

# **Timber!**

The Fall of the Environment, Biodiversity, and Indigenous Tribes  
at the Hands of Deforestation

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## **Preface**

The purpose of this report is to inform its readers of the dangers of deforestation to the environment and to societies of the world, as well as to outline certain actions being taken against deforestation and potential solutions to the issue.

Deforestation is the removal of a great number of trees from an area of forest or rainforest (though not necessarily the removal of all trees in that area). There are many causes of deforestation, some of which include logging, natural disasters, and urbanization (human activity being the main cause). There are also many effects of deforestation: the destruction of insect and animal habitats as well as human communities, issues with flooding and erosion, and a substantial contribution to global warming.

Deforestation causes harm to local environments in addition to the harm caused to the global environment. As well as putting plant and animal species at risk, it affects societies of the world, including the indigenous people. There are many different reasons for deforestation, some of which are logging, agriculture, and urban development. Brazil has cleared forest for cattle ranching, Thailand for agriculture, and Madagascar for logging, each among other reasons. Religion has also been known to play a part in deforestation, two examples being the influence of Abrahamic beliefs and those of Buddhists.

Deforestation in Canada has become much less prominent in recent years as the government has recognized the need for an increase in sustainability in the development of the forests.

There have been and still are many efforts to reduce the effects of deforestation, and one person involved in the spread of knowledge as a method of decreasing deforestation is Dr. David Suzuki with the David Suzuki Foundation. Other organizations involved in the efforts include the United Nations, WWF, the Rainforest Alliance, and the Wildlife Conservation Society.

A solution to deforestation will be difficult to find and likely not of a singular nature; some possibilities are a full ban on deforestation, a limit to the deforestation in every country, and policies of equal reforestation for all deforestation. However these potential solutions all have negative aspects which prevent them from being successful in bringing an end to the effects of deforestation.

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## Summary

This report was primarily researched through relevant internet articles accessed through the search engine Google. As well, books were borrowed from the library of Innisdale Secondary School, and information was gleaned from knowledgeable individuals. Mr. Wallin of Innisdale Secondary School was interviewed for his knowledge and opinions about the topic of deforestation, and Mr. Ruttan of the same school was consulted regarding certain information. Though not referred to so directly as to be listed as sources, magazines and databases were used in preliminary research of the report topic. Three of the most frequently used internet sources were provided by Natural Resources Canada, the United Nations and WWF.

## **Factual Material**

### **Background**

Humans have been participating in deforestation to some extent for thousands of years, through an activity as seemingly innocent as clearing land for agricultural use. Between the beginning of agriculture (estimated to be around 10 000 years ago) and the year 2005, at least one third of the earth's original total forested area had been lost, leaving slightly under 4 billion hectares (*United Nations Environment Programme, n.d.*). With the rise of technology came an increase in deforestation, due to the ability to clear-cut (remove every tree from an area).

Those contributing to deforestation thousands of years ago could not have understood its negative effects on the environment or plant and animal species, and even if they had seen the soil erosion and made a connection to the loss of trees, they would only have seen it on a small, local scale. Today it is known that deforestation affects everyone on the planet and is indeed a very global issue; deforestation has been named the leading cause of extinction of terrestrial plants and animals and has already contributed and continues to contribute greatly to global warming (Ganley, 2007).

Many people know about deforestation, but do not seem to realize what a serious problem it is; the issue contributes more to global emissions than the transportation sector each year (WWF, n.d.). Plants take carbon dioxide from the air, absorb the carbon and release oxygen into the environment. Carbon dioxide is an atmospheric gas which, when released into the atmosphere, contributes to the greenhouse effect; heat being reflected from the Earth into Space is trapped in the atmosphere by the greenhouse gases and therefore heats up the Earth's

surface. This is a very significant contributing factor to global warming. Forests act as carbon sinks in that they contain many plants which continually repeat the aforementioned process, eliminating carbon from the environment and producing oxygen. When deforestation occurs, not only does it eliminate the number of trees maintaining this cycle necessary for life, it also releases carbon and other greenhouse gases into the air: roughly two billion metric tons of carbon dioxide is released into the atmosphere by the burning of forests each year, and it is said that deforestation contributes roughly twenty percent of total greenhouse gas emissions (*Impact of Deforestation*, n.d.). It has been estimated that the carbon collectively stored in dead wood, forest biomass, litter and soil is about fifty percent greater than the amount of carbon in the atmosphere, with approximately 283 Gigatonnes stored in forest biomass alone (*United Nations Environment Programme*, n.d.). If the people of the world continue to contribute to global warming, the temperature of the earth's surface will continue to increase and eventually reach a point where human life is no longer sustainable. Countries and cities will also be flooded by the melting of the polar ice caps, and the earth will lose all of the fresh water stored in them as it mixes with the neighbouring sea water. These ice caps are estimated to contain about eighty percent of all fresh water on earth (Berenblit 2000).

Deforestation also has a strong effect on insect, animal, and plant species – about seventy percent of the land animals and plants on Earth inhabit forests, and when their habitats are destroyed, especially in large sections at a time, it becomes difficult for them to continue to function, live and grow (National Geographic, n.d.). When the animals lose their homes and their means of survival as suddenly as they do with deforestation, it is often impossible for them to adapt. This in turn affects the plant species, which rely on the animals to spread their

seeds, and to eat certain other plants in order to prevent them from overpopulating and depleting the surrounding soil of specific nutrients. Many of the plant species found in forests, especially the rainforests the earth is losing so much of, have been found to be of great use in medicines. In fact, more than 70 000 plant species are included in the practice of medicine, both modern and traditional (IUCN, n.d.). If the destruction of these plants continues, it will become difficult for humanity to discover all of their still-unknown properties, and thereby become difficult to advance the healing of the many different types of ailments faced in this day and age.

The fate of the indigenous people as caused by deforestation is also devastating. When these tribes are forced to move from one area because their lives can no longer be sustained there due to lack of flora and fauna, not only do they lose their home, but also their way of life. Many tribes have specific ties connected to the area they reside in, and when they are forced to leave that area, their culture is often lost, which can result in dissolution of the tribe altogether (*Loss of Indigenous Tribes*, n.d.). Another misfortune that accompanies the loss of the tribes is the loss of their knowledge; having lived amongst the plants and animals with no outside information, they have learned of the benefits and properties of all that surrounds them which could be of great assistance in medicinal knowledge.

The global environment is not the only one affected by deforestation; the activity causes many effects more local to the area in which trees are being removed. Three examples of this are rapid soil erosion, lowered water tables, and flooding. The trees anchor soil to their roots, so when those roots are gone, rainfall effortlessly washes away the nutrients with the soil,

resulting in soil erosion. Another detriment to soil caused by deforestation is a lack of moisture; with no canopy to protect the soil from the sun, it becomes very dry and eventually infertile. A second contribution made by the tree roots to the local environment is the absorption of water. This water is released by the trees as vapour into the atmosphere, and without this process the immediate environment becomes dry and the water tables become lower. Flooding occurs in areas in which trees have been removed because the forests previously there were able to absorb large quantities of water and heavy winds quickly in the event of storm, so with those trees gone, the barren ground is left to deal with harsh weather (Ronca, n.d.).

There have been countless efforts to offset the effects of deforestation by planting new trees, some in previously unforested areas and some where the original trees were lost for logging purposes or other causes of deforestation. There are many reasons this does not work perfectly, one being the lack of biodiversity. Often when trees are replanted, they are not planted in as diverse a way as may have existed before the deforestation. This especially tends to occur in urban areas, where only certain species of trees can survive and the issue of cost is often held as a higher priority than the health of the environment. This is a concern however, because the planet needs biodiversity to continue to sustain the human way of life and the environment; everything in the environment works as a cycle, each thing depending on another, and if certain elements of that cycle continue to be eliminated, surely the desirable balance will be lost. Furthermore, the concern with planting new trees where the old ones used to exist is that, because of the soil degradation and the loss of plants and animals that would help these new trees develop, previously forested environments have become unable to sustain much of the new growth.

A specific effort toward new plant growth is the Plant for the Planet: Billion Tree Campaign. This is a worldwide tree planting initiative hosted by the United Nations Environment Programme. Individuals and businesses who pledge to plant trees are encouraged to plant species appropriate to the local environment so as not to plant trees that are unable to survive. In 2010 the campaign made an effort to educate people about the importance of biodiversity and its effects on health, drinkable water, and fertile soils, to name a few. The current goal of the project is to have thirteen billion trees planted through pledges of the campaign. With 11.1 billion having already been planted and an additional 1.4 billion pledged, this particular goal appears to be quite realistic (United Nations, n.d.). This is evidently a very noble effort at counteracting the effects of deforestation on the environment, facilitated by a well-respected organization.

### Expert

Canadian-born Dr. David Suzuki is an environmentalist and a genetic scientist. Equipped with an Honours BA in Biology from Amherst College and a University of Chicago Ph.D. in Zoology, Dr. Suzuki is known for many things, including his television shows, radio shows, and over forty books written for children and adults. These all help to educate people about the intricacies of natural sciences in a way that can be easily comprehended. He is a Companion of the Order of Canada (which has been recognized as Canada's highest honour) and has been elected to the Royal Society of Canada. A highly intelligent man, David Suzuki has not only received many awards for academic excellence, but has also received twenty-five honorary

degrees from various schools throughout Canada, the United States and Australia (*David Suzuki, n.d.*).

Some of Dr. Suzuki's awards include the E.W.R. Steacie Memorial Fellowship (received for outstanding Canadian research scientist under thirty-five, which he maintained for three years), four Gemini Awards for best host of different television series in Canada, an award from the United Nations for his television series *A Planet for the Taking*, and several others. Among the most honourable include UNESCO's Kalinga Prize for Science, UNEPs Global 500, the United Nations Environment Programme Medal, and the Right Livelihood Award, which is often considered 'the alternate Nobel' (*David Suzuki, n.d.*).

