities by the state. On the one hand, all activities that affect the integrity of our territory must be stopped. On the other, economic incentives and support must be created for the development of our own systems of planting, health, education, and indigenous technology.

We demand an investment 100% greater than that which is invested in the rest of the nation's citizens for approximately 30 years, because our resources have been destroyed and we must undertake actions to recover them.

Subsequently, an agreement was signed with the Ministries of Government and Environment, in which the state agreed to:

1. Remove the Dureno 1 well and the military post, simultaneously, from the Cofán community.
2. Begin monitoring to establish the degree and the sources of contamination of the Aguas Blancas and Pisurie Rivers, removal of sources of contamination, environmental restoration with the immediate removal of the mini-station, flares, and storage tanks, and covering of the waste pit.
3. Study of the request for the legalization of Cofán communities who do not have deeds to their lands, and the solution of problems posed in the Proposal for the Recovery of Cofán Territory.
4. In terms of the definitive closing of the Dureno 1 well, the parties involved agreed to undertake a technical study to determine the feasibility of a definitive closing, with the participation of the Cofán people.

5. The Vigilance Commission of the Cofán people will remain active throughout the implementation of these tasks.

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THE ONLY OPTION: COLLECTIVE SUICIDE
The U'wa People and Occidental

Mónica del Pilar Uribe Marín
Signos Comunes - Colombia

THE U'WA PEOPLE

The U'wa, whose name means intelligent people who know how to speak, belong to the Chibcha linguistic family. This is one of the few peoples in Colombia who have managed to survive and who continue to actively practice their ancient culture.

Most of the U'wa live among the inaccessible peaks of the Sierra Nevada of Cocuy-Guican. From this refuge, they have watched as their sacred lands--which once included the present-day populations of Chinacota, Malaga, Oiba, Chima, Bucaramanga, Chiscas, Chita, Salinas de Chita, Guican, and the lowland plains of Tamara, Tame, and Morcote--have disappeared. In the past, these lands also included the Eastern Cordillera, from the Sierra Nevada of Cocuy to the Sierra Nevada of Mérida in Venezuela.

Of the eight original groups or clans that lived in the high, mid-level, and low lands of the Sierra Nevada, the Kubaruwa (Cobaría), Kaiboka, and Tagrinuwa have survived as clans; the others have organized into more or less dispersed families; and two are now extinct, the Biribir and the Guicanes, who used to live in the municipalities of Chiscas, Guican, El Cocuy, and Chita.

Today the U'wa live in a large part of the so-called Sarare region (in the departments of Arauca, Norte de Santander, Santander, Boyacá, and Casanare), which extends from the edges of the Sierra Nevada of Cocuy and the foothill plains in the south to the valley of Pamplona in the north.

Although their settlement is located on the eastern flanks of the Sierra Nevada of Cocuy-Guican, this is not a permanent residence: in Boyacá they live in the municipalities of Cubar and Guican, between the Margua River and the highlands of the Sierra Nevada of Cocuy; in Arauca, they reside in the municipalities of Saravena, Fortul, and Tame, between the Cusay and Bojab Rivers; in Norte de Santander, in the municipalities of Tolio and Chitag; in Santander, in the districts of Cerrito and Concepcion; and in Casanare, on the left bank of the river which is named after them, they live in the municipality of Hato Corozal.

CHRONICLE OF A DEATH FORETOLD

The events that have given rise to one of the most heated debates about indigenous territories began on April 7, 1992 when Ecopetrol approved in part a contract with Occidental of Colombia (Oxy), requiring the company to carry out seismic studies before June 23, 1996.

In the contract, this project was referred to as "Seismic Exploration of the Samore Block," and included the municipalities of Saravena, Tarne, and Fortul (in Arauca), Cubar (Boyaca), and Tolio (Norte de Santander), affecting 8,934 hectares of which 25% lay within U'wa territory.

In order to comply with legal requirements, on May 14, 1992, Oxy presented the necessary papers to what was then called the National Institute of Natural Resources (Inderena), in order to obtain the environmental license that would permit the company to enter the U'wa zone.

Their first step was an effort to comply with a demand by the Ministry of the Environment that they consult with indigenous communities, as established by Colombia's constitution (the Ministry was following the opinion offered by Inderena).

Although Oxy claims to have held 30 meetings to inform and consult with the U'wa, these were not accepted as the equivalent of the consultation demanded by the Ministries of the Environment and Interior.

The U'wa, for their part, claimed not to have been fully notified and further said that the meetings were biased, as a result of which they decided to hold a meeting of all U'wa communities on January 10 and 11, 1995 in Arauca to inform all members of the U'wa people about what was happening. The result of the meeting was the refusal by the majority of those present to any profaning of their lands and, specifically, radical opposition to any type of oil exploration and exploitation in lands to which they had legal title.

In spite of this, on February 3, 1995 the Ministry of the Environment granted Oxy the environmental license requested.

Since then, the peace which the U'wa enjoyed has been shattered, and the people have been obliged to fight to save not only their physical world but also the sacred--their cosmogony, their customs, and their very conception of life. At first, theirs was a lonely struggle, but with time it has been the focus of national and international interest, and the center of a debate in which those who have cast their lot with the indigenous community face those who believe that development is vital, even if the price to pay is the total elimination of a unique culture.

On March 31, 1993, the U'wa of Sarare publicly charged that Gran Tensor, a subsidiary of Occidental of Colombia, had not complied with its promise to respect the boundaries of the reserve, and at that point they refused to allow any further exploration or any eventual exploitation because they did not want to experience again the tragedies of Caño Limón, of the coal mining activities in Guajiri, or the gold mining in the Chocó, where the mirage of development had left only fleeting prosperity and obvious environmental destruction, violence,

and misery.

After having exhausted various channels (the ministries of Government, the Interior, the Environment, and the Presidency of the Republic), the U'wa went to the Public Defender's Office to find out whether they could revoke the license granted to Occidental. The Public Defender's office initiated a guardianship action before the Superior Court of Santa Fé de Bogotá, alleging that the government's decision "violated the right to territory, self-determination, language, life, and the survival of the community" and "threatened the right to participation, life, and the cultural integrity of the U'wa indigenous community."

The court decided in favor of the U'wa and asked that their fundamental rights be protected, that the company undertake a consultation with the community, and that the license be declared void. But Ecopetrol and Occidental appealed to the Supreme Court which overturned the decision in favor of the community.

Nevertheless, the Public Defender's office went to the Constitutional Court which agreed to hear the case. In their decision, handed down on February 3, 1997, the judges recognized that no consultation had taken place and gave the Ministry of Environment and Oxy 30 days to carry one out.

Simultaneously, in the Council of State, a discussion took place as a result of which, on March 4, the company's environmental license was declared valid based on the priority rights of "the interests of Colombians in general, the dominion of the State over national territory, and state ownership of the sub-soil," over any other consideration, including the rights of indigenous peoples which are protected by the same Constitution, a matter which makes of our laws a sad paradox.

In addition, the court declared the consultation Oxy claimed it had carried out valid and gave the company the go-ahead to enter U'wa territory to fulfill its contract.

But the U'wa were not intimidated and, on April 28, they sent a long letter to Ambassador Jorge Taiana, the executive secretary of the Interamerican Human Rights Commission, asking that he request that the Colombian government suspend the license, adopt measures to avoid irreparable harm to the indigenous community, and, during his next trip to Colombia, that he visit the U'wa people to confirm the facts of the case.

THE COST OF THE STRUGGLE

This hasn't been an easy fight, especially given that the U'wa people have been going ahead with the process of expanding their territory, turning it into what is known as the Unified Protectorate of the U'wa, a process begun at the Colombian Agrarian Reform Institute (Incora) on March 31,

1993.

And while relations between the government and the community have been diplomatic, it is evident that the latter feels it has been deceived by the attitude of the State and believes that it is violating norms established in the corpus of Indigenous Laws, the Constitution of the Republic, and Law 99 (of the Ministry of the Environment).

As usually occurs in these cases, mechanisms of participatory democracy (consultations, public environmental audiences, oversight committees...) are carried out, to "defend" the rights of persons, but in the end licenses are granted and mega-projects are permitted without regard to the arguments against these activities and the pain suffered by many communities.

There have been many cases like this one, involving attempts to get a favorable resolution through the courts, a collective struggle, demonstrations and protests but, in the end, the government "defends development," that is, the arrival of multinationals and large local enterprises which extract natural resources and, when they leave, leave behind a shadow of misery and the total absence of natural wealth. This is the case of the U'wa, a people who have offered a multitude of reasons for why the oil company should not be allowed into their territory.

However, though it has been a long and exhausting battle, the U'wa have achieved an amazing degree of solidarity. On the one hand, there are the constant activities of the "Colombia Is U'wa Committee," made up of environmentalists and journalists, which other groups who identify with the U'wa cause have joined.

And, on the other, is the Public Defender's Office, human rights and environmental organizations, and support from ecologists and indigenous groups from all over the world, whose numbers the community hopes will increase. Sadly, the Colombian government and Oxy remain unmoved, and the public in general is constantly fed misinformation the purpose of which is to confuse and to discredit the struggle of the U'wa.

One proof of this are the constant insinuations and rumors spread about the presence of Colombian guerrillas in the struggle. On one occasion, Stephen T. Newton, president of Oxy, told a reporter for a local newspaper that company employees had been surrounded by the guerrillas and that the traditional territory of the U'wa was "the home of the priest Perez" (commander of the subversive group known as the Army of National Liberation).

This type of statement causes indignation among the U'wa: "It's not the first time that the company has argued that the U'wa people, by defending our rights, are acting under pressure from the guerrillas. In 1994 members of our

Principal Council and the advisors of our national organization were charged with having ties to subversive activities."

In addition, two very delicate matters are involved: Some members of the community have received death threats, a fact repeatedly and publicly condemned by individuals such as Lorenzo Muelas, a senator and representative of Colombia's ethnic minorities and one of the greatest defenders of the U'wa cause.

As Armando Tegría Rinconada, a member of the community, explains, those who defend the U'wa are categorical in their support, and thus "living the same experience of the indigenous peoples on the foothill plains surrounded by the guerrillas, the military, and the paramilitary bands."

Another factor is that within the U'wa are a number of "whitened" Indians who have lost their cultural identity and who, having been bought by the multinational, agree with the need for oil production; the company needs the support of these individuals in order to safely enter U'wa territory.

This tactic has been revealed in press releases and interviews. As a result the Principal Council of the U'wa insists that members of the Association of Principal Councils of the U'wa are the only persons authorized to represent the community. This body is fully representative, including the Councils, all groups within the U'wa, the Werjays (priests), and all members of the community who wish to express an opinion, speak, and transmit their wishes (all decisions are made by consulting with the entire community).

The situation is uncertain today. The U'wa hope that the Environmental Impact Study will be declared null and void. (That study, in the hands of lawyers, is said to contain inconsistencies, and was carried out in a record five day period.) The U'wa are also waiting for the decision of the Interamerican Human Rights Commission. And they also hope that in the upcoming elections, candidates for office take the side of the U'wa. Finally, they hope that Congress takes up the debate on May 14.

But above all, the U'wa hope that the argument put forth by some Ministers of State, that the wellbeing of 38 million Colombians is more important than the needs of five thousand U'was, will be rejected in favor of the belief that the rights of indigenous peoples--as well as all communities which opt for their own roads to development, for their own model--must be respected, including their ancestral rights to territory and to life.

U'WA THOUGHT

The U'wa have many reasons for opposing oil companies and all others that exploit renewable and non-renewable natural resources. Collectively owned property is, without doubt,

important to the social life of this community, as is their ancestral knowledge of nature, their respect for the environment, their customs, and their medicinal practices.

Coca and yopo, "living elements which came from the heavens," are the tools they use to study the natural world. They believe that oil, or Ruiria, has blood and is the substance that gives strength and life to them, the trees, the world.

In addition, it is the "mother of all the sacred lagoons..." "He [oil] is working; emeralds, gold, coal, all of these resources are untouchable, they are alive, they are working."

Thus, the U'wa have their own way to control the environment in which they live, and their behavior toward their surroundings is explained in myths, beliefs, ways, and customs as ancient as the origins of their world. Their social and cultural world is organized according to their model of the creation.

For this reason, their daily and ritual practices are intended to care for the earth that Sira (eternal father) and Rairia (heavenly mother) have given them. These, and others among their pantheon of divinities, are charged with creating all that is visible.

Thus, to speak of territory, law, customs implies an exchange with U'wa cosmogony and their cosmovision, an analysis of the past, an attempt to see how their way of thinking is constituted and how it has made possible a relationship based on harmony with nature and among themselves for thousands of years.

They believe that the earth is "a living being and their mother," and on this belief their agricultural practices, their hunting, fishing, and gathering activities, and their ritual behavior are based.

They say that they could use the land in a variety of climates to get the food they need,, but that this is difficult now because the riowa (white) "has claimed the best lands."

And though this is one of the peoples who has been least affected by the outside world, many of its members have changed their traditional practices of planting, assimilating those of the white "which are more damaging because they exploit the earth too heavily, they burn or create pastures."

Those who continue to use traditional practices opt for the "socola": large trees and those that provide foodstuffs and keep the soil in place are not felled so that they will always provide nourishment. With traditional celebrations they assure a climate appropriate for the growth of plants and the development of animals and an absence of diseases so that the U'wa may live in harmony.

"But the riowa don't want us to move forward, they are constantly undermining our projects; they block the way we want to follow, they deny us our autonomy."

The U'wa see colonization as one of the consequences of the exploitation of oil by Occidental, and the damage occurs on a daily basis and at every level of the U'wa people, beginning with the disappearance of fauna and flora and ending with the loss of identity, the collapse of their traditional culture and the introduction of incurable diseases which, in certain communities, have become widespread epidemics.

At the same time, the question of territory is one of life or death because it involves access to resources for an adequate level of nutrition and because it is tied to the spiritual life of the U'wa.

The U'wa know that today they are threatened with hunger and serious health problems, and many already suffer from tuberculosis. It is for these reasons that they insist that the indirect impacts of oil exploitation be analyzed (migration, inflation, violence, sickness...).

In the oral tradition of the U'wa, the boundaries of their ancestral territory are intimately tied to hills, lagoons, rivers, and people are conscious of traditional boundaries.

Their territory extends well beyond the reserve. "When we talk about territory, we have to do so from the perspective of the time when we hadn't been invaded by settlers, we have to study the matter deeply and see the relation between the U'wa concept of our boundaries and our cosmovision and behavior: when Yagshowa was organizing, there were no gringos, no Americans or Spanish; there were only the indigenous people, the Werjaya.

"As soon as Yagshowa had finished, the U'wa emerged. The Eternal Father poured oil throughout the world, but within limits; he knew where the Spanish and the rest would arrive; for that reason he made this territory untouchable: here they could not touch..."

"...In this sense there are 'greater and lesser sacred places' (some lagoons are untouchable and no indigenous persons approach them out of respect), but the places that for the U'wa are sacred, the State considers vacant lands, and the settler considers forest, untamed land; the practice of the government, of the riowa, is destructive and disrespectful, very different from what the law itself requires".

"...We haven't committed the insolence of violating the churches and temples of the Riowa, but they have thrown filth into our lagoons and dried them up... Because the Law of the U'wa, the Law of Life, the Law of the World, is sacred and inviolate, we don't understand why the government and Oxy in general play with the law of the U'wa and with the others.

That's why the U'wa cry out: `Why do they not respect the right we have to be and to live differently from the Riowa?'"

The U'wa want to live in their world, not to "contaminate themselves" in the land of the white people, nor abandon the joy that has always been a part of their own life rhythm. And the beliefs of the U'wa are not simply an argument in this particular struggle, but the basis for the building of a new model of development in light of the national and global environmental crisis in which high levels of depredation and exploitation of natural resources are evident.

It is for this reason that the cosmogony of the U'wa goes beyond a particular place: it is part of a restating of the relationship between society and the natural world imposed by the Western world.

Note: The courageous struggle of the U'wa people has, up to now, prevented the entry of the transnational Occidental Oil Company into their territory.

ALL WE WANT IS TO LIVE IN PEACE:
THE ASHANINKA, NOMATSIGUENGA, AND YANESHA PEOPLES
OF THE FORESTS OF CENTRAL PERU, AND OIL ACTIVITIES

Lily La Torre
Racimos de Ungurahui - Peru

From 1980 to 1992, Peru experienced a state of permanent violence as a result of the activities of Sendero Luminoso (Shining Path), an armed group whose primary nuclei were in the Andean and the central Amazon forest zones.

This conflict had a drastic effect on the entire country and, in the areas where clashes occurred, a large part of the civil population suffered the tragic consequences of terrorism and war. The central rain forest, lands populated by a majority of the indigenous Ashaninka and Yanasha populations, was one of the stages on which death occurred. Entire communities had to pull up stakes in search of refuge, and many Ashaninka died in a war not their own. Orphaned and starving children, widows and refugees, settlements destroyed, a shattered economy--this was the high price of the violence.

When the conflict ended and peace returned to the zone, the Ashaninka returned to their land only to discover new surprises: their lands were occupied by settlers who had official support. Their forests had been ceded to large companies. As they bravely faced up to this new challenge, there came yet another surprise: a part of their lands had been turned into oil lot 66 in which a consortium of companies led by Elf Aquitaine had begun exploration activities.

LOW ARAWAK OF THE CENTRAL FOREST

Oil lot 66 is located in the central rain forest of Peru, near the eastern flanks of the Andes, and includes much of the valleys of Oxapamba, Chanchamayo, Perene, and Ene, territories originally occupied by the Yanasha, Ashaninka, and Nomatsiguenga peoples, all members of the pre-Andean Arawak linguistic family which has occupied these lands since at least 3000 BCE, and which today has approximately 76,000 members, thus constituting the largest linguistic family in the Peruvian Amazon.

The Ashaninka is the most numerous and widespread of the three, all of whom share the vast lands of the central forest. They are structured into different linguistic subgroups which have traditionally lived in the basins of the Pachitea, Pichis, Perene, Ene, Apurimac, Tambo, the upper Ucayali, Pangoa, Santipo, and the Gran Pajonal rivers. Some population centers are found in the Yurua region of Brazil, in the state of Acre, as a result of having been forced to move by the rubber barons at the end of the 16th century.

There are approximately 374 communities who received title to

their land after more than a decade of efforts by the first leaders of their modern representative organizations.

The valley of Chanchamayo, located near the sierra, became a port of entry for the first missionaries and Andean settlers beginning in the middle of the 17th century. The Ashaninka, a free warrior people, resisted those first attempts to take their land and, due to constant indigenous uprisings, especially those of Torote in 1737 and Juan Santos Atahualpa in 1742, efforts to create haciendas failed.

As a result of indigenous resistance, a large part of their land remained free of settlers for close to a century. Nevertheless, around 1850, Peruvian and European colonists once again attempted to conquer the region and, by the end of the 19th century, the huge debt that Peru had with England revived government interest in colonizing the Amazon in order to provide income from agricultural and livestock production and exploitation of forest products in these "vacant" lands and thus pay off the foreign debt.

In 1982, the Peruvian state granted a concession of two million hectares to the British Peruvian Corporation for the purpose of colonizing the territory of the Ashaninka and Yanasha, thus opening the door to a wave of settlers. Before long, migration was overwhelming, and successive waves of colonists arrived from the Andes, leaving the indigenous people landless or, at best, living in reduced areas. Preaching by members of religious orders and the force of the invasion weakened resistance, giving way to a process of systematic genocide which continues to the present.

The company forced indigenous people who wanted to remain on their land to work for the company as agricultural laborers and many became peons on the haciendas of settlers who had established a new system of production oriented to the market. Later, when the advance of Andean migrants continued unabated, the Peruvian Corporation sold to the indigenous people small parcels of land that had once been their traditional territory.

Meanwhile, in the east, the rubber boom had taken its toll on the indigenous population. Slave hunting among the Ashaninka and Yine was especially ferocious. When the boom ended, the rubber barons and their work forces established themselves on the best lands of the lower Urubamba, the upper Ucayali, and the lower Tambo rivers, creating an enclave of impoverished slave labor, according to charges made by AIDSEP to international human rights organizations less than five years ago. This was the situation, with few variations, that existed in the region until 1980.

Today, every Ashaninka subgroup has different economic, political, and social problems as a result of the varying degree of colonization and loss of territory suffered.

This region, the site of drug trafficking and subversive

violence during the last ten years, is the location of lot 66 granted to an oil consortium.

OIL IN ASHANINKA LANDS

Oil lot 66 covers one million hectares and is located in the provinces of Oxapampa, Chanchamayo, and Satipo in the central forest. The concession was granted in late-1995 to a consortium made up of Elf Aquitaine Hydrocarbures Perou, Eurocan Venture (Bermuda) Ltd., The Anschutz Overseas Corporation, Great Western Resources, Ltd., and Enterprise Oil Exploration, in order to drill six exploratory wells in the course of seven years and with the subsequent right to produce oil for forty.

Lot 66 directly affects land to which more than 120 indigenous Ashaninka, Nomatsiguenga, and Yanesha communities have title; the total population affected is about 10,000. In addition, the area includes the San Matias-San Carlos Protected Forest, the Yanesha Community Reserve, and the Chemillen National Park.

PRIOR INFORMATION

Although Elf sponsored three workshops to inform indigenous delegates from communities that would be affected about the extent of future oil operations, the information provided did not satisfy the population whose members wanted to know how their lands and their forest resources could be protected, how they would be able to live in peace and satisfy their needs for the 30 or 40 years oil activities would be going on in their communities. Conditions at the workshops were not appropriate for carrying on a true intercultural dialogue that would lead to understanding based on recognition of the cultural differences present.

As a result, the process was deficient, and accurate information on the impacts of oil activities for indigenous communities--knowledge that would have allowed them to weigh benefits and risks--was not provided; nor did anyone do the methodical groundwork that would have been required for a referendum and subsequent participation of indigenous residents in safeguarding their environment.

Indigenous delegates requested that leaders of the Council for Indigenous Unification of the Central Forest (CUNISEC), who had organized the workshops, that they inform national authorities that the Ashaninka were concerned about their land and requested that the President of the Republic tell them how the government intended to guarantee that oil activities would not affect their communities.

CUNISEC proposed that indigenous communities oversee oil operations. Meetings with Elf on this issue continued for several months. The company finally accepted that indigenous delegates assume this task.

Seismic testing began in March 1996. Workers were hired from the area and from some nearby settlements. The lack of monetary resources among some extremely poor families obliged them to accept the contractor's offer. Due to low salaries, an inadequate diet, and constant discrimination, a majority of indigenous workers soon left their jobs with the company.

INDIGENOUS OVERSIGHT

As mentioned, on the basis of the agreement among all indigenous organizations in the forest, as well as their legitimate right as a people to participate in oversight and control of all foreign activities in their territory, the indigenous organization in the region at that time, CUNISEC, established an agreement with Elf for the participation of indigenous delegates in environmental control and oversight of seismic prospecting activities in communal territory within lot 66.

The procedures and obligations of all parties were not defined from the beginning. Three months after the onset of operations, and in spite of repeated requests, neither the organization nor the delegates had access to necessary and complete information that would have made possible decision making and the development of oversight tasks in an appropriate manner. Indigenous delegates had not seen nor received a copy of the Environmental Management Plan, the Work Plan specifying exploratory operations, maps, or the description and evaluation of foreseeable impacts on the environment and the population. As a result, it was impossible for the organization to prepare a clear definition of the functions and responsibilities of its delegates.

At the same time, and ignoring a stipulation made by the organizations at the start of activities, CGG, the company contracted by Elf to carry out seismic activities, paid two indigenous delegates a salary. Thus, they were treated as company employees, and assigned the task of spokespersons for the communities, leading brigades that entered communal lands to present the tasks the company would be carrying out, and signing, as representatives of the company, "project requests." These requests were used by the company as proof that the communities not only consented to the presence of the company but also that the company had been requested by the communities to provide aid. It goes without saying that these requests were not discussed by a majority of the communities. As a result, oversight did not take place and the trust of the indigenous communities was betrayed.

WHAT HAPPENED TO ENVIRONMENTAL IMPACT STUDY RECOMMENDATIONS?

In spite of these limitations, the delegates presented reports summarizing their observations during the eight month period of exploratory activities. These documents contain descriptions of all instances of company non-compliance with their own Environmental Impact Study (EIS). For example, the company used four times the quantity of dynamite recommended

in their seismic tests.

When this and other acts of non-compliance were reported by indigenous overseers, the company reacted by making it difficult for the observers to follow their activities, such as not allowing observers to use their means of transport to get to distant sites where work was going on, limiting the availability of food, and even recommending that they say only good things about the company which was, after all, paying their salaries.

Residents of communities, for their part, became increasingly aware that promises made by the company were not being kept. In spite of the brief period that had passed since the onset of exploratory activities, changes in the way of life, environment, and natural resources of the communities were increasingly evident: the felling of valuable tree species for the construction of landing pads for helicopters, without any compensation offered; company employees who did not follow the night-time security measures established by the indigenous self-defense brigades; setting off explosives in community lands without first notifying residents; damage to crops--with no compensation offered--theft of fruit from orchards, excessive movement of earth, travel through crop areas beyond trails. These are only some of the problems reported by residents.

NON-COMPLIANCE WITH THE AGREEMENT AND CHARGES AGAINST INDIGENOUS RESIDENTS

As transparency in the relationship between company representatives and indigenous residents was lost, the latter began to mistrust CUNISEC, the organization to which they had delegated the task of oversight.

The Ashaninka and Nomatsiguenga communities in the valley of Pangoa created an organization called Kanuja and were the first in publicly expressing their dissatisfaction, charging that the subcontractor had opened a trail through the Tsiriari community in order to lay seismic line No. 11 without first informing the community and, when asked for an explanation, the company promised compensation, such as the building of a high school, a community house, and a pharmacy, but finally delivered "compensation" in the form of a small box of medications. When work had been completed, the subcontractor justified the actions of his employees by accusing the community of the theft of one of the company's motors. Residents pointed out the similarity between this argument and the one used by bosses in restaurants in mestizo communities where Ashaninka women find work: when the boss doesn't want to pay the woman for her labor, he accuses her of stealing something.

In the valley of Pangoa, community residents have expressed their opposition to the presence of oil workers. Before agreeing to any further seismic testing, residents want to resettle displaced members in their lands of origin and also

to finish the process already initiated of gaining legal title to their territory. They have also protested procedures not based on consultation with residents, above all the awarding of oil concessions that include their territory, and have requested that government authorities establish mechanisms for constant consultation with indigenous residents of these oil lots.

