



## Holding Trees Hostage: Ecuador's Attempt to Share the Costs of Preserving the Amazon

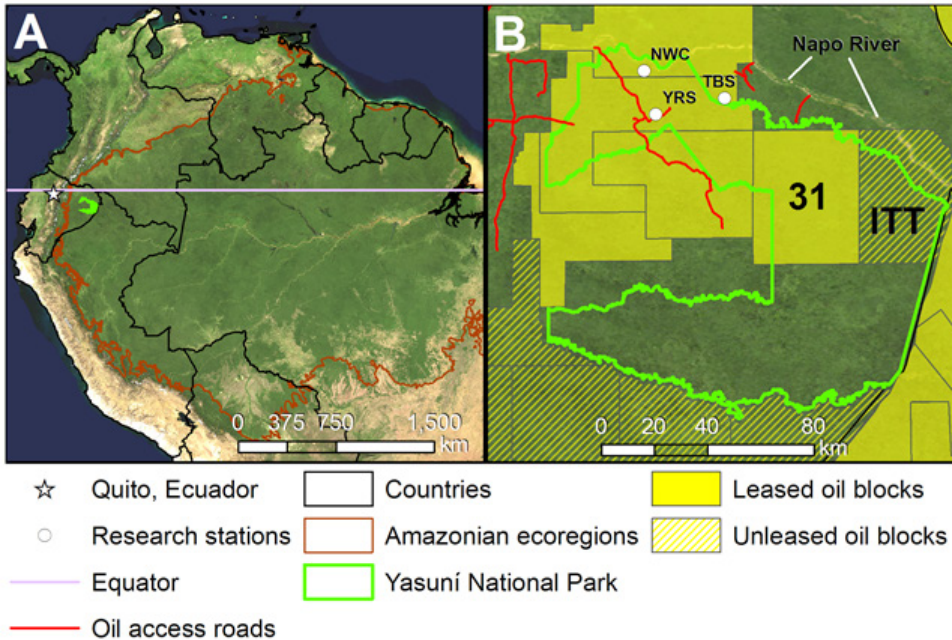
*Jayant Gandhi*

*Ecuador thought they would shock the world into action with their call for international funding to prevent the exploitation of oil reserves under their Yasuní-ITT National Park. The response was silence and inaction. Why? This paper examines Ecuador's Yasuní-ITT Initiative that sought to share the costs of preserving the Amazon Rainforest and its apparent failure through the lenses of collective action theory and cost-value analyses. While the initiative was unsuccessful this time around, with some adjustments it could prove a useful model for future conservation efforts.*

### **Introduction**

In 2012, Ecuador made an ultimatum to the world: pay us \$3.6 billion or we will cut down 1200 sq. km of rainforest. This was not so much a threat, but rather the

culmination of the Yasuní-ITT Initiative started five years earlier by the Ecuadorian government in order to offset the cost of not drilling for oil in a protected region of the Amazon rainforest (the Yasuní-ITT National Park). The international



Source: Bass, M., Finer, M., Kreft, H., Cisneros-Heredia, F., McCracken, S., Pitman, N., & English, P. (2010). Global conservation significance of Ecuador's Yasuní National Park. *PLoS ONE*, 5(1), 1–22.

response was underwhelming--only about \$8 million of the target was raised (with another \$100 million pledged, but not delivered) and Ecuador decided to move forward with the drilling project, hoping to produce oil in the area as early as 2016. While it may seem that Ecuador's actions were practically extortionary (and indeed many governments felt that way) they raise an interesting question of who should have to bear the costs of preserving and maintaining the Amazon. Brazil has also struggled with this question and has succeeded in combating some deforestation internally; still, their impact was far from the levels they could be if costs were more evenly spread among actors.

The benefits gained from a well-preserved Amazon (the increase in biodiversity, the natural carbon-sink it provides, etc.) are ones that are difficult, if not impossible, to preserve through privatization, yet are shared by the entire global community. Ecuador's request presents an interesting alternative to the traditional approach to preservation. But why exactly did their attempt fail if it is truly in the global community's best interest to preserve the Amazon? Was their price too high for the international community? Or was the very nature of the request problematic? One side is an issue of valuation and the other a collective action problem. Both probably played a role in the failure of the Ecuadorian proposal, but neither are insurmountable obstacles.

