

# Oil Development in the Amazon

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**Abstract** In this paper I explore economic patterns of oil development in the Amazon and analyze their effects.

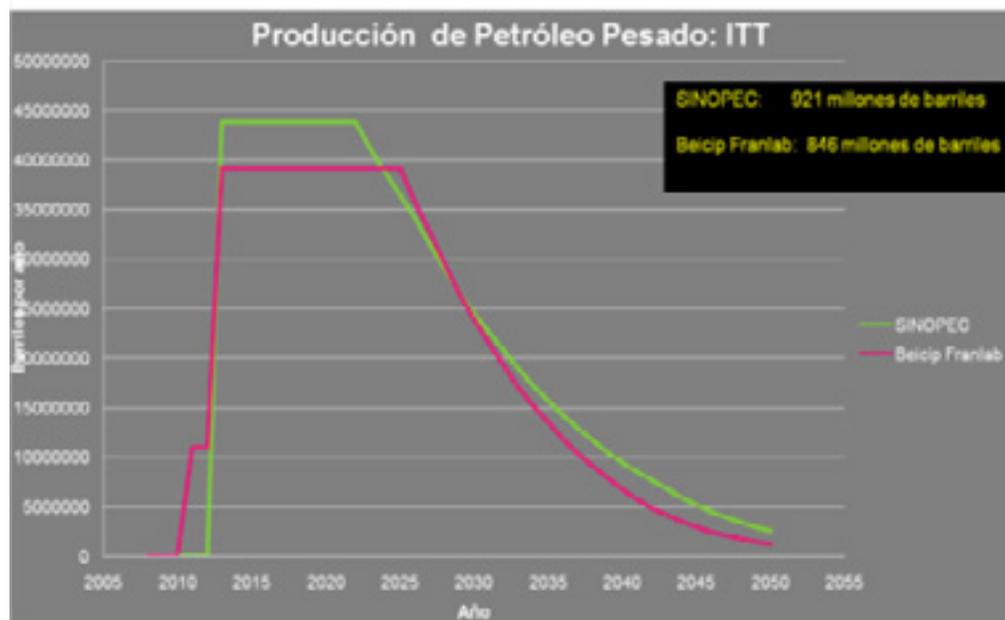
The Amazon rainforest is one of the most biodiverse but also one of the most oil rich places in the world. These two characteristics make policy decisions regarding the forest a dilemma between the temptation of extracting energy resources and the desire to protect the environment. Ecuador, a small country in South America is currently faced with this dilemma. The issue is over the Yasuni ITT (Ishpingo-Tambococha-Tiputini) - a stretch of Amazon rainforest within the Yasuni ITT in Ecuador with vast oil reserves consisting of 20% of the proven reserves of the country (Warnars 60). The Yasuni ITT is also a microcosm of indigenous life and a precious natural ecosystem.

This past summer, Raphael Corraera, the president of Ecuador decided to extract oil in the Yasuni ITT after a failed initiative to ask foreign nations to pay Ecuador not to drill here commonly known as the Yasuni ITT initiative. We will evaluate this decision to extract oil in the Yasuni on two criteria. First, we will look at what are the benefits of drilling here verses the status quo of not drilling. Then secondly we will analyze the

distributional effects of this decision as in which parties will be the better or worse off as a result and whether this distribution ethically justifiable.

This issue is critically important for three reasons. First, it will set a precedent for other environmental decisions in Ecuador and the rest of Latin America. Second, the Yasuni is a biological hotspot and several thousand species are endemic to this park. The oil development will affect the health of this ecosystem in ways that will be discussed later. Third, the Yasuni is home to indigenous peoples who vehemently oppose oil drilling here. Ecuador has had a sad history of environmental devastation due to oil spills in the past few decades that has made indigenous people very bitter to the idea of oil drilling. Pushing forward for oil development despite indigenous opposition raises moral issues that must be considered. It has been estimated that there are 900 million barrels of oil in the Yasuni ITT (Larrea 221). PetroEcuador, Ecuador's state-owned oil company, has calculated that the potential profit from extracting this oil is \$14.36 billion (Warnars 63).

