

## GLOBAL OVERVIEW OF DEFORESTATION: CAUSES, CONSEQUENCES AND MECHANISMS OF FOREST CONSERVATION

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Global Forests cover 29% of the total earth surface providing vital ecosystem services. It store 50% of the released carbon and home of much of the biodiversity. Forest resources are providing local communities with provisioning services: fuel, medicine, food and others. But all these ecosystem values are diminished as the result of deforestation. Major problems of deforestation that inflicts are water and soil resources loss, biodiversity loss, economic loss and social injustice and climate change that emanates global warming, ecosystems degradation, sea level rise, spread of diseases, failure of agricultural activities, etc; generally it triggers the loss of key ecosystem services. This review is to demonstrate the overall global deforestation level and its causes while parallely show the remedy mechanisms. The direct causes of deforestation are expansion of farm land, logging and fuel wood, overgrazing, forest fires, mining, urbanization, industrialization and infrastructure, etc. The indirect causes of deforestation are resource colonialism, over exploitation, overpopulation and poverty, land rights and inequitable land distribution, corruption and poor central planning and lack of political will are majors. All these drawbacks of forest resources can be handled by participatory community based forest conservation mechanisms with respect to protecting livelihoods and developing alternative livelihoods.

**Key words:** deforestation, forest resources, conservation, restoration, climate change.

### INTRODUCTION

Global Forests cover 29% of the terrestrial surface that provide vital ecosystem services. This forest cover store 50% of terrestrial organic carbon and source of much of the Earth's biodiversity. Tropical forests are sources of 50% of terrestrial biological diversity and 6% of the world's surface. But, sustainable forest management remains insufficiently competitive compared with more destructive uses of forests; 13 million hectares of forest are lost annually due to deforestation, 97% of which is in tropical countries. Deforestation inflicts high biodiversity losses and triggers the loss of key ecosystem services. Direct and underlying causes of deforestation are infrastructure expansion, logging, conversion of land for agriculture and ranching, extractive industries, etc) and underlying factors (economic aspects, such as the global demand for timber, soybeans or meat, as well as policy-related, institutional, technological, socio-cultural, demographic, etc. All these can be solved by sustainable development principles (FAO, 2006 and Leplay and Thoyer, 2009).

### OBJECTIVE

#### General objective

The main objective of this review is to demonstrate the extent of global deforestation level and indicate conservation mechanisms.

#### Specific objectives:

- To show the distribution of forests globally
- To assess the general causes and consequences of deforestation
- To explain Underlying causes and incentives for forest conservation
- To indicate forest conservation mechanisms

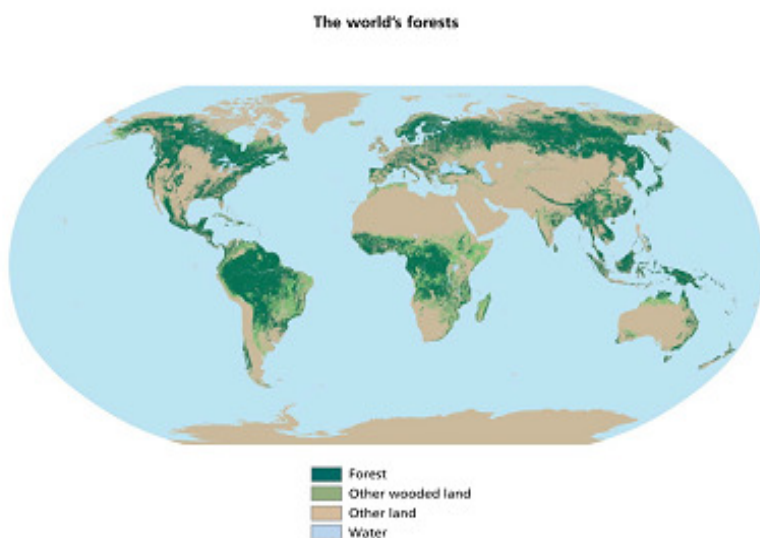
**Extent of world’s forest resources**

Forest is a minimum land area of 0.05-1 ha with tree crown cover more than 10-30% and tree height of 2-5m at maturity. Defined a forest as “land with a tree crown cover (or equivalent stocking level) of more than 10% and an area of more than 0.5 hectare; the trees should be able to reach a minimum height of 5 meter at maturity in-situ” (FAO, 2006 and UNDP, 2010).The Total forests area in the world estimated as 4 Billion ha that cover 30% of land area, which is an average of 0.6 ha per capita. From this Africa forest area is about 635 412 million ha, its coverage is 16.1 % of Global Forest Area (FAO, 2006 and UNDP, 2010).The five most forest-rich countries: Russia, Brazil, Canada, USA and China are the most forest rich countries accounting 53 % of the total forest area of the globe. The forest area is fairly stable in North and Central America while it expanded in Europe during the past decade. Asian continent especially India and China due to their large scale afforestation programme in the last decade registered a net gain in forest area. Conversely the South America, Africa and Oceania had the net annual forest loss. Brazil and Indonesia had the highest net loss of forest in the 1990s; significantly reduced their rate of loss (FAO, 2006, UNDP, 2010 and FAO, 2010).