In 1990, Dr. Suzuki and his wife, Dr. Tara Cullis, founded the David Suzuki Foundation (DSF), an organization dedicated to the preservation of the environment, largely through education, encouragement and involvement. In 2008, when the organization decided to narrow its focus, three of the five main areas it chose to centre on were: reconnecting with nature, protecting natural systems, and protecting earth's climate (*The Right Livelihood Award, n.d.*). These goals, worked toward through education, government work, and efforts with businesses and individuals, all directly relate to deforestation. This is a fortunate fact for this cause, as there are few organizations more well-respected and well-known than the David Suzuki Foundation.

Concerned more with sustainable development in the forest rather than the impractical idea some have of halting all actions involved in deforestation altogether, Dr. Suzuki attempts to decrease the effects in minor ways, such as by encouraging recycling habits in children at a

young age, and planting a tree in one's garden (seemingly for the purposes of both adding an absorber of carbon to the environment, as well as to promote beauty and enjoyment) (Hartley, 2009). Dr. Suzuki has used many of his broadcasts and books to reach children, as he feels they are more open to change than adults. He believes that influencing children is the best way to influence their parents, as they repeat what they learn and express their concerns about the future at home (Ruth Bradley-St-Cyr, 1995).

Dr. David Suzuki's main contributions to the issue of deforestation are evident in his persistence in reaching and encouraging people regarding this and other environmental issues. His word is trusted and respected in the worldwide community, and he uses it to put an end to unsustainable development and to warn against the dangers of using science unwisely.

According to Dr. Suzuki, "Our choices at all levels—individual, community, corporate and government—affect nature. And they affect us" (*Environmental Quotes*, n.d.). This shows the emphasis he places on the belief that in order to make a difference, everyone must do their part. It is not enough for the governments to decide they will reduce deforestation; they must communicate their plans, and others must cooperate. Everyone must work together to solve a problem as large and prominent as deforestation.

## Role of Control

About eighty percent of the trees in the world are publicly owned, but that number is decreasing as private ownership becomes more common (*United Nations Environment Programme*, n.d.). To find the source of control in almost any current-day situation, one must follow the flow of money. Those with money often have control. This is the case with deforestation; control is usually held by the large corporations that can afford to purchase huge chunks of forest to cut down. However there is also a certain lack of control in the issue of deforestation. This lack of control results from both the effect of natural disasters such as forest fires on the forests of the world, as well as the impact of rapidly increasing global population. The former is in conflict with control because humans generally cannot directly control whether storms, floods or fires occur, and also have a difficult time stopping them when they arise deep in the forest or in coastal areas which are nearly impossible to reach. This means that they can often result in devastating amounts of damage to the forests. The latter issue involves a consequent increase in needs, due to the increase in people with these needs. A common mistake is in thinking that forests are cut down simply for luxury, to make couches and chairs and dining room tables. This is not the case. Of course there are luxury products that result from deforestation, but a lot of deforestation occurs to satisfy people's basic needs. Wood is used for shelter, meaning more is needed when there are more people requiring homes. Wood is also used for fuel, especially in rural areas which, up until recently, held over half of the world's population (*World Population Becomes More Urban Than Rural*, 2007). One of the most prominent issues linked between an increase in population and deforestation is the need for land. Especially in overcrowded African countries where not much land is available to them,

people feel the need to clear the forests for home and agricultural land use. This generally causes more harm than the logging industries do, as loggers have the capability to remove trees without completely clearing an area (i.e. selective cutting, strip cutting), leaving it with as little damage as possible (although they do create roads to manoeuvre the machinery, which involves more damage). The clearing of land for agricultural use in developing countries, on the other hand, usually involves burning the forests, leaving them barren of any and all previous plant and animal life, and clearing vast areas at a time. These are some examples of the fact that control over deforestation does not always exist.

The question of who ought to have control over the forests and rainforests of the world is a debatable one. A large number of people argue that the governments should have control, that they will make the decisions that are in the best interest of the environment, ecosystems, indigenous people, and the like. Though it would be nice if this were the case, it often is not. While governments would surely attempt to give the people what they want (if for nothing else than hope of re-election), in the end many governments hold the economy at a higher priority level than they do environmental issues that they do not see directly affecting their lives. Unfortunately, this is the way a great many people feel regarding deforestation. It is difficult for people to understand that their actions will cause terrible results in the future, and even more difficult for them to change their ways to preserve a future they do not feel they will be a part of.

Another group of people that some argue should have control over the forests is the indigenous people; they do, after all, inhabit the forest land directly and know as much as

anyone else about the other inhabitants of plants and animals. While they may not be aware of the future environmental effects of deforestation as they relate to climate control, they surely understand the soil degradation (as shown by their harvesting of different plants each year to prevent depletion of minerals in the soil), the cycle of plants and animals and their reliance on each other, and of course the people's reliance upon the ecosystems around them.

A third party many feel should hold control over the decisions made regarding deforestation are educated environmentalist groups. These people would be able to make informed decisions with the intent of maintaining a healthy environment on all levels, without being unduly influenced by money or economic details. Ideally they would also understand the methods of retrieving trees that would cause the least harm to forests. These groups would possess the knowledge to allow logging and such activities to continue sustainably, creating a compromise between the environment and the economy, and keeping those interested in each relatively satisfied.

Currently the people who show the most concern about the state of the forests (aside from the indigenous people) are environmentalists, looking out for present ecosystems and future climatic conditions. These people wish to preserve the forests and sustain the environment for as long as possible. To make a difference, everyone on Earth should be concerned about the deforestation that occurs. Plants are becoming extinct and with them the loss of potential future medicines; in the short-sighted quest to improve the economy, the knowledge of these medicinal properties will be lost forever. If global warming continues, no one will be able to escape the dangerous climatic conditions. Money in the future will be of no

use in reversing the effects of present deforestation, so everyone should have a vested interest in who is making the decisions that will affect the future, and every single person who comes to live in it.

### Religion/Spirituality

Religion is connected to deforestation in many ways, one being the previously mentioned tie between the cultures and spiritualities of the indigenous people and their relationship with the forest. When the indigenous people are forced to move from their homes due to deforestation, not only do they lose the use of their knowledge of the plants and animals local to the area they were in, but they also lose their culture, and, therein, their religious and/or spiritual beliefs. Perhaps if this fact was considered by those contributing to deforestation, some of whom may belong to a religion themselves, they would be able to make a more personal connection.

Another connection between deforestation and religion is displayed through Abrahamic beliefs which teach Christian, Jewish and Muslim people that they have dominion over land, and therefore that they may do with it what they please. The result is often a contribution to deforestation (Ruttan, 2011).

An example of spirituality having an effect on preventing deforestation occurred in Thailand, in the form of a “forest consecration” around 2009. Those of Buddhist beliefs think everything to have a soul, including the trees. Orange cloths were tied around trees,

representing the robes of Buddhist monks. These trees were then deemed holy in a country that predominantly worships Buddha, and therefore not cut down. During the ceremony, a temple abbot said "in preserving the forest we also preserve oneself and all creation" (*Thailand: Buddhists, Catholics Join Forces to Fight Deforestation*, 2009). This shows how the views of a spirituality or religion can, when exercised in an appropriate cultural area, have a huge impact on an issue and in inspiring change.

### Case Studies

#### Thailand

Because much of the rainforest in Thailand is primary forest (undisturbed by human activity), the country holds great amounts of biodiversity, as well as storing large quantities of carbon (traits known to primary forest especially). These qualities make the forests of Thailand very important to the world, as are the forests in all countries, and therefore make the deforestation in Thailand detrimental to the global environment (*Thailand Forest Information and Data*, n.d.).

Prior to 1945, sixty-one percent of the land in Thailand was covered by forest. Within thirty years that number was cut nearly in half, to thirty-four percent. The numbers continued to drop as an average of 3.1 percent of the forest remaining each year was removed for eleven years following the initial twenty-seven percent decrease (*Deforestation by Region*, 2010).

A few years before the beginning of the twentieth century the Royal Forest Department was established by the Thai government for the purpose of managing the revenue of the teak forests in the north of the country. Within two years, the forests had all been claimed as government property, and it became illegal for any logging to occur without payment to the Royal Forest Department. A group was developed in 1956 known as The Forest Industry Organization, which gained government control of industrial use of the forests in Thailand. By 1962 the government had begun to designate forest conservation areas, but still, during the 1960s, deforestation in Thailand increased. However, the reason for deforestation had shifted from commercial use in the teak forests to agricultural use for export in the south. Logging concessions requiring the replanting of trees were put into place in the late 1960s, but the poor management of these concessions resulted in a limited degree of success (*Deforestation by Region, 2010*).

In 1976 Thailand underwent a military coup, leading to instability and disruption in the political sector. In an effort to repress the rebels who had fled to the forests for protection, the military cleared areas of forest, causing irreparable damage. Along with the military-induced damage came more commercial logging; with the government in such a fragile position of instability, logging was not closely monitored and an incredibly large amount of deforestation occurred illegally. It has been estimated that at one point somewhere between fifty and seventy-five percent of the timber exported from Thailand was illegally acquired (*Deforestation by Region, 2010*).

A main contributing factor to the deforestation in Thailand is overpopulation, especially in the north-eastern portion of the country; this area suffers from infertile soil and a population more dense than any other in Thailand. As the population increases the need for food does the same, and with the soil not fertile enough to be harvested for multiple seasons, more and more land has to be cleared to provide for the people. In an effort to encourage farmers to rotate their crops (successively produce different crops on the same plot of land to extend the harvest life of the soil and improve soil fertility), Thailand put controls on the price of rice. What was more effective than the price controls though were the roads built after the Second World War. These assisted with the transport of food, meaning that crops could be produced in the more fertile rural areas and brought into the urban centres. This resulted in longer periods of productivity for the land used, which meant that less forest had to be cleared. Farmers began to produce on a larger scale, which has added to efficiency (*Deforestation by Region*, 2010).

In the 1980s the Thai government implemented tree planting programs in an effort to increase the forest cover of the country to forty percent of the land. Furthering this initiative was a ban on all commercial logging as of 1989, enacted in response to a damaging flood in the south of Thailand the year before (*Deforestation by Region*, 2010).