According to Guillermo Naco Rosa, coordinator of the Ashaninka Emergency Commission, "We have observed that the state hasn't consulted with us before beginning these activities in the communities. The Environmental Impact Study was prepared without the participation of the communities or their organizations, and the company never revealed their findings to us. We have also noticed that the company doesn't fully inform affected communities about their work, for which purpose they have hired an anthropologist for public relations, who has worked in the Ashaninka zone in the Ene valley for many years and thus speaks our language which he now uses to convince residents to sign agreements which are not adequate but which allow the company into our lands."

The community of San Antonio de Sonomorro reacted in a similar fashion during work on seismic line 13. The company drew this line through dwellings in the community, which was unacceptable to residents who demanded that the course be changed. Finally, company employees did relocate the line so that it affected a smaller area of the community.

Later, by way of compensation for damages, representatives from the company appeared in Sonomorro with packages of medicines and notebooks, gifts the community refused to accept, indicating to the company's representatives that there were laws they were required to respect, including the Constitution of the Republic and Convention 169 of the International Labor Organization (ILO) which established the rights of communities and respect for indigenous peoples. The representatives claimed to be unaware of these laws, and suggested that the residents' organization and the company come up with an agreement of their own. Community leaders said that first they needed an opportunity to evaluate the Environmental Impact Study and the Management Plans prepared by the company. The engineers invited residents to send a delegation to Lima. In response, residents said that those who go to someone else's house without an invitation should first inform the owner that they are on their way, and why they intend to visit. If the owner is in agreement, he will have all the papers ready so that the visitors can inform themselves of the situation in question, so that he will not have to leave his house to search for those documents.

This is just one of many examples that illustrate how, as regards oil, indigenous people are asking that at least existing laws be complied with, and that companies and their representatives use common sense when in their lands and demonstrate the simple respect due everyone, whether he or she be a resident of Switzerland or some remote corner of the

Amazon, and that for this purpose neither gifts nor other promises are necessary.

In August of 1996, the Kimiri community was forced to travel on foot to the city of Satipo to issue a formal complaint about the arrogance of CGG, subcontracted by Elf for seismic exploration activities, and to demand that the company leave community lands. Specifically, at the time the complaint was lodged, the company had been monopolizing the community water supply and had installed their heliport in the school yard without consulting first with residents. In spite of repeated complaints from parents and the school director about the danger the children were exposed to when helicopters took off and landed, the company refused to speak with residents.

Finally, after making their trek and lodging their formal complaint, CGG promised to sign a rent agreement for the use of a playing field and, with the money, the community improved school buildings and repaired damage produced by the helicopters and constant fuel spills.

OIL AND LOGGING ACTIVITIES

Oil activities are leading to the increased presence of loggers in the zone. As is well known, logging companies have become one of the most influential economic groups in the central forest. Since the middle of this century, logging has been one of the activities which has caused the greatest impact on the Amazon forest. The central forest has been one of the major sources of timber which is sent to Lima along with agricultural products from the region, including coffee and fruits. This has meant the opening of roads and numerous trails, and these have facilitated the arrival of squatters.

Residents insist that illegal logging is on the rise because the loggers now have access to new areas thanks to the seismic lines opened by the oil company. The Ashaninka fear that these trails will also allow the return of subversives and settlers, or will become regular logging routes in their lands which would also lead to new problems of violence and usurpation.

In fact, Elf had to suspend oil operations soon after the beginning of the second phase of seismic prospection. Sendero Luminoso, a subversive organization, took 29 CGG workers hostage for a week, releasing them only after the company agreed to provide food, shoes, batteries, etc. This incident was interpreted in the press as a resurgence of subversive activities in the zone and the company decided to suspend activities in the area for a time.

In light of the above, including the reappearance of subversives, the Ashaninka of the Rambo River basin, who have formed the Rambo River Ashaninka Central Committee (CART) were very concerned on hearing that a new oil concession had been granted in their area, to a consortium formed by Mobil and Shell. Lot 75 covers 1,800,000 hectares and is located in

the Ucayali River basin, next to the natural gas reserves and condensers of Camisea. Among other problems, prospecting activities result in the presence of workers in an area in which the indigenous residents have controlled the movements of outsiders in order to avoid the reentry of subversives. Given the suffering of these communities in recent years, when they were forced to gather together in small settlements in order to organize resistance to subversives, their fears about this new threat are well founded, particularly since El Tambo is the natural port of entry to the zone from Ayacucho and Apurimac, areas plagued by violence and drug trafficking.

The leaders of the Ashaninka, Yanasha, and Nomatsiguenga peoples who have been affected by the war and have sacrificed a good part of their lives in the struggle for the peace enjoyed now by the entire country, hope that the authorities and the people of Peru understand what it means to have finally achieved that long-awaited peace, to be able to leave at last their cramped refuges and return to their places of origin and there live normal lives, rebuilding their homes, drinking fresh water, watching their children play, working their land, hunting, becoming acquainted again with the forest where their ancestors live and in which their spiritual life is concentrated, but then to discover in their lands multitudes of strangers taking measurements, drilling, dynamiting, logging, opening trails in the forest.

They ask themselves: "This is the thanks we deserve for having contributed to peace in the nation?"

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OIL THAT FLOWS, SEAS THAT BLEED

Elizabeth Bravo V.
Oilwatch

INTRODUCTION

In the tropical seas of Asia, Africa, and Latin America, oil activities are taking place in varying degrees of intensity. These activities affect natural ecosystems and threaten human communities located in coastal areas.

What is more, there exists an abyss of incompatibility between the cultural, cosmogonic, productive, and economic activities and needs of local populations and those of oil companies, and this leads to significant conflicts.

The most important social impact of oil production is the destruction of local economies, an increase in inflation, and the creation of situations characterized by insecurity and violence.

This high investment activity also produces dramatic changes in the landscape by generating industrialization and urbanization.

In addition, infrastructure installed in the sea and on land produces significant environmental impacts, including contamination of the atmosphere, water, and soil, as well as noise pollution, all of which affect coastal communities on a daily basis.

Up to now, offshore petroleum activities have taken place in shallow waters near the coastline, but recently oil companies have been working in deep waters (in Brazil and the nations around the Gulf of Guinea) and in other vulnerable ecosystems such as inland and semi-inland seas.

In countries such as Indonesia, Nigeria, and the Seychelles Islands, oil activities are also affecting mangroves, wetlands, coral reefs, and other endangered ecosystems.

While it is important to analyze the impact of petroleum production in the sea in an integrated fashion, looking at what happens during the various stages of the activity aids in understanding specific impacts.

SEISMIC PROSPECTION

In tropical zones oil company employees still use dynamite during seismic prospecting. This practice has an impact on fishing communities, affecting the residents directly or indirectly as a result of diminishing populations in local fisheries.

The explosions produce lethal impacts on the local fauna,

especially when they take place during spawning, mating, and lactation periods. The routes of migratory species are also sensitive to detonations.

The explosions can produce changes in the behavior of birds, fish, and marine mammals.

Sometimes, aerial discharges are used. While these are directed downward, they have a considerable horizontal effect. The underwater sound may have an impact on a radius of up to 10 kilometers.

These impacts are evident in fish and fish larvae with market value, especially when prospection is carried out in those areas in which species are in crucial biological cycles.

Sea birds and mammals are also affected, especially Cetacea (dolphins, whales, and sperm whales) which use complicated communication systems for orientation and searching for prey. In these species, marine biologists have noted failures in the auditory system, changes in response to stress, an increase in hypertension, and endocrine imbalance.

In addition, scientists have noted diminishing food supplies, which is particularly important when these animals are nursing and raising their young.

Given that sea birds have very special needs during their reproductive period (places for mating and the need for special foods), explosions during this period lead to the loss of a reproductive season, thus affecting the composition of natural populations. The problem worsens if the seismic activities are prolonged.

In studies on the impacts of seismic prospection in schools of fish, scientists have noted that for some species with market value, there is a reduction in numbers of up to an average of 45%. This impact has been measured in a radius of 10 kilometers. The number of fish is reduced both in the open sea and at the base of the column of water. The numbers do not recover for several days after an explosion.

DRILLING

Drilling follows seismic prospection. From the beginning, this activity generates waste material, the most significant being drilling cuts and muds.

The drilling cuts produce a physical impact, burying benthonic fauna and thus affecting the entire ecosystem as the benthos play an important role in the marine food chain.

Most studies on the effects of drilling muds and cuts have been done in the North Sea. In the area in which the British petroleum industry has been active, scientists have measured 1.5 million tons of contaminated mud deposits on the sea bed. Of these, at least 166,000 tons of wastes, in the shape of

pillars 30 meters high, consist of oil.

In addition, these muds contain other toxic materials, including barium sulfate and heavy metals. Approximately 500 meters surrounding the mud deposits have become deserts. At greater distances, the wastes produce changes in the composition of marine communities, favoring opportunistic species tolerant to toxic wastes.

The drilling cuts are made up of a heterogeneous mixture of rocks whose composition depends on the local geology. The drilling cuts are contaminated, to a greater or lesser degree, with drilling mud and hydrocarbons.

DRILLING CHEMICALS

There are two types of drilling muds, depending on the liquid phase on which they are based, that is, hydrocarbons or water.

Hydrocarbon based muds contain mineral petroleum with variable amounts of aromatic hydrocarbons, lime to increase the pH and control corrosion, chemicals based on lignite to control the loss of fluids, emulsifiers and detergents, including fatty acids, amines, amides, sulfonic acid, and alcohols used as secondary emulsifiers; bentonia; calcium chloride used as an emulsifier to increase the viscosity of the muds.

Muds based on hydrocarbons can affect fauna in a radius of 500 to 800 meters and more from the source of discharge, depending on currents. The effects are cumulative and can last for years.

Studies of the impacts of this type of drilling mud in marine environments have been done primarily in temperate seas. Scientists have noted the following impacts:

- * inhibited growth and reproductive development in some mollusk species
- * diminished reproductive activity in bivalves
- * reduction in the establishment of benthonic organisms
- * changes in immunological responses in fish
- * reduced colonization and destruction of the habitat of polychaetes and amphipodes
- * contaminated fish in coral reefs.

Muds that are soluble in water have, as their major component, barite and calcium carbonate, in addition to inorganic compounds such as bentonite and other clays which increase viscosity. These muds also include toxic heavy metals, inorganic salts, detergents, organic polymers, corrosion inhibitors, and bioacids.

In spite of their name, these muds contain significant quantities of hydrocarbons (100-7000 ppm.), which are used to reduce friction and as lubricants.

In area near drilling platforms, scientists have registered elevated levels of aromatic polycyclical hydrocarbons in the tissues of fish, and these lead to liver disease in human communities which depend on these species in their diet.

SEALING THE WELL

When the well is sealed with cement, a series of chemicals with varying levels of toxicity is used, the most important being lime and clay.

In addition, other additives are used to accelerate (sodium chloride, sodium silicate, and sodium carbonate) or retard (lignin, calcium lignosulfanate, and cellulose derivatives) in the sealing process.

Other agents are also used to prevent the loss of fluids (cellulose derivatives), dispersants (organic synthetic products), density controllers (bentonite, soil rich in diatoms--to reduce density--barite, sand--to increase density). Finally, agents are used to reduce foaming (esters, phosphatizers, fatty acids, and polyoxylates), and for other purposes.

EXTRACTION

One of the most serious problems during oil extraction is formation water which is pumped with oil. The quantity of water increases as that of oil decreases. During the final phases of production, the amount of water may be several times greater than that of oil pumped.

The composition of the water varies according to the characteristics of the field, but, generally speaking, contains hydrocarbons, radioactive materials occurring naturally, production chemicals, inorganic salts, metallic salts, and dissolved solids.

Another source of contamination are the chemicals used in the extraction process, many of which are highly toxic while the toxicity of others is unknown.

Given that one of the major problems in offshore oil drilling is the presence of sulfate reduction bacteria for the production of sulfur hydroxide, a very corrosive substance, biocides are used for control.

In addition, nitrogenous organic compounds are used to protect pipes from corrosion. In order to prevent the crystallization of mineral salts, phosphates and phosphatized esters are used.

Other chemicals used in production include antiemulsifiers, anti-foamants, chemicals to prevent the formation of paraffin, solvents, and others.

To date we have no studies on the eco-toxicity of the various contaminants found in formation water in tropical seas. While the major concern has centered on the hydrocarbons present in the water, other compounds may have greater impacts, especially in combination.

Concentrations of salts in formation water can be several times greater than those found in the sea, with negative impacts for the native flora and fauna. Another significant source of impacts is related to the high temperatures of these waters.

In some oil fields gas is extracted along with oil. The gas is either burned or used as a source of energy for the petroleum installations. The major atmospheric emissions associated with the burning of gas are CO₂, methane, volatile aromatic hydrocarbons, nitrogen oxide, sulfur dioxide, carbon monoxide, haloids, and CFCs.

PLATFORMS

The presence of a drilling platform produces a significant physical impact as it may change the behavior of wildlife, especially when infrastructure is located in places where species mate, spawn, and feed, or in the migration routes of species.

Another source of change in behavior is the noise and light generated by a drilling platform. Both may cause behavior changes and interfere with the migratory routes of mammals, fish, and birds. The heat produced by platforms overheats the sea, producing negative impacts especially on those species which have a demanding ecological niche, such as species in coral reefs.

PIPELINES

Crude extracted offshore may be stored in storage tanks on marine platforms or transported through pipelines to inland infrastructure. These pipelines can be a constant source of spills either because of accidental breaks in the line or the normal leakage that takes place in worn pipes.

The impact of these spills depends on the type of crude transported, the size of the spill, climatic conditions, the tides at the time of the spill, and the characteristics of the surrounding ecosystems.

When spills occur offshore, 10-15% of the oil is recovered, on average, under optimal conditions. Thus, these spills generally have long-term effects as the crude remains in the sediments as a constant source of contamination.

Oil spills occur as a result of careless routine management (leaks from tubes and other oil infrastructure) or by accident.

The impacts of crude on the marine environment can be immediately observed in the sessile biota. The mortality rate of plants and sessile invertebrates is greater at sites where crude has accumulated.

Pipelines and the presence of the well itself may produce a physical obstacle in the sea bed, with negative impacts on the local fauna.

PETROLEUM ACTIVITY IN TROPICAL ECOSYSTEMS

The impacts described above are even greater in tropical ecosystems where human populations depend to a larger extent on marine resources.

CORAL REEFS

Coral reefs are extremely important tropical marine ecosystems due to the high degree of biodiversity of which they are composed, and to the essential role they play in stabilizing coast lines, especially in low tropical areas where they prevent erosion and minimize the effects of tropical storms. Coral reefs are important to the sustenance of local fisheries and are also valuable in cultural and economic terms.

Oil production results in changes in the composition of species and habitat. The branching corals may suffer greater impacts than other species as they take the oil into their tissues as a result of which there is a correlation between body mass and mortality.

In the plant components of the reef, there is a reduction over time in the level of photosynthesis. This may be chronic in reefs exposed to high levels of contamination.

There is also a reduction in reproductive success due to the poor development of the reproductive tissue and atrophy of reproductive cells. This effect may last for years after contact with crude, reducing the rate of reproduction and thus population density. Decades will pass before a reef recovers from an oil spill.

MANGROVE FORESTS

Mangrove forests are extremely important ecosystems for social, economic, and ecological reasons. They serve as habitat for many fish and shellfish species and are a source of raw materials for a number of productive activities by residents of communities in the surrounding areas.

Oil activities in mangroves produce an interruption in fresh and sea water toward the mangroves and, within the forests, changes in drainage patterns, vegetation, and soil, and the production of general instability in the area.

Drilling by dredging results in complete destruction of the

area. Existing channels are made deeper and wider with dredging, and new channels are opened. The depth and size of the channel is determined by the drilling barge. The wider and deeper the channel, the greater the damage.

Dredging leads to widescale erosion, the death of vegetation in dry forests, the interruption for up to six years after a spill of plant growth, the suffocation and intoxication of tap roots and a decrease in the number of absorbent roots.

Mature trees which survive the process suffer a deterioration of their canopy, producing reduced biomass in terms of foliage and a reduction in the number of leaves and buds.

Recovery of the mangrove may take several decades if no spills occur. No one has discovered a way to clean up sediment contamination without destroying the forest.

MARINE GRAZING AREAS

Marine grazing beds are also affected by oil activities. These develop in shallow waters, especially along tropical coasts. The grazing beds are established on the sea floor. They serve as sediment traps, improving the quality of water. They are direct sources of food for more than 340 marine animals and are the substrate for a number of epiphytic algae species. Damage to or loss of marine grazing beds can have serious ecological impacts which extend beyond the areas of immediate impact.

Long term impacts on fauna are produced when marine grazing areas are affected. Populations decline, with the exception of certain species which are highly reproductive, as well as plankton. Those animals with a low rate of reproductivity and dispersion have a difficult time recovering.

While this has no direct impact on submarine mortality, the loss of fauna in the marine grazing beds produces an interruption in the food chain. In addition, at the borders there is a great loss of habitat which produces long term effects in associated fauna.

Fauna in inter-marine zones die as a result of direct contact with oil, while organisms in submarine zones suffer fewer impacts.

CONCLUSIONS

Although the impacts of oil activities in tropical seas have not been studied in depth, there is no doubt that said activities have a significant effect both on the environment and on local populations settled along the coast line.

Given its short term economic benefits, the social and environmental impacts which this activity generates are not justifiable. Thus, we propose that a moratorium be declared on the expansion of the oil frontier in tropical marine

ecosystems.

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REVIEW OF STUDIES ON OIL CONTAMINATION AND ITS IMPACTS
ON THE AQUATIC COASTAL ECOSYSTEMS OF BRAZIL

Eduardo Mendes da Silva, Instituto de Biologia da UFB
Carla de Barros Azevedo, Biomonitoramento e Meio Ambiente
Salvador, Brazil

INTRODUCTION

Among the many forms of contamination suffered by the aquatic environment, the impact of oil is one which causes the greatest concern among the public. This is due especially to its highly visible and disturbing effects. Unlike acid rain, eutrophy, and chemical or thermic contamination, oil contamination has an immediate impact on a variety of organisms and affects those consumed by human beings, including fish, birds, and shrimp, which may have a direct effect on us.

A number of factors must be taken into account in the study of the ecological effects of oil contamination, including the type and amount of oil, the frequency of exposure (i.e., acute, chronic, or subchronic toxicity), fractions of light or heavy oil, environmental conditions (water temperature, salinity, nutrient concentrations, tides, wind, currents), the use of chemical dispersers and their toxicity, and the sensitivity of local biological communities to the toxic effects of hydrocarbons [1,2]. In addition, the impact of oil in aquatic ecosystems depends on the form of access; because oil comes in a number of types and compositions, its impact on biological communities is, in many cases, difficult to predict.

Oil production is a relatively recent activity in Brazil. The first oil field was discovered in the state of Bahia, near the capital, Salvador, in the northeast of the country in 1939. Until 1968, oil exploration activities were concentrated in northeastern Brazil in the Reconcavo and Tucano basin in Bahia, and in some inland areas of Alagoas and Sergipe. After 1968, new oil fields entered in operation on the continental sand bar of Campos and Santos in southeastern Brazil and near the Rio Grande del Norte and Sergipe in the northeast. Figure 1 indicates the locations of the most significant oil fields in Brazil, and the locations of oil refineries and terminals along the coast. As is evident in the figure, the majority of oil activities in the country take place in southeast Brazil, especially in the states of Sao Paulo and Rio de Janeiro.

A large part of the population of Brazil and of industrial activities are concentrated on or near coastal areas. Oil production, refining, and transport are also more intense along the coast than in inland areas; thus, oil contamination is more probable along the coast. In addition, all Brazilian refineries were built before 1980, when environmental issues were not thought to be an important element in the planning,

location, and construction of these plants.

OIL IN MANGROVES

Brazil's coastline is made up of flat beaches with fine sand. In the estuaries and closed bays, mangroves grow from north to south.

Of the 494 accidents recorded in Brazil between 1978 to 1989, 98.6% took place in the state of Sao Paulo. In the area of Sao Sebastiao and Santos, there were 117 accidents during this period, due to poorly administered pipelines, spills from ships, accidental spills during transport, and the cleaning of oil tanks [18].

A number of comprehensive studies have recently been done to evaluate the effects of oil contamination in a subtropical coastal mangrove environment. Machado [19] analyzed vegetation by interpreting photos of a mangrove in the Bertioga Canal (23 53'10" to 23 54'4"S and 046 11'1" to 046 12'50"W), in the state of Sao Paulo which had been affected by an oil spill in 1983 caused by a malfunctioning pipeline valve. This spill affected an estimated 50,000 m² [20], with a total of 2,500 tons of oil spilled [21]. Using a scale of 1:10,000, the author confirmed widespread changes, such as the defoliation of a mangrove tree and changes in the color of its leaves, alterations also detected during field work.

In addition, these changes were more severe in plants located near major canals than in those located in the interior of the mangrove forest, thus demonstrating that the spread of the oil was primarily due to the movement of water.

Peria et al. [22], working in mangroves after an oil spill in the state of Sao Paulo (23 S), concluded that mangroves exposed to oil contamination have frail leaves and buds, a primary ecological response. This is particularly true of the red mangrove (*Rhizophora mangle*). Goodman and Baker [23], mentioned that after an oil spill in Tarut Bay, Saudi Arabia, mangroves were seriously affected, though they didn't die until the following year.

This confirms the conclusion of Lamparelli et al. [24] who observed the evolution of changes caused by oil in a mangrove swamp in the tropical zone of Brazil. At the same time, Jackson et al. [25], working after an oil spill along the coast of Panama, described a strip of dead or dying mangroves, primarily *R. mangle*, where oil was washed on to the beach exactly four months after the presence of oil in the mangrove, evidence consistent with the observations of Getter et al. [26].

In the course of their study on the Bertioga Canal (Sao Paulo state), Ponte et al. [27] have contributed important elements to the development of an model for the impact of oil on mangroves.

Four months after the spill, plants and epifauna near the edge of the mangroves were covered in 73.9 cm of oil. Toward the interior of the mangrove, the cover was 31.7 cm deep.

The scientists found different kinds of damage to the mangrove trees in a large number of aerial roots of *R. mangle*, and in the production of considerable numbers of deformed leaves and fruits in plants belonging to the genus *Avicennia*.

The *Aratus pisoni* crab, which moves among the mangroves, disappeared from the contaminated site and only began to reappear ten months later. Ponte et al. [28] studied the mangrove before and after the pipeline spill. Grass production after the spill was significantly lower (1.09 and 1.06 g.m⁻².d⁻¹ for 1984-1985 and 1988-1989, respectively) than the mean growth before the accident (1.26 g.m⁻².d⁻¹). The authors conclude that this chronic change has altered the normal flow of energy from the mangrove by reducing the amount of organic matter decomposed and exported.

Dicks [29] has demonstrated that the kind of sediment in the mangrove area can have a direct influence on the effects of oil on mangrove trees: in muddy sediments with limited drainage and poor oxygen conditions, black mangroves (*Avicennia marina*) are prevalent and produce greater densities of pneumatophores. In sandy sediments, on the other hand, where drainage is good, the root system can use oxygen from interstitial water. For this reason, mortality is higher in muddy sediments than in sandy sediments when both are affected by oil.

In addition, the response of different mangrove plants may be related to mechanisms for the regulation of osmosis [30]. *R. mangle* excretes salt through its roots, while *A. schaueriana* has mechanisms for salt excretion that facilitates the entry of oil through its leaves and is thus more sensitive and requires a longer recovery period.

The increase in mean values for leaf surface in mangrove trees after a serious oil spill suggests a response to pressure in the plants since the surface area is reduced during the first phase of contact. Changes in the production of grass also confirms these findings.

The State Agency of Sao Paulo for Environmental Technology (CETESB) [31] worked in the same areas from 1984 to 1994. Their study demonstrates that vegetation diminishes by 40% in the basal area and by 24% in the density of the plant. After drastic initial defoliation, the leaves began to increase in size. Small trees were deformed and fewer in number, and though they were able to colonize the affected area, their mortality rate reached 100% after a brief period of time.

Four phases of the oil spill were described in the study: (1) the initial impact with a duration of approximately one year, during which the shoots and young plants are likely to die;

(2) structural damage during a two-year period, when the trees begin to die; (3) stabilization, during a five-year period, when deterioration of the mangrove stops but no improvement occurs; and (4) recovery, when they system demonstrates signs of recovery in density, colonization, and survival rates, though it is impossible to predict when the system will return definitively to its previous state.

It is recommended that the frequency of young plants as well as the density of the tree and the basal area be taken into account as markers in a monitoring program after an oil impact.

A brief but interesting study was carried out by Schaeffer-Novelli et al. [32] in the same area studied by CETESB [18], which demonstrated that there are no significant statistical differences between the growth of adventitious roots of *R. mangle* contaminated by oil and those in uncontaminated areas.

The vulnerability of mangrove vegetation to oil spills is directly linked to the size of an oil spill in tidal areas, where the respiratory structures (pendulum disks and pneumatophores) are found in high densities. Much crude spilled in the sea expands to a thickness of around one millimeter after an hour and to a thickness of only a few microns after two or three hours. This is the mechanical effect of the spill and can, in some cases, be interpreted as acute toxicity due to hypoxia, though other types of acute toxicity have been observed. The chronic and even subchronic effects are the result of the characteristics of the oil, climatic conditions, composition of sediments, site, and decomposition processes inherent in the destination of the oil in the water: oxidation, emulsification, dissolution, and microbiological degradation. When large quantities of oil are spilled, acute toxicity is high due to mechanical effects (i.e., hypoxia) on the structure of vegetation. If it is light aromatic, a greater toxic fraction persists for a longer period in sediments, and the possibilities for chronic impacts increase, one of these being the death of vegetation.

Another important point is the determination of chronic effects in coastal organisms. Anatomical studies of the leaves of mangrove trees demonstrate that the stoma in *Rhizophora* and the stoma and salt glands in *Laguncularia* and *Avicennia* present densities that are different at sites near a refinery and an oil shipping terminal than those at a site distant from any source of contamination [33]. While these results clearly demonstrate the effect of oil activities on the mangrove leaf structures, it was not possible to determine the significance of this effect in trees, nor the significance in terms of population.

