

## MAJOR DRIVERS OF DEFORESTATION AND FOREST DEGRADATION IN DEVELOPING COUNTRIES AND REDD+

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### ABSTRACT

Identifying major drivers of deforestation and forest degradation has been an important task at the present context of Reducing Emissions from Deforestation and Forest Degradation “REDD+”. At present, many bilateral and multilateral projects are carrying out pilot activities for the REDD+ in developing countries and many Asian countries are being engaged in this process. Asian countries namely Nepal, Cambodia, Indonesia, Lao PDR are also in the process and have initiated some preparedness activities, where annual loss of forest covers was found different in the period of 1990 to 2010. This loss was due to several drivers which are not understood well but it is important for designing the REDD+ projects. This paper aims to identify major drivers of deforestation and forest degradation in these countries. This study identified that conversion of forest land into agriculture land, illegal harvesting, infrastructure development, forest fires, encroachment, grazing etc are major causes in the region. These drivers are associated with various underlying factors mainly socioeconomic, and policy governance and the magnitudes of drivers are different in each country. These should be addressed with government intervention to change dependency on the forest resources, income sources of the people and institutional set up of the forestry sector.

**Keywords:** *Forest Degradation, forest cover, Asia, REDD+*

### INTRODUCTION

Global climate change is becoming a huge threat for the living world. The rates of climate change are increasing day by day with increased temperature. Global temperature is increasing by 0.2°C per decade since the past 30 years (Hansen et al. 2006). This has forced plants and animal species to shift their existing distributions and abundances which has been putting risks at species-level extinction (McCARTY, 2001, Thomas *et al.*, 2004, Thuiller *et al.*, 2005). Changing habitats of plants and animals from historical place gradually reduces the ecosystem resilience and life supporting systems. This creates

natural abnormality in the existing ecosystem, its health and services.

Greenhouse gas emission (GHGs) is taken as one of the important causes to increase global warming. GHGs emissions from the anthropogenic causes are becoming a major threat for controlling the increased rates of global warming (Meinshausen *et al.*, 2009). Intergovernmental Panel on Climate Change (IPCC) mentions that forestry sector related emissions is also significant (Pachauri & Reisinger, 2007). Forestry related emissions are coming up either from deforestation or from forest degradation. Reducing forest loss would reduce emissions and increase carbon sequestration capacity of the

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forests. As global natural forests are still present with developing countries, protection from further loss and improvement is important. Moving with global development, many countries are carrying out infrastructure development, hydropower, water treatment, water supply, extension lines etc. Government of most of these countries prefers forest areas for these development activities as forest areas and resources are easily available to them. Ultimately, the governments have been supporting forest area depletion and forest quality reduction.

According to the Food and Agriculture Organization (FAO, 2011), a total of 0.7 million hectares of forests has been lost in the Asian and the Pacific Region annually from 1990 to 2008. Among various countries of the region, South and East Asian countries are facing similar situation of rapid deforestation and forest degradation. Most of these countries are on the way of development with emerging economy which is creating a huge pressure on the forests. These activities have resulted in loss of many important natural forests and the remaining areas are being depleted. Thus lead to the loss of many important plant and animal species. Reducing biomass in the forest increases carbon emissions by reducing sequestration of atmospheric carbon in the forests. This also increases due to burning of the forest biomass. Therefore there is a need to address these issues with an appropriate mechanism. This mechanism was not been included in the Kyoto protocol of United Nation Framework Convention on Climate Change (UNFCCC).

Now, the thirteenth Conference of the Parties to the UNFCCC (COP- 13)