This ban was quite controversial. It did manage to eliminate a great amount of deforestation in Thailand, which was seen by many as a success. However, with a rising furniture industry that relied on wood, Thailand began to import wood from other countries, mainly Cambodia and Myanmar. Unfortunately these countries were already struggling with severe over-deforestation themselves, and it all begged the question of whether decreasing

deforestation in one country was really better for the world, when it led to an increase of the activity in another. A second source of controversy was the idea of planting eucalyptus trees (not indigenous to Thailand) in the reforestation efforts, as their use for pulp and paper would make them economically profitable. This was controversial because it resulted in much of the land being redistributed to large corporations, as well as changes in the traditional techniques involved in land management and the upheaval of many farm families, who were forced to move elsewhere to find new land. Essentially, the “little man” was being replaced by larger businesses. The planting of eucalyptus trees for pulp also raised environmental concerns, including a loss of biodiversity and degradation of water and soil conditions. A third point of controversy stems from the Buddhist beliefs so common in Thailand: the ideology that everything has a spirit. It is difficult for Buddhists to see trees cut down in such expansive numbers, so when there are plans for reforestation with the purpose of cutting the new trees down, the government does not always have the support of the religious Thai people (*TED Case Studies*, n.d.).

A consequence of the ban on logging that not many foresaw was the intrusion of elephants into urban areas. Significant members of the Thai culture, elephants were used to a great extent in the lumber industry previous to the logging ban. When the ban was put into place, these animals lost their jobs along with the care that was provided to them. Many of them have relocated from the forests to the villages of Thailand, but find minimal salvation there. They are forced to compete with villagers for the nominal food supply in town, and in the wild they face a difficult search for nutrition in a time of reforestation efforts, during which non-indigenous plants are being grown for the purpose of profit rather than food. Toward the

end of the twentieth century, the number of elephants in Thailand had decreased severely, from about 41 000 thirty years before (11 000 domestic, 30 000 wild), to a number between 5 000 and 6 000 (3 000 to 4 000 domestic, 2 000 wild). The elephants that remain have, within the past twenty years, begun to follow trainers into the big cities of Thailand, such as the capital Bangkok, to put on shows, especially street-corner shows. This has been deemed unsafe by animal rights groups, who say that the noise, heat, and pollution of the city do not provide a healthy environment for elephants. A law was passed in 1995 prohibiting elephants from entering the city of Bangkok, but with unrealistic forms of management (elephants found in the city were to be fined and asked to leave, but should they disobey, it would not be an easy feat financially or spatially to remove or detain them), the law had minimal effect on the city (Friedman, 1997). The difficulties faced by the elephants parallel the issues faced by the people of Thailand; they are constantly searching for new land to provide food, either for consumption or for sale to generate money for survival, and overcrowding in certain areas is leading to health concerns for humans and animals alike. Deforestation is a very complex issue with no simple solution, and Thailand has been struggling with the problem for decades.

Fortunately, the situation in Thailand appears to be looking up. Their economy has been climbing in the twenty-first century, largely due to their success in changing their exports from lumber and wood-based furniture to automotive parts and natural metals such as tin and tungsten. Deforestation rates have maintained fairly low levels in the process; in the twenty years between 1990 and 2010, merely three percent of the forest in Thailand was lost (an average of 0.15 percent each year) – a great improvement from the time of 3.1 percent being removed annually (*Thailand Forest Information and Data*, n.d.).

## Madagascar

As with most areas of the world, deforestation has been occurring to some extent in Madagascar for two thousand years, since the initial appearance of humans. Since that point, the country has lost an estimated ninety percent of its original forest cover (*Deforestation by Region*, 2010), though most of the deforestation has been attributed to the time after 1960, when Madagascar gained independence from France (*TalkTalk*, n.d.). Deforestation has degraded the soils, polluted the water and led to desertification, all affecting the natural environment that provides the necessities of life (*Deforestation by Region*, 2010). The damage to Madagascar is a global concern both because of the greenhouse gas emissions escaping into the atmosphere, caused by any and all deforestation, and also because of the large extent of biodiversity found exclusively in the country. Almost ninety percent of the species in Madagascar (and a few nearby islands) exist only in the area, including lemurs, which are quickly on their way to extinction. These flora and fauna have properties not yet discovered, and it is a great loss for all societies on Earth as these species cease to exist with continued deforestation (Draper, 2010).

There are many factors that have led to the deforestation in Madagascar, none of them uncommon; lumber, farming (especially coffee), mining, cattle ranching and the like. Much of the development began when Madagascar was colonized by the French in 1896, resulting from the arrival of settlers and the need for cleared land to live on and harvest. It was not until mid-way through the 1900s, however, that the major era of deforestation in Madagascar began. Within the thirty-five years between 1950 and 1985, half of the forest of Madagascar was lost,

with an end result of just thirty-four percent of the original forest remaining (*Deforestation in Madagascar*, 1996). Madagascar is a very poor country, whose citizens exploit the natural resources as a way to get by, prioritizing survival over conservation of one of the most diverse lands in the world and the rare species contained within it. It is difficult for a population as poor as that of Madagascar to think of the future and the damage their actions cause when they face such difficulties as they do on a day-to-day basis. In fact the Malagasy people (Madagascar's main ethnic group) have adopted a phrase which translates into "it is better to die tomorrow rather than today," showing their focus on the present (Draper, 2010). To make matters worse, the government of Madagascar is influenced by large logging corporations, as they need their investment, especially with the international debt they face (*Deforestation in Madagascar*, 1996). The deforestation in Madagascar has gotten out of control and today only ten percent of the original forest remains (Goldstein, 2009).

With one of the highest population growth rates in Africa at three percent per year, the deforestation in Madagascar is in part caused by overpopulation. This causes the clearing of land to make room for the growing numbers of people to live, as well as to grow the crops needed to support so many people. A major issue with the deforestation in Madagascar is that the Malagasy people use a slash-and-burn method for mass clearing, which is perhaps the most destructive as it releases an excessive amount of carbon into the air as the trees are burned, as well as clearing entire areas. This is in contrast to selective cutting, which leaves many trees uncut but is used mostly in the logging industry and not as a method to clear land (Draper, 2010).

In 2000, a ban was enacted in Madagascar prohibiting the export of rosewood, one of the most popularly logged woods of the country. Unfortunately this ban has been rather unsuccessful, largely due to an unstable government resulting in poor management of the forest. Another issue in the upkeep of this ban is its occasional lifting after cyclones have hit the coast. The government has decided that in this situation, since the trees have been damaged by the storm, they might as well allow their export temporarily, permitting only the trees affected by the cyclone to be removed. This provides loopholes for loggers. It has become fairly common practice for loggers to collect rosewood trees that are in good condition while the ban is in effect, and then export them during the time that the ban is lifted, bringing them great profit, as they have been collecting for much longer than the period of time allowed by the lifting of the ban (Draper, 2010).

Deforestation has been shown to be dangerous not only for the environment, but for the safety of the people involved as well; the hazards of falling trees aside, gang threats have become a concern, and have resulted in deaths over timber disputes. This is one of the great risks of such a large industry as the logging trade running outside of the law. People are forced to move from one area to the next quickly to avoid reaching the expiration dates of bribes paid to forest officials as incentives to ignore illegal actions for a certain period of time. This moving can lead to people or groups encroaching on the territories over which others have staked claim. Resulting gang issues have led to deaths and are causing societal stress and grief; many of the people logging illegally are doing so in order to survive, so when there are increasingly more dangers to the job, society feels the strain (Draper, 2010).

With the sudden increase in illegal logging in recent years, the prices of many necessities (such as fish and rice) have also increased. This is directly connected to the fact that there is more profit in the lumber industry, meaning that the people of Madagascar have been abandoning their work in the fishing or farming industries to work in the forest. Because there are less crops but the demand continues to rise (due to the continued rise in population), the prices increase. This is very difficult for the citizens of Madagascar, as they are already going to great lengths to afford food for survival; it is an extra tension for them to keep up with rising prices (Draper, 2010).

A culture with beliefs tied in ancestry, the Malagasy people were originally wary to cut down the trees. In fact, for centuries this is what protected the forest from being exploited to the extent that it has been more recently. It has been suggested that the introduction of the French culture that came with the colonists removed some of the anxiety, but still today when negative incidents involving loggers occur in the forest, the people believe that their ancestors have been angered due to their selfish actions. The forest was perceived as sacred land by the original tribes of Madagascar. These beliefs have been passed down to some extent to the people of the current generation, who know the superstitions even if they have disregarded the ancestral beliefs enough to break tradition. These cultural ties can be very difficult on the Malagasy people, who most often do not mean to exploit the land for economic purposes but merely as the only means of survival they see available to them (Draper, 2010).

Fortunately for Madagascar and the world, a man named Olivier Behra has been working with a self-created non-government organization known as *Man and the Environment*,

trying to improve the situation in Madagascar. Since 2000 he has been using his organization in an effort to decrease deforestation by giving the people of Madagascar a reason to stop destroying the forest. Given that their main reason for contributing to deforestation is to provide for their families (exempting the small few who control the vast majority of the logging corporations, looking for profit), he attempts to find new ways for them to earn the money they need that are less detrimental to the environment. One example is the organization's involvement in medicine; Behra has categorized numerous different species of plants that could be used for medicinal purposes with the intent to sell them overseas. The very successful French company Chanel became involved in the project after developing an interest in the extracts of certain plants for use in fragrances, and thereby took part in what became a halt of deforestation in the region of Vohimana by 2007. The villagers who formerly found necessity in destroying the forest now earn a living collecting leaves (Draper, 2010).

Another attempt at slowing deforestation lies in the Makira Forest, on the eastern half of Madagascar, which contains what little has been left after severe deforestation in the area – 350 000 hectares and decreasing. The leading cause of deforestation in the Makira has been and continues to be farming; the fertile land of Madagascar is used to produce coffee and other crops for export, so the people of the country are forced to clear forest to produce subsistence crops to feed their families. Unfortunately this soil is less fertile, especially after it has been cleared of trees, meaning that after a short period of farming on one plot of land, farmers are forced to clear a new plot. The Makira Forest Initiative has been making an effort in recent years to reduce the clearing of new land for farming by educating the citizens in the area as to more sustainable methods of production. Conservation International (CI), the Wildlife

Conservation Society (WCS), and the government of Madagascar have joined together to train the farmers in processes of production which will enable them to use the same plot of land for a much longer period of time than their current use allows, benefitting both the environment and the people (*Makira Forest Initiative*, n.d.).