## The Initiative

The Yasuní-ITT initiative was launched in 2007 by Ecuadorian President Rafael Correa in order to prevent further deforestation of the large national park as a direct or indirect result of oil drilling. While deforestation of the Yasuní Park has already occurred through concessions to oil companies, the Ishpingo-Tambococha-Tiputini (the ITT in the last part of the name), which represents about 12% of the total area of the national park, has yet to be disturbed. The oilfields in the ITT region are estimated to hold around 900 million barrels of oil, which would amount to 20% of Ecuador's total reserves. For a relatively poor country like Ecuador that is dependent on its oil exports, this is a huge opportunity to forgo. Yet Correa designed an initiative to prevent drilling in the region for about half of the estimated economic value of the oil (at the time the total value was estimated to be more than \$7 billion, taking the price of oil to be \$61 per barrel).<sup>1</sup>

Why would Ecuador be willing to even consider forgoing extraction in exchange for only half their potential profits? According to Correa, Ecuador was in a position to switch from "an extractive type of economy to a service economy." He did not mean that Ecuadorians would be joining service sectors of the economy, but rather that the rainforest itself could be construed as a global service to be sold on the world market.<sup>2</sup> To Correa it made perfect sense that the heavily industrialized and polluting countries of

the wealthy world should have to pay for the environmental benefits provided by rainforest-rich countries like Ecuador.

The program, however, was not as successful as Correa would have hoped. Only achieving a total pledged amount of \$116 million since it began to collect funds in 2010, it is clear that the initiative has not been able to bring about the redistribution of costs that were hoped for.<sup>3</sup> In fact, as of 2013, the initiative has been officially abandoned by Correa's government and the initial groundwork to begin drilling the three oil fields has already begun. The initiative is not completely dead however, as calls to reinstate it through a referendum have begun to gain momentum in the country.<sup>4</sup>

This idea itself seems reasonable at first glance. Just as firms are expected to internalize their externalities, why shouldn't nations? Many nations claimed that they did not want to participate out of a fear that Ecuador would not uphold their end of their bargain and either drill anyways or put the funds into even more destructive projects. While this lack of trust is not entirely invalid, it was something the Ecuadorian government was aware of. In fact, they were actively trying to ameliorate this problem through the establishment of a UN-administered trust fund that would ensure the funds go towards reforestation, conservation, and social development projects.<sup>5</sup> Ultimately, trust in the Ecuadorian government was probably not the deciding factor. While ideally the cost for maintaining such an important global good should be shared

(perhaps with greater responsibility given to those who produce more negative externalities than others), there is little incentive for any one nation to act, making it all the more difficult for Ecuador to find support from the global community.

**Along for the Ride**

The collective action problem has long been a central theme when talking about international cooperation on matters of the environment. At its heart, it is a question of who can effectively manage and produce a public good or common pool resource within a large group. The environment itself definitely fits the criteria of a public good (non-excludable and non-rivalrous), but certain environmental aspects are better described as a common pool or fall into different property schemes. The problem of who should bear the costs for such a good becomes the focus of the collective action problem. Ideally, it would be shared equally among beneficiaries, but the very nature of the collective action problem posits that this cannot occur spontaneously.

In his 1965 work, *The Logic of Collective*

*Action*, Mancur Olson describes the necessity of “providing some sanction, or some attraction distinct from the public good itself, that will lead individuals to help bear the burdens of maintaining the organization.” This lack of incentive for active participation would not only make cooperation amongst large groups (like the global community) less likely, but it increases the chance that any one individual in the group will free-ride. In fact, Olson points out that the burden of providing a public good or common resource in this system will disproportionately fall upon the larger actors, while the smaller actors benefit without paying.<sup>6</sup>

Olson’s description of the collective action problem has become a key part in our understanding of why groups do not necessarily achieve the most optimal ends. This view of group behavior leads to the conclusion that concentrated interests come to dominate any group that lacks the ability to enforce incentives towards a more general (and diffuse) goal. However, this is not the only shape collective action can take, as pointed out in Todd Sandler’s *Global Collective Action*.