Thirty-six hours after a spill of 48m³ of oil in the northern zone of Bahia de Todos los Santos, two of us observed that the behavior of the fiddler crab, *Uca thayeri*, which lives along the central coast, was different from that of members of the species living in the upper coast where there was no

oil. The affected animals had lost their sense of territoriality and, being unable to find their burrow holes, sometimes invaded occupied holes and fought with inhabitants demonstrating clear signs of weakness. This observation is confirmed by the findings of Gundlach et al. [34], who observed that two species of crabs, *Sesarma ricordi* and *Grapsus grapsus*, recovered after an oil spill in eastern Puerto Rico, demonstrated slow responses to stimuli immediately after an accident. More recently, after an oil spill at the beginning of 1990 in New Jersey (USA), Burger et al. [35] described that individuals of the species *U. pugnax* were expelled from their burrows when the oil spread.

The Environmental Protection Agency of the State of Sergipe (ADEMA) [36] described the effect of an oil spill in a mangrove area in Rio Cotinguiba (10 9'5" to 10 10'3"S and 37 7'8" to 37 8'2"W). This accident occurred in February of 1982, and in May the mortality of the mangrove crab *Ucides cordatus* continued to be observed. It was the organism most visibly affected since the oil was carried principally through the gills and subsequently accumulated in tissue rich in lipids. To mitigate the impact on the mangrove, workers cleaning the spill forced the oil into the ground, covering it with sand and building a barrier at the high part of the coastal zone. Three months after the accident, colonies of young plants (5 cm. high) of white mangrove *Laguncularia racemosa* were observed.

A prior study by Nascimento [37] established the period between September and November as the molting season for mangrove crabs (*U. cordatus*), when the animals remain in their burrows for about 20 days. This vital process was severely affected by the presence of oil in the sediments. Although the rest of the oil had been covered with sediments to reduce direct exposure of the crabs, the rate of biodegradation of oil was considerably slowed. As a result, the remains of the oil in the burrows forced crabs to leave before the molt, with only two shells, making them more vulnerable to predators. A simple survival test for crab larvae demonstrated that LT50 (average time needed for 50% of all individuals evaluated to become immobile or die) for larvae from contaminated crabs was less than 2 days while the larvae of crabs from a control site, free of major impacts, survived for 28 days.

A study of the density of crabs in a mangrove affected by domestic wastes and by the refinery in the estuary of the Iguaca River (state of Rio de Janeiro) also demonstrated that there were no significant differences in density between this site and other mangroves under different conditions studied by the authors.

Two minor accidents in the Bay of Todos os Santos (state of Bahia) have been of interest to scientists. The first involved the loss of 80m³ of crude when a storage tank spilled into an adjoining mangrove in 1990. The unpublished results of a study by Santos and Barros, who followed the

accident, established that all the mangrove plants in the affected area (3,000 m²) were covered with oil and a very short time later lost their leaves and eventually died. Based on a study carried out in a similar zone adjacent to a mangrove, the authors estimated that during this accident approximately 184,000 young individuals and 42,000 adult individuals of *U. thayeri* and 8,000 individuals of *U. cordatus* died. Suffocation (physical instead of chemical toxicity per se) seems to be the clearest symptom of acute toxicity, and this seems to play an important role in the mortality of both plants and animals. Six months after the accident, the young *U. thayeri* individuals returned to the contaminated site. At this time, seven years after the accident, the mangrove trees and the communities associated with them, have recovered and there is no evidence of the presence of oil.

A second spill occurred in 1992, when 48 m³ of Boscan asphalt oil was spilled when a reservoir overflowed within canals rich in mangroves. An estimated area of mangrove measuring 30.7 x 22.7 hectares of mangrove and sandy beach were covered with oil. The white mangroves (*L. racemosa*) seemed to be more affected than the red mangroves (*R. mangle*), with their internal structures (pneumatopores and leaves) containing small drops of oil (different mechanisms for osmotic regulation), though the number of dead plants was not registered. A year later, the leaves containing oil were alive and the plants appeared healthy. The normal and oily leaves of *R. mangle*, *L. racemosa*, and the black mangrove (*A. schaueriana*) collected a year after the spill demonstrated that while some leaves had been internally affected, not all of them fell, changed color, or died.

This contradiction simply confirms the fact that variations in toxicity are highly dependent on the quantity and quality of oil and the geomorphological, oceanographic, and climatic characteristics of the site affected. A study by Baker [39] in a salt marsh in Australia, on the toxicity of oil for plants, demonstrates that by experimentally pulverizing an area of the salt marsh, one can observe that florescence was reduced when flower buds were exposed to oil as they developed and that oil contamination in winter can reduce germination in spring. In addition, he found that oil can cause more damage to plants in warm, sunny weather. This toxicity can increase, as viscosity is diminished by an increase in temperature, providing for easier penetration, or an increase in the formation of toxic acids and peroxides in oil. Getter et al. [40], working in various types of mangrove forests in the Gulf of Mexico and the Caribbean region, established that the model of damage and recovery depends on time and the type of oil spilled, the volume of the spill, the extent of clean-up techniques, and the physiographic types of mangrove affected.

Jacobi and Schaeffer-Novelli [41] proposed a conceptual model for oil spills in mangroves. Nevertheless, the uncertainty associated with oil spills, together with the lack of

complementary data on other variables, such as the transport of sediment, the export of detritus, the carrying capacity, and the toxicity of oil retained in the sediments, all make an evaluation of the chronic effects of oil on these ecosystems difficult, and other factors also contribute to the deficiencies of these models.

PETROLEUM ON ROCKY COASTS

Biological communities on the rocky coasts of the San Sebastian Canal (Sao Paulo state) were studied after two tankers crashed in 1989. In this accident, 250 m³ of heavy crude oil spilled into the sea and were washed up to the sandy beaches and rocky coasts. The study was undertaken to determine how communities developed after this type of ecological pressure. The population of goose barnacles *Chthamalus* spp, on both open and sheltered beaches, was seriously affected. In selected areas, water sprayed through low pressure hoses was used to clean the beaches covered with the oil slick.

The studies were carried out to compare recovery of the contaminated community in treated and untreated areas [42]. In the open areas after 20 days, the sites were relatively clean, and there was no mortality because the accident occurred during the winter and the currents originating in the south were strong. On the protected beaches, the oil remained for more than six months and the population of barnacles was wiped out during this period, probably due to hypoxia and high temperatures due to effects of heat differentials.

In this region, an unidentified blue-green algae began to colonize the area just below the layer of barnacles. Areas treated with a low pressure spray of water, in both protected and open areas, did not demonstrate any surviving barnacles. In fact, mortality rates in areas treated with water sprays were higher than in untreated areas. Nevertheless, this cleaning techniques might eventually provide a comfortable habitat for the settlement of larvae in protected areas where the mortality of barnacles is naturally high.

In two reports [43, 44] the rocky coasts with more complex community structures were treated with a high pressure spray of water after an oil spill and observed for two years. The species present in the greatest numbers were the rock mussels *Brachidontes solisianus* and *B. darwinianus*, the barnacles *Chthamalus bisinuatus* and *C. proteus*, the oyster *C. rhizophorae*, the periwinkles *Littorina ziczac*, *L. lineata*, and *L. lineolata*, and the limpets *Acmaea subrugosa* and *Siphonaria hispidia*.

The use of high pressure sprays caused a severe impact on these communities, and even two years later the sites were not completely colonized. No significant difference ($p > 0.05$) was found between the reference season and the rocky coasts exposed to oil in terms of the type of biological community

and the rates of settlement of organisms.

One important aspect of the studies on stagnant currents on rocky coasts is the season, as indicated by Bonsdorff [45], that is, the effects on biological communities can vary, depending on the season in which an oil spill takes place, as can the level of competition for space among adult and young individuals (young oysters), a common phenomenon in these habit.

TOXICITY OF OIL IN TROPICAL MARINE ORGANISMS

Sea birds are probably the only vertebrate group that can not avoid oil contamination as their diet is based on fish. This is also true for sea mammals and sea turtles. Almeida [46] noted that affected birds lose their ability to fly or float. At a subchronic level, they manifested liver degeneration, supracortical hyperplasia, and pneumonia. Of a sample of 60 individuals of southern fulmars (*Fulmarus glacialis*) found dead in the south of Brazil in August of 1987, only 8% had oil on their feathers, while of 51 puffins (*Puffinus puffinus*) found dead between 1979 and 1989, 14% were contaminated by oil [47].

Oil can also enter membranes of food eaten and thus affect the birds. For example, the *Calidris canutus* uses the beaches of southern Brazil between March and May, on its return from Patagonia en route for the Arctic. On the wide sandy beaches these species voraciously eat small bivalve mollusks and crustaceans which provide energy for molting and for the 9,000 km. flight to the Bay of Delaware [48]. Oil contamination of the beach, a frequent phenomenon, could endanger the reproductive strategy of these birds as their eggs are extremely vulnerable to oil and hydrocarbons accumulate in their fatty tissues. Contamination by this toxic hydrocarbon could be fatal to the survival of the species.

Results of tests for sediment ecotoxicity in mangrove oyster and sea urchin larvae, the *Artemis* sp nauplius, and the *Pennaeus vannamei* postlarva at six stations around the bay of Todos los Santos (state of Bahia), indicated that the most toxic site (compared with two control sites) was the one closest to the refinery. Toxicity at more distant sites subject to currents was different than that at sites near the refinery though, statistically, there were some significant differences at the two control sites [50].

Coimbra [51] who worked at three of the same sites, in the north of the Bay of Todos os Santos, concluded that the phytobenthonic community site closest to the refinery was not representative as compared with the other two sites, as only two species with very low biomass values were present. These results clearly demonstrate the influence on neighboring biological communities of untreated oil discharges from the the refinery.

Gundlach et al. [34] also found reduced biomass in the epiphytes (Bostrychia) after an oil spill in Puerto Rico at the end of 1970, demonstrating the influence of oil on the development of Bostrychietum.

In a recent work, scientists demonstrated that the development of concentrations of stress proteins in young mangrove oysters (*Crassostrea rhizophorae*) in regions affected by oil in the Bay of Todos os Santos [50], were different from control sites and that these differences are due to the proximity of oil activities. Although levels of contamination are highest at sites closest to the refinery, the concentration of stress proteins in oysters was not statistically significant at the control sites due to an effect that is more lethal than chronic [52].

For a year, scientists took monthly samples of the mussel *M. constricta* from an intertidal area in the Todos os Santos bay to gather data on growth, nutrition, and the bioenergetic process of this organism on the island of Madre de Deus, an environment chronically affected by oil and its derivatives as a result of a nearby oil terminal. The region of the Buen Jesus de los Pobres beach was used as a control station [53].

The results obtained for all the variables studied (length/weight, growth curve, condition factor, and estimated production based on biomass increase) demonstrated statistically significant differences between the two populations studied. *M. constricta* reached a maximum average length of 64.4 mm at the control station and 54.2 mm among the population under pressure. The average maximum weight was 2.8 times higher at the control station than at Madre de Deus, demonstrating the value in using these species as bioindicators in areas chronically affected by oil, as suggested by Hickey et al. [14] for *M. liliana* in the coastal waters of New Zealand.

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MERCURY IN THE GULF OF THAILAND
James Fahn - The Nation
Thailand

Mercury is a heavy metal, neurotoxic and dangerous, that can be a sub-product eliminated with formation water which is extracted from the subsoil together with gas from some hydrocarbon deposits.

(recuadro)

Mercury is a metal, whose transformation in nature is extremely slow and, thus, remains in the environment producing a direct impact on human health, ecosystems, and agricultural systems.

Mercury enters organisms in a number of ways: through the respiratory and digestive systems, and the skin. Mercury deposits can accumulate in human lungs, where they remain for 50 days, as well as in kidneys, the brain, the liver, and the red blood cells. It also occurs in a mother's milk.

The maximum concentration permitted is 0.04 mg/m³. A concentration of 0.05 mg/m³ is equivalent to a concentration in the blood of 3.5 micrograms/100 ml. and of 150 micrograms/liter in urine. The critical quantity of 300 micrograms/liter of urine corresponds to an area concentration of 0.1 mg/m³.

Mercury is toxic to cells and impedes the physiological action of enzymes. In the human body, it can produce chest pains, difficulty in breathing, coughing, a metallic taste in the mouth, nausea, diarrhea, abdominal pain, vomiting, headache, alterations in vision and hearing. After three or four days, it produces gingivitis and nephritis. In severe cases, significant psychological alterations and muscle tremors appear. Death may be due to edema and the destruction of muscle and renal tissue.

Betancourt, 1996

(fin de recuadro)

At different offshore deposits in Southeast Asia, mercury is present as a subproduct, especially in the Gulf of Thailand, producing serious contamination problems.

MERCURY ON THE COASTS OF THAILAND

Major problems have occurred in Thailand, where one in five fish contains high levels of mercury, well beyond permissible health limits in areas surrounding Rayong and Chon Buri on the eastern coast of Thailand. In a small-scale study, researchers from Chulalongkorn University noted that shellfish from the area showed signs of serious mercury pollution.

Other studies have documented high levels of mercury in fish caught around natural gas platforms in the central Gulf of Thailand. Mercury levels increase in both water and sediments near the industrial port of Mab Ta Phud on the eastern coast.

However, no information has been made available to the public regarding mercury in animals in the eastern region.

"What worries me is that mercury levels in fish are higher than they were ten years ago," says marine scientist Prof. Piamsak of Chulalongkorn University, who supervised the study cited. "We still haven't identified the source of the mercury contamination, whether it comes from the central Gulf or from industries on the coast.

The study was carried out in the Bang Sarae Bay, a site popular among sports fishermen from Chon Buri. The bay is 30 kilometers west of an industrial park, Mab Ta Phud, where many petrochemical industries are located, and it is here that efforts to identify the source of mercury contamination have been concentrated.

Piamsak speculates that the western current might have carried mercury discharged at Mab Ta Phud, in the Rayong province, to Bang Sarae; but an official from the Department for the Control of Pollution (DCP) noted that there are many other possible sources for mercury on the Eastern Coast.

"Local industrial activities might be causing mercury pollution there," said the DCP official. "The levels of mercury in Laem Chabang (the Chon Buri industrial park) are also high."

But an expert for the petrochemical industry who has worked in Mab Ta Phud is convinced that a majority of the problem comes from there.

"The quantity of mercury eliminated in the production of natural gas is very small compared to that coming from Mab Ta Phud," according to an industry source who asked to remain anonymous. "But the problem on the Eastern Coast has not been revealed for political reasons," he added.

It is known that natural gas produced in the central Gulf by Unocal and Total contains mercury. Production water contaminated by mercury and discharged from platforms into the sea has been the cause of relatively high levels of mercury found by Piamsak in fish near some of the old drilling platforms. Now both oil companies are trying to control contamination.

The source of mercury emissions on the Eastern Coast, in any case, is a problem that remains to be solved because the heavy toxic metal is present in gas; in the process of condensation, the metal is discharged from the production platforms toward factories in Mab Ta Phud, and is also used as a catalyst in some petrochemical processes. In addition, the mercury may rise naturally in the sewers along rivers on the Eastern Coast.

"It's a very complex problem," said the industry source. "I

don't think it's critical yet, but we have to be careful so that it doesn't get to that point. What worries me is that no information on mercury levels in marine life on the Eastern Coast has been published."

Together with the DCP, the Industrial Authority of Thailand (AHIT), and the Port and Fishing Departments have done studies of mercury in the area, but only some of the results have been made available to the public. Piamsak is also planning another study for the Department of Mineral Resources (DRM).

The DCP and the AHIT have analyzed samples of waste water discharged by some factories in Mab Ta Phud, but according to official data, mercury has not been found in levels beyond those permitted by law. "We also analyzed a small sample of marine animals from the Eastern Coast and the majority have levels below the legal norm," said the DCP source who stated that a comprehensive study would be undertaken next year.

The study in Chulalongkorn was done over the course of a year by a master's degree student, Piyanat Toonworm, who analyzed how mercury, unlike other heavy metals, increases when it enters the food chain, a process known as bioaccumulation.

Piyanat took samples from four levels in the trophic marine food chain in Bang Sarae and found that 300 carnivorous fish collected had mercury levels more or less close to the health limit, that is, 0.5 parts per million (ppm). Twenty-five per cent of these large fish had mercury concentrations higher than the permitted level, the highest being 1.5 ppm.

Comparing this study with his evaluation of fish at the Unocal platform in Erawan, Piamsak said, "In Erawan, there were fewer fish (11.6%) with mercury levels above the norm, but those which contained mercury had relatively high concentrations--more or less 2.0 to 3.0 ppm. In Bang Sarae, there were more fish with concentrations higher than the norm, but not that much higher.

When he was asked about the precision of the Eastern Coast study, he said that the results had been analyzed twice using a process known as the "recovery system," which has a 10% margin of error.

"The results we got are good enough for a master's thesis, but for the study to be published by the DRM, we will send our samples to an outside laboratory to confirm our data, and we hope that the results will be within a 5% margin of error," Piamsak explained.

"We also plan to focus our studies on mercury levels in one fish species, the cobia, taken from the Eastern Coast, the central Gulf, the sea off the Province of Chumphon, and from the Andaman Sea."

Commenting on the Bang Sarae results, the DCP official said

that "we need to find out what percentage of fish can contain mercury levels above the permissible level before we have a health risk."

In this respect, the industry source said, "I don't eat fish when I am in Rayong."

The French company Total, on the other hand, has discharged around 35 kilograms of mercury in the Gulf of Thailand since it began to produce natural gas there three years ago, according to the company's chief.

Jean-Paul Azalbert, director of Total Exploration and Production Thailand, also recognizes that a lot of Thai fishermen fish round his platforms, and that some of their catch could be contaminated with the mercury discharged.

When asked if any danger existed, Azalbert said, "It's hard for me to comment on that, because I have no idea of the level of mercury in the fish."

Total began an extensive environmental control program and a campaign to study the fish in July, but results have not yet been released.

Unocal eliminates around 90 kg. of mercury in the Gulf of Thailand each year and, according to some statistics, fish around their platforms manifest increasing mercury levels.

Although the mercury doesn't cause immediate damage to the fish, it could eventually cause damage to the central nervous system as well as genetic deformations in those persons who consume the toxic substance in high concentrations.

Unocal has said that it has the right to prohibit fishing within 500 meters of its platforms.

In any event, fishermen like the area because fish are abundant there. Company officials also recognize in private that it would be difficult to establish and maintain an "exclusive economic zone" in the area.

The Total operation is smaller than Unocal's, which has operated in the area for 15 years and set up 80 platforms.

Total has 12 platforms in its Bangkot field, producing an average of 350 million square feet (mpc) of gas per day and, in 1998, planned to increase production to 550 mpc per day.

Like Unocal, Total discharges its mercury into the sea during the elimination of formation water which, together with the gas, emerges from the subsoil.

Azalbert said that Total's goal is not to eliminate mercury in concentrations greater than 100 parts per billion (ppb), but he said that "very occasionally" that amount is exceeded.

The mercury discharge norm on-shore in Thailand is 5 ppb, but there is no offshore norm.

Azalbert explained that all of Total's formation water is discharged from the production platform after going through an advanced water treatment system, which includes an apparatus for purifying the water (rotary hydrocyclon).

Toward the end of this year, he said, Total hopes to have installed a formation water reinjection system.

Total has already discharged between 10 and 20 barrels of mercury-contaminated wastes as well as pure and liquid mercury through a process in which the mercury is put into steel capsules and buried in exploratory wells no longer in use.

Azalbert said that this is a temporary solution and that the company is looking for a more effective process to refine or crystalize the mud.

Although Total's Bangkok project head, Phillipe Persillon, had previously said that he was "surprised" when the company found mercury in its production water, Azalbert said that this was only because Persillon "was not aware of the entire panorama in detail."

Azalbert said that Total knew from the beginning that in its project in the Gulf of Thailand there was a mercury problem.

"We realized from the environmental impact evaluation and from the sediments in Bangkok that there were higher levels of mercury than those more to the south in the gulf," he said.

"It's difficult to analyze the presence of mercury in gas during exploration," he added. "We do it, but we get results that aren't very reliable. There is no way to know if there is mercury in the gas until we begin to produce at a stable rate."

OTHER COUNTRIES IN THE BASIN OF THE GULF OF THAILAND

Other projects are planned for extracting gas in the Vietnam zone and the frontier zone between Thailand and Malaysia in the gulf. The geological formations are similar, and thus the gas produced there could also contain mercury, according to Azalbert.

Mercury and other dangerous substances--including low-level radioactive materials--have also been found in gas fields in Malaysia and Indonesia, industry sources say.

In Malaysia, small quantities of mercury have been found in gas produced in the sea off the state of Terrenganu, but no mercury has been detected in production waters, and thus the metal is not being discharged into the sea, says Ir Hussein

Rahmat, spokesman for Malaysia Petronas.

Rahmat, who was in Vietnam attending a congress on regulating contamination in the oil and gas industries, said that the gas from Malaysia also contains naturally occurring radioactive materials (NORMS).

Petronas employees store mud with low-level radioactive elements in a gas processing plant in the state of Terrenganu, he said.

Sources from Total and Unocal--both with operations in Indonesia--say that the gas produced in some fields in that country contains both mercury and NORMS.

But Indonesian officials present at that congress said that they have received no information on this issue.

Natural gas from the Lan Tay offshore field in Vietnam contains mercury, according to the company that is attempting to develop the field.

The environmental impact in these areas remains unclear.

British Petroleum (BP), the company currently negotiating an agreement for the sale of gas in the Lan Tay field with the Vietnamese government, announced that gas there contains "extremely small levels of mercury."

Barry Bidson, chief of public relations for BP Exploration in Vietnam, said that delays in negotiations meant that commercial development of the field was unlikely before 1999.

"We have a rigorous health, safety, and environmental program, and our priority is pollution control," he said.

The Lan Tay field is 400 kilometers off the southeastern coast of Vietnam in the South China Sea.

The only gas field currently in production in Vietnam is the offshore Bach Ho field where Vietsov Petro--a Russian-Vietnamese joint venture--is producing a small amount of gas in addition to their larger petroleum operations.

Dr. Nguyen Duc Huynh of PetroVietnam states that there are no contamination problems at the site.

Australia's BHP is also producing oil in the Dai Hung field, near the coast of Vietnam, through a production agreement with PetroVietnam.

That company's activities are generating toxic substances such as barium, copper, and zinc in the sea, but within the legal norms established by the government, according to a source who asked to remain anonymous.

The levels of heavy metals found in fish around platforms at

Dai Hung are also within health norms, said the source.

Vietnam has also granted another gas concession to Unocal in the Gulf of Thailand, not far from that company's operations in Thailand.

As for the Yadana and Yetagun fields in the Gulf of Martaban in Birmania, Azalbert of Total said that they could have the same problems. There are as yet no reports of toxic contaminants in Burma, where two large gas fields have been discovered in the Gulf of Martaban, according to industry representatives and a government official.

Total controls 30% of stock in the Bangkot field, and in mid-July, 1998, the company began to operate fields for the Petroleum Authority of Thailand Exploration and Production Co., Ltd., which controls 40% of stocks. British Gas also has a 20% share of stocks and Statoil of Norway has 10%.

Azalbert said that he doesn't know if natural gas produced in Malaysia is also contaminated with mercury, but that he has seen equipment for mercury extraction in production factories in Indonesia. Natural gas contaminated with mercury is also a common problem in the North Sea, he said.

Finally, Cambodia has granted a number of exploratory offshore concessions in the Gulf of Thailand. Up to now no oil has been found.

Note: This is a compilation of articles written by James Fahn for the Thai newspaper "The Nation."

(recuadro)

In southeast Asia, the major producers of oil and gas are Indonesia (63% of total production for the region) and Malaysia (26%). For gas alone, Indonesia and Brunei account for 66% and 15%, respectively.

Forty-five per cent of oil and gas come from offshore operations. Refining takes place mainly along the coast. Spills and accidents during refining and transport of crude from the platforms to coastal installations, are a significant source of oil discharged in the seas.

The busiest route for maritime transport of crude in Southeast Asia is the Strait of Malacca and Singapore, this being the shortest and most economic route for markets in Europe and the Near and Far East.

Approximately 3.2 million barrels, consisting mostly of crude, move through the Strait of Malacca every day. Another 3.8 million barrels leave the region through the South China Sea, most of that destined for Japan. Around 0.6 to 1.2 million barrels per day go through the Strait of Makassar headed for Japan and the Pacific.

It is estimated that 150 ships pass through the Strait of Malacca and Singapore every day, en route for Japan and the Pacific, and of these vessels 10 are oil tankers. As a result, the possibility of an accident is great.

Habib El-habr, Coordinator UNEP EAS/RCU

THE PROFUNDITIES OF THE BOLIVIA-BRAZIL GAS PIPELINE (GASBOL)

CEJIS - Bolivia
Alcides Faria - Coalizao Ríos Vivos - Brazil

INTRODUCTION

There is no doubt that a detailed analysis of the multiple facets of the Bolivia-Brazil Gas Pipeline (GASBOL), especially regional geo-political issues and the interests of rich countries as prime motivating factors, will lead to answers to questions about the energy sector in a large part of South America and the major markets of those producer countries.

The GASBOL is one of the strongest elements determining the roads taken by the regional economy. The model chosen for its development is clearly a recycling of the traditional model, as is evident in documents from private companies involved in the project, financial agents, and governments, in addition to changes made in the law over the past few years. Today, public policy is no longer defined by local governments but by "consortiums" made up of transnational companies interested in specific sectors of the economy. In the energy area, GASBOL is the most visible product of these policies and involves other countries and short-, medium-, and long-term strategies.

The public in Brazil and Bolivia was generally kept out of discussions on the pipeline initiative. For those issues on which it was possible to create some debate, conditions were extremely limited and difficult. This situation was determined by the official governmental stance--represented by a state mega-business under the command of military governments--which did not allow for an appropriate evaluation.

MAJOR INFORMATION ON AND OBJECTIVES OF THE PROJECT

In 1993, Bolivia and Brazil's state oil companies signed a Natural Gas Sales Agreement involving the building of a 3,146 kilometer gas pipeline with a diameter ranging from 16 to 32 inches, which would begin in Santa Cruz, Bolivia, and go to Porto Alegre, Brazil. Initially, in 1998, the pipeline is expected to carry nine million cubic meters of gas per day. This volume will increase gradually over a seven-year period, reaching 18 million cubic meters per day in the year 2006.

The purpose of the project is to meet the growing demand for energy in southwestern Brazil and supply the region with an alternative source of energy which will, supposedly, be more environmentally friendly than current sources. Other objectives include stimulating Bolivia's export sector as well as increasing activity in Bolivia's hydrocarbon exploration and exploitation sector.

The gas pipeline will cover approximately 557 km. in Bolivia, beginning at a natural gas plant located on the Rio Grande, 40 km. from the city of Santa Cruz, and will end in Corumba, Brazil. The gas pipeline will affect the department of Santa Cruz and the provinces of Cordillera, Germán Bush, and Chiquitos.