### Brazil

Brazil is the country most known for its expansive deforestation, and for good reason; since 2005 Brazil has had the greatest area of annual deforestation in the world, and over 600 000 square kilometres of Amazon rainforest (a massive tropical rainforest travelling through eight South American countries) has been destroyed since the year 1970. Even recently, within the first six years of the twenty-first century, Brazil lost an area of forest larger than the size of Greece, with a reduction of about 150 000 square kilometres. The rate of deforestation has decreased within the last decade but the Amazon rainforest will still be forty percent less of its original size by the year 2030 if the current rate is sustained (*Deforestation by Region*, 2010). Known as “Earth’s lungs” for the incredible amounts of oxygen produced in the rainforests of Brazil, the continued loss of the forest is not only a loss for Brazil, but a loss for everyone on the planet.

The beginning of deforestation’s climb to a major issue in Brazil began in the 1940s, when the Brazilian President Getúlio Vargas began efforts to exploit the Amazon Rainforest to draw attention to Brazil as a country with economic potential. He began various government programs to assist with this idea, including the Superintendency for the Economic Valorization of Amazonia (SPVEA), the Superintendency for the Development of Amazonia (SUDAM), and

the National Institute for Colonization and Agrarian Reform (INCRA), all between 1953 and 1971. During this time, largely in the 1960s, Brazilian deforestation became more prevalent; much of the rainforest was cleared for use by cattle ranching in a time of high world beef prices, not only to eliminate hunger but also to repay international debt. Prior to the 1960s, deforestation was not a large concern due to the degree of difficulty faced by the lack of access to the Amazon. However, the colonists began venturing in to set up farms during the 1960s using a slash-and-burn method of deforestation, cutting and setting fire to the forest. The fertility of the Amazonian soil previous to human disturbance was already quite poor, so when the colonists burned the trees, the soil became nearly impossible to cultivate due to the further loss of nutrients. Because the soil was only productive for a very short amount of time, farmers constantly had to clear more land for each new, short agricultural season. The colonists eventually learned that the soil was not conducive to farming crops but was able to produce grass, so many turned to cattle farming, which required little effort and provided good profits. This caused widespread deforestation, severely damaging the environment. Adding to the extent of deforestation in Brazil was a law passed in 1964 on the premise that if a person could successfully cultivate a piece of land for a year and a day, they could claim ownership. This led to mass areas of forest being cleared for cattle farming by people looking for essentially free land (*Deforestation by Region*, 2010).

In the 1970s large areas of forest were removed for more commercial projects, including the Trans Amazonian Highway. The clearing of forest for cattle ranching increased during this time, when INCRA used the Highway to attract great numbers westward into the Amazon rainforest to exploit that land. In the 1960s and 1970s the government contributed to

deforestation by offering financial backing to those reforming the natural forest into farmland, and in the 1970s and 1980s, improved transportation and high beef prices sustained the desire to develop the former forest-land. Eventually Brazil also exploited the forest for timber in an effort to rid themselves of their international debts. By the time of the late 1980s, Brazil was exploiting forests to the extent that an area the size of England, Wales and Scotland combined was removed annually (*Deforestation by Region, 2010*).

The rate of deforestation in Brazil continued to increase, much of it largely due to cattle ranching; ninety-one percent of the land transformed from forest in Brazil since 1970 is used for livestock pasture. The amount of processed meat imported to Europe from Brazil increased from forty percent to seventy-four percent between 1990 and 2001. The first two highways through the forest, the Rodovia Belém-Brasília and the Cuiaba-Porto Velho, have been main contributors to the deforestation of the Brazilian Amazon; within twenty years of the former being built, it had attracted almost two million settlers. This, coupled with the construction and the population consequences of the second highway, has had severely negative effects on deforestation. It has been said that when the highway was built, it was eight times more likely for areas affected by the road to be deforested than it was for lands not touched. Up until recently, the Brazilian government was still encouraging the exploitation of the forests; between 1995 and 1998 it granted land to about 150 000 families in the Amazon (*Deforestation by Region, 2010*).

Mining and hydroelectric dams have also contributed to the deforestation in Brazil; forest is often cleared to open mines, especially since the 1980s, and hydroelectric dams have

caused major flooding of the rainforest (for example, the Balbina dam, which was responsible for the flooding of about 2 400 square kilometres) (*Deforestation by Region*, 2010).

After the United States, Brazil is the second-largest soybean producer in the world. Increasing soybean prices have led to soy farmers moving north into forested areas of the Amazon in search of land to clear for increased production of the crop. Because soy comprises a main industry of Brazil's exportations, the requirements of soy farmers have provided a reason for deforestation, not only for the change of the forest into farmland, but also for the continuation of transportation projects for the farmers' convenience. This is likely to be a continuing contributor to deforestation in the Amazon, as many farms and companies (such as McDonald's) use soy products to feed their livestock, and these companies are not likely to decrease their product quantities in the near future (*Deforestation by Region*, 2010).

It is not surprising that the people of Brazil are so willing to exploit their forests, given that the majority of Brazilians are of Roman Catholic background. Being of an Abrahamic religion, the Catholics have the belief instilled in them that people have dominion over land. Whereas other religions encourage a symbiotic relationship between humans and the land, taking only what they need and giving back to the earth in return, those of Abrahamic religions believe that the land is there for humans to do with it what they like. This results in deforestation for economic purposes, land use, food development, and all of the many other reasons the Brazilian Amazon is being deforested (Ruttan, 2011).

Logging in Brazil generally does not involve clear-cutting, but rather selective cutting, as only certain species (for example mahogany) are valuable enough to harvest. However this is not necessarily more forest-friendly, as on average, five to ten trees are destroyed for every

tree harvested for economic purposes as a result of damage caused by transportation. In addition to this, when a large tree is felled, it damages many smaller trees below it (*Deforestation by Region*, 2010).

It has been estimated that the deforestation of the Brazilian Amazon is responsible for up to ten percent of the world's greenhouse gas emissions, based on the amount of these emissions that would have been absorbed by the trees formerly in the forest. This is not including the vast amounts of greenhouse gases released when the trees are cut down, and especially when they are removed using the slash-and-burn method common to clearing for agricultural use. In the short time span between July and October of 1987, approximately 50 000 square kilometres of rainforest was burned in just four states of Brazil. This released an incredible amount of greenhouse gases into the atmosphere, including forty-four million tons of carbon monoxide, over five hundred million tons of carbon, and millions of tons of nitrogen oxides and other poisonous substances. The deforestation in Brazil caused by burning has also led to health implications; at one point in 2005 many were hospitalized due to smoke inhalation, and airports were temporarily shut down (*Deforestation by Region*, 2010).

There are many millions of plant and animal species inhabiting the Amazon rainforest, both known and not yet classified. In fact it has been estimated that almost half of the world's species exist in the canopy of the Amazon alone. The extensive biodiversity of the rainforest in Brazil is very conducive to the different species of plants as well as animals, including large numbers of plants not yet discovered which may have the potential to cure diseases that affect the world. Not only does society lose the plants in an area that is deforested, the animals are also often lost; they lose their habitats and therefore many die. The animals that do survive

become members of a less populous species, creating a shallow gene pool, therefore losing the genetic variation necessary for adaptability. More are likely to die in the future with further climate change and deforestation. Many of the species in the Amazon rainforest can be found nowhere else in the world. These species are largely interdependent, and so when one species suffers a loss they all do in one way or another. Deforestation is also leaving its mark in the pollution of the rivers, affecting the plants and animals in and around the rivers as well as the food chains connected with these flora and fauna. As the Amazon contains the world's largest river basin, which is the source of twenty percent of all of the river water on Earth, it is especially important that the water remains as pure as possible (*Deforestation by Region*, 2010).

It is approximated that there are around two hundred tribes of Indigenous people living in the rainforest of Brazil today, with almost as many languages. These people embody sustainability, taking only what they need from their surrounding environment, knowing it well enough to take what is useful to them. They are practiced in the healing and nutritional benefits of the flora and fauna and coexist peacefully with them. The numbers of these people have been dwindling from their original prominence in the sixteenth century, and most especially in the past hundred years, due to extensive deforestation. Not only do the indigenous people lose their homes, but are also often physically threatened by intruders into their territory, especially by those clearing the forest illegally. In the past they were taken by mining developers as slaves to work in the mines after their land was stolen to create these mines. The indigenous people have developed sicknesses over time from contact with the foreign germs of the outside world brought in by those developing the forest. Many of these

tribes prefer to live in isolation, concentrating on daily tasks and providing for one another as a group. This means that the deeper into the forest developers travel, the deeper the indigenous people are displaced (*Celebrate Brazil*, n.d.). In 2007, a tribe of eighty-seven Metyktire natives were forced to flee their land and travel one hundred kilometres on foot until they reached a village of Kayapo natives, of which the Metyktire are a sub-group. While this connection helped to develop a bond, especially due to the use of similar languages, there was no personal relationship between the tribes, as the Metyktire previously had very little contact with the outside world (*World Rainforest Movement*, 2007). This is just one example of an indigenous tribe being thrust into a society in which they do not belong, nor do they care to join. The indigenous people are accustomed to their own nature-dependent ways, and it would require an incredible degree of adaptation for them to fit into any other society, especially in an urban area, where they are often faced with poverty with few ways to cope. Being surrounded by modern-day society, even if not in direct contact with it, many of the tribes are finding their children being pulled toward the 'Western society', resulting in the disappearance of their cultures. Not only do they lose these young people and the potential for contributions to the tribe, they also lose storage of information. The natives use the brain to record information such as which plants are poisonous to humans versus which ones have healing powers, and the fewer young brains there are, the fewer minds survive the elder tribe members. If the harm to the indigenous people continues, at some point the knowledge of the tribes will be buried with their elders. While it has been deemed unfair that developers have been able to decide the fate of the land of the indigenous, it is a difficult battle, as the natives do not believe in land ownership. Because they believe that the land and nature cannot belong to just one person or

tribe simply for the reason that they live there, it is claimed that they have no more legal right to the land than the developers do, and so they are removed, along with their cultural and ancestral heritage. This can be truly devastating to some tribes (*Celebrate Brazil*, n.d.).