**Table1.** Global forest resources

Country	Total Forest Area (Million ha)
Russia	809.0
Brazil	520.0
Canada	310.0
USA	304.0
China	207.0
DRC	154.0
Australia	149.0
Indonesia	94.0
Sudan	70.0
India	68.0
Others	1,347.6
World	4,033.6

Source: (FAO, 2010 and Chakravarty *et al.*, 2012)



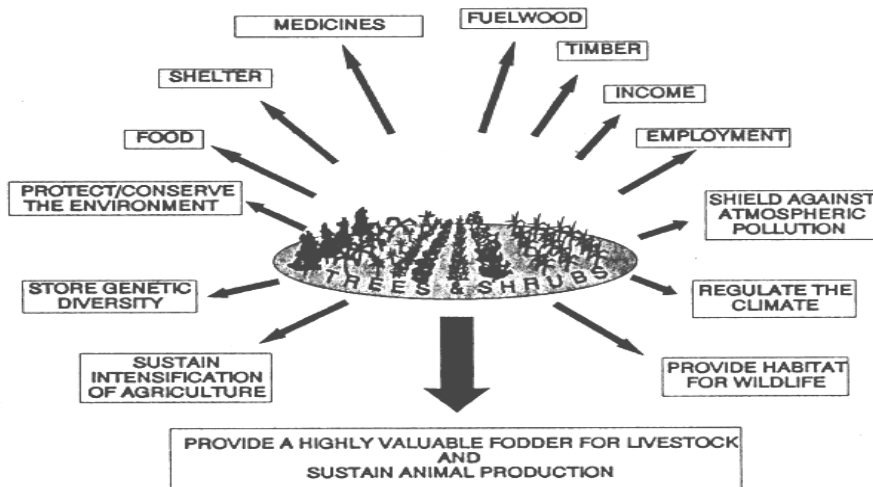
Source: (FAO, 2006)

**Figure 1.** The world’s forest cover

**Values of forest resources**

Forests cover about one third of the earth’s land surface providing many environmental benefits. It has major roles in the hydrologic cycle, soil conservation, prevention of climate change and preservation of biodiversity. Forest resources provide also long term national economic benefits. For example, at least 145 countries of the world are currently

involved in wood production (Chakravarty *et al.*, 2012 and Oyono *et al.*, 2003). Forests are not only considered as source of materials and income by Indigenous Peoples. They are an integral part of "communities" existence and identity, intrinsic to life itself, both spiritually and culturally. For example, people of Armachiho in Ethiopia, their identity are expressed through their forest resource even though it is threatened by the resettlement program of the government. Thus Indigenous Peoples across the world are highly motivated to conserve forests and restore the damage by others: Indigenous Peoples identify themselves as custodians of Mother Earth. It is observed in Panama, "Indigenous People have considered that the land is sacred and the welfare and health of the planet depend on their health and conservation. This is motivating the communities to conserve and restore forest resources" (Tesema, 2009).



Sources: (FAO, 1992)

Figure 2. Benefits of forest.

Forest resources having the above values, the world is facing an environmental crisis due to heavy deforestation; mainly the conversion of tropical forests to agricultural land (UNDP, 2010).

## Deforestation

Majorly deforestation is the phenomenon of temperate and sub-tropical areas. It is primarily a concern of developing countries of the tropics. Developed nations are located in temperate regions and developing nations in tropical regions. Deforestation is significantly less in tropical moist deciduous forest in 1990-2000 than 1980-1990 by using satellite imagery. Latin America with about 4 million hectares per year suffered the largest net loss of forests during the last decade followed by Africa with 3.4 million hectares per year and the least Oceania with 7 hectares annually (Chakravarty *et al.*, 2012). Brazil and Indonesia had 40 % net loss of forest that is the highest during the 1990s but has significantly reduced their rate of loss after this decade. Even though the forests in Brazil are so extensive, it is the top deforesting country by area that represents 0.4 % per year loss of the total. During the past decade the forest area in North and Central America remained stable. The forest area in Europe continued to expand at a rate of 7 hectare per year during the last decade and 9 hectares per year in the 1990s. Asia lost about 6 hectares annually during 1990s but gained more than 2.2 million hectares per year during the last decade (Myers, 1994). Globally there was the largest net forest loss per year in the period 1990-2000 AD had net loss of forest area of 7.9 million hectares per year. In the period 2000-2010 AD this was reduced to six million hectares per year as a result of reductions in Indonesia, Sudan, Brazil and Australia. The five countries with the largest annual net loss in 2000-2010 AD were Comoros (9.3 per cent), Togo (5.1 per cent), Nigeria (3.7 per cent), Mauritania (2.7 per cent) and Uganda (2.6 per cent). The area of forest land decreased during the past two decades is in Africa, Asia and South America (UNEP, 2007; Chakravarty *et al.*, 2012 and FAO, 2006, 2010).