	does not contribute	contribute
does not contribute	0,0	$b_i - 0.5c_i, b_i - 0.5c_i$
contribute	$b_i - 0.5c_i, b_i - 0.5c_i$	$2b_i - c_i, 2b_i - c_i$

	does not contribute	contribute
does not contribute	1,1	3,3
contribute	3,3	4,4

Source: Grether, Jean-Marie (2014). *Global Collective Action – Summary of Todd Sandler’s 2004 Book*. Université de Neuchatel – Faculte des Sciences Economiques



Using Olson as a starting point, Sandler explored how different resource and group structures would lead to different outcomes, refuting Olson's idea that noncooperation is inevitable. Sandler posited that loosening the assumptions of some of the games used to predict collective behavior (e.g. Prisoner's Dilemma or Chicken) revealed a much more complex view of public goods. For example, by assuming costs are systematically shared, a normal game of Prisoner's Dilemma results in a Pareto optimal Nash equilibrium.<sup>7</sup>

In order to reach such Pareto optimal results for transnational public goods (TPG), international agreements become a necessity. The often cited success of the global effort to reduce the emission of harmful chlorofluorocarbons, responsible for the depletion of the Earth's ozone layer, was achieved through such an agreement. Left to its own devices, a country prefers a situation where every other country bans the use of CFCs while they maintain their freedom to use them - a classic Prisoner's Dilemma that could be overcome through an international treaty. The key success of the treaty was the establishment of trade restrictions on countries that did not participate. This meant that countries now had a disincentive to free-ride and would therefore seek to lower their emissions.<sup>8</sup>

So where do the rainforests of Ecuador stand in all this? Rainforests themselves present an interesting case, because their benefit for existing (a healthier environment) is a public good, yet the

country in which they exist also receives secondary benefits (such as erosion control and eco-tourism). These joint products that the host country receives (and can exclude from others) change the dynamic of the good from a pure public good. If the ratio of excludable benefits to total benefits is high then it is more likely that there will be an efficient allocation of resources, since the good behaves more akin to a private good. Conversely there is also a rivalrous aspect the public benefit of a healthier environment. Damage to the environment does prevent others from using it as efficiently. In essence, by polluting more, a country is using up more "units" of environment at the expense of everyone else. This latter point served as part of the logic behind Correa's plan.

The main problem with collective action with regards to the rainforests of Ecuador is more fundamental: there are just too many players. The global benefits for maintaining the Ecuadorian forests are too diffuse to incentivize anyone but Ecuador itself to pay for its preservation. Viewing the cost of preserving the rainforests as a payment to reduce the externalities of polluting nations leaves us in a standstill. The large number of agents means that bargaining (as prescribed by Coase theorem) becomes prohibitively costly. Within a state this could be remedied through command and control tools or a Pigouvian tax on the polluters, but in an international system with no supra-national force to enforce such rules, nothing will happen. And indeed that was the result of the Yasuní-ITT initiative.<sup>9</sup> Ultimately, cost sharing would result

in the optimal allocation of rainforest reserves. As Sandler pointed out, cost sharing leads to a modified version of the Prisoner's Dilemma where the Nash equilibrium lines up with the Pareto optimal result. The question is how to incentivize countries to share this cost. Obviously just asking them does not work, otherwise Yasuní-ITT should have seen more success. International organizations can help coordinate and restructure the game so that individual state incentives align better with what is globally optimal.

Currently the UN-REDD's REDD+ (Reducing Emissions from Deforestation and Forest Degradation) program is seeking to create a financial value for the carbon storage of forests in developing countries, hoping to eventually offer pollution credits to developed countries in exchange for their support in maintaining (and expanding) these forests.<sup>10</sup> While this is in line with Correa's intentions, it too suffers from a lack of support internationally, not only because of the collective action problem inherent to it, but because it necessitates the creation of a global carbon market.