It was around the end of the 1980s that the concern of deforestation in Brazil became a recognized world issue. The UN Framework Convention on Climate Change in 1992 held discussions on the issue, and began developing efforts to decrease greenhouse gas emissions from tropical forests worldwide. Since 2004, the annual rates of deforestation in the Brazilian Amazon have decreased from 27 423 square kilometres to about 7 000 square kilometres in 2009 (an almost seventy-five percent reduction). The Brazilian President has credited conservation areas and more efficient production of fuel (with aims to lean more toward biodiesel and ethanol than wood-based fuel). As part of the country's conservation efforts since 2004, more than 200 000 square kilometres of nature reserves, parks, and national forests have been designated in the Amazon and, should they be effective, are expected to prevent roughly one billion tons of carbon from being released into the atmosphere by 2015. Decreasing deforestation is quite an economical issue in Brazil, however; very large numbers of the people rely on deforestation to live, and it would be incredibly expensive for the government to provide funds to compensate for all those in need. Many international non-government organizations have gathered together with a goal to end deforestation in the Amazon by the year 2015. They have developed the "Agreement on Acknowledging the Value of the Forest and Ending Amazon Deforestation," which plans to combine market strategies with strong public policies to achieve the yearly deforestation reduction targets (*Deforestation by Region*, 2010). It remains to be seen how successful their efforts will be.

## International Organizations

### United Nations

Founded in 1945, after World War II, the United Nations (UN) is an international organization dedicated to preserving international security and peace. The 192 Member States of the UN work together to promote human rights, social progress, and better standards of living. The UN contributes to many world issues, not limiting itself to peace keeping. For example, it works to encourage sustainable development, it often provides disaster relief, and it assists with environment and refugees protection, to name a small few (*UN at a Glance*, n.d.).

The United Nations Environment Programme (UNEP) began to look into the need for an international convention to promote sustainable biodiversity in 1988. On December 29, 1993, the Convention on Biological Diversity came into effect (*History of the Convention*, n.d.). The three main objectives of the Convention are as follows:

1. The conservation of biological diversity
2. The sustainable use of the components of biological diversity
3. The fair and equitable sharing of the benefits arising out of the utilization of genetic resources (*About the Convention*, 2010).

In 2002 a goal was set to significantly reduce the rate of loss of biological diversity (caused largely by deforestation) of all countries involved. This 2010 Biodiversity Target was endorsed by the United Nations General Assembly and by the World Summit on Sustainable Development in 2005 (*About the 2010 Biodiversity Target*, 2007). These goals were not met by

most countries, and a significant amount of the blame falls on short-term thinking. The main political issue with slowing deforestation rates, or more specifically the rate of loss of biodiversity, is economics; many governments feel it simply costs too much to invest in the future of the environment. The trees cut down provide immediate, if short-term, economic value to countries and smaller regions, and large numbers feel that they need this economic contribution to society in order to maintain national stability. While biodiversity continues to decline despite the efforts of the Convention, the 2010 Biodiversity Target has been extended to become a 2020 goal, with the hope that countries will have realized that they each need to shoulder the costs and the efforts of such a large environmental movement (McDonald, 2010).

### WWF

WWF is an organization dedicated to bringing an end to the degradation of the natural global environment, working toward a future world which holds a better balance between humans and nature than the one currently projected. Its policies involve:

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- promoting the reduction of pollution and wasteful consumption (WWF, *WWF in Brief*).

Formerly recognized as the World Wildlife Fund or the World Wide Fund for Nature, the conservation organization is now formally known around the world as WWF. Born in 1961, the independent, non-government foundation, now consisting of over ninety offices, is officially

registered in Switzerland. Its offices are hosted by more than forty countries across the planet and its global network stretches to reach over one hundred countries (WWF, *WWF in Brief*).

WWF has created a goal in which there is zero net deforestation in the world by the year 2020. This goal is not to be mistaken for a goal of zero deforestation, as zero deforestation would imply no deforestation occurs anywhere, and would not likely be achieved in a manner that concedes with the often-encouraged sustainable development methods. A goal of zero net deforestation involves the necessary deforestation continuing, so long as “the net quantity, quality and carbon density of forests is maintained” (WWF, *Zero Net Deforestation*). WWF believes in reforestation, in planting new trees when old ones are removed, believing that if the number planted were equal to the number removed, there would be zero net deforestation with little effect on the environment. In areas that are deforested for land use or agriculture, however, it is not practical to plant new trees, so the plan allows for trees to be planted in other areas, given that they still contribute to the environment in the same way as the trees formerly inhabiting the land would have regarding carbon absorption.

With that point having been made, WWF recognizes the irreplaceable biodiversity of the forests previous to deforestation that cannot be replicated by reforestation. This has led WWF to encourage that as much of the existing natural forest be conserved as possible (WWF, *Zero Net Deforestation*). Another factor that contributed to the desire for conservation rather than relying entirely on reforestation lies in the fact that when trees are cut or burned, they release greenhouse gases into the atmosphere. While reforestation is beneficial in that it provides new carbon sinks formerly provided by the original forests, it does not erase the fact that additional

carbon has been released due to deforestation. WWF has been very involved in efforts not only to increase the area of protected forest, but also in ensuring that the already-protected lands are properly cared for, as so many often fall under poor management (WWF, *WWF Work on Parks and Protected Areas*).

In addition to the need for conservation, WWF sees a need for the zero net deforestation goal to involve specific targets for reduction in greenhouse gas emissions. It feels that countries should be aiming to diminish 'gross forest-based greenhouse gas emissions' by seventy-five percent by the year 2020. This is meant as a stepping-stone to a 2030 goal of almost complete eradication of forest emissions directly caused by humans (WWF, *Zero Net Deforestation*).

REDD (Reducing Emissions from Deforestation and Forest Degradation) is WWF's forest carbon initiative. The name is self-explanatory and expresses the organization's beliefs in lessening the effects of deforestation and forest degradation. WWF aims for REDD to be incorporated in the post-2012 UN climate agreement. It has already been included in the Cancun, Mexico climate conference of 2010 (as 'REDD+', to allow for the idea of more broad conservation of ecosystems), with various countries forming a non-binding agreement and many volunteering financial assistance to those countries in need of it in order to meet their goals. The REDD+ program gives countries of high carbon output the chance to pay for the protection of forests in developing countries and to count the decreases in carbon output of those forests in their own overall carbon output count. This is an effective idea; a main reason most countries have difficulties reducing deforestation is that the activity provides a substantial

pillar to their economies. This program allows those countries to use the money earned from deforestation to help prevent over-deforestation in other areas, thereby connecting the necessity of economy with the necessity of environment, and affording the ability for an economy-prioritizing country to do its part in preserving the environment. However, the REDD+ program, like all environmental programs, has its share of critics. Many fear that the payment for the protection of trees in a foreign country will lead to claims of ownership by those countries funding the protection. While Bolivia was the only country to fight the idea of REDD+ (due to the market value it places on trees), many others are arguing the idea. Another main concern is the rights of the indigenous people inhabiting the forests; no laws have been put in place to prevent the countries that sponsor the protected areas of land from removing the indigenous from their homes. REDD+ does have safeguards in place protecting many rights, and the people of the forest are supposed to be protected within those safeguards, however it will be difficult to govern these rules. In addition to the aforementioned concerns, there has been no long-term financial plan for the REDD+ program, which has led to a slowing of its progress (Estey, 2010).

### Rainforest Alliance

The Rainforest Alliance “works to conserve biodiversity and ensure sustainable livelihoods by transforming land-use practices, business practices and consumer behaviour” (Rainforest Alliance, n.d.). The Alliance realizes the economic difficulty often associated with these changes and therefore aims to reach its goals by making the changes economically feasible for those involved. The Alliance’s two main methods of going about this are to educate

the people and businesses contributing to deforestation (and other unsustainable practices) about the benefits of sustainable development to both the local and global environments, and to attract consumers to purchase the products of those who practice sustainability. The first method involves teaching foresters more sustainable processes for their work. The second method is achieved through certification; when a forest area has met the Alliance's strict sustainability standards, it is certified and its products are marked with either the Rainforest Alliance Certified™ seal or the Rainforest Alliance Verified™ mark. These markings tell consumers that the product they are purchasing was created with the environment held as a priority, in conditions safer than most for both the atmosphere and the employees. With the number of people concerned about the future of the environment increasing greatly in recent years, the Rainforest Alliance not only helps consumers to purchase goods that will be more morally satisfying to them, but also helps the businesses that make an effort to make a difference, by drawing the attention of an increasing number of consumers (Rainforest Alliance, n.d.).

Certification by the Rainforest Alliance has been very effective, in many cases more effective than government conservation efforts; in one example, in the Maya Biosphere Reserve, the deforestation rate of the areas protected by the government is twenty times that of certified areas. The Rainforest Alliance has now certified 63.6 million hectares of forest worldwide through the standards of the Forest Stewardship Council (an international non-government organization with similar goals to those of the Rainforest Alliance, dedicated to utilising certification in an effort to encourage more sustainable development methods and preserve the forests of the world). On average every year consumers spend over 12 billion

dollars on products certified by the Rainforest Alliance. With numerous companies making commitments to use only Rainforest Alliance Certified products in their own products within the near future (Mars, Inc. has committed to using only certified cocoa beans, and Unilever has committed to using only certified tea in Lipton tea bags, which make up twelve percent of the world's tea), certified goods are becoming quite a trend (Rainforest Alliance, n.d.). Hopefully the influence of such large companies' involvement will put a pressure on other businesses which will lead to certified goods becoming the norm. The more common certification becomes, the more common sustainable practices become, and the better the future of the environment.

#### Wildlife Conservation Society

The Wildlife Conservation Society (WCS) is a non-government organization founded in 1895 which works to protect wildlife and wild places throughout the world. The organization is involved in more than sixty countries, currently managing about five hundred conservation projects. Owning over 200 million acres of conservation land around the planet, WCS has made a commitment to protect twenty-five percent of Earth's biodiversity, thereby protecting forests from being over-exploited (Wildlife Conservation Society, n.d.).

