

# Climate change: A threat for Bangladesh

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CLIMATE change is the greatest environmental challenge facing the world today. Human induced changes in the global climate and associated sea level rise are widely accepted with policy makers and scientists. The Intergovernmental Panel on Climate Change (IPCC) concluded that "the balance of evidence suggests a discernible human influence on global climate". Rising global temperatures due to climate change will bring changes in weather patterns, rising sea levels and increased frequency and intensity of extreme weather events. Climate change poses significant risks for Bangladesh. The exact magnitude of the changes in the global climate is still uncertain and subject of worldwide scientific studies. It is broadly recognised that Bangladesh is very vulnerable to these changes. Indeed, it has internationally been argued that Bangladesh, as a country, may suffer the most severe impacts from climate change. A new report called Climate of Disaster, published this month in Bali by Tearfund shows that, based on past experience, Bangladesh is going to continue to be one of the worst-hit places on the planet.

climate change in Bangladesh will take form in floods, salinity intrusion and droughts, all of which will drastically affect crop productivity and food security. We will also face riverbank erosion, sea water level rise and lack of fresh water in the coastal zones. The prognosis is more extreme floods in a country already devastated by floods; less food for our country in which half our children already don't have enough to eat; and less clean water for where waterborne diseases are already responsible for 24 percent of all deaths. Bangladesh is one of the world's largest deltas, formed by a dense network of 230 unstable rivers; most of the country is less than 10 meters above sea level. Were the Earth to warm by just one degree Celsius, 11 percent of Bangladesh would be submerged, putting the lives of 55 million people in danger. Most scientists -- including the UK government's David King -- expect a two-degree increase. It is almost impossible to imagine how Bangladesh will cope with this situation.

Climate refers to the average weather experienced over a long period. This includes temperature, wind and rainfall patterns. The climate of the Earth is not static, and has changed many times in response to a variety of natural causes. Climate change represents

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a change in the long-term weather patterns. When scientists talk about the issue of climate change, their concern is about global warming caused by human activities. Global warming refers to an average increase in the Earth's temperature, which in turn causes changes in climate. A warmer Earth may lead to changes in rainfall patterns, a rise in sea level, and a wide range of impacts on plants, wildlife, and humans.

The main human influence on global climate is emission of the key greenhouse gases -- carbon dioxide (CO<sub>2</sub>), methane and nitrous oxide. The accumulation of these gases in the atmosphere strengthens the greenhouse effect. At present, just over 7 billion tonnes of CO<sub>2</sub> is emitted globally each year through fossil fuel use, and an additional 1.6 billion tonnes are emitted by land use change, largely by deforestation. Due to greenhouse impact global temperature is increasing with increased amount of CO<sub>2</sub> in the atmosphere. The Earth's average surface tem-

perature has risen by 0.76°C since 1850. Over the last 16,000 years, the rate of increase in global temperatures has been about 1°C for every 4,000 years -- and yet, some predictions now suggest that we may see another 1° increase over the next one hundred years. In its Fourth Assessment Report (AR4), published on 2 February 2007, the Intergovernmental Panel on Climate Change (IPCC) projects that, without further action to reduce greenhouse gas emissions, the global average surface temperature is likely to rise by a further 1.8-4.0°C this century.

This will result in a further rise in global sea levels of between 20 and 60cm by the end of this century, continued melting of ice caps, glaciers and sea ice, changes in rainfall patterns and intensification of tropical cyclones. Scientists examined the number of tropical cyclones and cyclone days as well as tropical cyclone intensity over the past 35 years, in an environment of increasing sea surface temperature. A large increase was



seen in the number and proportion of hurricanes reaching categories 4 and 5. The largest increase occurred in the North Pacific, Indian, and Southwest Pacific Oceans, and the smallest percentage increase occurred in the North Atlantic Ocean.