**Figure 6.2 Projected petroleum production in ITT**



Source: Larrea et al., 2009

On the cost side there are private costs and social costs. No data was available on what the private costs were or that they were increasing at the margin. Social costs come as a result of environmental damages that will result from drilling in the Yasuni. We can use data from Cano Limon oil field in Colombia to estimate what the environmental damage from drilling in the Yasuni ITT will be. This oil field lies in a similar terrain as the Yasuni and was drilled by Ecopetrol, the Columbian state-owned oil company. Ecopetrol has a similar environmental record to that of PetroEcuador, the Ecuadorian state owned oil company (Oil and Indigenous People). Drilling in the Cano Limon oil field destroyed 810,000 hectares of Amazon Rain Forest. With a lifetime of 50 years, producing 73,000 barrels of oil a day, this oil field produces 13,3225,000 barrels of oil (McCollough) over its lifetime. We

will use this information to deduce that producing a single barrel of oil destroys 0.00611 hectares of forest (810000 / 133225000). Conversely, we can say that destroying a hectare of forest allows us to produce 1/.00611 or 163.4 barrels of oil. If we multiply this by the average price per barrel of crude oil over the past 5 years (\$87.93) we get that the marginal benefit of destroying a hectare of forest for drilling is \$14,367.76.

There is also a marginal cost of destroying a hectare of forest. A Brazilian organization, the Institute for Applied Economics Research, calculated the marginal cost of destroying a hectare of Amazonian forest (Anderson 34). We have changed the axes on this graph to match the situation of the Yasuni ITT. The marginal cost takes into account lost tourism value, existence value, carbon sequestration value, water recycling value, resource extraction cost, and other types of value (Anderson 11).