The WCS uses knowledge and awareness through education in its efforts to decrease resource depletion, which has been occurring in the forests of the world for centuries. A major area of effectiveness consists of five institutions in New York City run by WCS. These institutions, visited by four million people annually, teach visitors (many of whom are school children) the importance of conservation of the environment (Wildlife Conservation Society,

n.d.). The organization realizes the importance of people's awareness about deforestation and other resource management issues; up until recently forests were exploited all over the world without hesitation, as the environmental consequences were not known. In recent years the issue has become increasingly more recognized, with new efforts at reducing deforestation constantly being developed, and it is no coincidence that these results have come after the increase in knowledge about the issue. While most people are now aware, they often still do not know the extent to which deforestation is a global issue, and many continue to turn a blind eye. That is why institutions such as the five set up by the WCS are large steps towards more sustainable global development.

WCS is also working directly with industries such as logging industries of different areas, encouraging and teaching them to practice more sustainable methods of development. The organization is urging foresters to develop plans which are in accordance with conservation goals but are still economically and socially sustainable. They help developers to choose the best course of action and assist in the development of practice standards. On top of this, WCS works with governments to help develop monitoring systems and support regulatory efforts, to ensure that rules that are put in place are abided by (Wildlife Conservation Society, n.d.).

An example of WCS's conservation efforts is shown through their work in the Congo. For over twenty years they have been in the country, helping the government to create the Nouabalé-Ndoki national park and teaching logging industries to practice better sustainability. Their assistance with one particular timber company helped the Congolaise Industrielle des Bois (CIB) become the first Central African company to receive Forest Stewardship Council

certification, meaning that their products met international sustainability standards (Wildlife Conservation Society, n.d.). This shows how organizations can have a substantial effect throughout the world – the CIB is now decreasing the amount of forest degradation compared to the years previous to WCS intervention. The certification and practices of CIB will very likely influence other companies around them, leading to a spread in sustainability. The continued work of WCS will contribute to many different countries, hopefully with similar results.

## Conclusions

### Canada

The boreal forest (a mainly coniferous forest), which covers thirty-five percent of the country's land, makes Canada very susceptible to deforestation (Natural Resources Canada, 2009). In fact, about two thirds of the deforestation in Canada takes place in the boreal forest (Natural Resources Canada, 2008). Despite this vast resource, the country is known to import some forest products from other areas (mainly the United States and some tropical countries) (WWF, 2002). Canada is the only country that still has ninety-one percent of its original forest cover, with a current rate of deforestation that makes up only 0.4 percent of global deforestation, however the country has had a long journey to reach this point (Natural Resources Canada, 2008).

Throughout the 1800s, lumber was a major source of trade for the land that is now Canada, and brought an increasing amount of people to the area. With the increase in settlers and the increase in wood trade came an increase in development; forest was cleared not only for the export of wood, but also to provide land for the droves of people entering the area. As the colony developed, so did the need for wood. One of the major reasons for logging became provision for the British Navy; large oak and pine trunks were required for use as powerful masts and could be found in the forests of Canada. During Britain's war with France in the nineteenth century large amounts of wood were shipped from the then-colony to Britain, much of it for use by the Navy (Wynn, n.d.).

While many types of wood were exported and used locally, pine quickly became a very important species to the industry. Between 1810 and 1850, areas that were discovered to contain pine became almost completely depleted of the tree, loggers having exploited all they could. When railways were introduced to Canada, they made lumber trade easier as those involved no longer had to rely on the waterways to transport the products of their logging. This led to the exploration of new areas in search of pine (Wynn, n.d.).

During the 1820s, in most provinces of the colony systems were put into place to regulate the exploitation of the forests, which included logging licenses with revenue returning to the government. These regulations were fairly well upheld (Wynn, n.d.).

Eventually the east coast forests that had been subject to deforestation for so long became exhausted, and so the loggers moved westward, many of them to British Columbia. There, the machinery that became available around 1875 was more quickly adapted to than in the east, allowing for maximal production. Though deforestation in British Columbia did not become fully popular until around 1850, by the 1920s half of the timber in Canada was produced in that province alone (Wynn, n.d.).

Much of the original deforestation that occurred in Canada was due to logging, largely for export to Britain and other parts of Europe for use during war. In the 1950s diameter limits were put in place to monitor the logging of certain areas, and a method began which is still used today; trees are marked with paint indicating whether they may be cut down or whether they are to remain in the forest. This has proven a useful method, as the trees that are showing

signs of decline and are not expected to continue to contribute to the environment are cut down, while thriving trees remain (*Algonquin Forestry Authority, 2010*).

After these implementations discouraged some of the former methods of logging, and some of the loggers with them, many Canadians turned to the pulp-and-paper industry, which allowed them to exploit the forest in a slightly more environmentally safe way, as this industry could use trees that were already dying or damaged. However the pulp and paper industry is still a concern today, as it leads to mass amounts of trees being removed.

Non-logging forest use is becoming more popular, including the export and local use of herbs, berries and maple sap found naturally in the forest. The shift that has been occurring towards these less-intrusive methods of exploiting the forest is allowing Canadians to decrease the amount of deforestation that has been known in the past. Today there is an industry in Canada of almost five hundred non-timber forest products (NTFPs), providing extensive opportunities for citizens surrounded by forest to make use of their environment sustainably, rather than through deforestation. NTFPs can also often be integrated into cultural traditions, such as the aboriginal harvest of certain forest goods acting as a fundamental part of their lives. In a country which accepts and celebrates different cultures, including those of aboriginal people (many of whom live in communities surrounded by forest), these methods of forest use are becoming more and more popular (*Natural Resources Canada, 2010*).

Canada now acknowledges the extreme importance of practicing sustainable methods of development in forestry, and goes to great efforts to protect all aspects of the natural environment through forestry protection, such as keeping bodies of water clean and

maintaining vast degrees of biodiversity (Natural Resources Canada, 2010). One particular effort involves integrated landscape management, which means that multiple methods of environmental exploitation are organized so as to minimize the total damage. An example of this occurs in Alberta, where the forest is logged in areas that are to be cleared for extraction of gas and oil, meaning that rather than two areas being cleared, they are combined, reducing the deforestation by half. This planning also prevents areas of newly planted forest from being cleared for oil purposes, and on the west coast is used to encourage multiple industries to utilise the same roads, rather than each constructing their own through the forest (Natural Resources Canada, 2008).

While deforestation everywhere is a problem, Canada has been known to practice more sustainable methods in recent years. Proof of this fact is that in 2005 less than 0.02 percent of Canadian forests were affected by deforestation. To view deforestation in Canada from a more Global approach, merely 0.4 percent of global deforestation is attributed to Canada's actions. This is a fairly low number, considering that roughly ten percent of the forest cover in the world exists in Canada, with about 400 million hectares of forest and other woodland. However, it is 0.4 percent of a number far larger than it should be if the environment were to hold priority in people's minds (about thirteen million hectares of deforestation occurs annually world-wide, covering an area the size of New Brunswick and Nova Scotia combined) (Natural Resources Canada, 2008). One of the major contributions to the improvement in Canada's deforestation rates is the implementation of forest conservation areas and forest protection systems; about forty percent of the forest in Canada is protected through different methods such as integrated landscape management, and eight percent of Canadian forest is protected by legislation. By

2009 over a third of Canada's forests were certified as being sustainably managed (Natural Resources Canada, 2010). Deforestation in Canada has been decreasing for over thirty years, and the deforestation that does occur is being countered by the planting of trees in new areas, known as aforestation. In 2005, when approximately 56 000 hectares of forest was removed in Canada, roughly 9 400 hectares were planted, offsetting about seventeen percent of the original deforestation (Natural Resources Canada, 2008). As a country that does not place a heavy economic reliance on deforestation, as is often the case in developing countries, Canada is able to continue to implement movements to reduce deforestation and improve on the success already being experienced.

The Canadian government recognizes that to decrease the effects of deforestation in one country is not sufficient in the preservation of the global environment. This is why Canada is a participating country in several international forest initiatives, including the REDD+ Partnership, which Canada joined in May of 2010 (Environment Canada, 2010). Within that same month, it was announced that the country would be increasing its assistance for developing countries' efforts in major global environmental agreements by fifty percent, from 158.94 million dollars between 2005 and 2009, to 238.4 million dollars between 2010 and 2014 (Canadian International Development Agency, 2010). Canada is proving to be a leader in environmental preservation and is helping other countries contribute to efforts toward increased sustainability in the development of the world.

## Solutions

Deforestation is a very complex world issue, and as such there is no simple solution. It has proven very difficult to find a balance between preservation of the environment and development of the economy, these being the two main factors taken into consideration in efforts to solve the problem of deforestation. The following comprises a few examples of potential solutions, both national and international, their benefits, and the negative aspects associated with them.

### Full Ban

One option that has been entertained as a potential effort to solve the problem of deforestation is to create a full ban on all deforestation in the countries contributing the most to the issue. This would eliminate the majority of the negative effects of deforestation, while allowing countries that practice more sustainable development to provide wood products for the rest of the world. Not only would less carbon be released into the atmosphere, but more trees would be left standing to absorb the carbon that does make its way into the environment. However, it is unrealistic to believe that the entire world's forestry needs could be supplied without the use of the countries that contribute the most to deforestation. Another problem with this solution is that the majority of the countries in question are developing countries and need the land and economic gain harvested through deforestation to survive, especially with rising populations. In poor communities surrounded by forest, it would be nearly impossible to find satisfactory alternate employment for every person formerly employed through forestry. The dependence of these countries on deforestation would lead to increased crime rates as

people would continue to exploit the forests illegally and gangs would inevitably form (as in Madagascar), increasing the danger in the woods. Aside from these issues, a main reason this solution has not been attempted is the difficulty of enforcement; the United Nations is quite often involved with the formation and implementation of solutions to world issues, however it would be very difficult for the organization to monitor such a vast ban involving the forests, some of the most remote areas on the planet.