## Causes of deforestation

According to Global forest coalition (2010), Chakravarty *et al.* (2012) and Pearce and Brown (1994) cause of deforestation are classified as direct and indirect causes. Direct causes of deforestation are:

### Expansion of farm land :

60 % of the clearing of tropical moist forests is for agricultural activities and logging, infrastructure, urbanization and Fuel

wood accounting for the rest 40 %. Tropical forests are one of the last frontiers in search for subsistence land for the most poverty vulnerable people worldwide (Myers, 1994). Industrial tree plantations, intensive agriculture and cattle ranching are major sources of deforestation in Bangladesh, Cameroon, Colombia, El Salvador, Ecuador, Indonesia, Kenya, Nepal, Papua New Guinea, Paraguay and the Philippines. There are also problems associated with other tree species plantation. For example, in the Mymensingh area of Bangladesh, plantations of exotic species: rubber, acacia, eucalyptus, pineapple, banana, cassava shrubs and medicinal plants are causes of forest degradation that adversely affected the livelihoods of the forest-dwelling peoples. In Cameroon the elite groups are destroying important forest areas to palm oil and banana plantations. In Colombia to produce the ginger cash crop and coca are other cause of deforestation. 73% of Brazil's cattle herds are in forested lands having a devastating impact. In El Salvador mangrove forests have diminished by over 50% due to agricultural land seeking. Similarly, intense competition for land in Kenya is also a serious impact on non-gazetted forests, clearance of the forest to create new farm land (Chakravarty *et al.*, 2012; Stiftung, 2014 and Oyono *et al.*, 2003).

### **Logging and fuel wood:**

Logging in Southeast Asia is more intensive and quite destructive. Fuel wood gathering is the major practice in tropical rain forests that degraded forest areas. High demand for fuel wood is a prominent and persistent driver of deforestation. International demand is primarily by over consuming industrialized countries, but domestic demand is high in the developing countries where wood is the most easily accessed fuel resource. Increasing demand of wood is the underlying cause of deforestation in Bangladesh, Cameroon, Ecuador, Papua New Guinea and Philippines. For example in El Salvador the sale of timber to sawmills and in Nepal the increased number of furniture factories is causing deforestation. Collecting wood or burning it to produce charcoal for fuel is a major problem in many countries such as Ethiopia, Kenya, Nepal and Georgia, Cameroon, Ghana and Panama (Chakravarty *et al.*, 2012; Oyono *et al.*, 2003; Stiftung, 2014 and Bishaw, 2001).

### **Overgrazing:**

Overgrazing is more common in drier areas of the tropics where overgrazing subject to soil erosion. Stripping trees to provide fodder for grazing animals can also be a problem in some dry areas of the tropics but is probably not a major cause of deforestation (Chakravarty *et al.*, 2012 and Ministry of Forestry and Wildlife, 2013).

### **Forest Fires:**

Fires are a major tool used in clearing the forest for agricultural land expansion and in developing pasture land. Fire is used responsibly in agricultural and forest management but if abused it can be a significant cause of deforestation (Chakravarty *et al.*, 2012 and Guido *et al.*, 2011).

### **Mining:**

Mining is very intensive and very destructive of forest resources. Mining is an activity promoting development booms which may attract population growth with consequent deforestation (Chakravarty *et al.*, 2012 and Nepstad *et al.*, 2013).

### **Urbanization, industrialization and infrastructure:**

Expanding cities and towns is done by clearing the forests. Tropical forests are targets of infrastructure developments for oil exploitation, hydropower dam construction and the construction of roads (Sands, 2005). Industrialization, urbanization and infrastructure development are collectively identified as principal drivers of deforestation in Bangladesh, Bulgaria, Cameroon, Colombia, El Salvador, Ghana, India, Kenya, Nepal, Panama, Papua New Guinea and the Philippines. The industrial sectors most clearly identified as a direct threat to forests are in Bangladesh, Cameroon, Colombia, India, Papua New Guinea and the Philippines (Nelson and Durschinger, 2015). Road construction is a key problem in El Salvador, India, Kenya, and Panama. Dams are also concerns of deforestation in Philippines and Bangladesh (Development and Policy Management Consultants, 2009 and Oyono *et al.*, 2003). Urbanization is also identified as a significant driver of forest loss in countries such as Bulgaria, El Salvador and Kenya. In Kenya, Nairobi city is a threat to Ngong and Karura forest; Kakamega is a threat to Kakamega forest; and Nakuru is a threat to Menengai forest. Elburgon and Molo towns are exerting pressure on the East Mau and Molo forests. In Cameroon, Ethiopia, Ghana, Kenya, Nepal and Panama the population is growing; that increases demand for land, roads and housing, with significant impacts to forests (Chakravarty *et al.*, 2012; Ministry of Forestry and Wildlife, 2013 and UNDP, 2010).

