

## **DEFORESTATION – A TRAMPLE ON THE MOONSCAPES**

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### **ABSTRACT**

Forests are unique. They contribute to the climate but fall victim to its change too. They carry the potential to be the solution of the climatic changes as well. They control soil erosion, provide clean water and create corridors for wildlife and plants to move to favorable cordons. Loss of these services eventually disturb the ecology.

When a tree is cut, it ceases to be a carbon sink. When an area of forest is destroyed, it becomes a source of greenhouse gases. Number of other impacts also comes forward and the phenomenon ultimately becomes one of the major constituents of global warming and the linked climatic problems.

Climatic problems in turn damage the forest. Decreased rainfalls and rising temperatures cause droughts and increased forest fires. A damaged forest consequently fails in providing the natural ecosystem services and much needed protection to the biodiversity.

The paper being presented here would be discussing various aspects of deforestation and also the possible measures to control deforestation both at regional and global level. It would further attempt to build a premise that only standing forests would be helpful for us in providing a valuable and sustainable ecosystem.

### **OUR CLIMATE TODAY:**

Stable-isotope records from the ice cores and the deep ocean sediment cores reveal that the earth has experienced a repeated climatic rhythm of glacials and interglacials with a cycle of about 100 ka (thousand years) after 800 ka BP (before the present). Closed lake level records in the northern middle-latitude zone suggest a drier climate during the hypsithermal interval (HI) at around 6 ka BP, the warmest period during the present interglacial, and a wetter climate during the last glacial maximum (LGM) at around 18 ka BP. The saltiest lake

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water in the world, in the Dead Sea, is a result of rapid desiccation of the lake after the LGM to the HI, during which the lake level dropped by more than 200 m. However, in the Indus River basin, on the same latitude of 30°N, the climate was drier during the LGM and wetter during the HI compared with the present climate. The Indus civilization flourished during the wetter climate following after the HI, and finally disappeared at around 3.3 ka BP when a dramatic decrease in precipitation occurred during the course of global cooling after the HI. Climatic changes near the 30°N latitude were very variable and differed from region to region (Table-1) because a small latitudinal shift of the position of the polar front could result in dramatic increases or decreases in local precipitation.

**Table-1 – Climatic Changes in the Zone of Latitude 30°N**

Period					
Region	LGM <sup>a</sup> (18 ka BP; cold)	HI <sup>b</sup> (8-6 ka BP; warmest)	Global Cooling (ca. 4ka BP)	Ca. 650 AD	Global Warming
Indus River	Dry	Wet	Drying		?
	Wet	Dry	Wetting	Drying	?

a = Last Glacial Maximum, b = Hypsithermal Interval.

The global climate system redistributes energy from lower to higher latitudes. The energy surplus in the lower latitudes, bounded roughly by latitudes 35° North and South, results from the latitudinal gradient of the Earth's energy budget. The total energy distributed by ocean currents is greater than that distributed by the atmosphere. Thus, the atmosphere contains insufficient heat to act as the source of future dynamic changes in the global climate and the future atmospheric behavior would, therefore, depend upon increase in greenhouse gas concentration, changes in the sea surface temperature (SST) and the increased atmospheric turbidity. The SST in the Indian Ocean increased by 0.5°-1.0°C during the middle half of last century. As a result of increased ocean evaporation due to the SST increase, the rainfall at the several points in its area of influence also changed.

The link to the changed precipitation trend has been attributed to the indirect effects of human activities. Further studies have also lead to the conclusion that the precipitation variability has increased globally both in time and space and this may induce problems with respect to water resources and food supply in the future. Deforestation is being considered as one of the most significant of such human activities.

**DEFORESTATION:**

As per United Nations, deforestation is “land degradation in arid, semi-arid and sub-humid areas resulting from various factors including climatic variations and human activities”. Deforestation, therefore, is the removal of trees by any method from slash and burn deforestation to land clearing.

Deforestation is directly responsible for soil erosion and hinders the efforts to reduce global warming. Many people have no idea how terrible in the loss and how frequent our tramples could become on the moonscapes, which evolve on the globe as a result of deforestation, particularly the induced one.

**MAJOR CAUSES OF DEFORESTATION:**

Forests are threatened by both biotic and abiotic factors. Other than the direct cutting of trees for commercial and other reasons, climatic hazards, diseases prompted by insects or pathogens, threats of a purely anthropogenic nature, fires and atmospheric pollution are few of such to mention. This classic division, however, is bit artificial. Indeed the mark of human actions is always present.