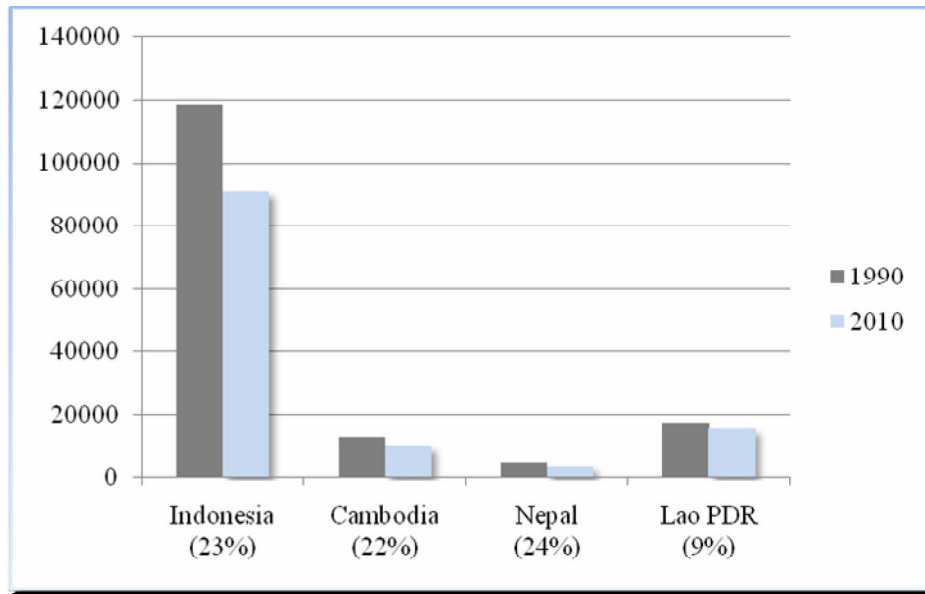
in Bali in 2007 agreed on roles of deforestation and forest degradation to reduce the rates of climate change. This was gradually developed in various negotiation and preparatory meetings. It was started with the agenda of avoiding deforestation and gradually moved to reducing emissions for deforestation and forest degradation (REDD) and reducing emissions for deforestation and forest degradation (REDD) plus. At present, REDD plus conservation, sustainable use and enhancement of the forest carbon is included and agreed in the negotiation. In REDD+ mechanism additional carbon credit generated from forestry is eligible for sale in the future markets but this mechanism is unclear and still has to be developed and made acceptable globally. The REDD+ mechanism is not obligatory for the developing countries (non annexed countries in Kyoto Protocol) which would be voluntary only to the countries who want to take part in carbon markets to sell their credit in accepted mechanism. However, present global concerns are focused in developing such accepted mechanism with having a clear understanding of the common drivers of deforestation and forest degradation.

#### **Status of forest covers changes**

Forest cover changes in Asian countries are remarkable. Southeast Asia experienced the largest decline in forest area in the region during the last decades, with an annual net loss of forests of more than 0.9 million hectares. However, when compared with figures for 1990–2000 (-2.4 million hectares per year), this represented a significant drop. The significant change in the total forests in Nepal, Indonesia, Cambodia and Lao PDR in between 1990 and 2010 has been in rates of 24%, 23%, 22% and 9% respectively (FAO, 1990, FAO, 2010). In

term of areas, Indonesia has large forest areas followed by Lao PDR, Cambodia and

Nepal respectively (Figure 1).



**Figure 1: Changes in forest cover (1990-2010)**

Figure 1 shows Indonesia, Nepal and Cambodia having high forest cover changes in proportion of the total forest but in term of the total forest areas, Indonesia lost comparatively huge forest areas. We need to explore the reason behind it to develop an appropriate strategy to reduce deforestation and forest degradation rates.

**Drivers of deforestation and forest degradation**

The changes in forest cover are the result of various drivers. These drivers can be divided into two types namely proximate and underlying. Proximate causes are those which are visible drivers whereas underlying causes are hidden behind the proximate drivers of deforestation and forest degradation (Geist & Lambin, 2002, Sunderlin & Resosundarmo, 1996).

Proximate drivers of these countries are mostly common but their intensity levels are different. Infrastructure development, agriculture expansion and wood extraction are major common drivers in these countries. Since all these countries are moving towards development, infrastructures like road networks, electricity, and communication networks are being built. These infrastructures mostly from government initiatives and using private land are quite expensive. Therefore forest lands are exploited. Agriculture is the main source of livelihood in these countries. It pushed the forest conversion. This is mainly due to less land holding and not enough land to sustain even farmer’s livelihood. Presently, a total of 3,600 million people hold 25 million square kilometers of

land mass. In term of individual country, Nepal's per capita land in 0.1 ha.(CBS, 1997), in Indonesia 0.1 ha (World Bank, 2011), in Cambodia 0.4 ha (FAOSTAT, 2004) and in Lao PDR 0.2 ha (World Bank, 2011). This land scarcity and agriculture based economy have demanded rapid expansion of agricultural land through conversion of forests (DeFries *et al.*, 2010, Barbier, 2004, Angelsen, 1999). Similarly, extraction of wood from the forest is another proximate driver that can be legal or illegal. in order to generate income and employment many people are involving in wood extraction and trade. Wood export is highest in Indonesia, Cambodia and Lao compared to Nepal and northern countries have increased demand of tropical timber.