### **Wars and role of the military:**

Wars and military operations devastate the forest resource. For example military operations caused deforestation during the US-Vietnam War in Vietnam. The civil war in Myanmar and the timber trade between Myanmar and Thailand is known to deforestation. Myanmar regime sells timber to the Thais to finance its civil war against the Karen hill tribe that causes deforestation in Myanmar. The role of powerful military in Brazilian politics is also a major cause of Amazonian forest destruction (Chakravarty *et al.*, 2012 and Stiftung, 2014).

### **Tourism:**

Without doubt National parks and sanctuaries protect the forests but improper use of these areas to tourism is damaging. The national governments of tropical and sub-tropical countries adopt tourism for easy way of making money without management strategies of natural resources or tourist sites which is damaging. In Australia, the rain forest is being threatened by excessive tourism (Chakravarty *et al.*, 2012 and EPA, 2012).

Indirect causes of deforestation are:

### **Colonialism:**

Colonies of the colonial powers like Britain, France, Spain or Portugal are now the third world countries or the developing nation's tropical rainforests exploiters except Australia and Hawaii. Countries natural resources and their indigenous people's rights; destroyed by the colonial powers (Chakravarty *et al.*, 2012).

### **Exploitation by industrialized countries:**

Wealthy countries having deficit of natural resources are mainly dependent on the resources of the financially poorer countries but rich in natural resource. 20 % of the world's population is using 80 % of the world's resources. The governments of these financially poor but resource rich countries had adopted the same growth-syndrome as their western neighbours by maximizing exports, revenues and exploiting their rich natural resources unsustainably for short-term gain (Chakravarty *et al.*, 2012 and Colchester and Lohmann, 1993).

### **Overpopulation and poverty:**

The impact of population density on deforestation has been the issue of controversy. Poverty and overpopulation are believed to be the main causes of forest loss. More people require more food and space which requires more land for agriculture and settlement. This in turn results deforestation. Increasing population is the biggest challenge to achieve sustainable management of the environmental systems. It is said poverty and natural resource degradation are in a vicious circle. An individual in an industrialized country is likely to consume sixty times as much of the world's resources as a person in a poor country. The growing population in rich industrialized nations is therefore responsible for much of the exploitation of the earth and there is a clear link between the overconsumption in rich countries and deforestation in the tropics (FAO, 2006 and Colchester and Lohmann, 1993). Poverty and overpopulation are inter-linked. Poverty while undeniably responsible for much of the damage to rainforests and the large extent has been brought by the greed of the rich industrialized nations. Deforestation is mainly affected by the uneven distribution of wealth. Resource distribution or the question of equity is ignored and undervalued as it is the major cause of deforestation. Countries including Bangladesh, Cameroon, El Salvador, Ghana, India, Panama and Papua New Guinea focused on international trade and investment that drives and entrenches all of the above underlying causes (Chakravarty *et al.*, 2012 and Stiftung, 2014).

### **Land rights, land tenure and inequitable land distribution and resources**

Poorly defined tenure is generally bad for people and forests. In many countries government control of forests but are too weak to effectively regulate their use. This can lead to a tragedy of the commons where forest resources are degraded. Land rights in Bangladesh, Cameroon, Ghana, Philippines and Tajikistan as a significant common factor for deforestation and conflict. The most significant is the uncertain land tenure and rights of many of the Indigenous Peoples traditionally living in the forests which have cared for the forests over the centuries. In Colombia and Philippines indigenous peoples' rights to their forest resources is not guaranteed, by preventing them from exercising their livelihoods in their traditional territories. This leads to a decline in traditional knowledge with respect to managing forests sustainably. Conflict is stemming from legal uncertainty to live in various forests is aggravated by constitutional issues

concerning ownership of forests and land. For example, Ethiopia's constitutional principle, dictates that unoccupied lands are considered as having no owner and the government can give them to anyone it thinks necessary. Similarly in Philippines, indigenous forest areas are considered to be public lands or government properties, under Presidential Declaration 705. Such laws are dangerous to Indigenous Peoples inherent rights of customary responsibility for nurturing, developing and protecting forests and legalize land grabbing (UNDRIP, 2010; EPA, 2012 and Chakravarty *et al.*, 2012).

### **Economic causes (development, fiscal policies, markets and consumerism)**

Development will increase land productivity and thereby reducing the need to clear forests to meet food requirements. Another issue is that development will produce further capital and incentive to expand and clear more forest. Economic poverty combined with a lack of alternative livelihoods was a key underlying cause contributing to forest loss in Bangladesh, Cameroon, Ecuador, El Salvador, Ethiopia, Ghana, India, Kenya, Nepal and Panama. Typical examples in the Amazonian area of Ecuador communities have no economic alternatives, where they need cash to support their families and bring up their children. Young people without jobs often look to the forests for non-timber products or farmland. For example, in the Maasai Mara game reserve in Kenya as there is no job opportunity to the young, this pushes the young to use forests as source of income. In Georgia the population is reported to be increasingly dependent on the use of forest resources because of the stagnation and demonetization of the economy (UNEP, 2007 and Wu, 2011).

