

CLIMATE CHANGE MITIGATION IN THE FORESTRY SECTOR OF NEPAL



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List of Acronyms

ASL	Above Sea Level
BSP	Biogas Support Program
BZ	Buffer Zone
BZCFUGs	Buffer Zone Community Forest Users' Groups
CARE	Nepal CARE International Nepal Office
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CF	Community Forestry
CFM	Community Forest Management
CFMP	Collaborative Forest Management Program
CFUGs	Community Forest Users' Groups
CO ₂	Carbon dioxide
COP	Conference of Parties
DANIDA	Dannish International Development Agency
dbh	diameter at breast height
DFID	Department for International Development (UK Aid)
DFO	District Forest Office
DFRS	Department of Forest Research and Survey
DNA	Designated National Authority
DNPWC	Department of National Parks and Wildlife Conservation
DoF	Department of Forest
DoPR	Department of Plant Resources
DoSC	Department of soil Conservation
EIA	Environment Impact Assessment
FECOFUN	Federation of Community Forest Users, Nepal
GEF/LDCF Change	Global Environment Facility/Least Developed Countries Fund for Climate Change
GHG	Green House Gas
GoN	Government of Nepal
ICIMOD	International Centre for Integrated Mountain Development
INGO	International Non-Government Organisation
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
MAC	Ministry of Agriculture and Cooperatives
ME	Ministry of Energy
MOF	Ministry of Finance
MFSC	Ministry of Forest and Soil Conservation
MoE	Ministry of Environment
MST	Ministry of Science and Technology
MW	Mega Watt
NAPA	National Adaptation Plan of Action
NGO	Non-Government Organisation

ICIMOD	Integrated Centre for Integrated Mountain Development
JICA	Japan International Cooperation Agency
INGO	International Non-government Organisation
IUCN	International Union for Conservation of Nature
NTFP	Non-Timber Forest Product
NTNC	National Trust for Nature Conservation
PAO	Protected Area Office
PES	Payment for Environment Services
REDD	Reduced Emission from Deforestation and Degradation
SBSTA	Body for Scientific and Technological Advice
SDC	Swiss agency for development and cooperation
SNV	Netherlands Development Cooperation
UGs	User Groups
UN	United Nation
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WWF	World Wildlife Fund

Background

Nepal is a beautiful country (147,181 km²) with great cultural, biological, geographical and climatic diversity. It expands from sea level in the Southern Plain (152m asl) to snow-capped mountains (8848m asl), which include the highest peak of the world. Water¹ and the forests are the major natural resources of the country. Nepal's wide climatic and topographic variation includes 118 ecosystems, 75 vegetation types and 35 forest types that provides habitat for large number of plants and wildlife and in terms of biodiversity richness it is 25th nation. Nepal is only 0.03 percent of the total surface of the earth and only 0.1percent of the world's land area but is rich in biological diversity. Until now 9.3 % (850) of bird, 4.5 % (185) of mammal, 1.6 % (100) of reptiles, 1.0 % (43) of amphibians 1.0 % (170) of fish, 2.6 % (645) of butterflies and moth, 2.7 % (5856 of which 700medicinal plants & 248 endemic species) of the flowering plant species, 5.1% (853) of bryophytes, 3.4% (389) of peridophytes, 2.3% (465) of lichens, 2.4% (1822) of fungi, 2.6% (687) of algae and large number of many other insects of the world are reported from this country.² Over 9549 people are employed in the government forestry sector and 776 in related non-governmental forestry sector, thousands in INGOs while several thousand benefits from forestry programs.³ Besides controlling natural disasters, forests also provide different products a large number of households' subsistence, as well as providing wider economic benefits.

Nepal's GDP is US\$5.5 billion with an annual average growth rate of 4.9% and annual per capita income of US\$250.⁴ The share of forestry in GDP is approximately 15%⁵, particularly because Nepal exports forest products worth US\$35million annually.⁶ Despite its economical and ecological importance, however, this sector receives only 4.6% of the total government development expenditure.

Land use changes and degradation of forests and soils in this region have important implications for CO₂ emissions and global climatic change. Even insignificant changes in the climatic system threaten the vulnerable ecosystem of the geologically young and fragile Himalayas. Though Nepal's share of global emissions of greenhouse gases is negligible⁷ it faces the consequences of global warming (0.06°C/year, Shrestha et al, 1999; 0.5⁰C/decade, Dhakal, 2003), including social, economical and ecological impacts, and hence it is a matter of serious concern in Nepal. Over the past few years, Nepal has experienced severe droughts and other adverse weather conditions that have affected agriculture, water bodies, forest and created several other environmental problems. In the country about 64 percent of cultivated areas are fully dependent on monsoon rain

¹ of which Nepal has approximately 2.27% of the world's resource, based on CBS 2005.