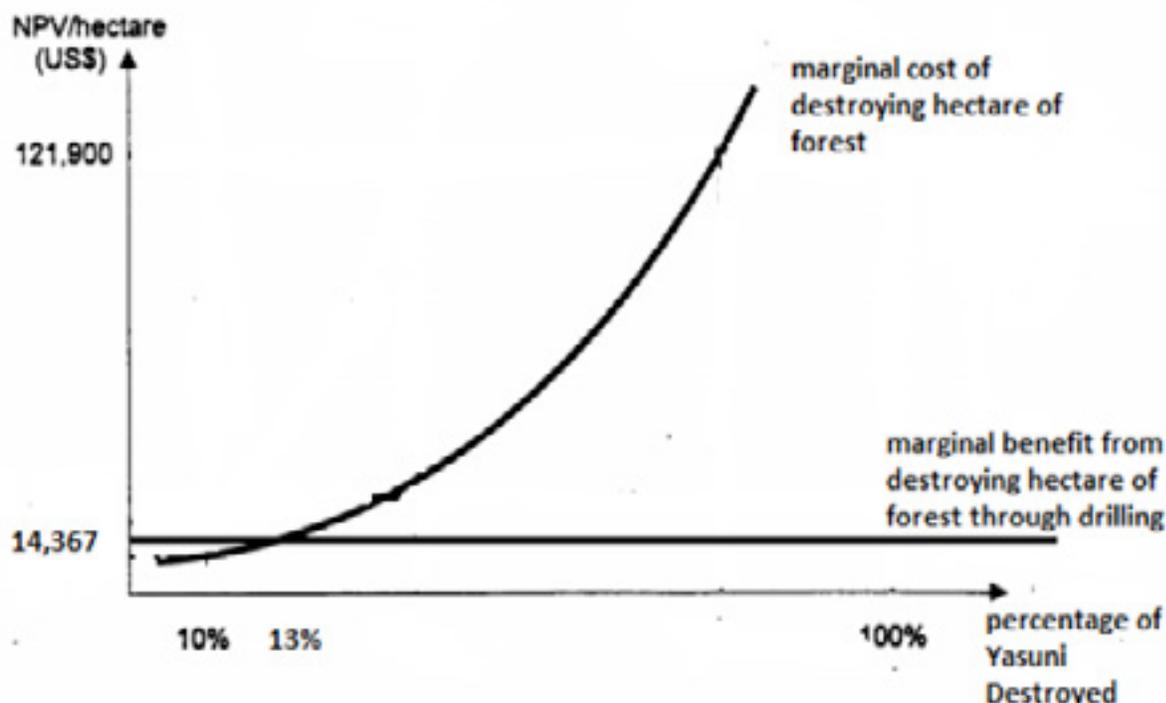


Figure 1: Costs and benefits of deforestation (2% discount rate)

Using this data, we find that it is most efficient to destroy 13% of the 980,000 hectare Yasuni ITT or 127,400 hectares. If destroying a hectare of forest allows for producing 163.4 barrels of oil, then destroying 127,400 hectares allows for producing 20,817,160 barrels of oil. The Yasuni ITT contains 900 million barrels of oil so it is efficient to extract 20,817,160 barrels (13%) of this oil. Doing so, will incur distributional impacts that will be discussed next.

The Ecuadorian government will be better off as a result of the oil revenues and international oil companies will be better off as they will have contracts with Petroecuador to help develop the infrastructure needed for the oil extraction. However, indigenous people living the Yasuni will be harmed as a result of environmental destruction and the ending of their isolation for the outside world. The Ecuadorian people will not see an increase in their standard of living despite the revenues from the oil extraction and people around the world will lose existence value of learning that oil will be extracted in the Yasuni and many endangered species will be harmed.

Indigenous tribes in the Yasuni depend on the land for their well being. Based on Petroecuador's environmental record, it is likely that there be significant environmental damage resulting from the oil extraction. Drilling in the Amazon would incur damages to the environment in the form of habitat destruction due to installation of infrastructure necessary for drilling and due to leaks in pipelines transporting this oil. Petroecuador, the company drilling this oil has a particularly egregious track record in drilling this oil. Petroecuador has had a world record of 400 leaks per year on average and is known to dump "liquid garbage," byproducts of oil drilling into lakes and streams in the Ama-

zon (Warnar 54). Even if Petroecuador drills in a safer way than it has previously, the inherent process of drilling means "500 cubic metres of garbage and between 2500 - 3000 cubic metres of liquid garbage is produced... which may be either directly dumped into rivers and streams, or deposited into the soil" (Warnar 66). Also transportation networks developed such as pipelines and roads, increase indigenous peoples' exposure to drug gangs and other negative influences that harm their way of life (Warnar 68).

Indigenous tribes do not use money and so it is not possible to compensate them monetarily for their loss. In the past, economic contact between indigenous people and mainstream Ecuador has been detrimental for their way of life. Contact increases alcoholism and drug use among indigenous people and often causes them to adopt environmentally destructive practices such as logging and unsustainable agriculture (Warnar 53-54).

Even though the Ecuadorian government will reap profits from selling the oil to the international market, the people of Ecuador will not realize this as an increase in their living standards. Historically, Ecuador has not developed despite extracting its vast oil reserves. Ecuador discovered oil in 1969 but since then the country has been growing at a rate of only 0.75% per year (Kraft). Places in Ecuador that have more oil reserves are generally poorer than places that don't. Rural areas such as those found in the country's "eastern Oriente region, where most of Ecuador's oil reserves are located" have poverty as high as seventy five percent (PBS). The oil revenues from the Yasuni will be used to pay off part of Ecuador's debt which is at \$14 billion, rather than be used as social spending for the benefit of the Ecuadorian people (PBS).

The Yasuni is one of the most biodiverse places on the planet and a reservoir for many near extinct species. Below is a chart of the species richness of the park.