Construction of the pipeline will include the opening of a right-of-way 30 meters wide which, on completion of the construction phase, will be reduced to 17 meters.

About 508 km. of existing roads will be improved in the project area to facilitate construction of the pipeline, including access roads along the perimeter of the Gran Chaco National Park and roads within the Santa Cruz La Vieja National Park. The project will include the construction of three compression stations, two meter stations, and a control and maintenance station. The pipeline will be buried at least a meter deep and will be made of carbon steel tubes.

In Brazil, the pipeline will extend for 2,589 km., beginning at Corumba and passing through large metropolitan areas, including Campinas, Curitiba, and Florianopolis before arriving at Porto Alegre in the south of the country. In Campinas, the pipeline will have a connection for Guararema, connecting with another pipeline that already exists and joins Rio de Janeiro, Sao Paulo, and Belo Horizonte, the nation's three major cities. Projected maximum capacity is for the transport of up to 30 million cubic meters per day. The contract signed by the governments of Brazil and Bolivia foresees that the pipeline will supply gas for a 20-year period.

On the Bolivian side, the project is being developed by Yacimientos Petroliferos Fiscales Bolivianos (YPFB), together with Enron Corporation (USA). It should be noted that Enron has acquired virtually all proven natural gas reserves in Bolivia. This company controls 20% of the world's natural gas supply. Together with Enron, YPFB formed the TRANSREDES consortium, which controls 85% of the Bolivian portion of the pipeline.

In Brazil, Petrobras is the responsible company and has formed a consortium with Broken Hill Proprietary Company Limited (BHP-Australia), Tenneco Energy/El Paso (USA), and British Gas (England).

The total cost of the project is estimated at US\$2,149.5 million, with the Bolivian portion accounting for US450 million financed by:

Petrobras	210
Export credit agencies	160
Partners	80
Total	450 million

The Brazilian portion of project costs is US\$1,699.5 million, approved under the following Financing Plan:

Interamerican Development Bank (BID)	240
World Bank	310
Andean Development Corporation	84
European Investment Bank	60
Partners and export credit agencies	1,005
Total	1,699 million

PETROBRAS is in charge of engineering, design, material acquisition, and construction of the GASBOL. The company paid US\$280 million in construction costs in order to receive long-term rights to use gas that will be transported through the pipeline. In an agreement with the Bolivian government, PETROBRAS promised to pay US\$100,000 per day after December 31, 1998 if the pipeline had not been finished.

THE AGREEMENTS

Negotiations for the construction of the GASBOL began in 1974 when General Ernesto Geisel, president of Brazil at the time, visited Bolivia. One of the outcomes of that visit was an agreement signed by Bolivian president General Hugo Banzer, today constitutionally elected president of the country. It should be noted that two years before (1972), Argentina had begun to import gas from Bolivia.

From 1974 to the signing of the current contract, which indicates the possibility of buying up to 30 million cubic meters of gas per day--and the pipeline has the capacity for this volume--other protocols were signed by the presidents of both countries:

- * 1978 between Ernesto Geisel and Juan Pereda
- * 1984 between Joao Batista Figueiredo and Hernán Siles Suazo
- * 1988 Between Jose Sarney and Paz Estensoro

The terms of these agreements contain significant differences. The 1988 accord, for example, establishes the construction of the pipeline only up to the border between the two countries for the transport of three million cubic meters of gas per day. This gas would be basically used for the production of electric energy to be exported to Brazil. In addition, those involved in the agreement determined that Bolivia would be in charge of looking for resources to finance the project. Today Petrobras is one of the companies financing the Bolivian portion. It is noteworthy that the pipeline idea only made progress when transnational companies took an interest and, from that moment on, regional strategies were developed in the fields of production, distribution, and sale in major South American markets.

THE ECONOMIC DEBATES

On analyzing the size of reserves--118 billion m3--Fernando

Zuniga Rivero, a World Bank consultant, said that the volume was insufficient and therefore rendered the project a financial risk and that the Bank ought not, therefore, get involved.

Engineer Carlos Walter Marinho of Petrobras stated in 1996 that "with an investment of this size we can't work on the basis of hypotheses." The Northwest Railway Union of Brazil-- a state company now privatized under the name Novoeste, responsible for the railway line that joins Corumba on the border with Bolivia to the state of Sao Paulo--participated in the technical debates on transportation alternatives. Members of the union defended the processing of gas and its transport by rail to the consumer market. They stated that reconstruction of the rail line would be a cheaper alternative.

In 1996, the newspaper Folha de Sao Paulo published an entire page devoted to the most controversial issues involved in the project. In 1997, an Interamerican Development Bank document entitled "Bolivia-Brazil Integration Pipeline"--in which the institution presents its reasons for granting the loan requested by Petrobras--reports on the results of an independent audit undertaken in 1996 on gas reserves in Bolivia, in billions of cubic meters:

Proven reserves	93.6
Possible reserves	36.9
Probable reserves	51.0
Total reserves	181.5

Questions posed by professor Rogerio Cezar at a meeting of the Association of Engineers, and by others, became the point of discussions throughout the decision-making process for the GASBOL. The controversy forced businessmen to reveal the strategies of governments, transnationals, and multilateral credit agencies. In the event that Bolivian fields were exhausted, an extension of the pipeline could be built to the Camisea gas fields in the Peruvian Amazon, discovered by Shell in 1983. Reserves in these fields are estimated at 183 billion cubic meters. In a document entitled "Strategic Environmental Evaluation for the Project," issued in July of 1997, Petrobras confirmed this fact and also indicated the possibility of importing gas from northern Argentina by reversing the flow of the existing pipeline. In the GASBOL contract, the Bolivian government agrees not to charge tolls for the transport of gas from other countries.

The lack of a market for gas in Brazil, according to some technicians, was resolved by building gas-powered thermoelectric projects all along the pipeline, the first of these in Brazilian territory in Corumba. Today a discussion is underway regarding the construction of a 700 km. branch for the north, beginning at Campo Grande, to satisfy demand for electric energy in the city of Cuiaba and other regions of the state of Mato Grosso.

ENVIRONMENTAL ISSUES

The pipeline will affect some of the most ecologically sensitive areas in this region of South America. It will cross wetlands, yomomales, streams, and large rivers, affecting almost exclusively areas with intact vegetation. According to the World Bank, the route for the pipeline was selected in order to avoid environmentally sensitive, protected, and populated areas. In spite of this allegation, the Bank recognized that the pipeline will cross a number of sensitive ecosystems, including the Pantanal and the Gran Chaco and Santa Cruz la Vieja national parks, and that it will cause constant damage in the parks.

The Gran Chaco National Park was created in 1995 to protect the largest area of subtropical dry forest in America. Covering 3.4 million hectares, this is one of the largest protected areas in South America. It is home to a diverse group of endemic fauna, including a significant number of species that are threatened or in danger of extinction.

The park is also located in the territory of a significant number of indigenous communities, including that of the Izozenos and Ayoreos peoples, and is administered by the Captaincy of the Upper and Lower Izozog. The CABI is the central organization of these peoples.

The wetlands of Izozog, Chiquitos, and Otuquis will also be affected by the pipeline. Up to the present, these areas have experienced very little human intervention and are the habitat of numerous threatened species.

In Brazil, the Mato Grosso Pantanal is an ecological zone in which the most serious environmental problems are concentrated. These problems include the extermination of vegetation, the possible use of explosives to break up rocks, and the creation of landfills in order to install the pipeline. In the Pantanal, the creation of these landfills is a serious problem because the result would be the blocking of the free flow of waters, with repercussions in distant areas. A border of 20 meters in width will be deforested the length of the pipeline.

In addition to the Pantanal, the pipeline will cross the Ibitinga and Corumbatai Protected Areas (transit points for migratory birds), a stretch of the Ipanema National Park (an area of experimental forestry), and remnants of the Mata Atlantica in the Paranapiacaba Sierra and the Pluvial Tropical Forest. Remnants of the Montana and Ombrofila Forests will also be affected, as well as grassy-wooded plains and the Galeria vegetation formations. There are also archaeological sites in the path of the pipeline.

INDIGENOUS PEOPLES

The human population affected in Brazil is part of the Terena ethnic group which lives in the Pantanal, a total of

approximately 15 thousand persons. In the south, in the state of Santa Catarina, there is a small population of Guarani Nandeva.

In the final phase of project decision-making--beginning in August of 1997--the Terena negotiated some compensatory and protective measures for their communities in the event of damage due to the presence of large numbers of workers from other regions. From the beginning, a major demand was an increase in their territory, a discussion that did not lead to positive results due to mediation of the National Indian Fund (FUNAI), a governmental entity. At the end of negotiations, Petrobras announced that the company would spend 900 thousand dollars in compensatory measures.

In the Bolivian zone, the pipeline will cross a region inhabited by the following indigenous communities: 6,650 Izoceno-Guaranies, 4,900 Chiquitanos, and 950 Ayoreos. According to the World Bank, these populations will be significantly affected by the pipeline.

EVALUATION OF ENVIRONMENTAL IMPACTS

A series of evaluations and strategies have been developed by supporters of the project in relation to the socio-environmental effects. These include an Environmental Evaluation Plan begun in 1996, which was declared inadequate by the Banks because it did not take into account secondary impacts of the project nor did it provide sufficient details of compensation and mitigation measures. Subsequently, parties involved assumed responsibility for the development of an Environmental Management Plan, a Strategic Environmental Evaluation, an Economic Environmental Evaluation, a Plan for the Development of Indigenous Peoples, a Contingency Plan, and a Risk Analysis Study.

At the request of the World Bank, project backers also contracted an independent evaluation of preliminary environmental and social studies for the project. The evaluation was made public on July 22, 1997.

The authors of the evaluation say that social-environmental management of the project is complex and will be a challenge. The multiple strategies for inspection, review, and auditing of project operations provide for very long response times. In addition, they had problems evaluating mechanisms planned for social-environmental compensation and mitigation due to lack of detailed information on these strategies.

The authors point out that those backing the project have not fully complied with basic guidelines established by the World Bank. For example, they insist that more attention be given to the need for opportune and informed participation of indigenous peoples and other public interest groups during project development, as required by the operational proceedings of the World Bank.

They also state that many details of a range of compensation programs have not been submitted for public debate in an opportune manner. They conclude that if pertinent actions are not taken, the project will soon be the point of environmental and cultural controversies on an international level.

The Indigenous Peoples Development Plan of June 24, 1997 lists the benefits that indigenous peoples affected by the project will receive. The Plan was negotiated by the national indigenous organization of Bolivia, The Central Office of Indigenous Peoples of Bolivia (CIDOB) and by the Captaincy of the Upper and Lower Izozog, which represent 23 Izoceno-Guarani communities.

The Plan provides 3.5 million dollars for financing management of the Gran Chaco National Park, the consolidation of indigenous land titles, acquisition of water systems, electrical generators, and health stations, as well as for training and education, among other benefits. While the Plan guarantees that indigenous peoples will benefit from the construction of the pipeline, the independent evaluation of the project notes that the Plan lacks an adequate system of objectives and criteria for evaluation of the results. Thus, it is not clear how implementation of the Plan will be guaranteed.

The Strategic Environmental Analysis (AAE) extends the reach of the Environmental Impact Study, taking into account broader issues. For example, the AAE discusses a significant increase in oil prospection activities over those foreseen as a result of construction, because the capacity of the pipeline exceeds proven gas reserves in the Santa Cruz area by 12 million cubic meters per day. Thus, it will be necessary to increase exploration to take complete advantage of the pipeline's potential.

According to the AAE, exploration and exploitation activities will have a negative impact. Among predicted effects are the construction of roads, the opening of forests, the presence of workers and machinery in sensitive areas, the arrival of settlers, and potential contamination, in addition to effects associated with the establishment of more connections between new sources of gas and the pipeline. Evaluation authors maintain that the most promising areas for the discovery of gas in Bolivia are located in environmentally sensitive areas, including the Yungas and parts of the Chaco. The AAE also explains that, in spite of expectations, the pipeline has a limit potential for stimulating economic development in Bolivia.

The IDB, in its Socio-Environmental Impact Evaluation for the GASBOL, discusses more serious, long-term impacts, especially in relation to future exploration. The Bank reports that, as a result of institutional deficiencies in the area of environmental management in Bolivia, oil companies will have to take the initiative in developing rigorous strategies for

the adoption and implementation of adequate environmental practices.

For example, in Bolivia there is no requirement that companies use cutting edge technology to reduce negative impacts, nor is public participation required in hydrocarbon activities.

In spite of the multitude of social and environmental dangers associated with the project, on February 19, 1997, Bolivia's Ministry of Sustainable Development and the Environment granted a license authorizing construction of the pipeline. At the beginning of August of 1997, PETROBRAS began construction on the Bolivian portion, before final negotiation of the World Bank loan and the associated socio-environmental agreements, and in the absence of an agreement signed by representatives of affected indigenous peoples. Construction began without adhering to the procedures recommended in the Environmental Management Plan and without establishing an environmental supervision system as required by World Bank regulations.

In response to protests from the groups involved, a mission from the World Bank and the IDB visited the construction site and reported on environmental damage and violation of environmental procedures. Construction was suspended until new machinery and environmental supervisors were introduced. Work then proceeded, in spite of the fact that the final environmental plans had yet to be completed. PETROBRAS' urgency in proceeding with construction is due to the fine it would have to pay for construction delays. In the rush to finish within the indicated time-frame, PETROBRAS has ignored social and environmental issues.

Some public interest groups have requested that the socio-environmental directives of the World Bank and the IDB be complied with, and have been very critical with overall management of the project. Given that World Bank and IDB financing will cover construction only in Brazilian territory, the banks claim that they have no power to force compliance with directives in Bolivian territory. Nevertheless, the IDB has argued that although they are financing only a part of the pipeline in Brazilian territory, the project should be considered as a whole in technical, economic, and socio-environmental terms, and that this includes gas production in Bolivia, transport via the pipeline, and the arrival of gas to Brazilian cities.

Nevertheless, it seems that the IDB is not prepared to implement its own analysis by insisting that the pipeline be built according to precautionary directives.

As a result of uncertainty regarding the responsibilities and jurisdictions of those involved in the project, some public interest groups are worried about the commitment and the ability of the banks to force compliance with the socio-environmental mitigation measures in the Bolivian project.

The independent evaluation of the World Bank emphasized this point, observing that as a result of inadequate integration among all key participants, the pipeline appeared to be two distinct projects. The authors suggested that the directives of the banks be studied and that criteria for social and environmental programs be developed.

THE NGOS

In response to demands from interested non-governmental organizations which expressed concerns about these and other matters, backers of the project, together with the multilateral banks, organized a forum on August 21, 1997 in Santa Cruz. The purpose of the workshop was to review environmental studies and socio-environmental mitigation plans associated with the project. Participants were very critical of the consultation process. Criticisms included the fact that organizers of the consultation were not provided with sufficient information in response to their requests, that many affected and interested groups were excluded from the consultation, that the process lacked sufficient participation, and that the consultation was undertaken only as a result of their requests and after construction had begun.

Participants in the consultation and other interested groups have expressed a number of concerns with respect to the gas pipeline project. One of the major criticisms is in reference to the fact that PETROBRAS has not been able to establish an adequate socio-environmental monitoring system that includes participation and control by indigenous peoples and communities affected by the project. Interested groups have demanded that construction of the pipeline be suspended until such a system is established. They argue that the system that has been developed by backers of the project to supervise their operations is insufficient, especially because personnel contracted to carry out environmental supervisory activities have been selected and employed by project sponsors. In addition, other groups argue that Petrobras' request for the creation of a formal and local monitoring committee, that includes one representative of a single NGO who will accompany the environmental during visits to the sites, is insufficient.

Interested institutions have also claimed that there is no access to up-to-date project documents and information. They insist on the need for a broad consultation regarding socio-environmental mitigation strategies. In addition, participants in the consultation and others have complained that compensation provided for social and environmental costs is inadequate. Finally, they insist on the need to have a plan that includes a broad consultation to avoid adverse socio-environmental effects from future hydrocarbon activities in the Bolivian Amazon.

Since the consultation, public interest groups have continuously communicated their concerns about the pipeline

project. They have repeatedly stated that the Environmental Impact Study and the Environmental Management Plan are not based on facts, that responses to their observations to the consultation have not been satisfactory, and that many important matters are still pending.

In addition, a number of field inspections have been carried out and the serious problems observed have been made public. According to an evaluation by the Foro Boliviano de Medio Ambiente y Desarrollo (Bolivian Environmental and Development Forum--Fobomade), export of gas under the conditions established will promote a "sacking" of the country's natural wealth, endangering its development. This view was expressed in an article published in the organization's bulletin in September of 1997.

In its analysis of the contract, the Forum states that "if energy use increases and production is not sufficient to cover the increase, the results will not be as serious as the reverse phenomenon: high production and low consumption, a situation characteristic of third world countries. The Bolivian case does not fall within either of these scenarios: low energy production and low consumption are characteristic of the conditions of misery in a country whose development is in a state of chronic paralysis. More than seven decades of oil exploitation in Bolivia has created serious social and ecological impacts the true dimensions of which have yet to be evaluated."

In Brazil, members of the Coalicion Rios Vivos (Living Rivers Coalition) has been monitoring various aspects of the project for a number of years. They received all eight volumes of the first version of the Environmental Impact Study (EIA) in 1993 through the Office of the Environment of Mato Grosso do Sul. The technical discussion process involved the State University of Mato Grosso do Sul, and demonstrated the poor quality of the studies and the risks involved in making decisions about a project with the dimensions and impact of the GASBOL on the basis of those eight volumes. Technicians responsible for the study listed in the text, for example, species of fauna not found in the Pantanal. In addition, the final route of the pipeline was not known at the time, which fact made the 1993 EIA a reference work rather than an instrument for decision-making that provided a concrete basis for society's understanding of the project.

In 1997, with final preparations for the beginning of the project, definition of financing, and the release of new studies, non-governmental organizations intensified their actions and widened their approach, establishing, in particular, common strategies in different countries. Some did field studies to identify environmental and social risks. In Rio Grande do Sur, Brazil, the Acci3n Democr3tica Femenina Gaucha-Amigos de la Tierra (Gaucha Women's Democratic Action-Friends of the Earth) put together a file on problems that would occur--including risks of large-scale accidents--if the initial route through a region known as Aparados da Serrar

were maintained. This area is subject to storms and landslides.

In the Pantanal, Ecoa identified a series of impacts and invited the governor of the state to fly over the area where the pipeline would run through the region. The ITC (Comité Intertribal Ciencia y Memoria Indígena-Intertribal Indigenous Science and Memory Committee), a member organization of the Rios Vivos Coordinating Committee, presented a series of proposals related to inclusion of projects necessary to contain impacts on the communities. The organization's president, Enir Terena, developed and sent a project to those responsible for the initiative in which he proposed, as the principal point, the need to inform women of the risks of the spread of sexually transmitted diseases given the presence in the camp of individuals from regions near the communities.

In July of 1997, organizations received copies of the Plan for the Development of Indigenous Peoples, the Environmental Management Plan, and the Strategic Studies of Environmental Impacts.

Even in government spheres, there were criticisms of the authoritarian manner in which Petrobras had treated small municipalities located along the pipeline. On June 19, the associations of Municipalities of the Brazilian States of Sao Paulo and Mato Grosso do Sul released a resolution protesting Petrobras and the federal government's lack of consultation and violation of the constitutional rights of municipalities. One of the impositions of the central government was the application of a system of fiscal incentives for municipalities through federal law.

CONCLUSION

One of the strongest arguments for the GASBOL, not directly related to the issue of its economic viability, is that the project will contribute to diminishing air pollution in Sao Paulo as a result of more widespread use of natural gas as a source of fuel in the public transport bus system. Other analysts say that the 200 to 300 million dollars the Bolivian government will receive will contribute to diminishing poverty in the country and will serve to free that nation from the grip of international drug production and trafficking. These factors, while true, do not lessen the seriousness of the lack of transparency with which the project has been implemented. As mentioned, the pipeline is a framework for profound transformations in energy policies and development in South America. Attention to its results and the movements of those involved is fundamental in the monitoring of public policy.

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CENTRAL AMERICA'S NEW GAS PIPELINE

Luis Solano -
Oilwatch Mesoamérica

INTRODUCTION

The governments of Central America and Mexico began to promote the construction of a natural gas pipeline in late 1997, which would begin in Ciudad Pemex in Tabasco, Mexico, and run through Guatemala, El Salvador, Honduras, and Nicaragua. The project was presented as an alternative to covering the growing energy demand in Central America through the use of a relatively cheap and clean fuel that was easy and safe to transport.

Central American ministers of energy met on March 30 1998, the following year in Nicaragua to analyse the preliminary feasibility study which was prepared by the Economic Commission of Latin America and the Caribbean (CEPAL). However, none of the governments of the isthmus, with the exception of Guatemala, seemed to be prepared for the construction of the gas pipeline nor completely interested in doing so.

Guatemala's interest in the pipeline was evident throughout the long meeting of Central American governments, as was that of Mexico during the Tuxtla III summit held in San Salvador, El Salvador. At that meeting, progress on the Guatemala-Mexico pipeline construction agreement was made; the pipeline will connect the south of Mexico with the southern coast of Guatemala, a distance of 700 kilometres, and will cost between US\$500 and US \$600 million.

Although natural gas is being promoted throughout the world as a cleaner hydrocarbon, and Guatemalan authorities are using this same argument to promote the pipeline, there are a number of doubts in this regard. Taking into account experiences like that of Mexico, and a number of studies available, it seems that natural gas, being a hydrocarbon, is equally as dangerous--and perhaps more dangerous--than is petroleum.

It should be noted that information about the project is scant and that energy and mining authorities are not forthcoming in their public statements. Nevertheless, the information presented below is taken from various sources, including interviews and articles in the press, and while full details about the project are lacking, the facts available are sufficient to provide a general idea of the project.

THE GAS PIPELINE PROJECT

According to a summery document issued by Guatemala's Ministry of Energy and Mines, the objectives of the project are: connect Mexican-Central American natural gas distribution networks; substantially reduce transport and sales costs; replace liquid and wood fuels; reduce the high levels of contamination produced by non-renewable energy resources; guarantee a constant supply of natural gas for productive activities in the region; develop national economies at a faster pace and improve the quality of life of residents.

The advantages of natural gas, according to authorities, are: abundance; low cost due to minimal processing required; alternative or substitute for liquid fuels; clean-burning,

reducing toxic emissions; reduces deforestation by replacing wood with natural gas; safer; anti-explosive (120-130 octane); easily transported through pipelines.

Pipeline construction, according to the original version (which includes Guatemala, El Salvador, and Honduras in the process) will take place in phases. The first section, from Ciudad Pemex to Salina Cruz on the northeastern border with Guatemala (vertex, El Ceibo, Peten) is 140 kilometres long. From Guatemala, there are two possible routes, both of which touch major centers of development in the region; the choice between the alternatives will depend on whether or not the other Central American governments participate in the project.

Route 1 would be approximately 710 kilometres long. It would begin at Cactus/Ciudad Pemex on the Mexican-Guatemalan border, and include distribution terminals in Puerto Barrios, Guatemala, and optional distribution terminals in Escuintla, Guatemala; Puerto Cortes and San Pedro Sula, Honduras; Acajutla and San Salvador, El Salvador.

Route 2 would be approximately 563 kilometers long, with its point of origin in Cactus/Ciudad Pemex on the Mexican-Guatemalan border, with optional distribution terminals in Coban, Guatemala City, and Escuintla, Guatemala; Acajutla and San Salvador. El Salvador, and Tegucigalpa, Honduras.

The project has been designed so that it can be implemented completely or in segments. Thus, it is feasible that only Guatemala be involved in construction. According to the Ministry of Energy and Mines, Guatemala's interests are based on geographic proximity and comparable economic objectives. Mexico is prepared to build the portion in its territory in order to assure that the project progress.

Natural gas is used by the industrial sector, for the generation of electricity, and for transport and residential use. Guatemala is emphasizing industrial uses and generation of electricity.

As regards costs, to build only the Guatemalan portion will require an investment of US\$330 million, according to the March 9, 1998 issue of Prensa Libre. The cost for El Salvador is US\$111 million; for Nicaragua, US\$152 million; Costa Rica, US\$141 million; and Panama, US\$296 million. Investment in Honduras would be minimal because it could depend on branches from the Guatemala and El Salvador trunk lines.

According to figures from CEPAL, the projected demand for natural gas in Central America for the year 2005 is:

Country	Year	Millions of cubic meters	Millions of cubic meters/day
Guatemala	2005	392	1.4
El Salvador	2005	630	2.2
Honduras	2005	555	2.0
Nicaragua	2005	333	1.2
Costa Rica	2005	233	0.8
Panama	2005	539	1.9

CURRENT STATE OF THE PROJECT

By August of 1998, it seemed that only Guatemala and Mexico would be participating in pipeline construction. According to information obtained from the ambassador of Guatemala in Mexico, only that Central American republic had demonstrated an interest and was involved in the preliminary prefeasibility study.

After the July Tuxtla III meeting of presidents from the isthmus and Mexico held in El Salvador, progress between the two countries was clear. At that meeting, participants were informed of progress on this issue, including the existence of a framework agreement that would allow construction to go ahead with a November target date for completion. At that same meeting, Guatemala and Mexico created a commission for project follow-up.

In the coming days, the process for selecting the company that will build the pipeline will begin, according to Leonel Lopez Rodas, Guatemala's Minister of Energy and Mines. At that same meeting with the press, the minister noted the obstacles facing the project, including an impediment in Mexico's constitution which does not allow the country to guarantee a natural gas supply to Guatemala, as demanded by that country, though he stated that they are looking at different options in this regard.

At the moment, a number of U.S. companies, specifically from Houston, have demonstrated interest in the project. Those involved are also considering which companies will be selected to operate the pipeline and to negotiate with PEMEX.

THE GOVERNMENT'S VIEW OF ENVIRONMENTAL IMPACTS

According to Henry Hernandez, a consultant to Guatemala's Ministry of Energy and Mines, they are hoping for a quick decision from the National Commission on the Environment (CONAMA) as well as from the Institute of Anthropology and History (IDAEH) on environmental impacts and damage to historical heritage sites the length of the probable pipeline route.

Possible routes run through protected areas, as well as areas rich in flora and fauna, communities, and archaeological sites. Nevertheless, the official position in this regard is that the importance of environmental impacts must be weighed against the advantages of natural gas, the range of its application in different productive sectors, and the possibility of producing natural gas from other materials. Some local and international specialists view natural gas as the fuel of the future.