### **Undervaluing the forest**

Forests gain value only when they are cleared for obtaining legal title through 'improvement' or management. The extraction of non-wood forest products has been suggested as a way to add value to the forest but it is not economical when compared to clearing. Alternatively, if the national governments value the environmental benefits, it could apply a tax or disincentives to clear the forest. However, even though maintenance of the environmental services is essential for sustainable economic development, deforesting nations usually have more immediate or short term goals and are unprepared to take this step (Sands, 2005). Without education, people cannot find or create alternative livelihoods or reduce their dependence on forest resources. This is precisely the situation that prevails in the Sundarbans in Bangladesh, where the rate of literacy was found to be extremely low. People are thus forced to fall back on extracting resources from the mangrove forests, in order to obtain money to buy the grains they need by undervaluing it (Global Forest Coalition, 2008).

### **Corruption**

Bribery and corruption remain endemic in many countries and a significant barrier to the successful implementation of forest management. Forest crime and corruption is one of the main causes of deforestation and immediate attention has to be given to illegal activities and corruption. Moreover, corruption in government, military and economic powers is well known cause of deforestation (Colchester and Lohmann, 1993 and FAO, 2006). Illegal logging and corruption are identified as key drivers of deforestation and forest degradation in Bangladesh, Bulgaria, Cameroon, El Salvador, Georgia, Ghana, Indonesia, Kenya, Nepal, Panama and Papua New Guinea. For example in Bulgaria, illegal logging combined with corruption identified as the most serious problem for Bulgarian forests. Laws and policies may exist, but are not implemented because of a lack of political will and financial resources dedicated to their implementation (Global Forest coalition, 2008, 2010).

### **Poor central planning, lack of political will and inadequate capacity**

A range of problems relating to the capacity and concerns of governments, both central and local are important cause of deforestation. These issues are major in Bangladesh, Cameroon, El Salvador, Georgia, Ghana, India, Kenya, Panama, Papua New Guinea, the Philippines and Ukraine. Lack of good governance and effective central planning was a primary problem, although the situation is different from country to country. For example in Georgia, few government personnel qualified or understand Sustainable Forest Management but a weak and inadequate legal framework and a failure to apply an inter-sectoral approach. Similarly in Panama the State has no clear policies regarding: monitoring activities in forests and system of Protected Areas. In India there is also lack of proper attention to forests in central or state government planning and financial allocations and weak regulatory mechanisms (Islam *et al.*, 2009). In El Salvador there is lack of municipal ordinances regulating forestry activities, while state policy and environmental legislation allow. In Ukraine there is an imperfect market reform in forestry with the State dominating forest management and timber harvesting by prioritizing short-term economic considerations. In Ghana also there is inadequate institutional capacity and inadequate promotion of research in forestry, as well as inconsistent government policies, poorly constructed timber

leasing agreements and unfair revenue disbursement. In Panama inappropriate and top down policy-making was again a problem. Lack of political will and capacity are also significant underlying cause of deforestation in countries Bulgaria, India, Cameroon, El Salvador, Georgia, Ghana, Panama and the Philippines (Chakravarty *et al.*, 2012; UNEP, 2008, 2011).

### **Impacts of deforestation**

Emissions of CO<sub>2</sub> from deforestation are primarily caused by the burning and clearing of tropical forests (FAO, 2006). Globally 18.2% of Green house gases emissions is as the result of land use change and forestry. This is 1.6 billion tons of carbon emissions annually, more than the global emissions from the transport sector and almost equivalent to the total emissions from US fossil fuel use. Deforestation and forest degradation have contributed 90% of total global green house gases emissions from land use change since 1950. 65% of the mitigation potential in the global forest sector is located in the tropics; while total emissions from least developing countries for all sectors constitute only 5% of global green house gases emissions, least developing countries are responsible for 20% of the global emissions that stem from land use change and forestry (Global Forest Coalition, 2008; IPCC, 2007; Chakravarty *et al.*, 2012 and UNDP, 2010). Biodiversity, wildlife and water availability considerably affect the livelihoods of forest-dependent communities. These further influenced by the possible adverse effects of climate change impacts on agricultural and forest-dependent communities, who may be forced into activities such as land clearing or deforestation. It is precisely known that forests serve as significant elements in the coping strategies of local communities' livelihoods and has to be recognized in supporting a pro-poor forest management process that can help adaptation, resilience and mitigation of climate change (Rowe *et al.*, 1992). One form of Environmental degradation has effect over the other form of ecosystem services. At the same time deforestation has the following forms of negative impacts according to Chakravarty *et al.* (2012):