² Base don HMGN 2002.

³ Based on MFSC 2009.

⁴ Regmi & Adhikari 2007.

⁵ Poudel 2007.

⁶ Subedi 2008.

⁷ with 0.13 t *per capita* CO₂ emissions. Based on Many Eyes 2008.

and erratic weather patterns due to climate change-affected crops and livelihoods (ABPSD 2006, Ghimire 2008).

Moreover, Himalayan glaciers cover about three million ha (35,110 sq km), or 17% of the total mountain area of the earth. The total ice reserve of these glaciers is 3,735 km³, which is equivalent to 3,250 km³ of fresh water; they are the perennial source of several rivers of Nepal as well as of the region. Due to recent rises in temperature, many large glaciers have been melting rapidly resulting discharge of huge volumes (42millions m³) of water. The glacial retreat in Nepal ranges up to 20 m/year (CNCCC 2007); this has resulted in a six-fold growth of glacial lakes, which have led to lake bursts in the country. According to ICIMOD and UNEP there are 26 potentially dangerous glacial lakes in Nepal that have threatened life and property throughout the country. Furthermore, rapid shrinkage of these glaciers had seriously threatened water availability, particularly during lean flow seasons, when meltwater contributes to the rivers that supports human activities and ecosystems downstream.

With more than 80 percent of the national area in fragile ecosystems and with low per-capita income, the main concerns of forestry sector in Nepal are the annual rate of deforestation (1.785 percent per annum), development and implementation of scientific management plans, extension of authority and control over forest resources and the unutilized potential of forest resources. The limited skilled manpower and technology and financial resources are the major constraints of the forestry sector.

Forestry Sector Information

The forest area (forest & shrubland) of Nepal is estimated to be about 5.53 million hectares or 37.6% (36,36,000 ha forests land and 18,97,000 ha shrublands) of the total geographical area of the country. Forests stand as one of the important natural sources to meet basic needs because around 88.3% of the population of Nepal depends on the forests for daily fuel wood supply⁸ and 42% population depend on forest for fodder for livestock.⁹ 80% population of Nepal are highly dependent on forest for fuelwood and annual fuelwood consumption of Nepal is 12.5mt/year, which emits roughly 5mt of carbon to air.¹⁰ Projection of consumption and sustainable supply of major forest supplies like timber, fuelwood and fodder shows a high supply deficit in Nepal. Supply-consumption (demand) projection for the year 2010 of fuelwood shows deficit of 1,427,000 tonnes, timber deficit of 1,038,400m³ and fodder deficit of 218,100 tonnes.¹¹ Total CO₂ emission in Nepal is 3,045,000 metric tons (in 1998), of which 898,000 metric tons¹² is from solid fuel. Of this solid fuel, 75% is contributed by fuelwood.¹³ This clearly, indicates high pressure on the forests of Nepal, which consequently are decreasing by 1.7 percent every year. This also suggests that without the development of alternatives future demands cannot be met.

Forests help in mitigating climate change by sequestering atmospheric carbon. According to the global forest resource assessment data of the FAO (2005) Nepal's forests sequester 897 million metric tonnes (mmt) of which 485mmt carbon in living biomass, 86 mmt in deadwood and litter and 326mmt in soil. Similarly, Nepalese shrublands bind 226 mmt of carbon—43mmt in living biomass, 13mmt in deadwood and litter and 170mmt in soil.

Alternative energy programs are being implemented in Nepal as means to both mitigate as well as adapt to climate change problems. Implementation of such alternative energy programmes play a mitigation role by protecting forests and shrublands from further degradation, while in areas with scarce or limited supply of fuelwood from forests it is adopted to meet energy needs. Alternative energy programs that are implemented in Nepal to decrease pressure on the forests include solar dryer/cooker, biogas plants, improved Chulo, homemade solar energy power system, improved water mills, electricity through micro hydro projects and maintenance of existing old plants. To date, under the Biogas Support Program (BSP) alone, 174,591 biogas plants have been constructed, adding to 6000 that were constructed before BSP program was launched.¹⁴

⁸ Based on MOF 2008.

⁹ WECS, 1997.

¹⁰ Regmi & Adhikari 2007.

¹¹ Based on MPFSN 1988.