Underlying causes of deforestation include demographic factors, economic factors, technological factors and Policy and institutional factors. These drivers are somehow interdependent and all are important (Geist & Lambin, 2002, Forestry Administration Cambodia, 2011, Ministry of Forest and Soil Conservation Nepal, 2010, Department of Forestry, Lao, 2010, Ministry of Forestry Indonesia, 2009).

#### ***Demographic factor***

Population growth rate is at an average of 1.2% in all countries. The population census data show that all countries have reduced their annual population growth rates i.e. Indonesia's annual rate was 2.1% in 1990 and 1.097% in 2010 (CBS, 1990, 2010), in Nepal, it was 2.1 % in 1990 and 1.5 % in 2010 (CBS, 1990, 2010, Cambodia 2% in 1990 and 1.71 % in 2010 (CBS, 1990, 2010) and Lao PDR 2.81 % in 1990 and 2.2 % in 2010 (Lao PDR National Statistics, 2011) but overall population is growing. This

growing population needs additional livelihood resources to survive.

Migration is another demographic factor that created different pressures on forests. The main factor is urbanization which is huge in these countries. People move from rural areas to urban, for better survival opportunities. In Nepal, migration of mountain people towards Terai (low plain area) was massive in 1970's. They deforested Terai's forests and converted forest land into agriculture land. This was similar in other countries as well; migration and urbanization has increased demand on forest resources and forest land.

Dependency on wood based energy is higher in these countries. Out of total energy requirement, Cambodia fulfils 83.3% of energy needs from wood. Similarly, this ratio is also significant in Nepal and Lao with 80.6 % 77.3% respectively. But this is only 30.2 % in Indonesia (FAO/ RWEDP, 1999).

#### ***Economic factor***

Above 2 billion peoples are living in the rural areas (Rosegrant & Hazell, 2000) in Asia and all of them are in agriculture based economy. With food crisis of the 1960s, Asian countries initiated green revolution that increased per capita income and reduced poverty. This increased 190 percent in domestic products in between 1970 and 1995. This demanded forest land conversion to agriculture land. All these countries have limited industrial development and forest based enterprise activities and employment generation is considered an important sector.

#### ***Technological factors***

Technology development can be either supporting or reducing deforestation

and forest degradation. Deforestation and forest degradation is rapid with application of machineries for logging and preparing land for cash crops. This is huge in Indonesia, Cambodia and Lao (Enters *et al.*, 2002). Logging of the timber for domestic use and export and conversion of forest land into oil palm plantation in these three countries are high. Inadequate technology development is hindering to push energy efficient stoves and machineries to reduce fire wood use (Bhattacharya *et al.*, 2000). On the other hand, technology can help replace the accessories made from wood products with other materials and comparatively better to reduce wastes of the trees etc. However, development and application of technology in reducing wooded products for particular geography is yet to be developed.

***Policy and institutional factors***

Good policy, appropriate institutional structure and effective functioning of all wings of the structure are important aspects in forestry governance (Cadman 2009). Forest laws and regulations are mostly formulated without involving key stakeholders such as community organization, research organization, related ministries, and development organization. Indigenous communities whose livelihood is highly attached to the forest resources are raising voice that they are not included in the policy formation process. This policy does not represent voice of the key stakeholders and low possibility of the effective enforcement (Agarwal, 2001, Cadman, 2009). Good institutional structure is also important aspect to enforce all policies in practice. Low capacity of the staff, inappropriate authority of the certain institution is also seen (Forestry

Administration Cambodia, 2011, Ministry of Forests and soil Conservation, Nepal 2010, Department of Forestry, Lao, 2010, Ministry of Forestry Indonesia, 2009).

There are many confusing policies in place. Different informal laws and traditions such as collection of plants for religious use, use of forest for social and community development are continued in all countries. Mostly indigenous communities are practicing shifting cultivation that is believed as a cause of deforestation and forest degradation. In Cambodia, Indonesia, Lao PDR shifting cultivation is comparatively massive where as in Nepal there are comparatively less (Rasul & Thapa, 2003).