According to energy authorities, the attractive characteristics of natural gas are: a decrease in deforestation if the use of natural gas is widespread; the fact that combustion gases produced are not corrosive; the greater safety of natural gas; and reduced risks of an accident in the pipeline.

SOME CRITICISMS OF THE GAS PIPELINE

CEPAL claims that "construction will have a direct impact on the environment, but this will occur over a relatively brief period of time." In addition, there are other risks: "Once the pipeline is buried, most of the surface can be

restored.

The pipeline will operate for several decades, putting to the test installations, equipment, and materials, the deterioration of which could affect the environment and the human population in case of an accident."

CEPAL's study indicates that the pipes, which are 18 meters long and 24 inches in diameter, and which when joined extend for 2,200 kilometres, will go through forests, wetlands, rivers, lakes, mountains, hills, and plains. Nevertheless, CEPAL also believes that the use of natural gas in the electric and manufacturing sectors will produce less contamination than that which occurs with the burning of other fossil fuels.

CEPAL also believes that the use of natural gas will have negative effects on fuel oil refineries existing in both countries, as demand for this source of energy will drop. In addition, local industries will have to make changes in their installations in order to adapt them for natural gas use.

Among the benefits of natural gas, according to CEPAL, are the following: improvement in the trade balance by reducing the cost of hydrocarbons, an increase in levels of private investment, improved conditions for the participation of new private actors in the electricity sector, greater competitiveness of industries with a high level of fuel consumption, and diversification of energy sources.

In addition to comments by CEPAL, there are other issues that need to be taken into account. One of these is that the gas pipeline will probably be constructed parallel to the oil pipeline, which belongs to Basic Resources, an oil company, and which divides into two the area around Peten. The oil pipeline begins in the XAN oil zone, in the Laguna El Tigre National Park, and ends in La Libertad; the line passes the community of Raxrujha in Chisec, Alta Verapaz, and then joins the pipeline that runs through the Franja Transversal del Norte.

There are a number of important elements here. First, any accident would have double repercussions because, in addition to the repercussions due to gas, the oil pipeline would be affected. The environmental implications in the event of an accident in either pipeline would be very serious. The same is true of consequences for communities and the land through which the pipelines travel.

Those individuals and communities that received indemnization for right-of-way and damage to their land and territory during the construction of the Basic Resources pipeline should also be compensated for damages and right-of-way during construction of the gas pipeline.

Accidents have occurred in other countries, especially in Mexico, in the course of this decade, some of them with disastrous consequences, including one in the Federal District and others in Guadalajara, Jalisco. At both sites there were dozens of deaths as a result of explosions in the gas pipeline that went through urban areas.

At the same time, we need more information on the components of natural gas, some of which are said to be dangerous to human health. Some even argue that they are worse than those caused by petroleum.

According to Ricardo Carrere of the magazine "Sur," natural gas, promoted these days as "less contaminating," is also a non-renewable, polluting resource, which creates other potential dangers when being transported.

When combined cycle processing plants for carbon (the most contaminating fossil fuel) are compared to those for natural gas (the least contaminating fossil fuel), it is clear that in fact, the "cleaner" reputation of the latter is basically due to SO₂--sulfur dioxide--emissions (which are completely eliminated), while NO₂--nitrogen dioxide--emissions are about the same and CO₂--carbon dioxide--emissions (the major contributor to the greenhouse effect) are about half.

Comparison of emissions in combined cycle plants for carbon and natural gas:

Emissions	NO ₂	SO ₂	CO ₂
	(grams per kilowatt-hour)		
Carbon	0.11	0.30	758
Natural gas	0.10	0.00	345

Natural gas is distributed through pipelines. Throughout the world, there are about a thousand accidents annually in these lines given that the gas is transported under pressure ten times higher than normal and that the gas corrodes pipes and joints. As a result, there are explosions which affect dwellings, persons, and installations up to 300 meters from the explosion, even when the pipeline is buried two meters deep.

PERSPECTIVES FOR NATURAL GAS PRODUCTION IN PETEN

The Guatemalan Ministry of Energy and Mines has announced that drilling in the 1-95 and 2-95 contract areas will begin in October. The company selected for the project is Ramrod

Petroleum and Gas, financed by Ecuadorian, Spanish, and Canadian capital. This company began to explore earlier this year in lands around San Andrés and La Libertad, Peten, and specifically in the community of La Pista.

Drilling is for the purpose of finding oil and, especially, natural gas. According to ministry sources, there is a high probability that gas, including large deposits, will be found given results of tests carried out by company geologists.

A number of years ago, Texaco found hydrocarbons in the area. That company explored in Ocultun and Paso Caballos. But Ramrod's studies confirm the existence of more than oil. The company also presumes that light oil exists at a depth of about 15 thousand feet.

Lopez Rodas, Ministry of Energy and Mines, stated that if quantities sufficient for sale are found, there would be no need for a Mexico-Guatemala pipeline. Lopez Rodas hopes that Ramrod's drilling results will be available by November, as they are re-drilling Texaco wells.

Estimated natural gas reserves, according to the minister, are about 300 trillion cubic feet or 1,800 million barrels.

On October 1, Energy and Mines authorities announced that they would be signing an agreement with Pemex of Mexico to begin construction of the pipeline before the end of this year.

The authorities based this announcement on interest demonstrated by the Spanish company Iberdrola in a meeting about the pipeline project with representatives

of the Guatemalan and Mexican governments. The Spanish company recently acquired 80% of stock in the Guatemalan Electric Company; Guatemala is in the process of privatizing public enterprises.

In addition to Iberdrola, two other companies have manifested interest in the pipeline project. One of these is the Compañía General de Combustibles (CGC) of Argentina, which is already exploring for and producing oil in the departments of Alta Verapaz and Peten. Another is Shell, the Dutch transnational, which has been carrying out seismic tests and drilling exploratory wells in Guatemala for decades.

Up to now, the government has been promoting natural gas as a cheaper, cleaner fuel, though emphasis is on the economic rather than the environmental benefits that its use will presumably generate. However, care must be taken in use of the term "cleaner" as, in fact, natural gas is "less dirty" but carries high risks for human health.

AWAITING THE PROTOCOL

Mexican and Guatemalan energy authorities are discussing the necessary legal, regulatory, and tax requirements prior to signing the inter-governmental agreement or protocol that must be in place before presenting the project to interested private companies and international finance organisms.

The companies which have expressed an interest to date are:

Compañía General de Combustibles (CGC) of Argentina, which is currently involved in oil exploration and production in Alta Verapaz and Peten; ICA, a Mexican construction company; transnational oil company Shell; William's, a company based in the United States; and the Spanish company Iberdrola, which recently acquired control of Guatemala's Electric Company (EEGSA). If there are no other interested companies, those listed will have to take into account that there is no specific set of regulations for building and operating natural gas pipelines. But there are basic conditions that must be complied with: presentation of an Environmental Impact Study to the National Commission on the Environment (CONAMA), acquisition of rights-of-way, a license for transport and import, and competition.

In the case of Mexico, Petróleos Mexicanos (PEMEX), the state oil company, will build the pipeline that will provide natural gas to the state of Chiapas and the south of the country. In Guatemala, pipeline construction is programmed to begin in 1999 and will take between 24 and 36 months to complete. Thus, the work will be completed by the end of the year 2000 and enter into operation in 2001.

One clause in the contract will stipulate that PEMEX will be the only natural gas supplier in the southern zone that will supply the Guatemalan market.

SEVERAL SUPPOSITIONS IN FAVOR OF THE PROJECT

According to studies by the General Office of Hydrocarbons of Guatemala's Ministry of Energy and Mines, potential demand for natural gas will increase by 5.6% between 1994 and 2004, reaching 1.84 million cubic meters daily. It is assumed that the electricity industry will be the principal consumer of natural gas in Guatemala in the year 2004, utilizing 69.18% of production, while the industrial sector will consume 30.82%.

Net natural gas production in Mexico in 1998 was estimated at 30 billion cubic meters daily, and it is hoped that this figure will increase to 46 billion by the year 2004, for a daily production figure of 126 million cubic meters. Of that daily figure, Guatemala will consume 1.46% in the year 2004. It is

estimated that production of natural gas in southern Mexico will be 89.14 million cubic meters in the year 2004, of which Guatemala will consume 2.06%.

In the framework of potential markets, the study document proposes substituting 50% of fuel consumed in industrial activities and in the generation of electricity with natural gas; complete substitution of diesel consumed in steam and gas turbine engines; and, by the year 2004, it is estimated that new projects for the generation of electricity will be operated completely by natural gas.

RESPONSES FROM CIVIL SOCIETY

In August of 1998, the Humboldt Center (Oilwatch Nicaragua) received a copy of an unpublished Interamerican Development Bank (IDB) document on the project. The document was provided by Nicaragua's Grupo Propositivo de Cabildeo, a coalition of NGOs specializing in foreign debt and multilateral organisms. In October of 1998, this organization held a meeting in Washington DC, with Mark Cackler, chief of the IDB's Office on Sustainable Development for Central America and Panama.

One of the major themes discussed was concern about "Harmonizing the Hydrocarbon Market in Central America," a project proposed by the IDB, of which the natural gas pipeline is one aspect. One of the arguments presented by Oilwatch Nicaragua concerned the impossibility of talking about sustainability when the issue is the exploitation of non-renewable resources, especially when said exploitation threatens fragile ecosystems and indigenous communities.

The IDB official said only that new studies were being prepared and that those would be sent in due course, though he did not specify when that might be.

Oilwatch Nicaragua has criticized the project in many forums, pointing out the risks involved. Said forums include the "Fifty Years Is Enough" campaign and a meeting of IDB officials in Nicaragua called to discuss investing for the first time on the Atlantic coast of that country.

Subsequently, Mesoamérica Oilwatch held a press conference in Managua, Nicaragua, attended by indigenous leaders and authorities from the Caribbean coast of Nicaragua to denounce IDB's plans to explore for and produce hydrocarbons for the Central American region.

Those present at the conference emphasized the negative effect the projects planned by the IDB would have on biodiversity in the region. The information was widely publicized in the country. Nicaraguan authorities claimed that the information disseminated was alarmist, and downplayed the impact of construction of the pipeline in the region.

Currently, concerned groups are studying the environmental risks presented by the pipeline in the face of natural disasters such as hurricane Mitch in Central America.

In other Central American countries and in Mexico, there are also signs of growing resistance by civil society to construction of the natural gas pipeline.

A CONTROVERSIAL PIPELINE

Noel Rajesh
TERRA - Thailand

The continuing international controversy over the projected Yadana natural gas pipeline in Burma is due to the fact that it has been built using forced labor, and has led to the displacement of local communities and other human rights violations perpetrated by Burma's military regime throughout the project. On the Thai side of the border, the pipeline will cross one of the most important protected ecosystems of Southeast Asia.

The 670 km. pipeline, which will transport natural gas from the fields of Yadana to the coasts of Burma to supply electricity plants in Thailand, has encountered so much opposition both in Burma and throughout the world that it has become one of the most controversial projects ever undertaken. Since construction began in 1995 in Burma, international human rights groups have demanded that the oil companies involved--Total of France and Unocal of the USA--cease their involvement in a project that will primarily benefit the dictatorial and repressive regime of Burma (SLORC).

Construction on the Yadana pipeline is continuing on the Thai side, under the auspices of the Petroleum Authority of Thailand (PTT). The Thai portion of the project was delayed for a long period due to concern that the pipeline would destroy vast regions of primary forests in the Western Thailand ecosystem.

The Thai section of the Yadana pipeline measures 297 km, running through the southeast from the point of entry into Thai territory in the settlement of Ban Y-Tong, province of Kanchanaburi, to a 4,600 megawatt (MW) plant built by the Electricity Generation Authority of Thailand (EGAT) in the province of Ratchaburi.

Gas was to have been delivered beginning July 1, 1998, with an initial volume of 141 million cubic feet per day (mf/d), increasing to 525 mf/d during the 14 months subsequent to that date. By the time construction was finished in 2001, the 4,600 MW generated by the Ratchaburi station would account for 20% of electricity demand.

An agreement for the provision of gas for 30 years was signed in 1995 by MOGE and PTT. Thailand will pay between US\$200 and 400 million per year to SLORC.

THE ENVIRONMENTAL IMPACT STUDY REJECTED

In May of 1996, a Committee of Experts from Thailand's National Commission for the Environment (NEB) rejected the Environmental Impact Evaluation (EIA) for the project because

the information it contained on potential impacts to wildlife was incorrect.

For example, the pipeline route is 20 to 80 meters wide and runs for 25 km through the western forests of Thailand; these forests cover approximately 600,000 ha and are a continuation of forests that straddle the border with Burma.

The western forests are one of the largest protected areas in the southeast of Asia, and include 14 individual Protected Areas, including the Thung Yai Naresuan-Huai Kha Kaeng Wildlife Sanctuary, declared a World Heritage site by UNESCO.

The project will cross the Thong Pha Phum forest, which is in the process of being declared a National Park by the Thai government. According to the EIA, the Thong Pha Phum forest "is located in the center of other protected areas, such as the Thung Yai Naresuan Wildlife Sanctuary, the Kaho Laem National Park, and the Sai Yok National Park."

The western forests are the natural habitat of 120 terrestrial mammal species, 45% of the total in Thailand, and 33% of all known species in continental Southeast Asia. Forty-five species of mammals are classified as endangered in Thailand (53% of the country's total), and at least 15 have been internationally classified as endangered, including the tiger, the spotted leopard, the jaguar, the panther, the wild water buffalo, and the elephant. The forested area is the home of nine species in danger of extinction, including the white-handed gibbon, the Malaysian tapir, elephants and tigers. In terms of insects, the forest complex is considered the richest in species diversity in Southeast Asia.

The EIA for the project was carried out by TEAM Engineering Consultants for PTT in January of 1996. In Thailand, TEAM has done other EIAs which have not taken into account a variety of aspects of large-scale infrastructure that might generate environmental impacts.

In May of 1996, the Committee of Experts established by the National Environmental Commission (NEB) to review the pipeline EIA submitted by TEAM rejected the study and requested that PTT work with the Royal Forestry Department (RFD) to study the potential impacts that the pipeline might generate in the forests and on the wildlife in the project area.

According to an independent study by an ecologist who works for the RFD, the study submitted by TEAM is based on erroneous information: "Without information related to the sample taken, there is no way to draw conclusions in reference to species, nor can independent critics determine if the TEAM evaluation is reliable. For example, the study suggests that the Malay Tapir and the Ugly Muntjar are not present in the project area when, in reality, both species have been registered in the Thong Pha Phum National Park. Both species are listed in the Red Book of endangered species

by the IUCN and WARPA (Wildlife Species Protection Law).

"Without extensive and prior sampling, it is impossible to establish definitively that these important wildlife species are not present in the project site simply because TEAM did not observe them in their limited investigation. It is probable that the project will have an immediate impact on flora and fauna not only in areas near the project but will also affect wildlife in neighboring areas."

At the same time, Thailand's RFD expressed concern about the route of the pipeline through forested areas classified as watershed zones 1A (the highest conservation classification for watersheds) and protected areas, including the Sai Yok National Park.

The RFD has demanded that the parties involved do a technical audit of the pipeline's impacts which includes the impact on wildlife species in the area. In response to this concern, the NEB assigned to the RFD the task of an additional fauna study which was completed in October 1996.

The director of the pipeline project for PTT, Somphong Tantivanichakul, has attempted to dismiss concerns of the environmental movement, declaring that the pipeline will be built underground which will eliminate on-going impacts to the forest. However, it is highly questionable whether the construction of an underground pipeline will avoid destruction of large areas of undisturbed forest.

CAVES OF BATS

There is special interest in the pipeline's impact on hillsides of limestone which are the planet's only known habitat for the Kitti pig nose bat (*Craseonycteris thonglongyai*), the smallest mammal in the world, weighing only two grams. The bat is classified as a protected species by WARPA.

According to the EIA, the limestone endemic wildlife habitat is about 500 meters to the north of the pipeline route. The EIA states that, "The pipeline would not have an adverse effect on the pig nose bat because the species is confined to the Sai Yok National Park and it feeds in an area with a radius of one kilometer around its preferred caves. In addition, this tiny bat needs constant temperatures and a certain level of humidity to sleep within the caves, and thus it seems improbable that it moves beyond the Sai Yok area in order to colonize the Thong Pha Phum area."

Surapol Duangkhae of the Wildlife Fund of Thailand (WFT) has investigated the ecology and behavior of the pig nose bat. He dismisses the conclusion of the EIA, that the pipeline would not adversely affect the limestone cave habitat of the bat.

According to Suraphol, "The EIA does not provide sufficient information to clearly evaluate the impacts of the pipeline

on this habitat and on endemic species found there. The pipeline will cross the middle of the limestone formations, which run from north to south and which are the bat's only habitat. But the EIA does not provide a detailed study of adjacent limestone caves and the ecological behavior of the bats. Although the distribution of the pig nose bat is limited, the viability of the population will be endangered by disturbance of its limestone habitat caused by pipeline construction activities."

Engineering projects in the limestone areas have always been controversial due to uncertainty about ecological impacts. Of particular interest is the way that construction could affect the hydrology of these areas. A geologist who works for the RFD says, "The building of roads and the cutting of forests could increase sedimentation, exacerbating soil erosion."

In addition to soil erosion, in karst areas water seeps below the soil and causes erosion at the lowest points along the surface. Sediment leaches imperceptibly below fractures in the rock, leaving cavities which could lead to unexpected landslides.

Karst hydrology is never simple and the lack of knowledge about this feature of the area is critical. The EIA does not even mention that there might be problems of surface drainage because it does not provide an exact evaluation of environmental impacts.

"The environment of the caverns could be affected by unforeseen changes in the provision of water causing modifications in the stable conditions required by the bats."

THE PIPELINE: "A SERIOUS THREAT TO WILDLIFE SURVIVAL"

On May 3, 1996, Mr. Montree Saniprachakorn, Director of the Land for Forest Resources Section of the Royal Forestry Department, sent a letter to the Committee of Experts that was evaluating the Yadana pipeline EIA. In it, he said that "The forests near the project are watersheds 1A and 1B, areas within the Thong Pha Phum National Park, and it is foreseen that the pipeline route will be through the Sai Yok National Park, which should be conserved for the wellbeing of the nation.

"The surroundings of the pipeline are an area with a high level of biological diversity...including nine species in danger of extinction...and rare species such as the pig nose bat... Subsequent investigations could increase definitively the number of wildlife species [in danger of extinction]."

The impact of the road (that would be built to facilitate construction of the pipeline) will be to divide the forest into two distinct areas, altering wildlife migration patterns. In the long term, this would be a serious threat to the survival of the species in question.

Construction of the road will have impacts on forest animals. During the dry season, the water available to these animals is reduced. Construction activities during the dry season, and construction workers' camps near sources of water, will cut off these animals' access to water, and hunting and forest fires will be impossible to control.

Studies of the impact of the pipeline on wildlife in the area will require long periods of time since the animals in question are highly migratory, covering large forest areas rather than being confined to the precise area the pipeline will run through.

The RFD will need large numbers of vehicles in order to control hunting, but this would be no solution to the impacts of the pipeline on wildlife.

A GEOLOGICAL FAULT

The Tennesseerim Range seismic zone contains two large faults: Si Sawat and the Three Pagodas Fault, which have created concern about what would happen if there were a gas leak leading to explosions, landslides, and severe erosion, all of which are likely if the pipeline is built in a known earthquake area.

Virtually all of the Thai portion of the pipeline is located practically on top of the Three Pagodas Fault. The Meteorology Department registered earthquake epicenters near the project area six times during the 1983-1988 period, in the districts of Si Sawant and Thong Pha Phum, with a magnitude of 4.1 to 4.5 on the Richter Scale.

The threat of damage caused by an earthquake or the rupture of the pipeline is becoming very clear. In March of 1959, an earthquake in the Three Pagodas Fault produced a rift 300 meters long and 2 meters deep in the earth. In April of 1983, an earthquake measuring 5.8 on the Richter Scale, which apparently occurred in the Si Sawat Fault, left a crack in the earth more than 4 kilometers long and moved entire blocks of earth in opposite directions.

Landslides caused by earthquakes or by erosion resulting from project construction, in addition to damaging or breaking the pipeline, are a serious threat to the safety of residents of the project area, as well as to protected forests.

When the pipeline reaches Thailand, it will follow a route that runs the length of a narrow canal bordered on both sides by steep ravines and severe erosion is expected. Employees of Thailand's Department of Environmental Policies and Planning (OEPP) in the Ministry of Sciences have expressed concern that the EIA provides only general guidelines regarding how to deal with problems of erosion and landslides, and of what would happen in the case of an earthquake. According to one OEPP employee, "It is not clear

how the pipeline will cross rivers and currents when sediment could slide into settlements downstream."

THE YADANA FIELDS: GAS AT ANY PRICE

Located in the Andaman Sea, approximately 60 kilometers from the southeastern coast of Burma, Yadana is the largest field of proven recoverable gas reserves (5.7 trillion cubic feet).

The French company Total has 31.2% of stock in the project, with Unocal holding 28.26%, PTT and Thailand Production (PTTEP, a subsidiary of PTT) with 25.5%, and the Burman State property, Myanmar Oil and Gas Exploration (MOGE), with 15%. It is estimated that the sale of US\$400 million of gas to Thailand will be the greatest source of foreign capital for Burma's military regime, the SLORC.

Plans are for the pipeline to be laid during the dry season of October 1996 to April 1997, the offshore platforms to be built from mid-1997 to early-1998, and for gas transport to begin in July of 1998. Around 370 km of pipe will be underwater while the last 45 km will cross the Tennaserim region, home to ethnic communities such as the Karen and the Mon.

The pipeline will go through Karen communities in the Laydozoo District, in the province of Mergui-Tavoy, and through Mon communities in the province of Ye-Tawai. Burma has "cleared" the way for the relocation of a total of 11 Karen communities which would otherwise obstruct the project route.

On the Burman side, the pipeline has been built using slave labor from communities located along the pipeline route.

EPILOGUE

In spite of strong opposition to the Yadana project due to environmental risks, and to the fact that it has led to the violation of the human rights of indigenous peoples of Burma, construction has been completed.

Nevertheless, gas has yet to be transported to the electricity plant in Ratchaburi because General Electric and Mitsui, the companies contracted to build the plant, have not completed the work on schedule. This is complicated by the fact that in Thailand there have been serious protests against attempts by the government to privatize the national electricity company, EGAT, in order to pay that country's immense foreign debt.

At the same time, EGAT has stated that the cost of gas it will buy from the government of Burma, produced in the Yadana fields, will be substantially higher than that of gas from other sources. The price of electricity has been

increased several times in recent months, and an additional hike could unleash more serious protests.

In the meantime, the lawsuit continues against Sulak Sivaraksa, of the Kalamaniitra Council, for blocking construction of the natural gas pipeline in the forests of Kanchanaburi, an act for which he was arrested in March 1998. Peaceful occupation of the forest began in December 1997, when a group of human rights and environmental activists tied themselves to trees in order to stop pipeline construction. They remained in the forest for four months before being taken into custody.

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OIL IN DEEP AFRICAN WATERS

Ivonne Yáñez L.
Oilwatch Secretariat

INTRODUCTION

Until a few years ago, offshore oil activity in Western Africa took place in shallow seas, affecting above all the continental shelf. Today, oil exploration and exploitation take place in waters between 1000 and 2000 meters deep, affecting the continental slope.

Oil activity in deep waters involves relatively new technology, and thus the environmental impacts it might cause and the risks it involves are unknown. In fact, there are very few technicians specialized in deep water oil operations, and even fewer in related environmental aspects. At the same time, there are no specific environmental norms for deep waters, especially in tropical environments.

In addition, little is known about aquatic life on Africa's western coasts, not only in terms of taxonomy but also in terms of the structure and functioning of these ecosystems.

Oil exploration and exploitation in deep African waters signify an extension of the oil frontier into new zones which, until a few years ago, were completely off limits to this industry due to the lack of technology to extract crude from the depths in question.

In fact, these activities in Africa are in certain respects a pioneer event, especially since no one anywhere else in the world is looking for and taking oil out of similar depths; thus, the western coasts of Africa are an experimental field in terms of oil activity in deep waters.

These activities could generate new kinds of environmental and social risks in the coastal regions of Western Africa where the number and size of projects proposed are certain to complicate problems already existing in the area.

An important aspect of this issue is the problem of gas associated with crude. The oil industry believes that markets in Western Africa are too small to justify processing the gas as a result of which it will be burned off. Other options identified by the industry include using gas with a high butane and propane content in the operation, or reinjection into the reservoir for later recovery.

In any case, no matter which alternative is selected by the oil industry in the area, a new source of environmental contamination will be created.

NEW PROJECTS

Oil activity in deep waters has taken place in the Gulf of Guinea basin, where a large number of projects are underway, which will cover extensive areas in the next few years.

In 1997, between 55 and 70 exploratory wells were drilled in Western Africa, 20 of which were economically viable. In 1998, between 45 and 75 exploratory wells were drilled, some of which were viable.

Chart 1 presents a summary of oil activity in deep Western African waters.

COUNTRY	FIELD	COMPANY
Ivory Coast	Lion - Block 11	UMC
Nigeria	Oyo - Block 213, well	Statoil-BP
Equatorial Guinea	Zafiro	Mobil-UMC
Congo (Brazzaville)	Zafiro	Mobil
	N'kossa	Elf
	Kitima	Agip
Congo (Kinshasa)	Kokongo - Block B	Chevron
Angola	Girassol - Block 17	Elf
	Cabinda	Chevron
	Block B	Shell
Namibia	4 wells	Norsk Hydro

The following is a review of deep water operations taking place at present in Western Africa.

ANGOLA

One of the largest submarine fields is the Girassol field in Angola, operated by France's Elf Aquitaine, with estimated oil reserves of one billion barrels.

The Girassol field, discovered in April 1996, lies at more than 1,300 m below the sea in Block 17 in Angola. This is the deepest oil operation in Western Africa, and may be the largest field yet discovered in the area.

The Girassol 2A well produces a total of 18,000 barrels per day from two reservoirs. In the second well, a new source of oil at even greater depths has been detected. The operator is now drilling a new well off the original, named Girassol 2B.

An Elf official stated that Girassol is without a doubt the most important field the company is working, and that they expect to find about 500 million barrels of oil. They will be drilling a well in the Girassol field, which will require the building of a new wildcat pit.

The FPSO platform that will be used in the Girassol field in Angola could be the largest submarine platform in the world.