**Table 6.3. Threatened and Near Threatened species totals for Yasuni**

IUCN Category	Amphibians	Reptiles	Birds	Mammals	Plants	Total
Critically Endangered (CR)	--	--	--	--	1	1
Endangered (EN)	--	--	--	2	7	9
Vulnerable (VU)	1	2	2	6	46	57
Near Threatened (NT)	1	--	5	9	43	58
<b>Total</b>	<b>2</b>	<b>2</b>	<b>7</b>	<b>17</b>	<b>97</b>	<b>125</b>

Threatened species are those listed as Critically Endangered, Endangered, or Vulnerable in the 2009 IUCN Red List of Threatened Species.

Source: Bass et al., p. 28.

100 scientists have written an open letter to the Ecuadorian government urging them to revoke their decision to drill in the Yasuni for fears doing so will “degrade its extreme biodiversity” (Amazon Watch). The scientists have said that “A single hectare of forest in Yasuni National Park is estimated to contain at least 100,000 arthropod species, approximately the same number of insect species as is found throughout all of North America.” The decision to extract oil from the Yasuni is also extremely unpopular among the Ecuadorian people. About 680,000 people have signed a petition calling for a referendum to reverse the decision to drill in the Yasuni (Reuters). This opposition to the drilling suggests that a large number of people derive an existence value from the ecological richness of the Yasuni and their existence value for the park would decrease as a result of oil extraction.

This distributional outcome is not ethically justified. Article 26 of the UN Declaration of Indigenous Rights states that “Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired” (Warnar 61). The indigenous tribes in the Yasuni have vehemently opposed the extraction of oil on the land that

they have been living on for centuries. Even the Ecuadorian Constitution specifically mentions the rights of the indigenous peoples living on the Tagaeri and Taromenane - parts of the Yasuni ITT- to not have natural resources extracted for their land: “The territories of peoples in voluntary isolation are ancestral homelands, irreducible and untouchable, and they will be off-limits to all extractive activities. The State will adopt measures to guarantee their lives, respect their self determination and will to remain in voluntary isolation, and ensure that their rights are respected. The violation of these rights will constitute the crime of ethnocide, and will be dealt with by the law”(Government of Ecuador, 2008). Two of the tribes living in the Yasuni live in complete isolation and have not been contacted before. Encroaching on their land would be a flagrant violation of both Ecuador’s constitution and the UN Declaration of Human Rights.

The corruption of the Ecuadorian government and the fact that the revenues will not go towards improving the standard of living of the Ecuadorian people makes the distributional effects even harder to ethically justify. Neither will the oil extraction benefit Ecuador’s growth in the long run. Alberto Acosta, a head of Ecuador’s leading

research group investigating environmental issues, believes that Ecuador suffers from a “resource curse” and further extraction of oil will be extremely detrimental to the vitality of Ecuador’s economy (Vidal).

We have found that most efficient approach is for Ecuador to drill around 21 million of the 900 million barrels of oil in the Yasuni ITT. This conclusion was reached making assumptions based on Petroecuador’s environmental record and the price of oil not changing drastically within the next decade. While this approach would achieve the most efficiency, it has distributional outcomes that are not ethically justifiable. Chief among these ethical concerns is that of violation of the rights of indigenous peoples who live in the Yasuni. Their way of life and hab-

itat would be harmed. In economic terms, this cannot even be considered an externality - indigenous people do not use money so they do not lose any surplus as a result of the oil extraction.

The contentious issue of drilling in the Yasuni is reminiscent of other environmental issues in the Amazon such as gold mining. More broadly, it is a case study of a larger issue which is a dilemma between natural resource use and environmental protection. Through economic analysis, we strive to find an efficient balance between the two, by considering externalities rather than simply private costs. However, economic analysis needs to be accompanied with a holistic understanding of the issue in question as there are many practical distributional outcomes of ethical significance that may not be apparent in the economic analysis.

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