**Global mechanism to address deforestation and forest degradation**

Linking forest development to the incentives mechanism is being highlighted in many papers. Considering this facts, REDD+ concept is accepted as a climate change mitigation option. REDD+ is coming up with UNFCCC negotiations in climate change debates during the last five years. REDD+ concept aims to provide incentives or compensations to the developing countries for additional carbon enhancement in their forests in quantitative basis. The concept originated with request of Papua New Guinea, Costa Rica and coalition of rainforest nations in Conference of Party (COP) 11 Montreal 2005 and got support from Subsidiary Body for Scientific and Technological Advices (SBSTA). However, REDD+ is increasingly likely to be included in a post-2012 climate agreement, many challenges remain in the practicability aspects. To bring better learning, there

are various piloting going on globally. World-bank's forest carbon partnership facility and UN REDD program are major funding source to push this pilot projects. The Forest Carbon Partnership Facility (FCPF) programs have supported 36 countries and UN REDD+ financial support to 16 countries for capacity building, research and preparedness activities for REDD+ (FCPF, 2012, UNREDD, 2012).

## DISCUSSION

As the REDD+ has been taken as an important option for climate change mitigation, it is almost certain to include REDD+ in the post Kyoto negotiation. But, there is gap to identify methods and tools for addressing drivers of deforestation in acceptable ways ensuring safeguard of the social and environment aspects of REDD+. To overcome these gaps, ongoing preparedness activities and pilot projects in the many developing countries are expected to bring models to feed in global negotiation. However, the learning of the pilot projects should be analysed well according to the situations in order to develop an appropriate mechanism.

REDD + depends on how the country or project deals with drivers of deforestation and forest degradation. Strategies and enforcement of the REDD+ activities should depend on country's socio-economic situation as well as environmental governance mechanism (Corbera *et al.*, 2010). After reviewing the four Asian Countries, we found that all of them are moving towards transition of the development and government may not want to stop its development pace with creating unemployment and reducing national

Gross Domestic Product (GDP). Development activities of the countries are directly or indirectly expediting the rate of deforestation and forest degradation. No one dares to stop development activities and increase poverty of the country but it can formulate environment friendly development processes that help to reduce deforestation and forest degradation. As REDD+ will be a market based mechanism may provide additional incentives that can be used to follow such environment friendly development.

There are some ongoing initiatives in these countries that can be replicated in the similar situation, for example local stewardship, additional income options linking to sustainable forest resource management, alternative options of forest resource use has contributed to improve forests in Nepal. Additionally, an alternative income options, policy and institutional reform and enforcement are also important to address drivers of deforestation and get benefits from REDD+. The following measures are useful in addressing the existing drivers of deforestation:

- Economic and employment opportunities especially to the local people and indigenous communities in each country need to be expanded for better options.
- Government should establish an incentive mechanism for conserving forests compensating conservation efforts made by poor communities for long run.
- Government and supporting organizations need to work towards improving productivity of agriculture land rather than

conversion of land, invention and promotion of clean energy mechanism, cost effective technical inputs in natural resource management.

- Government policies and strategies need to make transparent, inclusive and appropriate enforcement mechanism. This would lead to inclusive policy making process and setting up an appropriate institutional structure that would create win-win situation to government, people and globe.
- Governments especially in Indonesia and Cambodia should change/stop their present conversion of forest land into palm oil plantation and mechanized logging.
- Community ownership is better in many countries and can be expanded for reducing deforestation and forest degradation (Nurse & Malla, 2006).

## CONCLUSION

Deforestation and forest degradation rates in all four countries are different however its causes are almost similar. Some common actions would work in all countries, however the governments of each country needs to take some country specific strategies to address it. Such economic development and institutional set up with good governing mechanism would be important for all. This could be compensated with incentive mechanism of REDD+ for economic development aspect but benefit sharing and proper monitoring mechanism would be effective to motivate all needy people.

Country specific interventions are important according to the country specific issues such as Indonesia and Lao need to stop or reduce forest land

conversion or deforestation whereas Nepal needs more sustainable management of forests reducing degradation of the forests. These issues should be further identified with detailed researches for each country. For example, Cambodia, Indonesia and Lao PDR need to develop alternative income rather than high value agriculture with forest land conversion whereas Nepal should reduce biomass based energy and dependency on forest based energy consumptions.

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