¹² WRI 2003.

¹³ Acharya 2003.

¹⁴ See also Opdam 1997, and BSP 2008.

Another important mitigation activity conducted in Nepal is the improvement of forest management. Forest management has a long history in Nepal. Forest management policy aims to conserve forest biodiversity and environment to assure sustainable supply of forest product, to secure access and rights of rural communities, and to secure employment for poor and disadvantaged communities through various programs. To meet these objectives, under the Ministry of Forest and Soil Conservation (MFSC) there are a total of 34 projects and programs. Similarly, based on the legal provision of the National Park and Wildlife Conservation Act 2029 BS (BS is Nepali year =1972), 16 protected areas, including 9 national parks, 3 wildlife reserves, 1 hunting reserve and 3 conservation areas, are established covering 19.7 percent of the total land of the country. In addition, 8 different wetlands have been included in the wetland of global significances list (Ramsar Sites).

Recognising interaction between people and the forest, has Nepal initiated a participatory forest management approach and to date more than 1.6million households (almost 40 percent of Nepal's population) are involved in community forestry programs. By mid-March 2008, 14,389 Community Forestry User Groups (CFUGs) had been formed, of which 789 are composed of only women. A total of 1,225,993 hectares of National forest (22.2% of total forest) have been handed over as Community Forestry, and of the total members of the users committee, 25.51% are female and 74.49% are male. Similarly, under Leasehold Forest Development Programs, by mid-March 2008 3,417 consumer groups had been formed and 17,244.73ha forest area (0.31% of total forest) has been handed over. From this, 28,128 households have directly benefited (MFSC 2009). Likewise, under the Collaborative Forest Management (CFMP) approach, which is implemented in 3 Terai Districts of the Western Region, and under a partnership forest program in three districts (Bara, Parsa, Rautahat), three Partnership forest groups have formed to manage about 6,670 ha (0.12%) of forest area. Similarly, the Biodiversity Program for Siwalik and Terai is being implemented in 8 districts of the Central Development Region. In total 42.33% of country's forest area is within protected areas and community management programs.

Mitigation Measures

Issues within Nepal's forestry sector are highly complex and so integrated approach is needed to address them. Mainly mitigation measures include management improvement, development of alternatives and economic incentives to attract people in conservation, a decreased dependency on forest, and strengthening rural and national economy. The skills and technology needed for these mitigation measures are available in Nepal but transfer of new cost effective methodologies/technology invention could make efforts cheaper, faster, and more effective.

Review Master Plan

The Master Plan for the Forestry Sector (1988) is due to end in 2010, and so needs to be reviewed, evaluated, and re-examined to develop a new Master Plan for Forestry Sector. The 1988 plan addressed many of issues; however, in the changed political and economic situation it now needs to be revised to address several issues that were not envisioned earlier. Several climate change issues (mitigation and adaptation measures, and implementation mechanisms) need to be incorporated in the new management plan.

Management Transformation

Forest management by local communities had shown very positive results to protect and manage forests. Hence, community-based forest management system could be acknowledged as a unit for the state to transfer management responsibilities. Increased numbers of CF has also increased monitoring responsibilities and improved technical assistance from the government; however, manpower and the technical efficiency of field-based personnel have not been increased. This had affected monitoring of the forests and also delayed handover processes between management systems. Moreover, declaring 11 additional reserves and buffer zones has increased management responsibilities of the government.

Similarly, success in the conservation of protected areas like Annapurna, Manaslu, and Kanchanjanga - Conservation Areas by non-governmental organisations (NGOs) through integrated participatory conservation and development programmes confirm the reliability of the NGOs. The handover of management responsibilities to communities and NGOs will decrease government's burden and government could use their strength to improve monitoring and speed up handover process. But to address future responsibilities of monitoring and technical assistance, the manpower of the forestry sector needs to be increased and better trained. While handing over rights to CFUGs, national level institutions have to ensure that indigenous peoples' rights will not be violated. This will help to improve management of forests and also increase local participation in forest conservation.

In some community forests since the insurgency period, democratically elected Users Committees were displaced by ad hoc committees, formed by political groups or

political parties. The acerbity and conflict raised among user group members threatens the future of the forests. Similarly, the issue of distance user is becoming very serious and needs to resolve. District Forest Offices need to coordinate with all political parties of their district to establish consensus for the formation of Community Forest Management Committee (CFMC) by democratic processes. Likewise, people beyond the boundary of present forest user group are also now attracted due to benefit from community forests and they are also claiming benefits from community forests. Hence community forestry guidelines need to be revised to address such distance users' issues. Moreover, the differences in rights and facilities between community forests from the buffer zones and other community forests had discouraged CFUGs from Buffer Zones. Therefore, policy reform is needed to address disparity and maintain equity among CFUGs.