Mobilizing the international community to any particular end is always a daunting task. Conflicting interests and disincentives to cooperate tend to inhibit progress, but if an agreement like the Montreal Protocol or an international organization like REDD+ can implement incentives for active participation (or more likely, disincentives for passivity) then an initiative like the Yasuní-ITT

could be possible. Treaties like the Kyoto Protocol have floundered because incentives could not be strong enough to counter the marginal cost of abatement of greenhouse gas emissions. This does not have to be the case with deforestation. Economic activity is not as dependent on cutting down huge swaths of trees as it is on burning fossil fuels. So if there is a reasonable incentive to participate in a global cost-sharing system for rainforests, international cooperation can be achieved. Of course, this is heavily dependent on the actual value of the rainforest.

### **The Price is Right**

What is the value of a hectare of rainforest? About \$18,000 in 1990 USD. Naturally, the value of any given area of rainforest is going to be dependent not only on who you ask, but on the potential resources that exist in the land. Many factors contribute to the value of existing rainforests and different groups value these factors differently. Some, like the economic benefits of eco-tourism or the carbon capture value of a forest, are easier to quantify. Others, like the value of biodiversity, are less so. Additionally, different actors will have different incentives to deforest. Farmers and loggers want to expand their economic activity while conservationists and indigenous populations would seek to preserve their ecosystem. Combining these disparate groups, you can arrive at a global optimum that should be the starting point when figuring out how much a state like Ecuador should really be charging to preserve its forests.

The previous figure of \$18,000 comes from Danish researcher Lykke E. Andersen and his cost-benefit analysis of deforestation in Brazil. While primarily focused on comparing the value of intact rainforest to the value of the lands used for agricultural and logging purposes, Andersen takes an in-depth approach to valuing a hectare of rainforest. He concluded that the value to the global community of a standing hectare of rainforest amounted to \$18,000 USD-1990, but that Brazil saw higher economic value in farming that land. Accordingly, it would require international intervention to reach the globally optimum amount of deforestation.<sup>11</sup>

Unlike REDD+ and other organizations that have focused almost exclusively on the carbon storage value of rainforests (admittedly the largest global value source), Andersen's study incorporated many other externalities of rainforests into the analysis. Of considerable note is his valuation of biodiversity. He focuses on the scientific value of biodiversity (and also the aesthetic value, in a separate section on eco-tourism). He divides this value between direct and indirect values. The direct value is comprised of the increased pool of genetic material that can be used in medicine and genetic engineering as well as the component materials derived from the many species of the Amazon used in modern medicine

	Total Economic Value per hectare (1990-US\$/hectare)	
	2%	6%
Discount rate		
Local private benefits		
Sustainable timber supply	5,200	1,733
Non-timber products	500	167
Tourism	80	26
Local public benefits		
Water recycling	3,000	1,000
Nutrient recycling	0	0
Protection against fire	300	83
Watershed protection	150	50
Global benefits		
Carbon storage	6,750	750
Biodiversity protection	1,540	513
Recreational value	80	26
Existence value	400	133
<b>Total Economic Value</b>	<b>18,000</b>	<b>4,481</b>

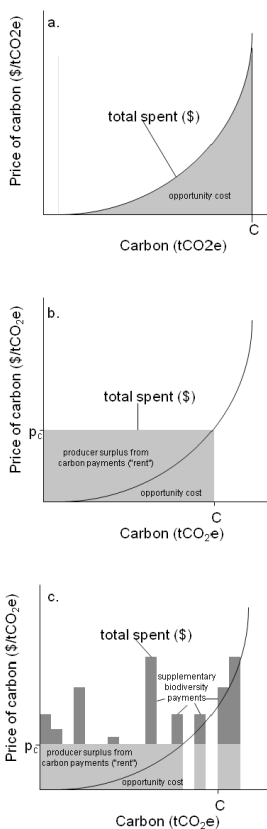
Source: Andersen, Lykke E. "A Cost Benefit Analysis of Deforestation in the Brazilian Amazon." Instituto de Pesquisa Economica Aplicada, Rio De Janeiro. January 1997

around the world. The indirect value comes from those species which have yet to be discovered and could potentially be incredibly valuable to scientific research (again mainly medicine).<sup>12</sup>