### **Climate change**

Deforestation can change the global balance of atmospheric energy not only through the micrometeorological processes but also by increasing the concentration of carbon dioxide in the atmosphere globally because carbon dioxide absorbs thermal infrared radiation in the atmosphere and it leads to increase in the albedo of the land surface and hence affects the radiation budget of the region that can cause regional or global climate change (Chakravarty *et al.*, 2012 and UNEP, 2007). Deforestation affects wind flows, water vapour flows and absorption of solar energy thus it influence local and global climate. Deforestation on lowland plains moves cloud formation and rainfall to higher elevations or altitudes which are one form of climate change (Global Forest Coalition, 2008). Deforestation contributes to global warming which occurs from increased atmospheric concentrations of greenhouse gas (GHG) CO<sub>2</sub> leading to net increase in the global mean temperature as the forests are primary terrestrial sink of carbon. Thus deforestation disrupts the global carbon cycle by increasing the concentration of atmospheric carbon dioxide. Tropical deforestation is responsible for the emission of roughly 2 billion tonnes of carbon (CO<sub>2</sub>) to the atmosphere per year. Release of the carbon dioxide due to global deforestation is equivalent to 25 % of emissions from fossil fuels combustion (UNFCCC, 2007, Climate Change, 2010 and IPCC, 2007). Climate change has a number of economic and environmental impacts. It can affect our health, our economy and the natural world. The major negative impacts of climate change are: Changes in global temperature, Ocean acidification, ecosystem service loss, Sea level rise, spread of diseases and pests and Failure in agricultural products (Climate Change, 2010)

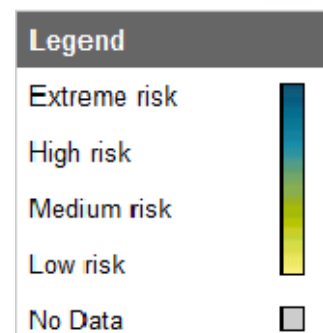
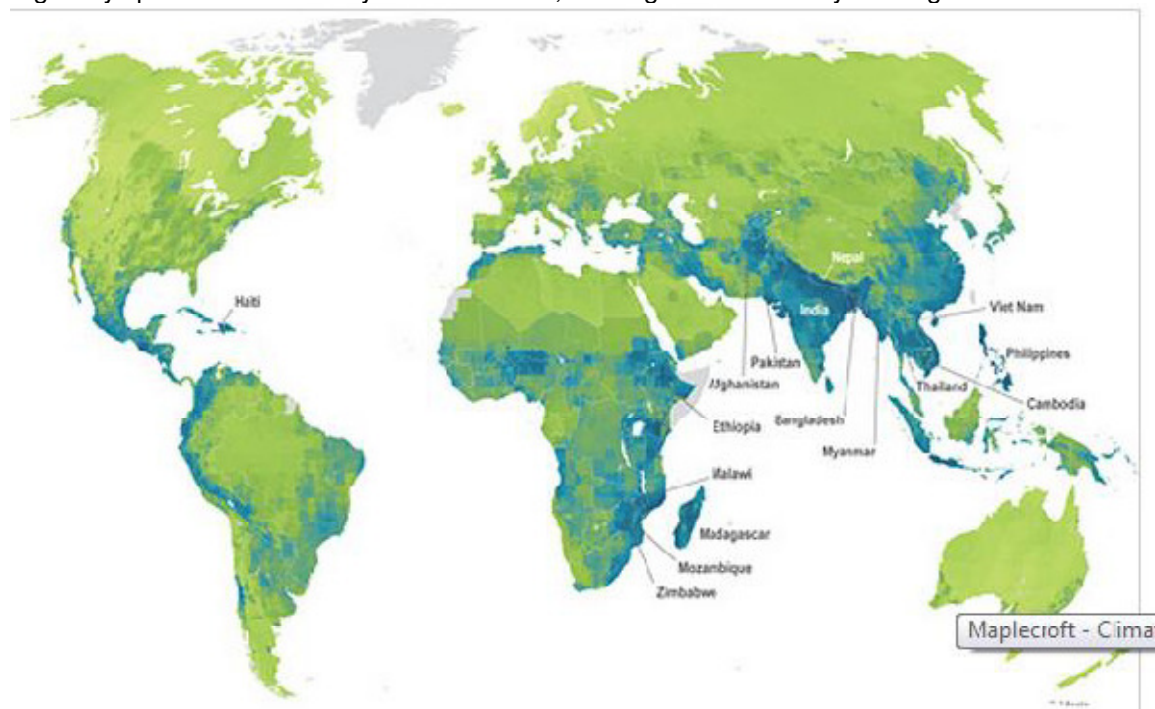
### **Water and soil resources loss**

Deforestation affects Water resources by disrupting the water cycle include drinking water, fisheries and aquatic habitats, flood/drought control, waterways and dams affected by siltation, water related recreations, and damage to crops and irrigation systems from erosion and turbidity (Bishaw, 2001 and Development and Policy Management Consultants, 2009). One of the most important services that forests provide is water conservation. Artificially Filtering and/or treating water is very expensive but Forests can reduce the costs of doing so either actively by filtering runoff or passively by substituting for housing or farms that generate runoff. Deforestation can also result degraded watersheds that are no longer able to sustain and regulate water flows of rivers and streams. Once they are gone, too much water can result into downstream flooding, many of which causes disasters in many parts of the world. This downstream flow causes soil erosion and siltation of water courses like lakes and dams (Chomitz *et al.*, 2007).