The aggressions upon the forests can broadly be grouped as following:

**Natural Catastrophes:**

Natural catastrophes are somewhat independent from the actions of the man. But the worries concerning eventual future climatic changes are going to grow. It would thus be sufficient to study not the ways of fighting these aggressions but the measures to take before forestry stands are subjected to such events.

**Biotic Threats:**

Insects and fungi play an important part towards the causes of diebacks. These biotic agents intervene, either as primary aggressors, or most often as secondary aggressors. The illnesses develop, either as a result of native pathogenic activity, or by the invasion of the non-native agents in non-resistant stands. One such example is that of China where the beetle *Hemiberlesia Pitysohilla* provoked the dieback of *Pinus Massoniana* during the last quarter of last century. In 1987, the area affected covered some 420.000 ha. Its rapid progression soon put in danger the area exceeding 25 million ha, most notably in the province of Guangdong of China.

**Storms and Wind-Blows:**

Storms have had an important destructive effect on forest. Throughout the last four decades several destructions occurred in Europe destroying millions of m<sup>3</sup> of wood. The following two notable examples:

- 28 million m<sup>3</sup> destroyed in 6 hours in Northern Europe in 1972.

- Almost 110 million m<sup>3</sup> was destroyed throughout Europe only in 1990.

### **Periods of Drought:**

Water stress renders forestry stands very fragile. Stresses can arise either by a change in the distribution of water throughout the seasons or by a fall in the annual volume of precipitation. It has now been established that the numerous cases of diebacks observed in forests stands throughout the world in the last ten years are due in part to the periodic water stresses. Damage has been witnessed in Europe, Asia, North and Latin America, Sri Lanka and Hawaii.

### **EFFECTS OF DEFORESTATION:**

The effects of deforestation can be categorized in many ways. A short discussion in this respect follows:

#### **1. Effects on Biodiversity:**

The [World Wildlife Fund \(WWF\)](#) defines biodiversity as "the wealth of life on Earth, the millions of plants, animals, and micro-organisms, the genes they contain and the intricate ecosystems they build."

Over a millions species of plants and animals are known to live in the forests and millions more are not classified. The unique environment of the forest allows such biodiversity to exist. The process of deforestation in various geographical regions is destroying this unique environment. Consequently, many animals and plants that live in the forests face a specter of extinction. The extinction of the plants and animals leads to the diminished genes pool. The lack of biodiversity and a reduced planetary genes pool may have several unforeseen ramifications, some of which could be fatal to the future of humanity.

#### **2. Desiccation of Previously Moist Forest Soil:**

Because of the exposure to the sun, the soil gets baked and the lack of canopy leaves nothing to prevent the moisture from quickly evaporating into the atmosphere. Thus, previously moist soil becomes dry and cracked.

#### **3. Increase in Temperature Extremes:**

Trees provide shade and the shaded areas have moderate temperature. With shade, the temperature may be 36 degrees Celsius during the day and 26 degrees at night. Without shade, temperatures would be much colder during the night at the first instance and may be around 50 degrees

during the day. Over the wider perspective under this category, the SSTs also become included and engaged.

4. **Moist Humid Regions Change to Desert:**

This is related to the desiccation of previously moist forest soil. Primarily because of the lack of moisture and the inability to keep moisture, soil that is exposed to the sun will dry and turn into desert sand. Even before that happens, when the soil becomes dry, dust storms become more frequent.

5. **No Recycling of Water:**

Moisture from the oceans falls as rain on adjacent coastal regions. The moisture is soon sent up to the atmosphere through the transpiration of foliage to fall again on inland forest areas. This cycle repeats several times to rain on all forest regions but gets hindered due to deforestation.

Another effect would be on the water table underneath the ground. Water table is the common source of natural drinking water by people living around forests. The supply of water underground could also dry up if not replenished regularly. When there is rain, forests hold much of the rainfall to the soil through their roots. When there are not enough forests, the water from rain would simply flow through the soil surface and is not retained by the soil. The process of evaporation would also immediately set in and the water table is not replenished, ultimately leading to the drying up of wells.

6. **Less Carbon Dioxide and Nitrogen Exchange:**

The forests are also important in the carbon dioxide exchange process. They are second only to oceans as the most important "sink" for atmospheric carbon dioxide. The most recent survey on deforestation and greenhouse gas emissions reports that deforestation may account for as much as 10% of current greenhouse gas emissions. Greenhouse gases are gases in the atmosphere that literally trap heat. As more greenhouse gasses are released into the atmosphere, more heat gets trapped. Thus, there is a global warming trend in which average temperatures become progressively high.