A more recent study of the costs of deforestation and the loss to biodiversity,

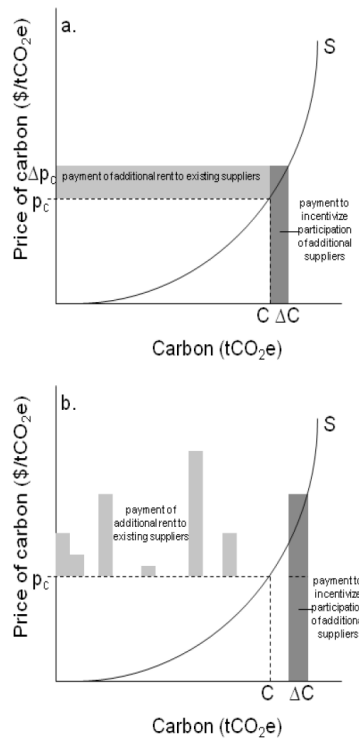
by Jonas Busch, looked at these issues in terms of the proposed REDD+ carbon credits marketplace. Since REDD+ almost exclusively focuses on carbon storage, priority is given to high carbon forests versus forests with high biodiversity. Busch argues that focusing solely on carbon storage can lead to a less optimal

**Figure 1: Payments, opportunity cost, and supplier surplus, with fixed fund size**



a) opportunity cost framework. b. service price framework with carbon payments only. c. service price framework with a mixture of carbon and biodiversity payments.

**Figure 2. Carbon payments, biodiversity payments, and the incremental unit of carbon**



a) service price framework with carbon payments only. b. service price framework with a mixture of carbon and biodiversity payments.

Source: Busch, Jonah. "Supplementing REDD+ With Biodiversity Payments: The Paradox Of Paying For Multiple Ecosystem Services." *Land Economics* 89.4 (2013): 658.



climate outcome than if biodiversity was taken into account. The major difference in pricing schemes is that the one based solely on carbon is a service payment: the supplier is providing the service of carbon storage. The integrated price is an opportunity cost scheme which would bring in even more suppliers, as shown in the graphs below.<sup>13</sup>

Looking at Ecuador, it is possible to apply similar prices systems to its rainforests. The first study gave us a good point of comparison, but there are still two major differences that set the Ecuadorian case apart: an incredibly high level of biodiversity and oil.<sup>14</sup>

### **Black vs. Green Gold**

Cost benefit analyses of rainforests with no subsoil assets have proven hard to internalize within a nation as large as Brazil. Ecuador's rainforests face an even steeper challenge. With about half the GDP per capita of Brazil and vast potential for oil wealth, it is impossible to expect Ecuador to carry the full cost of preserving its rainforest.

Ecuador has a long history of allowing oil extraction in its national parks. Even though the area around Yasuní was declared a UNESCO Biosphere Reserve in 1989, it was only in 2007, after much pressure from Ecuador's large indigenous population, that a large portion of the park became an "intangible zone" (meaning no resources could be extracted from the area).<sup>15</sup> This did not affect concessions already made to oil companies and left the

option open to the president to resume resource extraction at any time. Correa's moratorium on further drilling followed a year later in 2008.

As a member of OPEC, Ecuador's interest in producing or not producing oil tend to follow the decisions of the cartel. The current increase in OPEC production means that Ecuador's budget will be even tighter as oil prices fall. In fact, with a negative current account (as of 2014), Correa's government has been forced to begin preparations for oil extraction in the Yasuní-ITT region.<sup>16</sup>

Another problem facing Ecuador's desire to preserve its ecological heritage is the way in which it has valued the cost of preserving the Yasuní-ITT region. The \$3.6 billion requirement is based on the carbon-price of the petroleum underneath the soil, not the market price once extracted. While it does make sense to value the oil accordingly (since these prices are less volatile), it does raise the question of whether it would be enough to stop Ecuador from extracting should prices increase. The valuation also does not take into account the positive economic benefits of leaving the forest intact. Using Anderson's price estimations of \$18,000 per hectare, the Yasuní-ITT region can be valued at more than \$2 billion.<sup>17</sup> This number is not accurate for modern use, but it is clear that the economic value of maintaining the region's rainforests is immense. It should also be noted that more than half of that economic value is locally based (about 52%).<sup>18</sup>

In Ecuador's defense, it was only

asking for half of the potential gains by extracting the oil, so any gains they would have received from the preservation of the forests could have likely been offset by this omission. The presence of oil itself is problematic not only in determining a current valuation, but in ensuring preservation in the future. If deforestation is to be treated as a market, as is the intention of the Yasuní-ITT initiative, then perhaps the unwillingness to pay has more to do with the cost of abatement being far above the marginal harm caused by losing this section of the Amazon. In a sense, the oil underneath the region makes it 'premium' forest in terms of preservation.

