



The Prescription for Rainforest Protection

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Hurry and buy your very own chunk of rainforest now while the prices are low!ⁱ Through www.natureproducts.net one hectare of rainforest in China is selling for as little as \$4800. What do you actually get when you buy a hectare of rainforest? In reality you receive nothing more than the piece of mind that you are helping preserve the rainforest¹. What makes the rainforest preservation so special? Obviously, if people are willing to spend almost five thousand dollars to preserve a tiny morsel, it must be a worthwhile cause².

The benefits of rainforest protection are undeniable. Rainforests are home to the world's greatest biodiversity; it has been estimated that one hectare of rainforest often contains more than 750 types of trees and 1,500 species of higher plants. Furthermore, greater than half of the world's estimated 10 million species of plants, animals, and insects live in rainforests. Much of the world's food supply consists of species that originate from the rainforest. There is also great medicinal value in the rainforest that has yet to be realized. There are currently over 120 prescription drugs derived from species that reside exclusively in rainforests. More importantly, there is excellent potential for remedies to come as less than 1% of jungle species have been examined for medicinal purposes.ⁱⁱ 

Perhaps the most important anthropogenic function of the rainforest is the ecological services it renders. It is estimated that the Amazon Rainforest alone accounts for approximately 20% of the world's oxygen production.ⁱⁱⁱ Forestlands also serve as an immense carbon sink that is becoming increasingly important in the uphill battle against global warming and preserving air

¹ At www.natureproducts.net the question what do you actually get if you buy a hectare of rainforest is answered as follows: "You own one hectare of rainforest, presently for 60 years under local ownership and land-use rights; this may change to complete ownership with changing government policies within this decade. Within the statutes of the RFFF, this gives you the right to sell it to any other legal person or institution. However, its management responsibility will remain with RFFF because it is our obligation toward the local Government and the villagers to ensure sustainable management of the forests that we jointly select for this RFFF scheme.

² It is unclear how many hectare have been sold as Natureproducts.net does not volunteer that information on its website. There are other organizations with similar rain forest purchasing/ leasing programs; [World Land Trust](#), [Rainforest Action Network](#), and [Rainforest Heroes](#) are a few among the many available.

quality. It is estimated 360 million hectares of the Brazilian Rainforest are an annual carbon sink of 560 million tons of carbon.

Burning of the rainforest not only destroys this carbon sink but also emits tremendous amounts of carbon into the atmosphere. In 1998, nine million hectares of rainforest were destroyed releasing between one and two billion tones of carbon into the atmosphere.^{iv} This is roughly a third of the carbon released into the atmosphere each year from the burning of all fossil fuels.^v It is clear that rainforest conservation is important not only to protect the ecological services forests render, but also because their destruction is devastating to air quality.³

Ecological services create utility through indirect use but there is also a great deal of nonuse utility derived from the existence of a healthy rainforest. Some people gain utility from knowing the rainforest is intact so future generations can enjoy it, this is also known as a bequest value. Others receive utility simply by knowing that there is a healthy rainforest full of happy animals. This is called existence value. While this utility is solely based on the feelings of people without actual intention of using the rainforest, they derive real utility from knowing the rainforest is healthy. This value can be monetized and taken into consideration; theoretically everyone⁴ who has a nonuse value would be willing to pay some amount to prevent rainforest destruction given that an equitable solution can be found.⁵

³ The discussion of air quality, global warming, their relationships, and costs and benefits is a lengthy one. It is not my intention to educate the reader on this issue. I have included these statistics solely for the purpose of providing a more complete argument as to the value of rain forest protection. A complete understanding of the issue is not necessary, for the purpose of this discussion it will suffice to say that carbon sinks are good and massive carbon emissions from burning rainforests are bad.

⁴ While there are also negative existence values, that is to say some people derive disutility from knowing the rainforest exist, for the purpose of this discussion I will assume these values are trivially small in comparison to the positive utility. Because they are so small we can just assume they do not exist without marginalizing the conclusion of this discussion. Or if that does not sit well then we fall back on the assumption that there that here is a Potential Pareto improvement: the gain to the gainers would be much more significant to the loss to the losers such that an agreement could be reached leaving all parties involved better off.

⁵ By equitable solution I am referring to compensating the people who will be required to change their behavior in such a way that they are left better off than before the agreement was made.