### Limit the Deforestation in Every Country

An option that would result in less economic downfall (such as unemployment, decrease in exports) and continue to provide a fair amount of forest product involves setting limits on each country's deforestation, for example by setting a maximum rate of deforestation, or by setting a percentage decrease in the current rate. This would allow forest development to occur to some extent even in developing countries, meaning less people would be without work, and those that are would have a better chance of finding new employment in an economy not completely overwhelmed with people searching for jobs. Many would argue that a change in career is a minimal sacrifice to be made for reducing the amount of forest destroyed and preserving the future of the environment. The rate of illegal deforestation would also likely be much less than in the instance of a complete ban on deforestation; with partial bans, forest products would still be legally produced, meaning the gap between supply and demand would not be quite as wide as it would be in a market where almost none were produced. A decrease in that gap would hopefully result in a decrease in illegal logging, as only so many logs would sell. However, illegal forestry would undoubtedly still occur as people neglected the

environmental needs being met by the partial ban in favour of economic growth and development.

To impose the partial ban onto the countries of the world and to bind them to it would be a very difficult task, as proven by past efforts to preserve the environment in which objectives have not been met due to a lack of severity in consequences (for example the United Nations 2010 Biodiversity Target, now the 2020 Biodiversity Target, which is barely more than an agreed-upon goal). There are penalties that could be levied as incentives for countries to meet their required decreases in deforestation, such as banning trade between certain countries or implementing fines that, should requirements not be met, would make a greater economic impact than that which would have been experienced had deforestation decreased by the required amount. These consequences could be very effective, as trade and economy are two major reasons countries participate in deforestation; if negative consequences were to be experienced whether or not a country chose to limit its deforestation, countries would likely be much more inclined to preserve the environment. However, there is no world government body which creates international rules – these rules must be voted upon in a forum such as the United Nations. The chances of the countries of the world choosing this method and these consequences as part of a solution to deforestation are very small. Many would feel it unfair to impose an economic burden upon developing countries with little control over economy or population and enforce the upholding of such a burden with threats of economic fines. It would also be difficult to find a country that would agree to cease trade with another country which would make a significant enough impact; the most effective method would be to cut off trade between a country which contributed to deforestation at a rate higher than its maximum rate,

and the country it most relies on to export forest products. The issue is that the country importing from the country surpassing its deforestation rate would not be likely to agree to cease trade between the two, as it is likely as reliant upon the country developing the forest, as that country is reliant upon it.

### Equal Reforestation Policies

A third option would be to implement policies which require that for all areas of forest damaged, afforestation (the planting of forest in areas not recently forested) or reforestation (the replanting of trees in deforested areas) make up for a certain percentage. This would likely be more easily accepted by societies than bans on deforestation, as it would allow forest development to continue, furthering the development of the economy as well as allowing room for growing populations (as trees could be planted in more convenient locations). It would also prevent the levels of carbon in the atmosphere from rising too sharply, as the newly planted trees would absorb some carbon in place of the trees removed from the forest through deforestation. However, replanting trees does not undo the fact that when the original trees are removed they release carbon dioxide. This means that even if the nations of the world would agree to this solution, these new trees would absorb the carbon formerly absorbed through the previous trees, but deforestation would continue to harm the environment. Also, the effect on the ecosystems in deforested areas can be irreparable; human disturbance displaces animals from their natural habitats, sending them to unfamiliar areas where they are forced to adapt, and many plants, especially those found in small quantities only in certain areas, can become endangered. If these areas are deforested, these plants can be lost forever

in the process despite the regeneration of a tree-based forest. Another issue with this potential solution is that certain trees that are being harvested, such as those of the old growth forests, have grown incredibly rich in environmental wealth, having developed in conditions not present in today's environment. These are very large trees which absorb great amounts of carbon and simply cannot be replaced by young saplings or transplanted trees which began development a mere five or ten years before being planted. Trees are a precious resource which cannot be mass-manufactured in the favourable conditions of the past, so while this plan would solve certain problems, it would not solve them all.

### Conclusion

Deforestation is a very complex issue with many effects and no one solution. It is a difficult task to preserve both the environment and the economy, made more difficult by the global scale on which solutions must exist and be agreed upon. Many countries are taking advantage of the environment and over-exploiting the natural resources that the entire world depends upon, and which are important to the preservation of the future environment. If the problem of deforestation is to be solved, the solution must be satisfying to people in all areas of the world, in order that every government will come to an agreement.

It is unlikely that one solution will ever be decided upon and implemented; with the ties in society and the economy, it would be devastating to much of the world for forestry practices to end abruptly. The growing population also prevents an end to deforestation, as more and more room is needed for living space. Solving deforestation will require gradual steps toward

sustainability. Countries of the world must not only commit to projects and programs aimed at reducing deforestation, but must also begin to follow through on these commitments, meeting objectives and doing their part to save the environment. After all, the future of the world is in the hands of today's generation.

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## Appendices

### Appendix A



**Map of Thailand.** [Online Image] Retrieved from <http://www.thepangaeproject.org/thailand.shtml>,

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Appendix C



Map of Brazil. [Online Image] Retrieved from

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[route?rclub=252&rurl=http://www.texas.aaa.com/en-tx/explore-travel/research-](http://www.texas.aaa.com/en-tx/explore-travel/research-)

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Appendix D

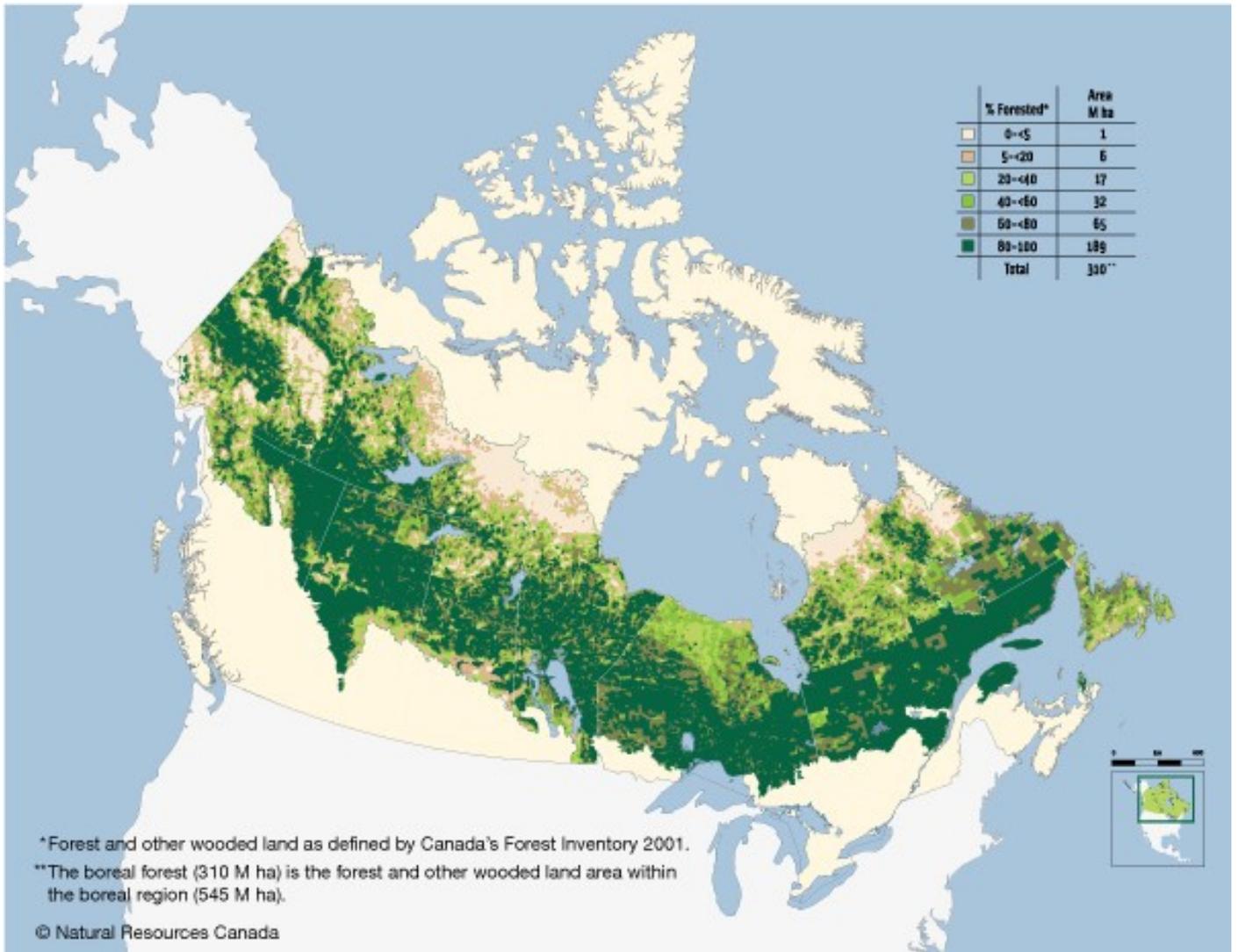


**Rainforest Alliance Certified Seal.** [Online Image] Retrieved from

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## Appendix E



**The Canadian Boreal Forest.** [Online Image] Retrieved from <http://www.hww.ca/hww2.asp?id=354>, 11 May 2011.

## Appendix F

### Interview

Mr. D. Wallin of Innisdale Secondary School  
Conducted by Jacklyn Tuckey

Mr. Wallin is a senior biology teacher at Innisdale Secondary School and as such is very knowledgeable on the subject of environmental matters such as deforestation.