Recently Sidr has battered Bangladesh. It is believed that natural calamities like Sidr and other types of cyclone is the output of the phenomenon as the world climate is changing fast because of global warming caused by anthropogenic pollution. Long vulnerable to nature's fury, Bangladesh stands to suffer even more from extreme weather events like this as a result of human-induced climate change, scientists say. Cyclone, Sidr and Tsunami are the outcome of climate change for which industrialised nations are responsible. A number of rich nations are yet to implement the agreement of Kyoto Protocol of 1997.

Climate change is a global issue that demands a global response. All countries must be part of the solution. Speaking at the UN Climate Change Conference in Bali, (COP13) Andy Atkins, Tearfund's Advocacy Director says: "It is time for the international community to take stronger action to support vulnerable communities' efforts to reduce the risk of disaster. Airlifting stranded people from floodwaters and sending food packages to

those affected by drought can no longer be our sole response to weather-related disasters. As a global community we have a moral responsibility to invest our aid money upfront in helping the planet's poorest people prepare for predictable disaster. If we do not, then many thousands of lives will be needlessly lost and billions of pounds of aid money will not be used to best effect."

Bangladesh, one of the most densely populated countries in the world, with over 755 people per square Km, has a per capita income of only about US\$235. Over 40 percent of the population lives in poverty. With its high population density, low level of development, and low lying deltaic mass, Bangladesh has already been facing a number of natural and man made problems. Natural hazards like cyclones, floods, droughts and socio-economic problems such as poverty, low literacy, poor health delivery systems, high unemployment are some of them. In future Bangladesh may also have to face adverse impact of climate change and sea level rise. To better prepare the country for dealing with these impacts pragmatic planning is needed based on authentic data and analyses from scientific studies.

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# Bangladesh drowning: A reality or a myth?

FARUQUE HASAN

ONCE again Bangladesh has been made the worst example of global warming. It is being said, one-third of Bangladesh will go under seawater in next 50 years due to the sea level rise being caused by the climate change. Drowning of Bangladesh is now a hot topic in the international arena.

No denying that a great part of Bangladesh, the largest delta in the world, is low lying, very usual for a delta. But when we talk of the impacts of global warming on Bangladesh, we must not forget or ignore the fact that it's a dynamic delta and its landmass is still growing, at the same time the land being raised by gradual deposition of silt.

Due to global warming, to which the contribution of Bangladesh is minimal, the rate of local relative sea level rise is 7 mm a year around the coastal areas of the country. An alarming trend indeed for the future, but this is only one side of the coin. The other side is that the average sediment accumulation rate for the last few hundred years in the coastal areas of Bangladesh is 5-6 mm a year. What we see is that the

sea level rises 7 mm/year and the land rises 5-6 mm/year; it means the relative sea level rise in the coastal areas of Bangladesh is 1-2 mm/year. The elevation of the Barisal town, which stands only at a distance of about 90 kilometers from the coastline, is 3 meters above Mean Sea Level. So to reach up to Barisal town level, the sea will take 1,000 (one thousand) years, if its level rises at 3 mm/year. This is one aspect of the picture; and the other aspect is that the coastline of Bangladesh is not static, rather progressing outward due to the fact that tremendous amount of silt being deposited on the shore in the Meghna estuary, causing land accretion.

Each year about 2.4 billion tons of sediment from the Himalayas is carried by the rivers of Bangladesh to the Bay of Bengal, and deposited on the continental shelf causing accretion of land to the coast of the country. The high sediment load results in a net accretion of about 35 square kilometers of land per year to Bangladesh.

Satellite pictures say of new land measuring no less than 20,000 (twenty thousand) square kilometers being formed in the Bay of Bengal in the coastal zones of Bangladesh.