Despite its enormous value,⁶ the rainforest is being destroyed at an estimated rate of 78 million acres per year with a predicted extinction rate of 50,000 species per year^{vi}. The parties using the rainforest in a destructive manner only receive a tiny fraction of the total social value because when the forest is cut down all the people who enjoyed the carbon sink, oxygen recycling, and non-use value have become worse off. If the marginal private benefit⁷ of rainforest destruction is significantly smaller than marginal social cost, why is the abatement of rainforest destruction such a difficult task? Clearly, there is an inefficient amount of rainforest destruction taking place and an intervention could foster an increase in social welfare.

It may appear as if the answer is clear: under current allocations the marginal value of rainforest preservation is more than the marginal cost, thus there should be a global effort to protect and preserve rainforests. However, preservation continues to be a major problem wherever rainforests exist. The reason is in the decision-making process. In considering whether or not to use rainforest land in a destructive manner, people consider their own costs and benefits, not social costs and benefits. An example of this would be Jose the farmer. Jose needs food to feed himself and his family and his cleared land has become insufficiently productive. Jose makes the choice of whether or not to clear more land based on his cost of clearing land versus the expected future benefit from new productive land. Jose is probably not concerned or even aware that there are people all over the world who enjoy his forestland. Jose's decision is based on his private utility; that is to say Jose balances his marginal private benefit and his marginal private costs. Since there are great social costs associated with rainforest destruction

⁶While it would be possible to use techniques such as contingent valuation to monetize the worth of rainforests and the services rendered, the actual value is not terribly important for this discussion. For this argument, I merely assert that the marginal value of the rainforest preservation is greater than the marginal costs. It is important to understand that I am not saying all rainforest land should be protected, I am merely arguing that an inefficient amount is being destroyed and we should take action in order to achieve a more efficient outcome that would be socially beneficial.

⁷For this discussion $MPB=MSB$ because we assumed away benefits to those who are not using the land that has been cleared. This is likely to be an incorrect assumption as there is likely to be positive externalities associated with slash and burn farming (for example the farmers have money to spend in the local markets so near by towns prosper). Here we will assume that the benefits are small enough that they are trivial. This is especially true because many of such benefits would still be realized after compensating farms to protect their forests.

this decision making process leads to an inefficient amount of rainforest destruction as $MPC < MSC$. While this is clearly an oversimplified example, it illustrates the self-interested decision-making process most people use. Some people take into consideration social costs when decision-making, however the quantity is clearly too low. Such is the case with most positive externalities.

There is clearly an inefficiency associated with this problem: when looking at the social benefit of rainforest preservation versus the benefit of its destruction, we realize that many wealthy people benefit from a healthy rainforest while, the poor locals benefit from the destruction.⁸ It follows then that there is a potential Pareto improvement to be had here, if the people who benefit from the preservation of rainforest compensated those who would otherwise destroy it, everyone could be made better off. This brings up many different issues regarding possible approaches to rainforest preservation and enforcement.

Clearly there are many different approaches to this issue that require an incredibly in-depth examination in order to fully grasp their different strengths and weaknesses. I began this discussion of rainforest conservation with the example of www.natureproducts.net and now analyze its effectiveness. For the purpose of this discussion I will take a cursory look at this non-government organization in order to raise problems that can be generalized to all current rainforest preservation efforts.

www.Natureproducts.net is an internet outreach program of the Rain Forest Farming Foundation. Their mission is to preserve the rainforest by enabling locals to farm using sustainable practices rather than slash and burn techniques. In order to make sure the land is used

⁸ It is pertinent to the conversation to mention property rights, however I will do so in a cursory fashion as to not distract from my argument. Throughout this conversation I have assumed the property rights are that of the local farmers and these rights are properly enforced. Unfortunately other property rights systems differ enough such that they would require an investigation that is too in depth for this discussion. I merely note that cost benefit structures change with the property rights; however I presume a rational similar to the one I have provided can be useful in determining solutions under circumstances different than the ones I have assumed. If it is found that this argument is only sound when property rights were clearly defined, protected, and in the hands of private individuals, then this argument would be relevant in fewer situations, but no less valid where relevant.

in a sustainable manner, the RFFF is selling the land to philanthropists who will then allow local farmers use of the land to support themselves. This is an example of a non-government organization attempting to solve the problem. Unfortunately, no matter how well the program is implemented it can never reach the efficient quantity of rainforest destruction abatement. Even if an extremely large number of people participate in the program, there will always be people who value the rainforest but do not donate money for its preservation. Voluntary programs will never be able to reach the efficient quantity because of the problem of free riding.