JT: *The goals of the 2010 Biodiversity Target (of the United Nations' Convention on Biological Diversity) were not successfully met, and the target was extended to 2020. Given that the rate of biodiversity loss continues to increase, do you feel that this new goal could realistically be expected to be met?*

DW: I don't know what the target was, but if the target for biodiversity is anything like the targets that were set for [The] Kyoto [Protocol], then a lot of the targets that have been set are going to be based not just on CO<sub>2</sub> but how that CO<sub>2</sub> is going to affect economies, and so a lot of the countries that are going to be directly responsible for setting those particular.. For coming to those lines, those baselines, whatever they are... If it's going to hurt their economy in any perceptible way, they're going to just say no, and they're not going to do them. So the only thing that I have to sort of base my opinion on this is what's happening in Kyoto. And I think a lot of the biodiversity targets are sort of the same; in order to be able to maintain the grizzly bear populations, or wolverine populations, or polar bear populations, means that you have to set a certain amount of real estate aside for them to be able to do that. Easier to do in this country because

we're rich, but if I'm in a third world country like New Guinea or some of those other countries, when I set those large tracts of land aside so that I can meet my biodiversity targets, I can't feed my family. If I can't feed my family and I can't support my family, then I'm not going to be totally in favour of this and I'm going to thumb my nose at whatever those targets are. And so I believe in order to make those targets happen, we've got to be able to educate people in the importance of those targets, and we are also going to have to support those people that are going to be affected by this economically the most so that they will get on board as well. Unless you get everybody on board, there's no way that they can happen. That's what you're seeing right now with the carbon dioxide; you see a lot of countries saying "well, I'm not going to do those carbon dioxide emissions... I'm not going to make those targets simply because if I do that, my GDP is going to drop – if that drops, then all of a sudden I can't afford the social programs. If I can't afford the social programs then I'm not going to be a popular government. If I'm not a popular government, I can't be re-elected. And elections are power, and so unless these things are things that you can do to get yourself re-elected, there's no way it's going to happen.

JT: *Do you believe that afforestation and reforestation are adequate methods of environment preservation in a world that relies on deforestation for economic purposes?*

DW: When you're putting forest back in, basically what happens is you're putting one species normally back in. You're not putting in the biodiversity that was there in the first place. What you're doing there is basically creating large monocultures. Afforestation, if I

understand you correctly, means that you've got something that's in place that wasn't there before, so now you're also destroying biodiversity in that area because there's something else that was there that won't be there now. Why wasn't there forest there before? Was that question asked before you put another forest in? If it wasn't there before because of agriculture, that's way way different than if it wasn't there before because it was swamp land, and so if you're draining a swamp to put up a forest, that's not good practice, and so that's not something that you want to do. So it all depends on what historically was there first; what kind of program are you destroying, or what kind of an ecology, an ecosystem, are you destroying by creating a new one? Reforestation seems to be something that should be done in all those places, especially with clear-cutting, but you have to remember that there was a certain biodiversity of trees, and that diversity should be reforested as well so you're not creating monocultures. That's why a lot of areas that you'll see in places like Algonquin Park have different managing programs where they don't put a lot of trees back in, they count on the natural re-growth and the re-seeding from the trees you see around; you get a natural succession that way, rather than just always trying to move toward the climax forest all the time. And when you have a natural succession, you bring in better biodiversity and you bring in a more healthy ecosystem, and so depending on your forestry practices, you can actually do it without actually having to reforest. It's more expensive, much more expensive, but you can do it.

JT: *The REDD+ program has a lot of potential for reducing forest emissions, encouraging nations to sponsor protected forest areas in other countries, thereby using the*

*economies developed by deforestation to prevent excess deforestation elsewhere.*

*However, there are concerns that the program will result in ownership disputes, the removal of indigenous peoples from their land, and in the fact that no long-term economic plan has been developed. Do you see a future for this program as a major contributor to the reduction of deforestation and the greenhouse gas hazards associated with it?*

*\*Response followed a very brief explanation of the program\**

DW: I think the answer to this is very similar to the answer for your question number one based on biodiversity. If using the REDD program means that you're putting somebody else's lifestyle, somebody else's social network and social values at stake, we don't have the right to do that. If we're putting something in place which enables them to create a better way of living, I'm thinking for example maybe when we take down all of the banana plantations and put back into something that is more of a natural ecosystem that the people living in the area could actually make a living from the new, rather than from the old, then I think that's something that we should pursue. But I think that the people that live there, that's where your values should come from, and you should always consider their well-being first. If you can't do that, then I think the program is destined to fail, because you're going to have people who are angry, and people who are angry do nasty things.

JT: *It is known that much of the control over deforestation is held by large companies and corporations, showing a direct link between money and control. Who do you believe should have control over the forest?*

DW: Well in a perfect world, the people that have to live with the forest after it's been knocked down should have the control over that particular forest. The people that are going to live there after the forest is gone, they don't have the financial tools and capabilities of the large corporations, so it's a really tough question. Seems simple when you first look at it; obviously the natives in the area or obviously the people that live in that particular area should be able to control their own destiny, but they don't always have their best interests at heart, because... A lot of it depends on the education in the area, a lot of it depends on how long-sighted these people are; if they're sort of short-sighted, they can actually do more harm than the large corporations. The large corporations are in business of making money, but they're not in business of making money at the expense of the company, and so there are times when these large companies actually do a better job of keeping an area sustainable over a long period of time than the local people because they are basically pretty short-sighted. It's a tough question, you can't really answer that in terms of the way it's written, because we don't know what country you're dealing with... I know that in Canada if you look at how our country has developed, our country has been much much more government, it sort of has controlled how our country has been developed. If you look at the United States it was much more frontier justice type of development where you had the Wild West and all that kind of stuff. That stuff didn't happen in Canada because we had a strong central

government. That's not necessarily true if we compare those two countries. You're going to find a lot of different situations depending on which part of the world you're dealing with, so it's really difficult to answer that question from what you've got there.

JT: *Many sources state that deforestation in Canada has been decreasing greatly. Do you believe that Canada really is developing sustainably? Where do you think Canada stands when it comes to deforestation?*

DW: I think Canada is decreasing deforestation greatly because the easy stuff is all taken out. You're getting to more and more and more difficult and costly areas to be pulling lumber from, and so that's going to slow things down. The other thing that happens in Canada is that we're controlled a great deal by the markets that we send our wood to, and so if you're sending wood to, say, Europe, and they're boycotting our lumber because we are cutting in old-growth forest [*primary forest*], then the companies aren't stupid, they're not going to cut old-growth forest and cut their market; they're going to move back to areas that hopefully are mature enough now from places they've already cut to actually re-harvest those areas. It depends on which part of the country you're dealing with as well; there's lots of places in Ontario that have never been logged, and probably will never be logged simply because economically it's just not feasible to take the logs away from there. It's a tough question. I think that we have a much better handle on the control of our forests than what we did in the past. Depends a lot on the government that's in power.

JT: *It has been suggested that governments should limit the deforestation in their own countries to spark a change, as this would perhaps be more easily managed than an international program. A commercial logging ban was enacted in Thailand in 1989 with this goal in mind, but rather than decreasing deforestation in general, this ban simply shifted the activity to other countries; Thailand imported wood products from Cambodia and Myanmar, which were both also riddled with deforestation at the time. Do you believe that there is a way for governments to regulate deforestation without leading to such a situation?*

DW: Not presently. When you look at basically that situation that you talk about right there, if you have a market, somebody's going to take it. Unfortunately, we have the dollar that runs our economies, and the energy that we use to take those trees down and to move them from one market to another a lot of times just plain doesn't make sense. And the only way that it makes sense is that I get a larger dollar for the product that I'm moving into those particular areas, and so until somehow we control the markets, (and we can't control the sources)... And so when you're talking here about limiting deforestation, well we're deforesting to supply a market. We have to control the markets before you can control the deforestation. And that's basically what happened in Thailand; they still had the market for those particular wood types, and so yeah, 'not in my backyard anymore', but it's still a problem. And that's what's happening in a lot of places, it's the market that's driving the deforestation. It's not the actual cutting down of the trees as per se, you have to have some place to sell your logs. And that's why, when we were talking about if Canada's stopping it's deforestation in certain areas,

yeah, it is, but it's under pressure of the markets, it's not under pressure of some allotable goal of increasing biodiversity or anything else. It's strictly driven by market pressures.

JT: *Do you feel that environmental solutions should be held above preservation of the global economy, or do you agree with the idea of balancing the two in sustainable development?*

DW: Well you don't have environmental solutions unless you have strong economies, and you don't have a strong economy without doing some harm to your environments, so you've got to have some kind of a balance, and so basically I think that your environmental solution is going to come from controlling your markets. Controlling your markets is controlling your economies. It's basically the snake chasing its own tail, and so you've got a problem here in that you've got an economy that is going to start to stall if I put too many environmental solutions in place and so they're not going to do those types of things. Kyoto is a prime example. Do you feel that environmentals should be held above? Well yeah, everybody feels that way, and I don't care who you are, but I have to feed my family. And so as soon as I have to feed my family and I have to support my way of life... Everybody wants to be comfortable, everybody wants to have the cell phone, everybody wants to have the nice sweater, everybody wants to have the nice new car in the driveway, and unfortunately those things are values and things that you have to change in order to make the other things happen, and I'm not sure that we're there yet.

JT: *What do you see as being a realistic solution in the efforts to decrease deforestation?  
Which current efforts do you think are the most likely to make a difference?*

DW: Realistic solutions? If I had one, I'd be a rich man. I don't think anybody has the solutions. I don't think it's something that's going to come from just one particular person, it's going to be a think-tank of a lot of people. You're going to have a solution that might work in this particular area, and it's going to be very different than the solution that's going to be put forth from say British Columbia. We just have so many complex permeantations in the types of solutions that are possible that there's not going to be one single solution, it's sort of like if you're trying to... say, 'is there ever going to be a cure for cancer?' Well there's not just one form of cancer, there's a gazillion different ones. And so the cure for cancer doesn't look to be all that soon right now simply because there's so much work left to do. And I think the same thing holds true here. You have basically the same old thing; you look at one thing that you think you can make a difference with, you make that difference, and then hopefully everybody looks to try and find that one thing that will make a difference and then the ounce of prevention gives you the pound of cure. If everybody finds one thing that they think may be helpful in helping to reverse the present trends that we're on, then maybe we'll get to some place that will make a difference. It's a really really difficult question, it's not as easy as what it first appears. It's like trying to predict the weather; you think you have a pretty good handle on what's going to happen and then Mother Nature throws a whole new wrinkle at you. It's very very difficult, you have so many different political ideals that are in this world, you have so many different requirements of

societies, and so there won't be any one solution. It will be a whole bunch of different things that people do, and it could be a lot of small things and a couple of large things that occur. You see a couple of the large things, like you see Kyoto, you see your 2010 biodiversity targets, those are the big things. And so you'll have a couple of big things that will sort of help people to target which direction that they should be going, and then you'll see a whole lot of small things that will go and start to become more common, because people are starting to think about making those particular goals of Kyoto and the biodiversity targets and all those other treaties that are happening at the world level.