The partners working Block 17 include Elf, the operator, with 35%; Exxon Corp., with 20%; BP Exploration, 16.67%; Den

norske stats oljeselskap AS (Statoil), 13.33%; Norsk Hydro AS, 10%; and Fina SA, 5%.

ECUATORIAL GUINEA

Oil activity is relatively new to Ecuatorial Guinea. A few years ago, Mobil had a permit to prospect offshore and soon after discovered the Zafiro field.

This field consists of three deposits. Zafiro reserves are estimated at 200 million barrels of crude.

As part of field development, oil workers are building a production, storage, and discharge tanker called Zafiro Producer, which will have a capacity of more than 50,000 barrels per day in seven tanks. The company hopes to increase production in the field through the development of satellite wells.

In conjunction with this project, Mobil has requested that the contractor, Coflexip Stena Offshore SA, Paris, install a system of flexible flow lines and eight submarine wells in 270 m of water during the development of the Zafiro camp.

In addition, Coflexip will join eight wells, to a depth of 570 m, and provide flexible flow lines that link with the production center five km away.

CONGO (BRAZZEVILLE)

The oil industry in the Congo is the fourth largest in sub-Saharan Africa, and the nation is highly dependent on oil, which brings in two-thirds of foreign export earnings.

One of the most extensive oil projects will be the gigantic oil platform-barge built by Elf in the N'Kossa field. This is the first floating oil production platform in the deep water of the Gulf of Guinea.

The largest oil companies in the country are Elf, Agip, and Amoco, with Elf being the most visible presence as a leftover from the nation's days as a French colony.

Elf Congo has drilled 550 wells and built 40 marine platforms. In 1990, Elf pumped 6.9 million tons of oil out of a total of 8.8 million tons extracted, from the coasts of the Congo. Hydro-Congo is the responsible state enterprise.

It is believed that oil companies are experimenting with new technologies in the deep waters of the Congo.

The greatest volume of oil production takes place in the N'Kossa camp, under the auspices of Elf. Production began in June of 1996, and has currently reached 122,000 barrels per day.

N'Kossa was developed together with two platforms and a

concrete barge and processing infrastructure for bottled gas (LPG). It is expected that the N'Kossa field will provide 440 million barrels of crude and 60 million barrels of LPG.

The N'Kossa barge is the largest concrete barge ever built. The rectangular loading platform measures 200 meters long by 36 meters wide and 16 meters deep, with an operational displacement of 110,000 tons, and a cargo capacity of 33,000 tons.

Elf Congo built the concrete barge because the Bouygues Offshore company, a contractor company, offered the French entity 30 years of uninterrupted service in the field, with high fatigue resistance and minimum maintenance. The barge began to produce oil two months after the cables were attached in the N'Kossa field.

In conjunction with Sedco-Forex and IFP, Bouygues Offshore has now proposed a multifunctional barge. This is another concrete unit which combines the functions of N'Kossa (where oil and gas are processed) with storage and transport of crude. It will also include a drilling unit and infrastructure for final processing.

The multifunctional barge will operate in 1,000 meter deep waters, though it can also be adapted to depths between 500 and 2,000 meters, and it is financed by Elf, BP, Shell, and Statoil.

Drilling and production will go on simultaneously. Crude will be pumped at a rate of 150,000 barrels per day, with a storage capacity of 1,500,000 barrels. Cargo operations will be done with a system of tanks.

Sixteen lines of chains/cables will be placed at each corner of the barge, attached to the marine bed by suction anchors, and connected to the shell, which is also of concrete. When the barge is completely loaded, it can support up to 20,000 tons.

As an accessory to the multifunctional unit, Bouygues Offshore proposes the construction of a platform with the heads of the wells in a single column. The concrete column is 200 m long and 14 m in diameter and will support a ceiling of 2,000 to 3,000 tons designed by Technip-Geoproduction. In the ceiling will be located the minimal separation and water injection units. From there, crude will be sent to the production platform.

Finally, also in the Gulf of Guinea (500 to 2,000 meters), Bouygues Offshore has developed an on-site submergible ensemble. This floating drilling and production platform consists of a steel ceiling integrated with four concrete columns 200 meters high, an OD 14 meters in height with a wall thickness of 0.4 to 0.5 meters. The shell of the steel ceiling is 88.5 meters long and 50 meters wide.

Processing equipment includes oil separation systems, gas processing and compression systems, and produced water treatment and injection systems. An SAS operating at 1,000 meters underwater would process 100,000 barrels per day of oil, 105 mcf per day of gas, 75,000 barrels per day of produced water, and 150,000 barrels per day of injected sea water.

At the same time, Agip is operating in the Kitina and Marine fields, also in deep waters. The Sounda Marine-1 well has a weight of 32 degrees API, and reserves are estimated at 20 million barrels of oil. The Sounda Marine is 6 km to the east of the Kitina field, so that it could be developed as a satellite. These two fields will eventually be joined to the N'Kossa field.

NIGERIA

Nigeria is the African country with the longest history of oil production carried out by a number of transnational companies in a consortium with the state Nigerian National Petroleum Corp. (NNPC).

Nigeria's Minister of Finances Anthony Ani has announced plans to gradually reduce to 57% the participation of NNPC, in favor of private companies, a process expected to begin in 1997 and end in 2001.

The transnational leader in Nigeria is Shell Petroleum Development Co. of Nigeria Ltd., with minor participation by Elf Nigeria Ltd. and Agip SpA, which are working a number of offshore fields in the Delta region of the Niger River.

A new actor in the zone is Tuskar Resources plc-Dublin, which acquired 2.5% of the Ukpokiti offshore field, Nigeria Camac International (Nigeria) Ltc. Tuskar will provide ordinary quotas to Camac in advance. The field is being developed by operator Conoco Energy (Nigeria) Ltd.

Conoco has a 40% interest, and Nigeria Express Petroleum & Gas Co. Ltd. has 57.5%. Tuskar states that the field has proven reserves of 32 million barrels of oil, and that peak production could reach 20,000 barrels per day.

In addition, a new consortium has been created, Nigeria LNG Ltd., among NNPC with 49%, Shell with 25.6%, Elf with 15.4%, and Agip with 10%; these companies have begun exploratory activities on Bonny Island.

Exports were to go to the Italian electricity generating company ENEL, to the Spanish gas distributor Español Enagas, to Botas of Turkey, and to Gas of France. ENEL had promised to buy half of production but in December of 1996 cancelled its contract because the Italian government refused to approve a plan to build a terminal for imports from LNG. Nigeria LNG is suing ENEL for breach of contract. The company is looking for other customers.

Statoil and BP are preparing the first well in deep waters off the coast of Nigeria, called Oyo 1, located in Block 213.

EXPLORATION TO THE NORTH

Increasing numbers of transnational companies are interested in exploring along the western coasts of Africa, especially in the north of Nigeria, given recent discoveries in deep waters.

For example, Ranger Oil Ltd. of Canada signed a production agreement with the government of the Ivory Coast for offshore block CI-102.

This block is located immediately to the south of Abidjan, at a depth of 200 m, between the oil fields of Espoir to the west and Belier to the east.

At the same time, the British company Dana Petroleum plc. has an exploration, development, and production license with the government of Ghana for a 2,341 square kilometer area in the Western Tano basin.

Dana hopes that cretaceous elements present in the offshore area near the Ivory Coast extend into the seas of Ghana. Partners in the agreement include Dana, the operator, with 45%; Seafield Resources plc. of England, with 45% interest; and Ghana National Petroleum Corp., the state enterprise, with 10%.

The gas is intended for an energy generation station located on the coast, 20 km north of the field.

CONCLUSIONS

There is no doubt that the extension of the oil frontier into the deep waters of Western Africa will consolidate the presence of transnational companies in the area. Up to now, this phenomenon has meant support for anti-democratic processes and has been a source of destabilizing elements in this conflict-ridden area.

Thus, question arise as to the introduction of new risks into an already complex political scenario in the region, and whether or not the benefits to be reaped merit said risks.

In addition, the new environmental and social impacts that will be generated by these new oil operations need to be evaluated.

REPSOL: A TRANSNATIONAL IN THE BOLIVIAN TROPICS

Marc Gavalda Palacin
Cochabamba - Bolivia

BOLIVIA: FROM MINES TO OIL

Since its early days as a Spanish colony, Bolivia specialized in the export of minerals. Although mining zones in Bolivia's highlands are among the most underdeveloped, in social and economic terms, in Latin America, it is from this region that a large part of the silver was taken to be shipped on Spanish boats to Europe. The metal enriched not only Castillian nobility but also bankers and British and German merchants who received payment for debts from the Spanish aristocracy in silver. By the end of the 19th century, when the silver was exhausted, tin took its place, and though Bolivia was by then an independent nation, the conditions under which miners labored and the poverty of the region did not change. Throughout Bolivia's history, miners and peasants have risen up to demand decent living conditions. Their protests have been brutally suppressed¹.

Oil has been produced in Bolivia since the beginning of the century when the first wells were drilled in the Chaco. The large oil reserves believed to exist in that zone led to the War of the Chaco, from 1932 to 1935, in which Paraguay and Bolivia, backed by Shell Oil and Gulf Company, respectively, disputed rights over the Chaco.

In 1969, under the administration of leftist president Alfredo Ovando Candia, Bolivia expelled the North American oil company Gulf and nationalized all concessions which were then placed under the management of the state oil company, Yacimientos Petrolíferos Fiscales Bolivianos (YPFB).

THE ENERGY TRIANGLE, SPEARHEAD OF THE TRANSNATIONALS

During its 60 year history, YPFB explored 30% of the nation's territory with hydrocarbon potential.

It was only in the 90s when Bolivia, following the example of its neighbors, began to undergo a profound process of economic transformation in order to attract foreign capital. The so-called Energy Triangle is at the base of a strategy to turn Bolivia into a competitive country for oil companies. The vertices of the triangle are the new Hydrocarbon Law, the injection of capital into YPFB, and the construction of a gas pipeline that will guarantee a market for the export of natural gas ².

The new Hydrocarbon Law, approved in 1996, changed the rules of the game, establishing an attractive, competitive taxation schedule in order to provide incentives to attract fresh capital for the purpose of exploring new blocks. The purpose of the law is to return to a system of unlimited oil concessions in the area with the highest level of

exploration³. There are also no limits to the number of joint venture contracts with YPFB so that a single company can work a number of concessions in the same country.

During the 1990-95 period, YPFB signed around 18 partnership contracts. In 1997, with the new Hydrocarbon Law, the National Energy Office distributed 10.2 million hectares among 21 foreign oil consortiums. REPSOL was granted four new areas for exploration purposes.

The state-owned Yacimientos Petroliferos Fiscales Bolivianos, like so many other state entities, was capitalized under the pretext of attracting new capital that would renew its productive capacity. Capitalization is a kind of privatization in which the state retains a residual portion of shares in the business. For purposes of capitalization, YPFB was divided into 2 production units, one transport unit, and one residual unit for the administration of joint venture contracts, sales, and refining.

The production blocks of the state-owned Chaco and Andina companies have been sold to North American companies (Amoco, in the case of the Chaco) and Argentine companies (YPF, Perez Compac, and Pluspetrol, in the case of Andina).

Oil transport, formerly under the Compañía Boliviana de Transportes, an affiliate of YPFB, has been turned over to Enron (United States) and Shell International Gas (Holland-UK)⁴.

REPSOL AND ITS EXPANSION POLICY

REPSOL is a Spanish company operating in a number of countries, especially in Europe, Africa, and Latin America. On this continent, it has interests in Venezuela, Colombia, Ecuador, Peru, Chile, Argentina, Brazil, and Bolivia.

REPSOL not only explores for and produces oil but also has numerous refineries and petrochemical plants in Spain, plus a growing share in natural gas fields and electricity in which the company plans to invest more than 300,000 million pesetas (almost two billion dollars) in the coming five years.

Latin America is the company's principal international objective; it plans to invest more than three billion dollars here by the year 2002.

In Bolivia, REPSOL was granted the Secure Block in 1994 and, in December 1997, a license to explore in four new blocks situated in the Amazon basin north of La Paz.

On February 3, 1998, the president of REPSOL submitted to the Ministry of the Environment the company's Environmental Management Plan and the general framework for its environmental policies. The minister of the Environment expressed her satisfaction with REPSOL's commitment to the environment and encouraged REPSOL's president to continue

working to improve "environmental health."⁵

REPSOL'S ARRIVAL IN BOLIVIA

In 1994, REPSOL signed a contract with the Bolivian government as a result of which the company was granted the right to produce oil in the Secure Block for 30 years, seven of which would be dedicated to prospection. The Secure Block has a surface area of 1,337,210 ha in the departments of Cochabamba and Beni.

The Secure Block concession contains a number of protected areas and indigenous territories established by ministerial decree and recognized by Bolivian law:

- a. Isidoro Secure National Park Indigenous Territory
- b. Permanent Chimanes Forest
- c. Multi-ethnic Indigenous Territory
- d. Chiman Indigenous Territory

The contract put total investment at 30 million dollars, with four million dollars earmarked for exploration.

REPSOL is required to comply with government norms and with Environmental authorities.

Specifically, environmental norms require that the company:

- * Prevent and control contamination, deforestation, erosion, sedimentation, protection of flora and fauna, crops, water, landscapes, and protected areas.
- * Develop a contingency plan to avoid spilling hydrocarbons and other substances.
- * Acquire and use water, wood, and other construction materials, within legal limits and respecting the rights of third parties, in the execution of activities.

All of these measures should be explicitly stated in the Environmental Impact Study, which must be submitted prior to the onset of any activities in the zone.

Seismic prospection took place in large part within the boundaries of the Isidoro Secure National Park Indigenous Territory (TIPNIS). This park, located in the provinces of Chapare (Cochabamba) and Moxos (Beni) was created on November 22, 1965, and covers 1,200,000 ha. On September 24, 1990, the park was declared Indigenous Territory, recognizing the rights of first peoples who live there⁶.

The objectives in declaring this a protected area are:

- * protect natural resources within the park
- * avoid the loss of flora and fauna biodiversity
- * protect watersheds and rivers
- * avoid the contamination of water
- * impede colonization and human activities beyond established

limits.

In fact, REPSOL's presence in TIPNIS has had an impact on all the categories listed above, but since hydrocarbon activities are a national priority, they take precedence over environmental interests.

REPSOL's entrance into indigenous territory generated opposition by residents of the zone who organized the "Extraordinary Encounter of Community Leaders and Representatives of TIPNIS" in June of 1995. At that meeting, residents of the park pronounced themselves against exploration by REPSOL because the company's presence was due to a decision made by the government without consulting with indigenous communities. Participants at the meeting decided to bring pressure to stop seismic prospection and threatened to take direct measures to put a halt to said activities⁷.

Finally, on July 19, a meeting took place with representatives of the government, YPFB, REPSOL, and indigenous organizations.

At that meeting, the following decisions were made:

1. YPFB would not engage in any activities without first consulting with indigenous communities.
2. The Hydrocarbon Law would be amended to include Law 1257 which reflects the specific characteristics of indigenous communities.
3. A Bipartite Commission would be created.
4. A proposal was made for indigenous participation and consultation.

THE FALLACY OF THE ENVIRONMENTAL IMPACT STUDIES (EIA)

Environmental Law No. 1.333, approved in 1992, requires that companies undertake Environmental Impact Studies prior to exploratory, production, transport, and sale of hydrocarbons. The EIA must include:

- * A description of the affected area
- * A list of impacts that the activity will produce
- * Measures for the prevention or mitigation of each impact
- * Contingency plans
- * Plans for closure, restoration, reforestation
- * Plan for application of environmental safeguards and follow-up.

The time-tables of these plans take the form of a Sworn Statement, and thus the EIA is, theoretically, an important tool in the execution of oil projects. These documents must be accompanied by an Environmental File containing a summary of the characteristics and impacts of a specific project. Approval of the Environmental File by the National Energy Office and the General Office for the Environment and Norms is required prior to the onset of a project.

During its first years in Bolivia (94-97), REPSOL presented

three EIAs to environmental authorities.

The first of these, the Environmental Impact Study for seismic prospecting in the Secure Block, was done by a North American auditing company while prospecting activities were going on⁸. The study was done in the United States using secondary sources, and was based word-for-word on an EIA done for another exploration block, the Chapare Block situated hundreds of kilometers from where prospecting activities were taking place⁹.

As a result, the study is notoriously superficial in its descriptions of the ecological characteristics of the zone, and repeats the same errors (including those related to taxonomy) found in the Chapare Block. There are also notable bibliographical deficiencies and the description of impacts lacks a scientific base that reflects the ecological reality of the zone. In short, the study simply creates confusion¹⁰. In addition, the mitigation measures proposed do not reflect the magnitude of the impacts that could occur. Finally, the Environmental Impact Study was done simultaneously with activities the study was supposed to analyze prior to their onset.

In August of 1996, a month after the first phase of seismic exploration was over, an audit was done to analyze and compare procedures used in the closure and restoration phase with recommendations contained in the EIA's Environmental Management Plan¹¹. A majority of recommendations in the plan were not complied with in the closure phase:

- * soils in the camps were not reconditioned
- * the camp areas were not reforested with saplings
- * the vegetation cover was not restored with native grasses
- * areas deforested for heliport, were not reforested
- * the banks of rivers and streams were not regenerated with willows and other species.

In October of 1997, prior to the secondary phase of seismic exploration in TIPNIS, an Evaluation of the Environmental Impact Study was written, this time on the basis of two days of field work to evaluate a region that covers 771,000 ha. Characterized by notable deficiencies, the study is focused on blaming local residents for damage caused by crops and claiming that any subsequent impact from prospecting will be comparable to that caused by residents.

The Evaluation of the Environmental Impact Study for the Exploratory Well established a number of preventive measures and a closure plan that were completely ignored during and on completion of operations.

This situation reflects the dynamic of this type of legal mechanisms, that are undertaken because they are required but with no intention of avoiding real impacts on site.

SEISMIC EXPLORATIONS

The first seismic explorations in the Secure Block took place in 1995 and 1996 when 20 trenches were opened along 961 km, crossing forested and crop areas.

During this phase, the company had budgeted \$200,000 for "humanitarian aid." Apart from a medical station at the base camp, at which local residents were attended to, the communities received bits of charity (sporting equipment, mosquito repellent, notebooks, and so on).

Non-specialized labor contracted for prospection activities came from other parts of Bolivia and other countries, a breach of the promise made by the company to contract local labor.

The placement of explosives every 50 meters along the seismic lines caused damage to crops (coconut, orange, and coffee groves) in indigenous communities and to human settlements. Seldom were residents compensated for damages.

The environmental impacts caused by seismic prospection included deforestation of forested areas for heliports, seismic lines, and mobile camps. In no case were areas reforested with saplings, as indicated in the EIA; in addition, trees beyond the maximum diameter permitted were cut. As a result of deforestation and explosions of dynamite on steep slopes or near rivers, erosion occurred at numerous sites (landslides, formation of gullies, etc.). In addition, the opening of seismic lines in settled areas has facilitated access to unauthorized hunters into previously inaccessible park areas. On one occasion, park guards requisitioned animals captured and kept as pets by oil company personnel.

DRILLING OF AN EXPLORATORY WELL

In September of 1997, the company began to build a camp in the peasant communities of San Mateo and Paracti, a few kilometers from the Carrasco National Park and the TIPNIS, in order to drill the first exploratory well.

In the process, they injected water with the drill, along with antioxidants, lubricants, and biocides, thus changing the bed of a water course, and they built a half-kilometer aqueduct and a road four meters wide to the drilling site, affecting a number of croplands.

During drilling, a nearby stream used to irrigate crops in the zone was contaminated, and the earth around the camp was compacted and contaminated by pools of oil and other contaminants that went untreated.

Drilling muds, together with other material extracted (heavy metal compounds frequently contaminated with radioactive material) were separated and stored in pits, some covered with oil and others with water. These pits are open,

providing access to birds and insects that approach in search of food and water.

In March of 1998, the mayor of the neighboring population of Villa Tunari reported to the newspaper "Los Tiempos" a massive spill of crude in the bed of the Putintiri River, a tributary of the Espíritu Santo River which because of its heavy current was the ideal river for the dumping of untreated drilling mud. The discharge was admitted by the company's workers who were about to dig a trench directly from the drilling pits to the San Mateo River. Fortunately, pressure from local residents prevented that from taking place and the company was required to contract a team to correctly treat residual materials.

According to the Environmental Impact Study for this well, after installations had been removed, a plan for clean-up, restoration, and reforestation would begin, said activities to be completed by January of 1998. To date, there has been no restoration of soils, sealing of pits, or reforestation with native species.

COMPLEMENTARY SEISMIC EXPLORATION IN THE SECURE BLOCK

This is the final phase of study prior to the beginning of oil production.

The general objective of the project is to continue exploration for hydrocarbons begun in 1995. The new phase will take place in a 771,000 ha area and is scheduled to last for six months.

Project execution requires the installation of a base camp for 200 persons and the opening of 20 trenches, 20 heliports measuring 900 m², and 493 detonation zones at a distance of 500 meters each the length of the seismic lines. Mobile camps will be installed every four kilometers and will be supplied with machinery needed for drilling holes at 50 meter intervals and a depth of 10 meters. In each hole, 3 kg of explosives will be placed.

THE CONFLICT BEGINS

In January of 1998, the Central Office of Indigenous Peoples of Beni and the Regional Indigenous Organization signed an agreement with REPSOL for a ten-month period. According to this document, REPSOL would hire all labor needed from local communities, would minimize the area of impact, would prohibit hunting, fishing, and the bearing of arms. Compensation offered by the company included training the local population in oil-related matters through workshops, two fares for high school educated indigenous residents to any point in Bolivia, four radio systems, and a worker camp to be used by the communities when the company had completed the prospection phase.

For its part, the TIPNIS Subcenter and the TIPNIS park guards

would monitor all activities, including the closure and restoration phases, and would provide aid in the event of emergency.

This agreement, which many residents viewed as a swindle, was signed by leaders of the indigenous organizations of Beni without consultation with their members. Nor were the residents of the Cochabamba area or park officials consulted.

In February of 1998, the Committee for the Defense of the Secure Isidoro National Park, representing 8 central organizations and 50 peasant organizations in the Cochabamba area, issued a statement to announce that they were declaring a state of emergency in view of the imminent entry of REPSOL into the area without having signed an agreement with residents who would be affected.

After notifying the Ministry of Sustainable Development at the beginning of March, REPSOL began moving its personnel and equipment into the settlement of Isinuta in order to immediately go into the TIPNIS and begin operations.

As a result, given the imminent entry of the company into Cochabamba territory with no prior consultation or agreement with the local population, the Committee for the Defense of the Park--the 8 umbrella organizations and 50 peasant groups mentioned and the Indigenous Council of Rio Ichoa and Moletomobilized the population to block the company's entry into the park until a fair agreement had been signed with the population to be affected by its activities.

REPSOL, having transported the equipment from Peru, was forced to delay work for two weeks until an agreement was signed in which the company promised to repair the road, provide park guards with a camp, and set up a Mixed Monitoring Team with the participation of peasants, indigenous people, and park guards to provide continuous follow-up during all operations.

Once again, the company did not honor any of the agreements and, instead, speeded up work in order to be able to get out of the zone as soon as possible.

THE RICH MOUNTAIN MOVES TO THE TROPICS

Today Bolivia has begun to see the first consequences of the neoliberal policies which are being applied in Latin America, in this case, as a result of the capitalization of Yacimientos Fiscales Petroleros Bolivianos, the concession of oil production blocks to foreign capital, and the building of the natural gas pipeline.

On the one hand, transnational oil companies, the true beneficiaries of this situation, are disseminating and promoting the economic gains and the new technology that are the result of their presence in the country. Their campaign is directed not only at the government (with royalties) but

also at civil society through a compliant press which acts as a propaganda vector.

On the other hand, we are experiencing growing degradation of the environment in production areas, and this had led to increasing protests by local populations, though this has not changed the situation as yet. Once again, history demonstrates the paradox of the impoverishment of areas from which riches are extracted.

The essential problem is the disproportionate inequality in terms of the means the different actors in the conflict possess. Oil companies have legal contracts with the government which legitimize them, and they also have Environmental Impact Studies with which they justify their activities, which allows them to act with immunity because there is no follow-up or attempt to assure compliance.

Civil society, on the other hand, is weakly organized and has access to very few resources and little knowledge about how to deal with the problem. There are no documented data on damage nor do people know how to make public said damage.

With concessions to oil companies covering the majority of Amazon and sub-Andean territory, there is likely to be a resurgence of problems and socio-environmental conflicts in this area, and the matter will progressively take on greater importance as the oil companies penetrate deeper into the Bolivian tropics.

Specifically, the REPSOL case in the National Park-Indigenous Territory Isidoro Secure is a clear example of the immunity which transnationals enjoy in Bolivia, which allows them to enter indigenous territory and protected areas, violate environmental norms, and display disrespect for the rights of local populations.

The conflict between peasants and indigenous persons from TIPNIS and REPSOL, while still unresolved, is an example of many others which will occur throughout Bolivia as the process of "petro-liferation" of the Bolivian economy progresses.

NOTES

1. During the 1965 Massacre of San Juan, during the dictatorship of General Barrientos, the army burst into Siglo XX, a mining colony, at night, firing against residents. Nobody knows how many people died as their bodies were hidden. During the Christmas Massacre, after the return to democracy (in 1996), a number of peasants from the communities of Amayapampa and K'apasirca were killed because they demanded that a gold mining company compensate them for contaminating their rivers and crops, and that the company also provide funds for community development.

2. La Razón, 19 July 1997.

3. Oil exploration and production blocks cover a surface area measuring from 300,000 ha in traditional areas to ten times larger in non-traditional areas. In 1995, for example, the government granted a 1,320,000 ha concession to REPSOL, 1,500,000 ha to Maxus, and 2,900,000 to Mobil.
4. In three cases, the companies granted concessions bought 50% of stocks. The CHACO company was granted for US\$307.67 million, ANDINA for US\$264.78 million, and the transport unit for US\$263.5 million.
5. During the meeting, Alfonso Cortina, president of REPSOL, emphasized the cultural change that the System of Environmental Control had imposed on the group: "We dedicate particular attention to the security and conservation of the environment, and to collaboration with the community."
6. Supreme Decree No. 22160. Isidoro Sécure National Park, La Paz, 1990.
7. CIDDEBENI. Consulta y Participacion de los Pueblos Indígenas y el Estado en Operaciones Petroleras. Trinidad, 1995.
8. Arthur D. Little. Estudio de Impacto Ambiental de la Exploración Sísmica en el Bloque Secure, La Paz, 1995.
9. Furgo-McClelland. Estudio de Impacto Ambiental de la Exploracion Sísmica en el Bloque Chapare, La Paz, 1995.
10. Gavalda, Marc. Monitoreo de las Prospecciones Sísmicas en el TIPNIS, Cochabamba, 1997.
11. Information obtained in an interview with Fernando Martinez-Fresneda, general manager of REPSOL Exploration Secure, S.A. (La Paz, September 1997) and from interviews with community residents and TIPNIS park guards (Isidoro, October 1997).