Similarly, the IEE and EIA assessment procedures before handing over forests is highly complicated for the users, and so to accelerate forest handover to communities these should be simplified. Identification of users has been very problematic and this has caused several conflicts in community-based forestry programmes. Therefore, guidelines should be revised to improve identification processes of users for handing over forests to communities. Moreover, while developing and handing over forests to communities there is need to pay attention to the security and priority of the traditional rights of Forest User Groups and indigenous people to encourage their active participation.

Furthermore, to avoid conflict and democratise participatory management practice, there is a need to institutionalise good governance in participatory forest management and forest based enterprise management by maintaining transparency, accountability, public auditing, public hearing and participatory monitoring. The task force recommendations for democratisation of the forestry sector of Nepal should be implemented.

Afforestation/Reforestation

There are large areas of degraded lands in Nepal that have potential for creating forest by plantation or by protecting natural regeneration. Besides government bodies, many NGOs and INGOs have also been involved in facilitating community forestry formation processes by providing technical assistance and also support in fencing for protection, plantation, and preparation of management and operation plans. Indeed, relying only on government budgets to accomplish plantation or regeneration in all potential barren/degraded lands will take a long time, whereas involving interested NGOs and INGOs would decrease time.

Similarly, in coordination with the Ministry of Agriculture, agro-forestry activities could also be initiated. This will also help to sequester large amount of carbon from the air. Two thirds of the area of Nepal is hilly terrain and agro-forestry activities will provide multiple benefits of fodder, fuelwood, fruits and other crops, while reducing soil erosion

and sequestering carbon from the air. Studies also indicated that total financial return from agro-forestry is higher than agriculture alone (GEFSGP 2006).

Reducing deforestation and degradation

Due to social as well as political reasons there has been increasing pressure on forests, resulting in decreases in forest area, density or diversity. Development of alternatives to forest products helps to decrease pressure on the forest and handing over of forests to user groups helps to generate local guardianship. But encroachment and illegal tree felling problems induced from political interest due to conflict or dispute within user groups or with neighbouring communities (distance user) need mediation from political bodies and NGOs to resolve the problem. Moreover, people are not aware of the consequences of climate change and its relation with deforestation. Hence, awareness programmes will be helpful in solving such problems and generating support for the protection of forests.

Beside encroachment and illegal tree felling, forest fire is also very serious threat to forest. This also needs to be controlled with the help of CFUGs. For effective control of fire problems, training programmes on forest fire control mechanism need to be organised for CFUGs.

Moreover, to address problems related to forest harvest and distribution, guidelines should be formulated and implemented effectively to ensure equitable fund mobilization and supply, distribution and sale of forest products from community forests and maintain transparency. Similarly, policies and mechanisms should be developed to maintain transparency and equitable distribution of earnings from carbon trading and Payment for Ecosystem Services (PES) projects.

Decreasing forest dependency

People's dependency on the forest has been very high and, as a result, forest area has been decreasing. Projections analysis of the sustainable supply and consumption of forest products indicated high pressure on the forest. This suggests that forest will not meet the demands of increasing population. To protect forest these pressure need to be addressed by alternative means. Alternative energy programmes so far implemented in Nepal include biogas, hydropower, solar energy, alternative stoves. There is need for a large number of alternative energy programmes to safeguard forest from subsistence and commercial demands. Technical potential of biogas plants in Nepal is 1.9 million and until now 180,591 plants have been constructed the target of 2009 is to increase this number to 200000 biogas plants in the country. Depending on the capacity of a plant it could decrease emissions equivalent to 5 to 10.4 tCO₂/plant/year. Annual electricity production is 2.511 billion kWh.¹⁵ Similarly a theoretical potential on the basis of average flows is estimated to be 83,000 MW electricity¹⁶, out of which 44,600 MW has

¹⁵ Based on CIA 2009.