**Some people term our annual flood as dreadful, but it is not indeed. The flood makes our soil fertile for better harvest, raises the land up gradually by millimeters each year. Otherwise a boon the flood becomes dreadful because the total population of the country is disproportionate to the total area of the land. By population we are the 8th largest nation in the world, by land area, 93rd.**

Inhabitants on our coastal islands, Neejhun Deep, Char Kukrimukri, Char Jabbar etc, know that how every year new shoals in our coastal zones are coming up, and how the water is getting more and more shallow between these shoals. We know Bangladesh has been formed over tens of thousands of years through the settling down of sediment on the bed of the Bay. Only about three thousand years back, one of our seaports was near Gopalganj in Faridpur district. We can see how far the coastline of our country has extended during the last three millennia.

Unfortunately, the land formation at the western coastal zone of the country has almost stopped due to the presence of the Swath of no Ground with a depth of more than 200 fathoms, which starts a few kilometers south of the Sundarbans forest coastline. The depth of the sea at our coast is five to ten fathoms.

This Swath of no Ground swallows up the sediment load carried out to the Bay by the rivers thus hindering new land formation in this coastal zone. But the central and eastern regions of our coast are very active in terms of formation of new lands as these dynamic regions are shallow in depth.

Certainly global warming is a great threat not only to Bangladesh, but to the whole world; and we must, fight against this threat hand in hand with rest of the world. We must make all our efforts to stop further warming up of the global climate, and then get it cooling down; but we, the people of Bangladesh, must not lend our ear to those painting a very gloomy picture saying Bangladesh is going to be the worst effected country, whose one-third or a big part will go under sea due to global warming in next 50 years.

Some people and organisations are always ready to paint a gloomy

picture of Bangladesh. They make our country as the worst example of any bad consequence or situation. As a result the country has earned a very bad image in the international arena. This bad image directly hampers our economic progress.

They invariably utter the phrase, 'the poorest country in the world.' On the list of the countries of the world sorted by their Gross Domestic Product (GDP), which has been prepared by the IMF, Bangladesh stands 58th with GDP to the tune of USD 64,854 million among 180 countries. On the same sort of list prepared by the World Bank, Bangladesh stands at 56th among 183 countries. Again, on the three lists of the countries sorted by their GDP on the basis of Purchasing Power Parity (PPP), which have been prepared by IMF, World Bank and CIA, Bangladesh ranks at 33, 49, and 31 respectively among 179, 145 and 227 countries; how come

Bangladesh is the poorest country in the world?

Due to the bad image of the country, we receive minimal foreign direct and indirect investments. For the same cause we receive virtually no tourist, though these days tourism is the number one global export item, and our country can be the haven of ecotourism. (Tourism earns foreign exchange for a country, so it is considered as an export.)

Some of us may join the chorus that say Bangladesh is drowning due to global warming with the hope of getting some aid for the country from the rich countries by evoking sympathy in them. What we need is not such dole money, but investment and tourism to make big strides forward in our economic progress. Seeking aid or dole money does not go with the sense of self-dignity.

At this moment our serious problem is not the rising of the sea

level, but the explosion of population. Due to population explosion people of our country are compelled to live near the coast, on the newly formed shoals, and lose their lives helplessly when a cyclone or a tidal surge hits the coast.

Two centuries back European countries were suffering from population boom. Fortunately for them the excess people of those countries had the opportunity to migrate, in big number, to the 'new lands' like America, Australia, and Latin America. Nowadays the scope of migration in big number has ceased. So we have no other way, but to control the population explosion.

The other day a fish vendor told me, his grand fathers were two brothers, his father and uncles were four, and now his brothers and cousins are 28 in number. What a scaring picture of population explosion!

Some people term our annual flood as dreadful, but it is not indeed. The flood makes our soil fertile for better harvest, raises the land up gradually by millimeters each year. Otherwise a boon the flood becomes dreadful because the total population of the country is disproportionate to the total area of the land. By population we are the

8<sup>th</sup> largest nation in the world, by land area, 93<sup>rd</sup>.

If we can stop the population explosion, we will be able to live keeping safe distance from the coast. When a cyclone hits our costal districts we die in hundreds, our houses get destroyed, because they are made of bamboo and reed. Economic progress will make us able to build our houses high and with brick. Then the storm won't be able to blow us like grass and twigs. We live in a delta, the largest delta in the world, a dynamic delta growing bigger and higher; we must know how to live in safety and with dignity.