### **Decreased biodiversity**

Tropical Forests serve as storehouses of biodiversity and consequently deforestation destroys the biodiversity including

migratory species weather they are threatened, endangered or critically endangered and their habitats. Tropical forests



Source: <http://www.treehugger.com>

Figure 3. Global forest risk to climate change

support about two thirds of all known species or 65 % of the world; of which 10, 000 are endangered species. Retaining the biodiversity of the forested areas (various plants, animal and microbial species) is like retaining a form of capital that can be expressed in terms of monetary terms, recreational /scenic values, regulatory and supporting roles that can't be clearly valued in terms of money. About 80 % of the world's population relies for primary health care at least partially on traditional medicine. The biodiversity loss and changes in forest cover could trigger abrupt, irreversible and harmful changes in many ecosystem services and catastrophic occurrences (Bishaw, 2001).

### Economic and Social consequences

The destroyed tropical forests loss each year amounts of 45 billion US dollar in forest capital. All potential future revenues and future employment opportunities that could be derived from their sustainable management for timber and non-timber products disappear by destroying the forests (Colchester and Lohmann, 1993). Deforestation is expression of social injustice. The social consequences of deforestation are many with long-term impacts. For indigenous communities it is source of civilization and its destruction usually change their traditional life style and the breakdown of their social institutions in their ancestral area. The intrusion of outsiders from different traditions and cultures destroys forest resources and at the same time traditional life styles, customs and religious beliefs. This is clearly pronounced in resettlement area of Ethiopia (Bishaw, 2001).

### Mechanisms and incentives for forest conservation

Indigenous Peoples' care for forests is demonstrated in different communities of different culture and practice. For example, in Panama, it is observed that the country's remaining forests are located in dedicated Indigenous Comarca



areas. The Mukogodo forest in Kenya, the Yaku indigenous community's attachment to the forest is a way to conservation. All the special attachment to the forest is ensuring its conservation. This community based conservation approach is the key factor in almost all countries to the underlying causes of forest conservation and restoration. It is more practiced in Colombia, Panama, Tanzania, Uganda, India and others (UNDRIP, 2010 and Wu, 2011). According to Global Forest coalition (2010) and Myers (1994) there are a number of ways that should be applied in forest conservation on local communities. With respect to protecting livelihoods and developing alternative livelihoods that enhance forest conservation, these included:

- Giving respect and care to the culture, skill and tradition of Indigenous people since local communities are fully dependent on biological diversity and forest resources.
- Protecting the rights of local communities with respect to natural resources use: forest, wildlife, medicinal herbs, land and water resources.
- Ensuring Indigenous communities to have a right to education and enabling them to protect their rights and access on forest resources.
- Giving free access of alternative energy for Indigenous communities living near the forest for the protection and conservation of forest and environment.
- Proving alternative livelihood securing trainings and facilities to local communities.
- Promoting the exploitation of non-timber forest products to encourage forest conservation by local communities.
- Increasing the access of local communities near forests to health, road, electricity, drinking water, and communications technologies.

There are different General mechanisms of forest conservation (Brack and Bailey, 2013 and UNEP, 2011). Some of these are:

### **Community forest Management Strategy**

Community forest management is the involvement of local forest dependent communities. In Panama, "Community forest management has been an exemplary achievement". Traditional knowledge associated with the cultural and spiritual values in forest management are promoted. In Nepal, over one fifth of the country's total forest area (1.219 million ha of forest) is managed by local communities. Community Managed Forests are managed more effectively and less degraded than government managed forests. In Ukraine, decentralization and community forestry in the forest sector and compensating forest owners who are prevented from harvesting timber for ecological reasons is realized. In Tanzania, the most successful forest restoration projects are that engage communities; restoring forests means much more than planting trees. In Uganda, communities around the Mabira forest are implementing collaborative forest management practices that include giving communities ten hectares of land which they can either plant with trees themselves, or lease for reforestation. In Ethiopian also successful community forest management come when the communities see that there is more than just an economic incentive to conserve and restore forests (Myers, 1994).