The majority of utility derived from rainforests is in the form of a public good; it is not excludable. Thus, there will always be free riding in the effort to preserve it. While some good souls will pitch in money for conservation, the majority of people will think to themselves “I really like rainforest conservation, and I derive utility from it, but I like it even more when I don’t have to pay for it. So I will not pay for it and hope that everyone else does.” The only way to ensure the efficient amount of preservation is if everyone who receives utility from it helps pay for it.

The ideal way to finance rainforest preservation is to have people pay exactly the amount of utility they derive from it. How would one go about finding out that information? There will always be incentive to game the system when reporting utility in order to pay less or achieve a desired effect on the overall result, therefore finding individuals’ actual utility is impossible. Maybe some day there will be a truth serum that helps find people’s exact utility so we can then bill them for it, but for now we need to have some standardized system that approximates it then distributes the bill using some system that is found to be equitable. This raises the question of who should fund rainforest protection?

Environmental quality is a luxury good; the more wealth one has, the more willing he is to spend on environmental quality. We see this with cosmetic cleanliness within cities: the nice areas of town are much cleaner and aesthetically pleasing. Wealthier nations are also significantly more interested in environmental restrictions to ensure health safety and often restrict the use of substances that have been found to have harmful effects over long periods of time. Populations in developing nations are generally more concerned with meeting basic human needs than protecting themselves from the small possibility of contracting an illness that would manifest in the distant future. The same is true for protecting rare species and other environmental qualities. Simply put, the poor generally have a lower willingness to pay for environmental quality as a significantly higher portion of their income (when compared to the wealthy) goes to satisfying basic human needs. As income increases people tend to spend much more money on improving and maintaining environmental qualities, thus environmental quality is a luxury good.

The implication of this reasoning is that rainforest preservation should be primarily masterminded and funded by a coalition of wealthy nations. There would need to be a binding agreement that forced nations to fund rainforest protection based on the utility its citizens receive from the rainforest. It is necessary to notice that this solution would likely not provide the efficient amount of rainforest preservation, but it would almost definitely be a Pareto improvement or potential Pareto improvement. Needless to say, this solution would not be popular amongst the people asked to foot the bill. Many objections would be raised and the establishment of this type of finance scheme is highly unlikely. Unfortunately without a finance system similar to the one I outlined there will always be an inefficiently low quantity of forest preservation.

There will always be an incentive for nations to game the negotiation of protection efforts.⁹ It is inevitable that the efficient quantity of preservation will never be reached as long as this continues. However, wouldn't it be nice if the leaders of the world decided that rainforest destruction was a real problem that was important enough to put aside selfish desires¹⁰ and work together to achieve the efficient amount? After all, I established above that the current course of inaction is far more costly to us all than if everyone who cared made an honest effort. If such an effort was made, I believe a finance scheme similar to the one I have outlined would provide the most equitable and efficient outcome.

⁹ Nations claim to have a lower willingness to pay in order to freeload rainforest protection efforts in the same way that the individuals freeload.

¹⁰ Who am I kidding? That's never going to happen. The USA (and wealthy nations in general) would rather bully other nations into dealing with the problem. I believe this phenomena (and most of the problems I find with our government) is caused by rampant ignorance and selfishness among voters which tolerates and perpetuates a political process that exploits the general population rather than serve it. One of the basic assumptions of economics is that our decision-making process is based on preferences that relies on perfect information... and because of the aforementioned rampant we make some pretty poor choices. That and the whole free loading thing... Very depressing.

ⁱ http://natureproducts.net/RFFF/Rainforest,_own_one.html

ⁱⁱ <http://www.rain-tree.com/facts.htm>

ⁱⁱⁱ http://pharmacy.nova.edu/Amazon/Activities_2001/Week_3/Rainforest/rainforest.html

^{iv} <http://www.clubeco.org/rainforest.html#1>

^v <http://www.clubeco.org/rainforest.html#1>

^{vi} http://www.ran.org/info_center/factsheets/04b.html