There's the glaring example of the Netherlands in front of us. About half of the land area in the Netherlands lies at or below sea level. The Dutch built dikes around swampy or flooded land and then pumped the water out. Several major rivers of Europe flow through the Netherlands into the sea. The country has few natural resources, and its lands are poor for agriculture. But the Dutch have struggled to make their country one of the wealthiest in the world.

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# Tropical timber harvesting, biodiversity loss and environmental change

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THIS paper examines the possible biodiversity loss and environmental changes following tropical forest harvesting and looks at practical approaches to address them.

In tropical forest, most of the biodiversity studies have been done on primary forest. Very little is known on the biodiversity of production areas that have been subjected to logging. This is particularly true for plants against the multitude of studies on fauna particularly birds and mammals. Currently scientists realised that both conservation and current style of timber exploitation are not compatible in managing tropical forests in terms of maintenance of structure, species composition and diversity. As a result, some scientists emphasised the need for preliminary baseline assessment followed by monitoring to achieve an optimum practice that is compatible in both timber production and biodiversity conservation.

Others looked at measuring forest biodiversity for deciding priorities by which certain areas of forest can be protected and the remaining converted to other uses with minimum impact on biodiversity.

However, in both cases, emphasis has been put to regulate human interventions to minimise the impact on biodiversity and environment. But to what extent is it achieved? How much of the forest is damaged by tropical logging? How much of species diversity is lost? What effects of logging on forest environment so far detected? What actions can be taken to address biodiversity loss and environmental consequences? Before describing the above issues, first, it is important to see the ingredients of the word, biodiversity and its relation to the conservation measures.

The word 'biodiversity' has recently been widely used to relate it with the conservation and global environmental change. It refers to the entire range of variation among

plants and animals across all levels of the biological hierarchy from genes to ecosystems and it is therefore a property of living systems of being distinct, that is, different, unlike. Discussion on biodiversity thus usually focuses on the number of existing species in a site and their ecological aspects. Currently, presence of rare species is the most often cited criteria for conservationists, and as such conservation measures to the whole ecosystem are getting priority as holistic approach. In the past, saving prominent species and threatened areas were the major focus for conservation decision.

Though timber harvesting is considered as secondary cause of deforestation, but uncontrolled logging has caused many tropical forest severely degraded, losing its original composition, and thus gradually deforested. Even before collecting and documenting biodiversity data, many tropical forest species meanwhile possibly eliminated due mainly to over exploitation and habitat alteration. According to an estimate, about 20

percent of the global carbon dioxide emissions come from deforestation and forest fires, with tropical America being the chief contributor.