7. **Soil Erosion:**

The relationship between deforestation and soil erosion is direct. Deforestation is known to contribute to run-off of rainfall and intensify soil erosion. The seriousness of the problem, however, also depends much on soil characteristics and topography.

## 8. **Social Effects:**

The process of deforestation had numerous social effects. The indigenous people living in the forest are the hardest hit. Besides the indigenous population, there are also riverine agriculturalists and backwoods agriculturalists, hunters, and extra activists that lived in the forests. Can all of the diverse interests, the needs of forest dwellers and the wants of big business people be reconciled? Is it possible to preserve enough of forests while allowing parts of it to be used for commercial purposes? Are the needs of the animals living in the forest a factor in this debate? Any successful policy of action regarding the management of forest must address these questions. The matter gets further complicated when the various effects of a single action are reconsidered. Such reconsiderations have demanded to include induced social imbalances, migrations, break-up of family structures, increased ailments, unrest in the local populace and lot more.

## 9. **Other Effects:**

There are many other rewards of forests too. Clean air and clean water perhaps are the two most important. Forests also provide many aesthetic, recreational and cultural rewards. If the forests are destroyed, then these rewards disappear. This has major social repercussions for the entire world.

## **TOWARDS A PREVENTIVE FORESTRY MANAGEMENT:**

Depending upon the particular nature of the area or the region to be considered, a number of preventive measures have evolved over a period of time to curb deforestation. The basic preventive measures, however, include:

### **Phytosanitary:**

The first measure to take is that of placing efficient phytosanitary barriers. The phytosanitary measures require a good knowledge of the biology of pathogenic species, in order not to provoke the abusive disfunctioning. Silvicultural measures must also be taken into account to improve the health of forests stands, and to stimulate their production. The maintenance of diversity and the stand type is equally important for an efficient fight against biotic threats.

### **Fires:**

Fire has always been an important element present in forestry ecosystem management. Though natural causes of fire exist, such as lightening and volcanic eruptions, the main causes of contemporary and anthropogenic fires include commercial and military interventions.

The total wooded surface touched by fire annually has been estimated to be around 10 million hectares, which represents some 0.3% of the total world forested area. However the impact of these fires is more important than what this percentage suggests. In fact, in the zones where the frequency of fires is high, the destructive character of such fires is worsened by the fact that forest stands, do not have the time to reconstitute themselves between the two consecutive fires.

The methods of fighting fires must be adapted to the socio-cultural environment in which they are put into place. For instance, the developed countries possess the necessary materials to permit them to carry out a "No-fire" policy. In this case, a perfect coordination between terrestrial and aerial fire fighting means are generally provided, in addition to the active participation by the public and private forestry sectors. The developing countries in contrast, or the regions which are less populated, one may accept that a part of the wooded surface is burnt. This practice is also due to an agro-silvo-pastoral culture which includes positive elements and is, therefore, difficult to condemn. Solutions thus cannot be put to place without taking into account the subsistence requirements of the population concerned.

**Reforestation:**

Generally speaking, deforestation is the result of an imbalance between natural resources and the need of the population. Before discussing this important subject, it is necessary to remember that developed countries have witnessed periods of very strong deforestation. The reversal, however, has been achieved thereafter through vigorous reforestation and preservation campaigns, which today can be seen bearing the desired results and leave the others to follow the suit without any further waste of time.

**Stringent Urban Planning and Development:**

The countries where the phenomenon of deforestation is most evident are those undergoing rapid population growths. This population development implies two types of harms to the forests in the absence of specific developments:

1. A growing need for wood, especially firewood and wood for construction,
2. A growing need for agricultural land to enable the subsistence of population.

The immediate satisfaction of these needs leads to the clearing and pillage of those resources that are closest to settlements. The fragility of these ecosystems on the other hand does not permit them to withstand

such pressure, and failure of the forest to re-establish itself leads the population to carry out the same type of aggression to forest areas that are further away. Hence, appropriate urban planning would be an important element which can contribute significantly towards preventive forest management.

#### **Harmonious Coexistence:**

The restoration of a balance will only be possible if those responsible for development privilege small projects and local population. In absence of awareness of the dangers of the dispersion of forests covers, and in the absence of a solution for the needs of agricultural development, no large-scale project can succeed. For example, where the need for fuel wood is one of the most pressing concerns, the combustion techniques are required to be improved. The fast growing trees are required to be planted and a more vigorous management of resources, permitting the reconstitution of reserves, is to be put to place. Different areas have their own habits and specific environmental conditions. These must be taken into account. Satisfying the needs of local populations would be indispensable.