### **It's All About the Money**

So was the failure of the Yasuní-ITT initiative due to an insurmountable collective action problem, or because the cost of abatement was too high? Either one could sufficiently explain what happened, but a combination of the two is the most holistic interpretation. It was a collective action problem because the incentive for other states to intervene and contribute was too low. The high price made it nearly impossible to create that incentive even after the Yasuní trust fund and carbon credits were established.

Correa's government tried a new approach to combating deforestation, one that is now being emulated by REDD+ (to only slightly more success...), and the benefits of trying definitely outweigh those of not trying at all. Figuring out a way to implement a cost-sharing regime

is probably the only solution to the Prisoner's Dilemma of deforestation. But without any means to enforce it on the international stage, cooperation is unlikely. Maybe an international agreement can be reached that punishes those who do not pay their fair share in order to preserve the Earth's rainforests in a similar manner to how the Montreal Protocol punished countries who continued producing CFCs. Unfortunately, it will probably take a much more dire climate situation for such an agreement to be created. In the meantime, however, there is a clear need for accurate valuations of rainforest lands that take into account their carbon content, but also the many other benefits they provide.

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### **Notes**

1. Davidsen, Conny, and Laura Kiff. "Global Carbon-And-Conservation Models, Global Eco-States? Ecuador's Yasuní-ITT Initiative And Governance Implications." *Journal Of International & Global Studies* 4.2 (2013): 1-19. p. 2
2. Davidsen, et. al. p. 4
3. United Nations Conference on Sustainable Development, "The Yasuní-ITT Initiative: shifting paradigms for a sustainable fu-

- ture”, 20 June 2012, <http://www.uncsd2012.org/index.php?page=view&nr=82&-type=1000&menu=126>, accessed: 1/15/2015
4. Associated Press in Quito, “Yasuni: Ecuador abandons plan to stave off Amazon drilling”, 16 August 2013, *theguardian.com*, <http://www.theguardian.com/world/2013/aug/16/ecuador-abandons-yasuni-amazon-drilling>, accessed: 1/14/2015
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  8. Barrett, Scott “Critical Factors for Providing Transnational Public Goods”. *Expert Paper Series Seven: Cross-Cutting Issues* (2006): 1-55
  9. Grether
  10. UN-REDD, *About REDD+*, <http://www.un-redd.org/aboutredd/tabid/102614/default.aspx>, accessed: 1/15/2015
  11. Andersen, Lykke E. “A Cost Benefit Analysis of Deforestation in the Brazilian Amazon”. Instituto de Pesquisa Economica Aplicada, Rio De Janeiro. January 1997
  12. Andersen pp. 23-24
  13. Busch, Jonah. “Supplementing REDD+ With Biodiversity Payments: The Paradox Of Paying For Multiple Ecosystem Services.” *Land Economics* 89.4 (2013): 655-675.
  14. Even for the Amazon the Yasuní national park is considered one of the most biologically diverse places on Earth with thousands of unique species per hectare. In particular the Tiputini Biodiversity Station boasts an amazing amount of plant and animal species unique to the region (it also happens to lie near one of the three untapped oil reserves).
  15. Davidsen, et. al. p. 10
  16. OPEC. *OPEC Annual Statistical Bulletin*. 2014. [http://www.opec.org/opec\\_web/static\\_files\\_project/media/downloads/publications/ASB2014.pdf](http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2014.pdf), accessed 1/15/2015
  17. Which because it took place in 1997 will most likely under represent the true modern value of standing rainforest. Even using his
  18. Refer to figure 3 for Andersen’s breakdown. His estimates have probably increased due to continued deforestation driving up the value of the remaining rainforests.

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