ANNEX

Oil production blocks in the first phase of public contracting in Bolivia.

COMPANY (Country)	PRODUCTION BLOCK	DEPARTMENT	AREA (ha)	COMMUNITY AFFECTED
YPF (Arg)	Lagunilla Montero	Chuquisaca Sta Cruz	603,700 750,000	Huaremaye, Tapete, Chiquitano, Ayorea
Texaco (USA)	Hito Villazon	Sta Cruz	1,012,500	
Sante Fe	Carondaigua	Sta Cruz	583,000	

(USA)

Diamond (USA)	Chico	Chuquisaca		
Chevron (USA)	Caupen	Chuquisaca	1,000,000	
Tesoro (USA)	La Vertiente	Tarija	936,000	
Pluspetrol (Arg)	Sierra del Condado	Tarija	20,000	Guarani
MAXUS (USA)	Mamore	CBBA and Sta Cruz	1,500,000	Huarayu, Colonos Quech Aymaras
Amoco (USA)	Carrasco	CBBA		Colonos Quech Aymaras
BHP (Aus)	Chapare	CBBA and Beni		Iracaye, Mojenos, Yukis, Col- onos Quech Aymaras
REPSOL (Sp)	Secure	CBBA and Beni	1,377,210	Chimanes, Mojenos Iracaeisis, Yuracares, Colonos Quech Aymaras
Esso (Fr)	Poopo	La Paz and Oruro		Quechuas, Aymaras
Mobil (USA)	Madre de Dios	La Paz, Cobija	2,900,000	Cabineno, Takana

Source: YPFB, 1995_

EXPLORING FOR OIL AND GAS IN BANGLADESH

Institute for Environment and Development Studies
FoE - Bangladesh

Bangladesh has known natural gas, carbon, petroleum, firewood, hydroelectric, animal, and biomass energy sources. Among the non-renewable energy sources, natural gas has been explored for and commercially produced, and only one oil field has been explored and put into operation at the present. Government policy has been to substitute expanded natural gas production for imported.

BRIEF SUMMARY

The history of oil and gas exploration in Bangladesh dates from almost a century ago, and can be divided into four phases.

The first phase took place from 1910 to 1933. During that period, six wells were drilled to a depth of 5,702 meters. Those wells produced neither gas nor oil. With the outbreak of the second world war, the first phase came to an end with no positive results.

The second phase lasted from 1951 to 1971, when multinationals such as Shell, Stanvac, and the former state company Pakistan Petroleum Ltd. (PPL), participated in exploration activities both offshore and inland. During this period, 22 wells were drilled, including some offshore. Eight gas fields were explored during this phase.

The third phase began in 1972 and continued to 1992. Exploration activities were conducted according to norms established by the 1974 Bangladesh Petroleum Law. In 1974, the Bangladesh Oil, Gas & Mineral Resources Corporation (Petrobangla) was created, with authority to supervise the exploration, production, and distribution of oil and gas.

From 1974 to 1978 new emphasis was placed on exploring offshore. Under a Production Share Contract (PSC) six foreign companies carried out exploration activities. During the 1972 to 1992 period, 24 wells were drilled, seven of these offshore; exploration took place in 9 gas fields and one oil field.

A SINGLE OIL WELL

During the third phase, at the end of the eighties, the Hariipur (Sylhet) field was discovered, with an estimated 1.6 million tons of crude oil reserves. A test well was drilled from which 300 barrels per day were pumped.

Government policy has been to use native natural gas as a substitute for imported oil as this well did not cover national needs. Officials believed that an increase in biomass as an energy source was damaging to the environment,

and international oil prices rose.

As a result, of all commercial fuels consumed, the share of oil dropped from 58.6% in 1973 to 34.5% in 1987, and the share of native natural gas increased from 30.7% in 1973 to 61.4% in 1987.

FACILITATING EXPLORATION ACTIVITIES

In 1984, the Petroleum Exploration Promotion Project (PEPP) was inaugurated to facilitate exploration activities. In 1988, parameters were established for foreign companies interested in introducing the Model Production Share Contract (MPSC). In 1989, the country was divided into 25 blocks (19 continental and 6 offshore). That same year, a number of PEPP meetings were held in London and Houston.

In 1993, a meeting of the Petroleum Round Table was held in Houston, with six foreign companies, including Cairn Energy plc and Holland Sea Search which indicated their interest in participating in exploratory activities.

MADNESS IN BANGLADESH

Although Bangladesh is not an oil rich country, a mad oil exploration race has begun, with no thought to environmental impacts.

Exploration for and consumption of gas in Bangladesh has dangerous impacts on the environment. Discharge of liquid wastes at the site of recovery of condensation and dehydration could cause serious damage. Though no sulfur contamination has been detected, this does not mean that there is no contamination from gases. At almost all oil fields there are contaminating products which are continuously released into the air.

The government of Bangladesh appears to be committed to protecting the environment when donors demonstrate an interest in the environment, but in practice its concern is of little importance.

An example of this is the Jalalabad Gas Project. This is a 15 million dollar project in which the International Finance Corporation (IFC) is responsible for monitoring environmental impacts, including the sites of contamination from previous activities, impacts from seismic testing, from infrastructure at the site, and alternatives to alignment, acquisition of land, socio-economic impacts (including public consultation), and impacts from the operation of equipment.

But what has happened in practice? The IFC announced that contamination of the site was minimal and had been mitigated as part of the project. The environmental and safety guidelines for seismic testing were established by the contractor, the International Geophysical Association.

A FIRE IN THE GAS FIELD

This was devastating, a disaster. An explosion in a gas tank in the district of Moulvibazar sent flames a distance of 500 feet. The blaze was visible 26 km from the site. The fire lit a one square kilometer area, forcing people and animals to flee. Houses, forests, and tea plantations were the sitesdf mostly seriously affected.

The accident took place on June 15, 1997 in a test well in Lower Magurachara, Kamolganj Thana, where US company Occidental was drilling under the auspices of Production Share Contract.

Each of the PSCs has a Joint Review Committee (JRC) of six members who include three representatives of Petrobangla and three representatives of the oil company in question. It is assumed that JRC-PSC officials will "monitor, supervise, and control" activities of foreign companies, along with two government representatives. However, there was no government representative at the site when the accident occurred.

According to government officials, the explosion took place due to "uncontrolled high pressure" inside the well. During drilling, the Occidental well had reached a depth of 840 meters when the explosion took place. An area of one kilometer sank and the fire swept over a one-kilometer stretch.

There were signs that an explosion was about to occur two days earlier. Several technicians expressed surprise at the fact that engineers in the gas field did not take measures to release the pressure, in spite of warnings a reasonable period prior to the explosion.

They expressed concern that Occidental did not seem to have the equipment needed to deal with this sort of event in spite of the fact that this is required by the PSC. After the initial burst of high flames, the fire spread. Water flowed from the well pipes automatically. Light tremors were felt in the neighboring hillsides. The natural habitat and the fauna were serious affected as far as 2 km away from the fire.

According to an expert, the automatic release of water from well pipes in the Mangurchara area could have caused the explosion. The expert said that, as the gas in the Mangurchara area comes from 800 to 850 meters underground at high pressure, a visible impact had been created on the sealed water reservoirs at the surface.

"The altitude pressurized the water reservoirs and thus the water emerged automatically," said the expert. As for the rocky nearby hillsides, the expert said that "it's possible that the well explosion has extensively destabilized the reservoir structure and that this has affected the ecology." The Mangurchara fire caused tremendous financial and physical losses in the nearby tea fields. The rails of a train track

were twisted by the fire. More than 500 mature trees were damaged by the intense heat. The neighboring forests were totally destroyed and the affected areas are so badly damaged that crops will not be able to grow there for many years. Approximately 500 members of indigenous communities such as the Khasia Punzi fled from their homes and their betal nut plantings were completely destroyed.

The Mangurchara blaze was so intense that, in spite of rains, the temperature was abnormally high. Sand and gravel were spread by the flames creating another type of damage to the tea plantings in neighboring areas. Seventy acres of the Fulbari state plantation were completely destroyed.

It took more than two weeks to control the fire. The battalion in charge was made up of experts from Singapore and Houston.

This is the third disaster of this magnitude in Bangladesh. The first took place in a gas field in Haripur in the fifties. The second took place in Semutang at the end of the seventies.

In spite of these experiences, the government seems not to have taken adequate measures to prevent this type of accident or at least to minimize damage.

ANOTHER OCCIDENTAL ACCIDENT

Another accident took place in the Jalalabad gas field. On April 29, 1998 there was a serious leak in the Lakkatura gas field. It was a miracle that there was no fire on the day of the accident. The incident occurred due to a "gas leak" in the pipes installed in a "finished well." While workers cleaned the pipes in preparation for the onset of production, the leak occurred. It happened when gas came in contact with water and reacted with oxygen. Deutag, the German sub-contractor, did the work by hand with inexperienced workers.

After the incident, workers in the neighboring Malnichhara tea growing area went on strike demanding, among other things, relocation of their houses away from the equipment site. They were worried about their own well-being and that of their land.

They complained that there were electrical discharges from the tubes in the drilling equipment. The discharges came at 15-minute intervals for many days after the incident. In spite of the fact the electrical discharges from pipes are normal during drilling, the frequency was highly abnormal, according to Petrobangla experts.

Vibrations from the equipment frightened women and children in the area. They could not sleep due to the peculiar noise produced by the vibrations.

Administration sources who asked to remain anonymous stated

that Deutag, the German sub-contractor responsible for the fire at the Magurchara gas field, was also involved in drilling in the Lakkatura gas field in Jalalabad.

Deutag hired inexperienced people to work in the gas field and provided no prior training.

The Petrobangla authority responsible for monitoring all activities carried out by the contractor in the gas field never objected to the hiring of inexperienced workers; instead, the authority supported contracting the cheapest labor available.

Residents of the town and the region have asked Petrobangla if the incident at Magurchara is not sufficiently serious to fire the contractor.

After an evaluation undertaken by a survey committee, Occidental and the subcontractor Deutag were found negligent.

According to a committee source, there was no reason for an accident, as revealed by data from Scimitar, the former operator. In spite of this, the source said that Occidental had blamed Scimitar for the accident because the company did not cover the well appropriately in 1990.

According to a Petrobangla source, Occidental will have to provide due compensation in the event that negligence is proven.

The Ministry of Energy and Mineral Resources has asked that Petrobangla not renew Occidental Oil Company's contract for blocks 13 and 14 as a result of the accident. However, Occidental declared that the accident is the result of an error made by Scimitar.

The Ministry of Energy did not accept this argument and stated that Scimitar left all information on the well with Occidental, and that there would not have been an accident if Occidental had been working in an appropriate fashion.

However, Petrobangla has asked Occidental to continue drilling. Contracts for the two blocks mentioned expired in January 1998, and since then the company has continued work on the basis of a verbal assurance that the contracts will be renewed for two years.

The Ministry has decided to seek compensation from Occidental for the Lakkatura incident on the basis of a preliminary report by the survey committee. Meanwhile, the Ministry has also requested that Occidental explain its actions on negotiating for the gas field and in selecting its sub-contractors and workers.

Occidental has decided to continue operations in Blocks 13 and 14 at its own risk in spite of the decision by the Ministry of Energy and Mineral Resources to refuse renewal of

its contract.

"We haven't renewed the contracts for these two blocks with Occidental, and if they decide to continue work in those blocks, they will do so at their own risk," said the president of Petrobangla during an interview with journalists.

PETROBANGLA LACKS ENVIRONMENTAL NORMS FOR DRILLING

Petrobangla has no norms for the safe administration of the environment at gas and oil exploration sites. The World Bank granted a US\$1.5 million loan for a project for Institutional Training for Environmental Systems and Administrative Safety to the Petrobangla Group. However, a code for safety and the environment during drilling will not be ready until the year 2000.

At present, foreign companies that operate in the country, as well as the Bangladesh Petroleum Exploration Company, continue to use international drilling codes for extremely fragile delta regions.

FOURTH PHASE: AN UNFORESEEN EVENT

And now an unforeseen event! All the natural and man-made forests are under a terrible threat. Recently, and without informing residents, a dangerous plan has been put into operation in the country in the name of exploration for gas and oil. This is the fourth and final phase of the oil/gas madness in Bangladesh.

All 56 billion square miles of continental territory as well as shallow offshore areas have been divided into 23 blocks for the exploration of gas and oil.

Drilling operations have begun in eight blocks and these, unfortunately, contain primarily protected areas, thus putting at risk endangered and threatened species, including the Royal Bengal Tiger, leopards, and other felines, elephants, antelopes, deer, bear, elk, gibbons, wild birds such as the peacock, and monitor lizards and other reptiles adapted to the forest.

People are concerned that oil activities will spread throughout the entire country, and they want to assure the future survival of their wildlife, forests, and the biodiversity of Bangladesh in general.

THE FINAL POSITION

Of the 23 blocks mentioned, eight have been granted in concession and work has begun in those areas. Negotiations for twelve additional blocks are in progress. The final three blocks have not been granted to any oil company for lack of interest and thus lack of offers.

In June of 1998, gas began to flow from the Sangn field. Soon after, gas was being pumped from the Shahbazpur field in the district of Borhanuddin Thana or Bhola (Block 7).

NEGOTIATIONS FOR THE REMAINING TWELVE BLOCKS

Twenty-one major oil companies submitted 28 bids, demonstrating great interest in exploring for oil and gas in Bangdadesh; nine of the concessions are inland.

The following concessions have been granted:

- Block 9: Tullow Oil plc
- Block 11: Shell & Cairn
- Block 4: South Asia Oil
- Block 4: Enron Oil and Gas
- Block 3: Texaco
- Block 6: Triton
- Block 7: Maersk Oil
- Block 19: Honda Oil & Gas
- Block 21: Bapex Unocal & PTT & Indonesia Gas Co.

The following blocks have been granted under the PSC:

Block 17 (a portion) and 18: Rexwood Oakland; block 22: UMIC; blocks 12, 13, & 14: Occidental; and blocks 15 and 17 (a portion): Cairn.

EXPORTING GAS

In the meantime, the Indian news agency, the Press Trust of India (PTI), has announced that gas from Bangladesh might be exported by the state to Western Bengala and the Indian northwest.

It has also been mentioned that Bangladesh is in agreement with foreign companies and has no alternative but to export gas to India, due to pressure from a number of companies exploring for gas in Bangladesh.

Current daily demand for gas in the country is for 940 million cubic feet. The Cairn Energy company will produce 160 million cubic feet by the end of 1998 in the Sangu field. According to PSA, Bangladesh will obtain only 34 million cubic feet. Petrobangla and the Petroleum and Gas Corporation of Bangladesh will buy the other 126 million cubic feet of gas at US\$1.50 per unit from said company and distribute it for domestic consumption at the subsidized price of US\$1.00 per unit.

Under the circumstances, the government of Bangladesh will have to allow more and more exploration and export of gas to meet payments to foreign companies in foreign currency.

In light of this, what might happen in Bangladesh is that foreign companies take out all the gas and the money from Bangladeshi gas, leaving some empty wells and a poor,

contaminated Bangladesh.

NOTE: A new round of bidding took place in Bangladesh, in which Occidental and Shell were granted concessions.

REFINERIES IN AFRICA
CASE STUDY OF THE TEMA REFINERY IN GHANA (TOR)

William Appiah
Third World Network-Ghana
Oilwatch Secretariat

INTRODUCTION

Of all petroleum derivatives in the world, 3.8% are refined in Africa, with Nigeria and Libya being the major exporters of petroleum derivatives, exporting 86 and 60 million tons, respectively. Nevertheless, the country with the greatest refining capacity is South Africa.

The continent's total refining capacity is 142,700 K tons per year, with 43 refineries operating at the present. Companies with a major role in the refining field on the continent are Caltex (Texaco-Chevron), Shell, and BP, among others.

As a result of world-wide globalization tendencies on the one hand, and structural adjustment on the other, the World Bank has designed policies for African refineries which are consistent with these phenomena. Thus, it has recommended that certain countries privatize their refineries and that others close them and become importers of fossil fuel derivatives. The former refineries would serve solely as crude storage facilities.

The World Bank has recommended, besides, the creation of regional free trade zones for petroleum derivatives, weakening or destroying what the Bank calls "public monopolies." The Bank has also recommended the elimination of subsidies for petroleum derivatives, as well as deregulation of the price structure.

Particularly in sub-Saharan Africa, the World Bank is pressuring countries to close small refineries or to convert them into storage facilities. The SAR refinery in Senegal is already in the process of being closed down.

REFINERIES IN WESTERN AFRICA

The following is the current situation of hydrocarbon refineries in Western Africa:

Angola has a refinery in Luanda, with a capacity of 1.75 million tons per year for internal consumption and for export. The refinery is operated by Fina Petroleos of Angola, in which Petrofina has 64.1% of stocks and the government of Angola 34%. Distribution is handled by Sonangol, Petrofina, and a new Sonangalp group formed by Petrogal (49%) and Sonangal (51%), and these companies plan on attracting 3 or 4 additional foreign companies. Lubricants will be distributed by Mobil.

Congo-Brazzaville has the Coraf oil refinery in Pointe-Noir. It has an operating capacity of one million tons of crude per year, but operates at 56% of its capacity. The refinery is a consortium between Hydro-Congo (60%) and Elf (40%). Sales are handled by Hydro-Congo. Mobil and Shell provide the plant with additives. Total sales of petroleum derivatives in 1990 were 223,502 metric tons. The World Bank has recommended that this refinery be closed, because the institution believes that it would be cheaper for the Congo to import petroleum derivatives. However, the government of the Congo is looking at the possibility of privatizing the refinery.

Congo-Kinshasa has an oil refinery, SOZIR (Societe Zairo-Italienne de Raffinage), located in Kinshasa on the coast near Muanda, in which Agip and the government each has a 50% participation, with another major stockholder, Chevron, about to come on board. Agip, Fina, Shell, Mobil, and PetroCongo are in charge of sales. Petroleum derivative consumption in Congo-Kinshasa is 880,000 tons per year, a figure that, according to the World Bank, could increase by 1-2% by the year 2000.

In Chad, 98% of energy demand is covered by fossil fuels imported from Nigeria. Internal consumption is 180,000 metric tons per year. Of that, 35% is distributed by local companies, 25% by Shell, 20% by Mobil, and 20% by Total, a French company.

In Equatorial Guinea, petroleum derivative products are imported from neighboring countries which cover all commercial energy needs. Annual consumption is 18,000 tons, with room for a possible 3.2% increase. Distribution is handled by Gettotal, in which the government of Guinea and Total each has a 50% participation. In addition, they have three hydrocarbon deposits in Bata and Malabo.

In Cameroon, the refining industry is significant, constituting the most important economic activity in the country. The consumption of liquid fuels is 900,000 tons per year. Crude is processed at a refinery in Sonara. Distribution takes place through the state SCDP company, and is carried out by Elf, Mobil, Total, Shell, and Texaco.

The Sogara refinery in Port Gentil, Gabon has a refining capacity of 21,000 barrels per day, but operates at only 70% of its capacity (17,000 barrels per day). The government of Gabon controls 25% of the refinery, with Elf controlling 21.83%, Total controlling 19%, and Mobil, Shell, Texaco, Fina, and Agip controlling 6.25% each. Elf operates the refinery.

Nigeria has four refineries, all belonging to the para-state Nigerian National Oil Company (NNPC). One of these is located in Kaduna in the north of the country, with an annual capacity of 5,500 K Tons. The others are located in the south, one in Warri with a capacity of 6,250 K Tons, and two in Port Harcourt with capacities of 3,000 K Tons and 7,500 K

Tons per year, respectively,

CASE STUDY: THE TEMA REFINERY

The Tema Oil Refinery (TOR) was developed in 1960 as part of an industrialization program being implemented by the government of Ghana. At that time, the government of Ghana, in conjunction with Entere Nazionale Idrocarburi, a consortium formed by the Ghanan-Italian company GHAIP, was responsible for oil refining in the country.

In December of 1961, GHAIP contracted a consortium of firms, made up of SNAM progetti, SAIPEM, and NUOVO PIGONE, to build the Tema refinery, equipped to process a wide variety of products. Capacity at the refinery was 1,250,000 tons of crude per year. By mid-1963, the refinery was finished and covered an area of 440,000 square meters.

THE PROCESS

The Tema refinery is joined to an oil dock at Port Tema by a pipeline 24 inches in diameter. There are other pipelines of 14.1 and 6 inches in diameter to export and import final derivatives.

When tankers arrive at the port, quality and quantity inspections are carried out. The fuel is then pumped through the pipelines to the storage tank in a boat. Because there is some water in the oil, it has to settle for two days before being processed.

REFINING

Crude is pumped from the storage tanks to the TOPPING Unit in which it is gradually heated in a series of temperature exchanges between 330 and 3350 degrees. Then it is distilled under pressure approximating atmospheric pressure:

Liquid gas from petroleum	2.0%
Virgin naphtha	2.5%
S.R. Kerosene	14.0%
Light gas	33.0%
Heavy gas	33.0%
Reduced crude	26.0%

Refined products are stored in a number of storage tanks where they are prepared according to market specifications.

FINAL PRODUCTS

The principal products refined at the TOR plant include liquid gas (LPG, commonly called gas), gasoline for engines, kerosene for aviation turbines, diesel oil, industrial diesel, bunker.

SOCIAL AND ENVIRONMENTAL IMPACTS

The refinery is located in the most industrialized zone of the city of Tema, with prevailing winds toward a zone of low population density. The principal drainage system in the industrial area of Tema borders the refinery plant. The drainage system has been designed and built to receive all the discharges of major industries, that is, industrial wastes, and from there drains into the coastal wetlands of the Chemu Lagoon, and finally into the sea at the fishing port of Tema. The lagoon is dead, with no signs of aquatic life, as indicated by a report from the Institute of Aquatic Biology in 1985.

In the areas surrounding TOR, there are industries which produce acetylene, textiles, aluminum, recycled steel, food, and drink. Consequently, there are particles and gaseous compounds in the air, emissions with potential impacts on air quality, as well as effluents which are not treated before being discharged into the major drainage system, affecting the wetlands of Chemu.

POTENTIAL IMPACTS OF TOR OPERATIONS

The major sources of potential impacts on air quality are related to the emission of particles, volatile hydrocarbons, and the combustion of petroleum-based fuels which generate particles of sulfur dioxide, nitrous oxide, carbon dioxide, and carbon monoxide. These emissions occur during the different operational phases, including that of the catalytic unit, the hydrodesulfurization process, heating, the burning of gas, storage and handling of crude oil and of refined products.

CONTAMINATION OF SURFACE WATERS

Contamination of surface waters as a result of discharges resulting from refining operations into the major drainage system generates a series of impacts, especially a high chemical oxygen demand (COD) and the presence of hydrocarbons in sea water used in the cooling process, waste water, and perlocation of the tanks.

IMPACTS ON LAND AND GROUND WATERS

Oil spills are a potential source of contamination of ground waters. These are spills of raw material and refined products and also result from undetected leaks from tanks and the pipeline. Refinery operations periodically produce varying quantities of solid wastes, especially in the form of catalytic fines, coke fines, and various types of liquid wastes (with and without lead) used for cleaning tanks, oil and water separators, and API gravitational interceptors and separators. Solid waste pits are dug for these. Other potential sources of ground water and soil contamination are the accidental freeing and spilling of refined products and crude oil. The design of the TOR drainage system is such that oil spills and leaks discharge directly into the major drainage system with no interference.

There is filtration from sanitary landfills, contaminating ground waters.

NOISE POLLUTION AND ITS IMPACTS

Refinery operations produce loud noises. The principal sources of contamination are the high velocity compressors, the control valves, the pipeline system, the steam turbines, and the chimneys where gas is burned. Noise levels typically range from 60 to 110 Dba at a distance of a meter from the source of the noise. When an individual is exposed to noise levels exceeding 90 Dba continuously for 8 hours, stress and physical damage to the ear result.

FIRE AND EXPLOSION RISKS

Most of the raw material and liquid additives of the intermediary products in the crude oil refining process are volatile. Safety measures for the control of temperatures at the refinery are very poor; in addition materials are extremely flammable, explosive, and corrosive, and contain components which can be highly toxic when entering the human body by mouth, through inhalation, or through the skin. Other products may be irritating to the eyes and skin.

Those organic compounds that contain lead are toxic and carcinogenic, and affect reproductive processes. Thus, in the transport, storage, and handling of these products there is always the danger of starting fires caused by explosions; this is a constant risk both at the plant and in neighboring ecosystems.

CONCLUSIONS

From this brief analysis of the situation at refineries in Western Africa, we can conclude, on the one hand, that these countries are being pressured by multilateral credit organisms to become importers of petroleum derivatives.

When this World Bank recommendation goes into effect, countries which up to now have been self-sufficient in petroleum derivatives will become importers. This change could be detrimental to the sovereignty of said countries as they lose control over supply of one of society's essential elements, which is energy.

On the other hand, countries will be economically affected as they will have to earmark money for these products.

However, maintaining refineries that are producing significant environmental impacts affects the environmental balance of the country and, in many cases, the presence of these refineries prevents other forms of sustainable life from developing at the same site.

Thus, it is important that the energy problem in the region

be studied anew, in order to find sources of energy that are decentralized, democratic, and non-contaminating.

ACTIONS AGAINST THE REFINERY IN TRUJILLO BAY

Secretariat - Oilwatch

INTRODUCTION

As a result of globalization, companies from industrialized countries have been moving their plants to the Third World where environmental laws are lax, wages low, and land cheap.

In addition, the Third World is home to fragile ecosystems with high levels of biodiversity and human societies characterized by the complex relationships they have developed with the environment.

Among the most dangerous activities moving into the region are oil refineries.

This is the case of the oil refinery being built in Sri Lanka. In spite of the fact that this nation does not produce oil, it will be importing oil, refining it, and then exporting it (Withanage, 1996). The same is true for Honduras, where a mega-refinery has been proposed for the same purpose in an area characterized by high ecological fragility.