#### **The Interdiction of Timber Exploitation: A Badly Adapted Argument:**

Forestry exploitation has of course been at the root of numerous abuses. But these abuses are to be fought. The banning of the commerce would deprive the regions concerned of the indispensable resource. Hence, interdiction of timber exploitation is badly adopted argument, which needs to be set off through the most suited measures.

### **IMPACTS OF DEFORESTATION IN SOUTH ASIA – A GLIMPSE:**

By concentrating in our region, we see that the continuing loss of forests in Asia is a result of many elements. A combination of governmental mismanagement and corruption, economic development, and an ever-widening gap between classes continues to cause deforestation. As the significance of forests both for their natural resources and their innate beauty declines, and as environmental protection remains undervalued to be replaced by immediate economic gains, deforestation continues to be a devious predator. The direct and indirect impacts of deforestation in the region are listed below:

#### **Bangladesh:**

Chokoria Sundarbans Flooded Mangroves - Rising ocean levels have flooded about 18,500 acres (7,500 hectares) of mangrove forest during the past three decades. Global sea-level rise is aggravated by substantial deltaic subsidence in the area with rates as high as 5.5 mm/year.

**India:**

Glaciers in the Himalayas are retreating at an average rate of 50 feet (15 m) per year, consistent with the rapid warming recorded at Himalayan climate stations since the 1970s. Winter stream flow for the Baspa glacier basin has increased 75% since 1966 and local winter temperatures have warmed, suggesting increased glacier melting in winters.

**Nepal:**

The Khumbu Glacier, popular climbing route to the summit of Mt. Everest, has retreated over 3 miles (5 km) since 1953. The Himalayan region overall has warmed by about 1 degree Celsius since the 1970s.

**Pakistan:**

The prolonged three-year drought (1999-2002) affected 2.2 million people and 16 million livestock in Pakistan. The event to some extent exhibited a repetition starting 2008.

**China:**

More than half of the 4,000 lakes in the Qinghai province are disappearing due to drought around 2001. The severity of the impact is exacerbated by over pumping of aquifers. Annual average temperature in China has increased during the past century, with pronounced warming since 1980.

**DEFORESTATION IN THE UPPER REACHES OF INDUS SYSTEM OF RIVERS – EXCERPTS FROM KEWA REPORT:**

Jammu & Kashmir possesses vast forests stretching from the lower valleys high up into mountain passes right to the edge of massive glaciers. Forests in Jammu & Kashmir vary according to both altitude and climatic conditions. They range from the tropical deciduous forests in the foothills of Muzafarabad and Jammu, to temperate forests in the middle altitudes of the Kashmir Valley. Higher up, in Gilgit, Baltistan, Ladakh, and the higher areas of the Kashmir Valley coniferous, sub-alpine, and alpine forests spring up. These eventually give way to alpine grasslands and high altitude meadows just below the towering mountains and glaciers. They are followed by scrublands which lead up to the permanent snowline.



Nanga Parbat at sunset above  
the forests of the Fairytale Meadows  
(Pakistan-administered J&k)

The KEWA report on deforestation in Jammu and Kashmir, shows that in the last 50 years, deforestation has accelerated in the region as a result of poor government control (and in some cases corruption), lack of local awareness, and military conflict. Sustained deforestation has begun to have a severe effect on the entire environment of the region.

In both Pakistan and India-administered Jammu & Kashmir, the cutting down of old alpine forests has occurred at an alarming rate with the full knowledge of both administering governments. Forests and timber are sold off by the governments in questionable deals. Logging companies carve roads into the area, strip the land of much of the old growth forest and move on, leaving bare hillsides exposed to the heavy rainfall common to the area. The rain waters rush down the hills, covered only by loose soil, and erosion causes this soil and silt to flow into the rivers and lakes. Deforestation and the resulting loss of habitat are driving a number of endangered species to extinction.



A jeep track has made cutting possible

In addition, the KEWA report takes as a case study the recently developed threat to the old-growth forests of the majestic Fairytale Meadows located below the towering Nanga Parbat (8,125 meters). It is hoped that viable solutions might be reached before Fairytale Meadows meets a similar fate as other alpine forests in Jammu & Kashmir.