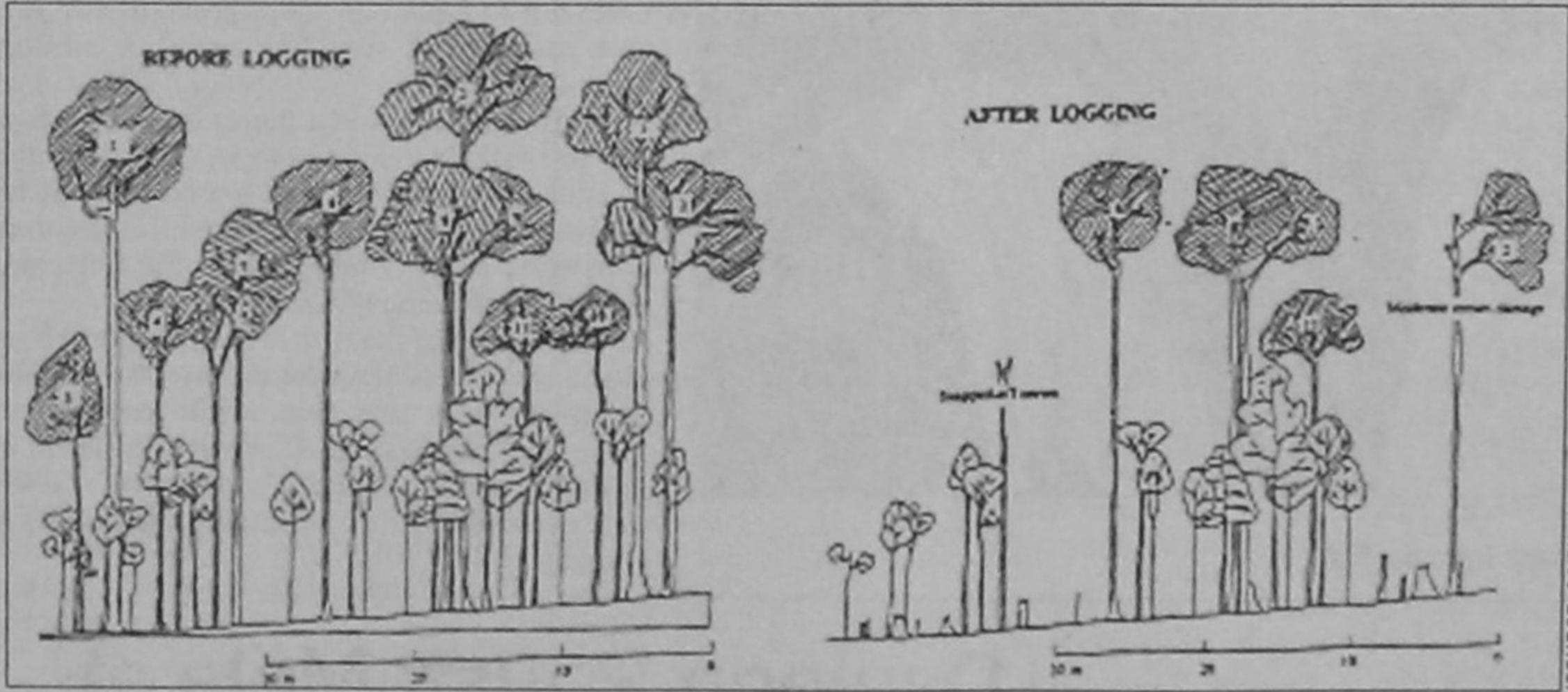
At global level, tropical forests are extremely rich in plants and animal species. About two-thirds of approximately 250,000 species of flowering plants in the world occur in the tropics. Trees are the major component in tropical forest ecosystem that represents varieties of economic, social and environmental values. Unfortunately, for high export earning, the tropical forest is regarded predominantly as a source of timber and this tendency has caused the species-rich forest of the tropics to be converted into species-poor secondary forest.

Based on the Wilson and Peter's conservative estimate of a tropical deforestation rate of 0.7 per cent per annum, about 50 species are being lost per day. According to an estimate of FAO, at least 5-10 per cent of tropical forest species would face extinction in the next 30 years. Setting priorities for conservation therefore requires a better understanding of the process of

deforestation, the amount and spatial heterogeneity of forest altered and their implications on species extinction.

Environmental aspects of tropical forest logging are also less known. Few scanty data are available. However, intensity of disturbance followed by changes in soil property and microclimate could have a profound effect not only on regeneration in early stage of succession but also on structure and species composition and richness of secondary forests. But information on how physical components of the ecosystem are affected by different intensity of selective logging remains largely untapped.

Based on the available published literature, it is difficult to ascertain the contribution of tropical forest harvesting towards rate of forest destruction, species loss and environmental change. It is because of the fact that study on the same population or samples before and after timber harvesting was rarely done. In other words, most studies were restricted to compare the logged forest with the adjacent un-



Forest profile diagram before and after selective logging in primary hill dipterocarp forests. For only three exploited emergent trees, damage to the residual trees and the canopy was considerable.

logged forests. Comparisons in such case may be confounded and valid changes cannot be detected if there are differences in topography, soils, and species composition and disturbance history between the unlogged and logged forest. As a result, sweeping statement cannot be made on how much of species diversity is lost as a result of selective logging, though overall species richness (i.e. number of species) may decline in the logged-over forest than the adjacent unlogged stands.