Both examples constitute an illustration of the transfer of environmental risks from industrialized countries to our countries.

THE HONDURAS MEGA REFINERY

In 1994, negotiations were begun for the construction of the biggest oil refinery in Latin America. The objective is to supply the entire region with petroleum derivatives.

This refinery would be located on the Atlantic coast of the Honduras, in an area of influence composed of highly fragile zones, including the great Northern Coast Wetlands, lagoons, coastal zones, seascapes, and coral reefs. The project would also affect agricultural zones.

The productive activities that would be affected by the project include fishing. The refinery would be located on the route of fish schools and, in the event of contamination, the toxic substances would spread throughout the Gulf of Honduras, especially the Bay of Trujillo. In addition, the zone has a high tourism potential, which would be seriously affected by the presence of a mega-refinery. The plant would also adversely affect traditional practices and the way of life of a number of local ethnic groups, as well as human health in general.

The site selected for the refinery is near a wildlife refuge. The importance of this refuge is due to the fact that it contains the most extensive coral reefs in the world, which

surround the islands of the bay.

The refinery would operate in Puntilla, Puerto Castilla, in the department of Colon, on land belonging to the National Port Authority (ENP). The ENO has rented the site to refinery interests for three years.

THE PROJECT

The corporation formed to build the refinery has, as its principal partner, the Banco Occidental de Honduras. This bank is a trustee of the Honduras Petrochemical Corporation.

Proponents of the super-refinery argue that it will replace all the small refineries operating in countries in the area, and will thus eliminate the environmental damage they produce as a result of lacking even minimal standards. When the refinery is in operation, all environmental damage will be concentrated in a single location.

The site was chosen for its depth as well as for the low tides in the area. This provides for a huge storage capacity, and for the entry of the largest tankers in the world. The site is ideal for the building of world-scale infrastructure. The government of Honduras sees the refinery as a way to attract foreign investment. In addition, the Bay of Trujillo is strategic in geo-political terms.

Construction of the complex will cost 1,133 million dollars. The complex will include an oil refinery, tanks, and port infrastructure. Only part of the total amount will be invested by the company; the rest will come from loans.

The project was initially expected to begin in March 1994, and to be carried out in four phases. But because of pressure from civil society, the project has been suspended.

Refinery capacity would be 2.5 million barrels of crude per day. Since Honduras is not an oil producer, it would have to import petroleum, refine it, and export the derivatives. Crude would be imported from the Middle East and other members of OPEC. It would be transported in large tankers. Finished products would be re-exported in smaller tankers to markets in the Western Hemisphere.

The design and construction of the storage tanks for fuel and crude, as well as that of the oil refinery, will be prepared through a patent with the Bechtel Corporation of Texas.

Bechtel participates in other projects which have been questioned by civil society in various countries, including the Camisea gas project in Peru and an electricity complex in Maharashtra, India. The company has a number of new projects in Western Africa.

ACTIONS BY CIVIL SOCIETY

A number of organizations in Honduras were concerned about the possible construction of the refinery, including CODDEFFAGOLF, an environmental organization which began to put together an Ecological Front to stop the super-refinery.

The front was made up of ODECO, OFRANEH; foundations from different cities and towns along the coast, including the Capiro, Calentura and Guimoreta foundations; the Catholic Church; and other institutions.

Members of this coalition for the defense of nature and the environment based their opposition to the refinery on respect for the Constitution of the Republic, international agreements signed by Honduras, and the secondary laws of the country.

Among the legal inconsistencies identified in relation to the possible construction of this mega-project is the constitutional principal in article 340 in which the rational and technical exploitation of natural resources in the country is declared a public good. Activists point out that oil refining activities would put these natural resources at risk because technically safe exploitation is impossible, and that this would be a violation of the constitution.

In addition, in Article 2 of the Tourist Zone Law, a number of areas that would be negatively affected by the refinery are listed, including Trujillo, Punta Castilla, Santa Fé, and Limón.

At the same time, Article 30 of the Tourism Law indicates that those zones declared of importance for tourism will be preserved and protected. No authority may grant patents nor authorizations within these zones or in their areas of influence which would lead to contaminating economic activities or the presence of industries whose waste materials would damage the resource; this prohibition applies to any activity that would damage the natural environment.

Finally, Agreement 1118-92 declares the mountains of Capiro and Calentura a national park, and the lagoon of Guaimoreto a wildlife reserve. Both sites contain fragile ecosystems and would be seriously affected by the refinery.

DECLARATION AGAINST THE REFINERY

Organizations representing civil society, the Federation of Private Organizations for the Development of Honduras (FOPRIDEH) and its associated regional OPDIs, organizations of the Atlantic coast, the Catholic Church, and the Ecological Network of Honduras for Sustainable Development (REHDES) and its community and regional organizations, met in Ceiba in order to analyze the Trujillo Bay refinery project. That meeting led to a declaration that includes the following points:

1. That the installation of a refinery in North Central Zone 2, especially in the Trujillo Bay, constitutes a serious violation of the Constitution of the Republic, the General Law of the Environment, the Fishing Law, the Tourism Law, the Investments Law recently approved, and international agreements to which Honduras is a signatory.

Because Honduras is a republic based on law, the government is obliged to require strict compliance with these and all other laws related to the common good and the nation's heritage which takes precedence over any private interest.

2. If, in spite of the fact that there is no justification for building the refinery within the nation's legal framework, the central government decides to go ahead with the project, we demand that it act responsibly by proceeding to prepare an objective technical study, guaranteed by a respected international organization, which will reveal the environmental, social, and economic impacts of the project. At the same time, the government is required to provide for participation by municipalities, communities, and organizations of civil society in the zone, assuring that they have full knowledge of proposals in order to proceed with a positive attitude.

3. Given the size of the refinery project, it is of paramount national importance, and thus all sectors of Honduran society should be advised of the negative repercussions it will have in the short, medium, and long term. We understand that industrialized countries like the United States are moving these industries to countries in which violation of laws and subsequent impunity are common, and the possibility of making profits is thus multiplied.

4. We call on all responsible private businesses who are conscious of their patriotic and humanistic duties, and on all other organizations in civil society, as well as on the international community, to assume an attitude characterized by dignity, and demand that this project not be undertaken for the sole purpose of favoring the interests of a few investors, without regard for the damage that it may cause to the environment, the nation's ecotourism potential, communal property, and the cultural heritage of the region.

5. We support, morally and materially, the actions that are being taken by the Calentura Guaimoreto Foundation (FUCAGUA) in this respect. We reiterate our commitment to continue making every effort to put into place a genuine development process in the zone, led by the community and for the benefit of the community, based on principles of sustainable development and the legitimate participation of all sectors.

On this date we have formed a permanent regional group which will be gathering, analyzing, and reflecting on all information as it is made public, and we will be observing all events related to this project.

In addition, we have formed a multi-sectoral coordinating body for the Regional Coordinating Commission of FOPRIDEH, which will be in charge of directing, training, and establishing mechanisms for steps to be taken in the struggle against the installation of a refinery in the Trujillo Bay.

In addition to organizations representing civil society, ecclesiastical organizations in the refinery's area of influence also made a statement against the project.

DECLARATION OF THE DIOCESE OF TRUJILLO

In light of fresh news about the possible installation of an oil refinery in the Bay of Trujillo, delegates to the XI Diocesan Assembly, with Monsignor Virgilio López presiding, and priests, religious, and lay persons in attendance, released the following statement:

1. The news appearing in different communications media in terms of the refinery has us greatly concerned, as these demonstrate contradictions among statements by different government officials.

While some deny that there is interest in the installation of the refinery, others have said in advance that they are in favor of the project, as though it were already approved. This suggests to us that the truth is being hidden from the public as regards the project, which would be disastrous for Honduras.

2. This Assembly, aware of the views of our people, declares itself decidedly against the installation of the refinery for the following reasons:

a. The project would be an assault against the Bay of Trujillo and its surroundings, which are public property. If private property must be respected, the same should apply with added force to public property which affects the entire population and is thus more sacred than any individual interest.

b. There is no need for environmental studies as common sense indicates that the refinery would be an assault on human life and health, as well as that of the flora and fauna of the zone, as is evident in other areas of the world.

c. The installation of the refinery violates Article 32 of the General Law of the Environment, which prohibits the contamination of the inland and offshore waters of our country.

d. This is a project that would benefit only large national and foreign investors, but would be enormously damaging to the poor of our diocese by denying them their means for survival which is small-scale fishing and agriculture. In addition, it would destroy the beauty of the bay and would discourage tourism.

e. In spite of the fact that authorities promise great benefits for the population, we are not in agreement as they will come at the cost of the poisoning of the air, the contamination of the water, the starving of marine fauna, and negative effects for human health and the environment.

f. We cannot mortgage the future of coming generations with grandiose promises for dizzying wealth, which are difficult for our people to assimilate. Thus, we exhort:

The population to become aware of the danger the installation of a refinery would represent on our coasts and come together with all churches, community organizations, and non-governmental and environmental organizations to energetically prevent a grave wound to the nation's heritage and the people of Honduras.

To the businessmen who are behind this process, we ask that you put the interests of the entire people before your personal interests, and that you look for investments that will lead to the real development of the economic situation of ordinary people.

To the government, may you abandon ambivalent and irresponsible positions which hide the truth from the people, and may you comply with your obligations to defend the nation's heritage and the common good.

Within the framework of celebrations for the Third Millennium, we beg our Lord of Creation to illuminate the minds and the hearts of all Hondurans so that we seek well-being for our people and the conservation of the natural wealth You have given us.

EPILOGUE

Up to now, the refinery has not been built in the Bay of Trujillo, in part due to the tremendous pressure exerted by the different sectors of civil society.

During the final trimester of 1998, one of the worst climatic disasters in the history of Latin America hit Honduras. Hurricane Mitch devastated 80% of the country. If the refinery had been in place, one can imagine the magnitude of the impacts that would have occurred.

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THE STRUGGLE AGAINST ENRON IN INDIA

Subodh Wagle
PRAYAS

THE PROJECT AND THE FIRST ENERGY PURCHASE AGREEMENT

The Enron project is the product of a new economic policy (NEP) in India, corresponding to the liberalization and privatization of the electricity sector initiated by the government in October of 1991. This is the largest project in the first package of eight "fast-track" energy projects with private foreign capital which has been approved by the government of India.

In this type of project, the respective state governments provide guarantees to foreign investors, assuring the payment of all expenses in case the respective state electric committees do not do so. In addition, the government of India extended counter-guarantees to the Enron project in case debts related only to Phase I were not paid.

The Enron Development Corporation, a multinational firm based in the United States, signed a Memorandum of Agreement with the government of Maharashtra on June 20, 1992 for the construction and operation of a thermal energy project.

The planned capacity of this plant--2000 megawatts (MW)--amounted to a fifth of the installed capacity of Maharashtra at that time.

In April of 1993, two other US multinationals--Bechtel Enterprises and General Electric--merged with the Enron Corporation to form a company called Dabhol Power Company registered under the Hindu Law of Companies of 1956. Enron, Bechtel, and the General Electric Dabhol Power Company hold 80%, 10%, and 10%, respectively, of the company's stock. On December 8, 1993, Dabhol Power Company entered into an energy purchase agreement with the State Electric Council of Maharashtra.

According to the Energy Purchase Agreement, Dabhol Power Company will build a thermal energy plant using combined cycle gas turbine technology.

The project's aim is a total installed capacity of 2,015 MW divided into two phases of 695 MW and 1,320 MW, respectively. Nevertheless, only the first phase was finalized and the government had the option of accepting, renegotiating, or rejecting the second phase.

In the initial two-year period (Phase I), the project would function on distilled petroleum until the alterations were made for the use of gas. Liquid petroleum gas must be imported from Qatar, where Enron produces gas. This would be transported in liquid form by sea, using special tankers.

The plant is to be built 250 kilometers south of Bombay on the western coast of India. The current site is near the port of Dabhol, but on the other side of the estuary formed by the Vashishthi River and the Arabian Sea.

The populations that would be directly affected by the project are Anjanvel (especially the communities of Katalwadi and Borbhatlewadi), Veldur, and Ranvi. These towns are under the taluka (subdistrict) administrative jurisdiction of Guhagar and the district of Ratnagiri. Nearly 700 hectares have to be acquired from these three towns. According to the Environmental Impact Study provided by Enron, about 2,000 persons would have to be relocated.

The Energy Purchase Agreement between the Maharashtra State Electric Council and the Dabhol Power Company contains many important details about the project and was kept secret for nearly 15 months by Enron and state government officials in spite of constant demands that it be made public.

Finally, a newspaper with national coverage obtained a copy of the agreement and published select portions. At the same time, political parties opposed to the project won elections for the Legislative Assembly in the state and formed a new government. Under the circumstances, Enron thought it prudent to publish the energy purchase agreement officially.

Some of the most important aspects of the agreement:

- * A "Construct, Possess, and Operate" agreement.
- * The Maharashtra State Electric Council would agree to buy energy from Enron with negotiable tax rates for twenty years.
- * Enron would construct the Phase I plant with a capacity of 695 MW (625 MW of base charge and 70 MW of maximum charge) 33 months after financial closing.
- * Enron guaranteed 90% (time) access to the plant.
- * A two-part payment method would be used to calculate payments to Enron. The two components would be: energy charges (cost of fuel and other related costs) and capacity charges (charges for regeneration of capital, operation and maintenance costs, insurance, and other related costs).
- * Payment would be calculated on the basis of 44.9% of efficiency for basic charge operations and 28.1% efficiency of maximum charge operations.
- * The cost of fuel would be transferred to the Maharashtra State Electric Council. However, responsibility for guaranteeing minimal provision of costs would rest with a subsidiary of Enron against payment of \$2.5 million per year.
- * The new central policy of the Hindu government (restricting a return on stock to 16%) would not be applied to this project. Thus, project profits are governed entirely by (secretly) negotiated payments.

TECHNICAL-ECONOMIC AND ENVIRONMENTAL OBJECTIONS

The energy purchase agreement was the object of serious

objections from experts in various fields and a number of representatives of distinct organizations. These objections can be classified as follows: technical-economic (technical, economic, financial, legal, procedural, etc.), environmental (ecological, related to safety, etc.), and social (removal and subsequent relocation, and rehabilitation).

In addition, there were charges of favoritism and corruption. These allegations were based on the lack of transparency in proceedings, secrecy regarding the negotiation process and documents, the speed with which various exonerations for the project were approved, the nature and number of extraordinary incentives and exemptions offered to Enron.

In the environmental field, critics complained that the gases produced by an electric plant would affect not only human health (especially in the rainy season) but would also seriously threaten mango, cashew, and other fruit crops grown throughout the region. In addition, the hot water discharged by the plant would be dangerous to marine life.

Enron, the Maharashtra State Electric Council, and the government of Maharashtra published their responses to these objections. According to authorities, the project was compatible with the environment. Natural gas is the cleanest fuel available. In addition, Enron could create a green zone around the plant in order to contain contamination created by operations. Enron has submitted the Evaluation of Environmental Impacts to the Ministry of the Environment and Forests.

Critics of the project provided the following responses to the arguments listed above:

In Phase-I of the project, the plant would not be using natural gas but, instead, distilled petroleum, the impacts of which were neither discussed nor analyzed.

Second, natural gas is not a completely pollution-free fuel as described. While it produces less contamination per unit of electricity generated--when compared with other fuels available--the energy plant would, when burning natural gas, certainly create some contamination, both thermal and chemical.

At the same time, the Enron plant, given its tremendous capacity, would generate an enormous amount of contamination in a fragile environment. It is believed that there will be adverse effects on the flora and fauna of the area, especially in mango, cocoa, and betel nut plantations, which are very delicate.

Finally, there were concerns about thermal contamination when 60 million liters per hour of hot water are discharged into the Vashishthi estuary. It is believed that the high heat will bring adverse impacts on the marine ecosystem of the area and also on traditional fishing communities whose diet

and livelihood are based on these natural resources.

As for the Environmental Impact Study (EIA), Enron and governmental agencies treated it as though it were a secret document and refused to reveal its content even to the persons who would be affected. The INDRANET group presented a detailed analysis of the EIA, revealing a series of incorrect declarations, defective interpretations, and prejudicial conclusions. They have demonstrated the way in which the scientific data of the EIA were manipulated to justify the project.

THE SITE, THE PEOPLE, AND THEIR WAY OF LIFE

The narrow fringe of the coastline in the state of Maharashtra, running between a chain of the Western Ghats mountains and the Arabian Sea, is called Konkan. Konkan is blessed with fertile soils rich in minerals and good weather conditions throughout the year. As a result, the local ecosystem is ideal for a variety of crops, fruit trees, forest species, and wildlife. The marine ecosystem of the coast of Konkan is equally abundant and diverse in life forms, on the basis of which the fishing communities in the coastal areas have survived for centuries.

The people of Konkan have lived simple but rich lives for centuries, using nature's gifts in a prudent fashion. They have not adopted intensive agricultural techniques. Instead, they have relied on a variety of resources to satisfy their subsistence needs, including gardening, and a wide range of marine and forest products, together with agriculture.

Nevertheless, orthodox executives and experts have called the peasants of Konkan "obstinate" and "ignorant." Their simple way of life, which involves the sustainable use of land, water, forests, trees, and marine resources has been described as "underdeveloped."

The state and central governments, academics, bureaucrats, businessmen, and even representatives of the media who believe in conventional development, have supported the so-called "development" of Konkan, and have joined forces with the sons and daughters of residents of Konkan who have emigrated to the cities where they have been "successfully integrated" into the dominant system.

With this support, the government has decided to "industrialize" the entire region, using to the maximum local advantages and natural resources, especially the land and the water. It is estimated that investment in industries in Konkan in the near future will reach Rs 600 billion, according to state government statistics.

Not long ago, the state government promoted massive horticultural schemes and programs for developing Konkan, and especially the districts of Ratnagiri and Sindhudurg, based on the "California model." The push for the industrialization

of Konkan is reinforced by the massive flow of foreign capital into Bombay, the result of new liberal economic policies.

The completion of the railroad joining Konkan to Bombay was also an important factor as it provided a channel of communication.

THE CONCERNS AND OBJECTIONS OF AFFECTED COMMUNITIES

Ironically, contrary to the debate among experts, local people are concerned about the effects the project will have on their daily lives, their subsistence needs, and future generations. They clearly understand that the project will destroy all that they have and value.

Through letters and petitions to the state government and the Dabhol Power Company, as well as interviews with the media, they frequently point out that their daily life and subsistence depends on public, private, and communal lands.

In spite of this, the government of Maharashtra has taken a typically urban-industrial attitude. Officials maintain that the acquisition of lands will only affect the agricultural income of families owning the properties acquired.

The local people explain that they depend on the land and on other basic resources which it offers for their material needs (such as food, fuel, forage, fertilizers, and fiber), for their daily activities and emotional needs (since their cremation deities and lands share the same physical space).

They also point out that many families don't have land--including those who are members of fishing communities--and depend for their subsistence and daily needs on community resources. Thus, without access to those basic resources, fishing communities would find their lives severely constrained, as would families without land. In addition, in the case of the fishing families, the appropriation of the estuary by the project, for example, to provide a waterway for the large tankers and a sewer for the discharge of substances and hot water from the plant would result in a serious threat to their subsistence.

Residents also claimed in their petition that the people of the area were not prepared to relocate or emigrate, since their lives were rooted in community solidarity. Given that the earth is the home of their ancestors, it would be a violation of their family and their community to leave their land. According to the petition "(community residents) have also experienced a solidarity that comes from close social, cultural, and emotional ties among members of the extended family, settlements, communities, and neighborhoods." In addition, residents are concerned that the project and secondary economic activities could cause an influx of uprooted individuals from other parts of the country, especially men, into their area, destroying the peace,

tranquility, and security that local communities normally experience.

Payment of a single, equal monetary compensation to all community residents, according to local people, would not compensate them for losses, nor allow them to continue their subsistence lifestyle based on essential resources. Nor would the monetary compensation be adequate to change to a basic urban existence. In any case, the change to an urban life style, in material and psychological terms and in terms of the skills needed, can not be created solely through a compensation scheme or a vocational school.

According to the local people, many of them lack the basic knowledge to subsist in urban areas, as well as the training needed to compete for jobs in the service sector, or opportunities for self-employment created by the project. Many of the new jobs would be as doormen, unskilled laborers, gardeners, security guards, and domestic employees. Even for these lowly jobs, which would be few in number, they would have to engage in bloody competition with huge numbers of poor people from other areas in the country. They ask themselves, why is it expected that local people sacrifice their dignity and their subsistence security (though simple) in exchange for miserable, uncertain jobs that pay poorly?

Local people are very clear about the danger involved and have expressed very articulately that they are happy with their current form of life which they prefer even to large monetary compensations.

Up to now, the resistance of local people to the project has been based on the disaster that this would bring to their way of life and that of future generations. They are convinced that any monetary compensation or other type of alternative arrangement will not stop the disaster. In summary, for the local people, no correction in the project or compensation package can be an alternative to stopping the project.

LOCAL RESISTENCE, CANCELLATION OF THE PROJECT AND ITS NEW BEGINNING

On October 30, 1993, a public meeting was held in Bombay of residents of the three neighborhoods threatened. At the end of the meeting, a Committee for the Rights of the People (threatened by) the Veldur, Anjanvel, Ranvi Energy Project was formed to begin joint actions.

On November 6, 1993, this committee sent a detailed petition to the DPC as a response to its public announcement. In the following months, three oversight committees were formed in each of the three threatened communities. Though emigrant residents made the first move, local residents and their leaders on the oversight committees got involved quickly in various political activities undertaken to challenge the Enron project. The oversight committees also monitored activities of the DPC, governmental agencies, and the

defenders at the project site.

On October 2, 1993, the Federation of Workers of the Maharashtra State Electric Council announced the first action protesting the project, which was cancelled due to a devastating earthquake in September of 1993.

On June 5, 1994, the Federation organized a meeting in the town near Shringartali, in conjunction with local action committees, trade unions, the Maharashtra State Electric Council, Bhel, banks, the State Transport Corporation, as well as employees of GOM and many other organizations. In July of 1994, these organizations formed a united front called Enron Virodhi Sangharsh Samiti, and organized protest actions in Bombay and Pune. A similar meeting was organized in Veldur on October 15, 1994, against a land acquisition proposal.

The initial efforts of the government to acquire land, using draconian laws, failed since local people successfully resisted efforts by the government to push the project using repressive tactics.

On October 29, 1994, using police force, government officials crushed resistance by local people and unilaterally declared that they had completed all legal proceedings for the transfer of land. On that day, 144 women and 55 men were arrested. The people continued resisting the forced acquisition of their lands. Once again, on November 8 and 10, 1994, a large number of women and men who protested were arrested. The police used a variety of tactics to harass the protesters in order to break their spirit. BJP and Shivsena, then opposing the government, also joined the combat.

On December 8, 1994, state Legislative Assembly elections were officially announced. The campaign slogan of BJP-Shiv Sena was based on the Enron project. Their leader, Mr. Gopinath Munde, promised to "toss the project into the Arabian Sea" at a public meeting in Guhagar on March 6, 1995. Also at the state level, the BJP-Shivsena alliance won the highest number of legislative seats, and formed a governmental coalition at the beginning of March 1995. The new BJP-Shivsena government announced that negotiations with Enron would be fully reviewed. Many of the organizations and local people who has resisted the project celebrated their victory.

CANCELLATION OF THE PROJECT

On April 3, 1995, the state government created a high cabinet level sub-committee with Mr. Munde, minister in charge of the department of energy, as president. The committee requested a detailed review of the Enron project and the negotiations, and that the report be submitted to the state cabinet. The committee invited representatives of all of those involved, as well as of the public.

Nevertheless, after the new state government nominated members of the cabinet sub-committee and they began to work for cancellation of the project, those in favor of the Enron project became alarmed. This group included national and international media, academics, the government of India, as well as the governments of the United States and the United Kingdom, and the World Bank.

Conservative institutions with widespread power in India raised their voices strongly in favor of the project at that time. The orthodox communications media and their readers launched a fierce attack against the new government and all opponents of the project. The ex-chief minister himself, Mr. Sharad Pawar, wrote a series of articles defending the project. Many in academia also joined in support of the project.

While the new government was still unshakeable, international networks in favor of the project were activated. There were official warnings from the Departments of Energy and Commerce of the United States. In the name of the government of the United Kingdom, Mr. Kenneth Clarke, Chancellor of the Treasury, issued a warning. Even executives of the World Bank attempted to persuade the Hindu government to rescue the project.

Meanwhile, when local people realized that the new government was weakened in its promise to cancel the project, they themselves, led by local women, and without any violence, stopped the Enron project on May 12, 1995. Around 400 of the protesters were arrested as they carried out their actions against the new government headed by BJP and Shivsena.

Finally, the state cabinet sub-committee submitted its report on July 18, 1995. Based on this report, the state cabinet made the decision to reject both phases of the project on August 3, 1995. The decision created comments in the state, the country, and in the United States where the report was soon made public.

Work on project construction was stopped on August 8, 1995. In the following weeks, Enron began arbitration proceedings in London against the Maharashtra State Electric Council and the government of Maharashtra, demanding US\$300 million in compensation. On September 6, 1995, the government of Maharashtra brought a lawsuit against the DPC in the Supreme Court of Bombay for involvement in fraudulent business practices and for tempting government officials with corrupt practices in order to get the project approved.

RENEGOTIATIONS AND THE REVIVAL OF THE PROJECT

In spite of these events, intense meetings took place behind closed doors to iron out differences between the new government and Enron. The decision to cancel the project had been announced vehemently, fanatically. However, from the beginning there was a clear disagreement about project

cancellation between the two sides in the coalition government and even within the party.

The counter-initiative came from Mr. Thakre (the head of Shivsena) who held sway over his party and insisted on negotiations with Enron. The leadership of BJP experienced the same kind of pressure.

Finally, on November 8, 1995, the state government announced the visit of a committee of experts to renegotiate the contract with Enron. The committee was made up in large part of academics and bureaucrats who were in favor of the project. They were designated to finalize the details of the new negotiation sessions and to design a set of measures that would save their image. The naming of the renegotiations committee unleashed another round of protests at the local level.

on November 8, 1995, local committees from the communities organized a protest march, with local women making up a large percentage of participants. During the first week of December, the three committees from the communities, Enron Virodhi Sangharsh Samiti, another formed by leftist political parties called Enron Hatao Kriti Samiti, and other organizations carried out a three-day hunger strike at the main entrance to the project.

The committee of experts submitted their recommendations to the government at the end of 1995. The government announced its decision to invite Enron to continue under new terms on January 8, 1996.