It is to be noted that the region is the source to the Indus System of Rivers. Under the increasing water stress, the continuance of deforestation in the region is affecting the flows downstream. The variation in the flow in the system over a past decade has been observed to be alarming and unprecedented (Table-2). If the deforestation, which is the major contributor towards the ecological imbalance, is not checked, the results would continue to grow more and more detrimental.

**Table 2-Western Rivers\* Inflows at Rim Stations**

YEAR	TOTAL (MAF)
1999-2000	129.56
2000-2001	102.89
2001-2002	97.16

YEAR	TOTAL (MAF)
2002-2003	118.03
2003-2004	137.93
2004-2005	112.52
2005-2006	145.13
2006-2007	142.67
2007-2008	126.08
2008-2009	118.85
2009-2010	115.00

\* River Indus, River Jhelum and River Chenab

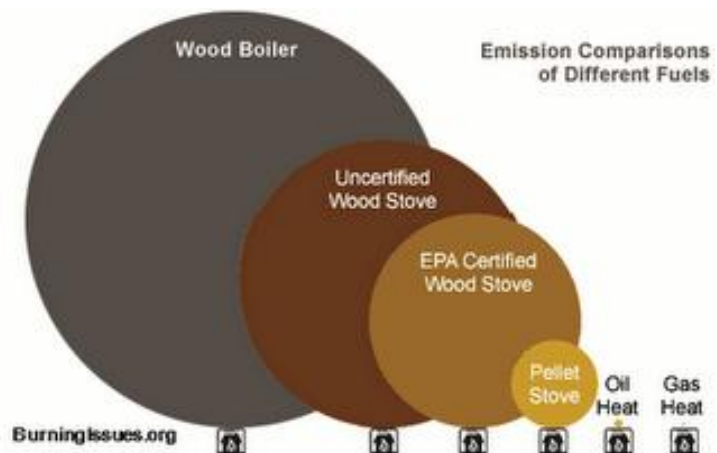
**REFORESTATION OF EFFECTED LANDS:**

Now let's talk about how to actually revert from the deforested moonscapes. How to get the ideas, information, and technologies out to the public? How to persuade governments to be ready for the issue? For this purpose, there is no need to roll out massive wind and PV farms but just to focus on smaller-scale and distributed options which broadly include the following:



**Efficiency Concentration:**

Older woodstoves waste up to 60% of the wood they burn, and fireplaces are much worse - up to 90% of the wood they burn is wasted. Fireplaces actually make a house colder by sucking warm air from the house up through the chimney, while only warming the area about 6 feet



around the fire. Newer wood stoves emit only [2 - 4 grams of smoke](#) per hour, compared to 40 - 60 grams emitted by older stoves.

The U.S. Environmental Protection Agency periodically sponsors a "Great Wood Stove Change Out" where rebates are offered for buying new [EPA-certified stoves](#). Other ways to decrease the need for heating include energy conservation measures, such as [weatherizing and insulation](#). Similar measures can be replicated by the other countries/states, which eventually would lead to a reduced deforestation and would also provide a space for the moonscapes to regain and regrow.

#### **Indigenous Cooking and Heating System:**

Each climate will have different options that make sense for the inhabitants. The most renewable options for cooking are a combination of sun ovens, hay box cookers, Kelly Kettles, certified woodstoves, rocket stoves, and earth ovens. Many homes in sunny areas would be able to depend almost fully on solar means of heating and cooking. In other areas, residents could reduce their wood burning by super-insulating their house, and using solar methods to the fullest extent possible. Of course, solar photovoltaics are also an option, albeit a more expensive one.

#### **Communities to Prepare for Emergencies:**

In a fast-crash scenario, when overwhelming change happens quickly, city and federal officials are likely to be unprepared. In a long-emergency scenario, the governments would be overwhelmed by one crisis after another, with decreasing amounts of energy and resources year after year. Either way, the true scope of the peak oil problem is way beyond conventional wisdom, and most people will not recognize the massive upheavals that are coming. A Resilient Communities initiative to this effect could work with already existing sustainability options. A task force under the stated context may look for the proposals to prepare community resilience plans, which may then be incorporated into the larger plans.

#### **Tree Planting Program:**

Trees are valuable and can be even more valuable in future. Best choices for a mass-tree planting programs would be the fruit and nut trees, trees that can take heavy pruning for firewood, large trees that will efficiently absorb pollution, and trees that can be coppiced. A food forest could also be established as part of an urban community garden or to support local food banks. These programs don't have to necessarily cost a lot of money and can be instituted quite easily through a proper plan or in consonance with the existing models in the other parts of the world. This stands workable both for nascent areas, as well as for existing moonscapes.