However, one extensive study on census of the same samples before and after timber harvesting over 1000 hectares of selectively logged primary dipterocarp forest using heavy bulldozers and following systematic sampling design showed that about 47 percent of trees were totally injured and 40 percent trees were smashed or dead. The relative disturbance index (RDI) also showed significant negative relationship with the tree density per hectare. There were also drastic changes in the forest structure and 43 percent canopy was open followed by invasion of pioneer species. The resulting changes in the forest structure possibly displaced many forms of animal life, particularly birds.

24.1 percent of the total tree

species were locally lost from the study site in the first cut that encompasses only rare tree species including highly valued timber trees. Again, about 50 percent of the residual species were under very rare category in the logged-over forest. The increase in rarity was due to the fact that some species of common and frequent status were newly added in the rare category by reduction of individuals following logging. These rare species would be lost even forever from the area if they cannot survive as a result of destructive harvesting. Per plot species richness and Shannon diversity index fell by 42.2 percent and 20.9 percent, respectively after logging.

Environmental aspect of logging suggests much delaying of the recovery process for the original composition. Severe soil compaction with bulk density exceeding 1.4 g/cm<sup>3</sup> was observed in the logging tracks and log landing sites and is unfavourable for normal tree growth. But the other area remained below the critical level as in the case of undisturbed forest condition. The logging also reduced the moisture content to 21.2 percent from the original level. The logging compartments with higher canopy damage had significantly low percentage of moisture

content.

Significant changes in microclimates were also detected due to canopy opening. For example, selective logging significantly altered all microclimatic variables such as air temperature, soil temperature and relative humidity by increasing air and soil temperature but decreasing relative humidity. On a regional scale, however such heavily logged forest in the tropics might disrupt rainfall patterns, create hotter and drier environment. The regional cumulative environmental effects of tropical forest harvesting may also accelerate global climate change.

To address the effects of tropical timber harvesting, there is a real necessity for intervention not only in the management system but also in the extraction operation. These are as follows:

Integration of biodiversity in the management system: There is no evidence for long term success of the existing management system in the tropics as the system is solely dependent on timber production. With the indications of rapid decline in biodiversity in the tropics, there is a great necessity for integration of biodiversity survey with the existing management inventory so that the results of the inventory could be applied directly

to resource management and conservation.

Execution of improved logging practices: Execution of harvesting guidelines is also more important than simply incorporating these in the management plan. For example, trees retained as seed bearers were also reported to be damaged due to lack of directional felling. Reduced impact logging reported elsewhere is of considerable importance towards efforts to reduce logging damage by about half in the tropical forest.

Environmental Impact Assessment (EIA) of forestry operations: Forestry operations can have negative environmental consequences for the forest area itself as well as for the surrounding environment. These consequences should be assessed in advance of operations to take necessary measures against the possible impact of logging. Studies showed that one of the major shortcomings in EIA reports in the tropics is the lack of detailed baseline data supported by sound ecological content and hence poor prediction of impacts and insufficient mitigation measures.

Policy support: At the policy level many tropical countries had already a biodiversity policy and plan of action proposed. The adoption of the national policy on biological diversity is a follow-up action of the nation's commitment to make operational the Convention on Biological Diversity. The current state of forest and biodiversity affairs in the tropics provide the proper setting and need for a better approach to biodiversity conservation especially in the timber production areas. The recent Bali Action Plan emphasised the enhanced national action on mitigation of climate change and acknowledged that forest degradation due to human interference also leads to emissions and if needs to be addressed through policy approaches and thus enhancing forest carbon stocks in developing countries.

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