### **Protecting and promoting livelihoods as a driving force**

According to (Chomitz *et al*, 2007) and UNEP (2007) to conserve forest resources, Sustaining and improving local communities' livelihoods is an important incentive. But the fate of the worlds' forests is tangled up in the dominant economic system, which paves communities towards poverty and drives deforestation; Such as: logging, industrial agriculture, mining and oil extraction, etc. In the current economic process, governments and communities should adopt sustainable processes that provide basic livelihoods and social security that enable fair trading and sustainable livelihood. Alleviating poverty by creating alternative economic opportunities are effective mechanisms to forest management. For example: In India, helping communities by sustainable forest based livelihoods and providing sources of employment is a trial practice. In Tajikistan, women's NGOs have created a platform for cooperation and development of microcredit programs to create employment opportunities for women in environmentally friendly businesses. In Ukraine, participatory and interdisciplinary approach to research on forest conservation with improving the welfare of communities in reduction of unemployment is going on. In Nepal, community based forestry is form of capital assets that provide goods and services for the improvement of rural livelihoods. In Cameroon, forests are less as a source of economic products and more as a means of supporting development and the well-being of the local communities. In Tanzanian planting a tree help in achieving the Millennium Development Goals which has contributed directly to the achievement of improving household incomes, education and health, while at the same time restoring biodiversity and ecosystem integrity. In Kenyan, ecotourism is an alternative means of income (although it was identified as a cause of deforestation in other countries).

## **Connection of forests and water flow**

Conserving forests protect local water resources as incentive for forest restoration in Brazil, Colombia, and Tanzania. In Colombia it was observed communities experienced severe consequences in lack of water resources. But recently as the result of forest restoration they feel the great importance of forest it plays in the provision of water, oxygen, temperature regulation maintaining biodiversity and providing food resources. These motivate the community for forest conservation and restoration. In Brazil Ecological restoration is primarily focused on connecting the remnants of the Atlantic Forest and creating and securing ecological corridors, biological refuges, riparian forest and forest cover close to water springs. The Atlantic Forest has received special attention in terms of forest restoration because seven out of the nine largest hydrographic basins in Brazil are located in this densely populated biome. The economic success and dependence of Brazil agriculture is dependent on the availability of water for irrigation that flows from the forested areas (UNEP, 2011).

## **Transition to agroecology and agroforestry**

Transforming from the dominant monoculture agriculture system to both agriculture and forestry is emanating from the harmful system to both people and the planet earth (Stiftung, 2014 and FAO; 2006). For example: In El Salvador, adopting new agroecological agricultural practices (based on ecological principles) together with saving, replicating and exchanging indigenous seeds and replicating successful forest management practices by practicing fruit plant plantation. In Panama, much emphasis is given on the experiences of Indigenous People with respect to the conservation and restoration of forest ecosystems by scientifically proven practice. In Brazil, agroforestry projects are found mainly in experimental projects on degraded areas of the Amazon for recovering degraded areas used for extensive cattle raising. In Ukraine, productivity and biodiversity of forest ecosystems is implemented by systematic monitoring of the government. Multifunctional approach to forestry involves the evaluation of multiple forest goods and ecosystem services by developing market conditions and economic incentives in forestry are more effective.

## **Curbing corruption and strengthen forest conservation law**

In deforestation and environmental degradation there has to be improvement and implementation of the legal laws. Curbing corruption with respect to logging must be a priority if the world's forests have to be successfully protected and restored (Koyunen and Yilmaz, 2009).

## **Raising awareness and improving communities' capacity**

According to UNDRIP (2010) and Global Forest Coalition (2010) Community based awareness raising and education are critical in forest conservation. Most People are not aware of Forests capacity for self regeneration. It is increasingly threatened by over burden of human use and the use of fire to renew pastureland for cattle and the subsequent spread of intensively farmed monocrops (including GMOs and the associated use of agrochemicals that impact on biodiversity and pollinators, which are critical to natural restoration mechanisms). For example: In El Salvador, strengthening organizational capacity with respect to land rights, securing shelter and food, off poverty and protecting forests is prioritized. An important element is forming alliances amongst different stakeholders in civil society and raising the awareness on the consequences of deforestation. In Bulgaria, the civil societies do not have influence over national forest policy and lacks critical information. All relevant stakeholders, including local communities, should be part of the forest policy processes through different mechanisms: awareness creation campaigns, public consultations, and meetings at both regional and local levels. In Ukraine, the need for professional, objective and unbiased presentations and discussions of forest biodiversity conservation and restoration in mass media and developing study courses focusing on sustainable forestry for schools are focus areas.

## **CONCLUSION AND RECOMMENDATIONS**

### **Conclusion**

Deforestation can only be halted if the underlying causes of both are addressed; analyses are often flawed or incomplete. the most effective measures to stop deforestation and forest degradation and promote forest conservation and restoration are: reducing demand for wood, reducing demand for land, supporting cultural values, respecting indigenous territories, promote community conservation areas, redirecting financial investments, addressing lack of political will and capacity, curbing corruption, integrating forest and poverty reduction strategies and halting climate change.

## Recommendations

Deforestation must be tackled by sustainable development principle; the resource has to be exploited creatively for people's benefit (by forest conservation mechanisms), to use by maintaining and enhancing its ability in the present generation without compromising the future generation. Equitable share of a resource is crucial to minimize the damage particularly in local level and in global level generally.

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