**Transition Towns and Post-Carbon City Movement:**

Rob Hopkins, a permaculture teacher, began the Transition Towns movement in Ireland to prepare communities for a lower energy future. Rob believes in working towards solutions for Peak Oil and Climate Change as one problem, by decreasing our energy use as well as increasing resiliency in our local communities. Rob emphasizes envisioning and creating a hopeful future of energy descent - one which people can connect to and work towards, rather than shut down in denial from fear. The Post-Carbon Cities movement on the other hand focuses on raising awareness in local governments, gaining consensus on the need for action, and providing the tools to local government to create plans for a lower energy future. It is more government-oriented than the Transition Towns movement.

These two movements are currently the most accepted and comprehensive approaches for community energy descent. They provide one of the best current hopes for proactive preparation and awareness raising concerns about wood fuel - the increased particulate pollution and problems caused by deforestation.

These are some of the ideas but by no mean fully comprehensive. All depends upon what one makes a priority or what works best in some particular area.

**PAKISTAN – A GENERAL OUTLOOK:**

The overall environmental degradation in Pakistan has been estimated in the year 2009 to be causing a loss of Rs 365 billion per year. Deforestation has been termed as one of the major cause to this effect. Others, which are directly linked with deforestation, include air and water pollution, climate change, ozone layer depletion, desertification, and vanishing biodiversity. A high rate of population growth, lack of public awareness, degradation of natural resources, rapid urbanization, and industrial expansion are also among major causes. In the year 2001 the government vowed that it would bring environment into the mainstream. In order to achieve this goal, the year 2009 was declared as the year of the environment.

The Global Environment Facility's (GEF's) National Dialogue Initiative (NDI) also took place at Islamabad in 2009. The activity was to help to determine national priorities in focal areas for availing GEF-4 (2008-10) within a strategic approach, and discuss areas of interest for the GEF-5.

The GEF is a global partnership among 178 countries and it works with international institutions, government and non-governmental organizations (NGOs), and private sector to address environmental issues, while supporting

national development initiatives. The GEF is currently funding seven different projects in Pakistan while 11 new projects have also been approved. Several local initiatives by Government of Pakistan are also being instituted. It is thus expected that the awareness which has finally emerged to some extent would help in addressing the forest regime of the country through appropriate and well considered measures.

### **REDD – A NEW PERSPECTIVE:**

In further pursuance to GEF, there is growing recognition in the international community that if forests are to be incorporated into a global climate change solution, developing countries must be rewarded for reducing deforestation. Forested land can be valuable for timber, and for its potential to be converted into commercial plantations or to agriculture to feed a growing population. Financial rewards are necessary to ensure that forested land is most valuable only as forest.

Reducing Emissions from Deforestation and Forest Degradation (REDD) is a mechanism being designed to provide these rewards. Under this system, countries will measure and monitor the emissions of CO<sub>2</sub> resulting from deforestation and degradation within their borders. After a certain time period, they will calculate the amount of emissions that were reduced and receive tradable forest carbon credits based on the reduction. These credits can then be sold on the global carbon market. Hence, the REDD mechanism would reward avoided deforestation and degradation and would also enhance the forest quality. However, the final shape of REDD would not be known until at least 2011.

The success of REDD would depend upon the country's capacity to implement it. Many questions about forest tenure and inventory design need to be answered before REDD projects can start. For example, who owns the forest or who will receive the revenues. REDD is not yet part of the global climate change agreement, so, over the next few years, there is time for countries to build their capacity to implement REDD. For this purpose, the countries must measure their existing forest resources through accurate national inventories, and then estimate the amount of carbon contained in these forests. They must also make predications of how this national forest carbon stock will change in the future, based on the best available evidence, including, for example, historical trends of deforestation and future demand for forest resources and agricultural land. This prediction, or reference scenario, will be used to assess a country's success in achieving REDD targets.

### **CONCLUSION:**

Forests are critical for preserving the green covering on mountain soils. Extensive deforestation and grazing results in barren surface, soil erosion and porosity. The porous soil, during the monsoons and cloud bursts, soaks in water gets loosened and whole mountain sides slide down taking with them trees, farm lands, villages and finally damming the rivers-leaving behind barren scars on the mountains which will further increase erosion. The phenomenon triggers number of other climatic changes. Global warming is just one of such impacts. Wisdom is thus required not to plunder but to preserve.

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