¹⁶ Shrestha, 1968.

been assessed to be technically feasible, while 42,130 MW (50.6 Percent) could be economically harnessed.¹⁷ Cooking technology plays a critical role in fuelwood consumption; therefore, promotion of improved cook stoves will also help to decrease fuelwood consumption. Promotion of solar energy and wind energy programmes will also help to decrease energy demand, thus safeguarding the future of the forest. A recent study carried out by the Alternative Energy Promotion Centre (AEP) in six stations across the country stated confirmed potential of wind power in Nepal at 3,000MW.¹⁸

Furthermore, encouraging private forestry will supply firewood, timber, fodder and other NTFPs needs and decrease pressure on the natural forest. These measures help to bind GHG from the air. However, complications in the bureaucratic process for acquiring permits discourage people, and hence the process should be simplified. Moreover, to encourage people in private forestry, supply of information on forestry-related subjects, provision of quality seeds, and technical support need to be improved.

The MoE promote and administer alternative energy programmes in the country while MFCS also has an alternative energy programme in the buffer zones of protected areas. Coordination is needed to develop alternative energy action plans. But before this, there is need to carryout assessments on the number, capacity and types of alternatives needed for different parts of the country.

There are technologies available to improve biomass energy use, which decrease the quantity of biomass used and also emissions. Similarly, there are technologies available for energy efficiency improvements for the electricity that currently exists in Nepal, which have not been sufficiently implemented due to various reasons.

Capacity Enhancement

Despite having a policy of handing over management responsibilities to local communities, due to limited manpower within the government this policy has not moved at the desired speed. Moreover, most of the field level manpower of the forestry department is weak in technical knowledge of modern land measurement technology, plant identification, resource base assessment and sustainable yield calculation of different species. Due to this CFUGs are not able to include detailed information on forest resources in their operation plans. Lack of information on NTFPs in operation plans has been depriving UGs from utilising NTFPs for economic benefits. Therefore, field staff of the Department of Forests and Department of National Parks need to be trained in modern field technology and forest inventory practices following the standards set by the IPCC (2003) for the land use, land-use change and forestry sector—that is, estimation of above ground and below ground biomass, soil carbon estimation

¹⁷ Sharma and Adhikari, 1990.

¹⁸ Clean Energy News 2008.

and estimation of leakage (unplanned and indirect emission of GHG resulting from the project activities).

Record keeping of resource base, harvest, resource distribution, and administrative and financial activities is necessary to maintain transparency and also for Nepal to benefit from carbon trading. For this, capacities of the User Group members need to be enhanced by providing training opportunities. The few attempts made in Nepal to train members of CFUGs showed that they could conduct inventory in their forests¹⁹ by using GPS sets to locate permanent plots, measure diameter using diameter at breast height (dbh) tapes and height using clinometers. In most places, country people with basic education are available either within Forest Users' Group or within the village. These people could be used to train on forest survey and record keeping. This information can then be fed into the national database through the district offices of the forestry department and national park department.

Government could use this information to claim carbon revenues, and distribute them among the CFUGs (depending on their ability to reduce carbon emission by forest management), or use revenue as an incentive to measure carbon in the forest by paying the CFUGs to undertake forest inventory. Carbon revenue could be used as an incentive for the government to conduct forest inventory and carbon assessment on a regular basis in community managed forests by paying the CFUG members to collect field data. To support these activities, a national level payment system, a suitable policy, and an institutional arrangement at the national level is also required.

Similarly, infrastructure damaged during the insurgency has affected activities of district level and range post level activities of forestry sector. Therefore, construction or renovation of damaged infrastructure needs to be accomplished.

Reduce Impact of development program

Recent amendments of Nepal's EIA policy, which waive EIA requirements for hydro projects up to 50MW, is harmful to the forest sector, and hence needs to be amended to make arrangements for EIAs for hydro projects of all capacity. Other development programmes should also try to avoid negative impact on forests and the environment. Since many of our projects are financed by foreign donors; any cooperation is very helpful for environment protection arrangements.

Discouraged use of forest area for non-forestry activities and, in the case of national priority programmes, making sure that forest areas will not be reduced from such programmes, are all essential.

Develop Economic Incentives

¹⁹ Karky 2007.

Value estimation at present consumption levels shows that carbon payments are relatively small compared to the monetary or non-monetary value of forest resource use, and hence carbon payments may not substitute these benefits. Many believe that in such a situation, if the sustainable use of resources is not permitted under carbon trading, CFM may cease to exist because resource extraction is an important incentive for forest management in rural areas of Nepal.²⁰ However, continuation of present harvest levels will lead to failure of community management and deforestation. Because, the demand and supply of major forest products indicated deficit scenario i.e. demand is higher than supply. Projection of demand and supply suggest even worse scenarios, which in long term suggest the resource base will further degrade resulting yet more decreases in supply. This decrease in supply may discourage people and increase conflict leading to the failure of management strategies.

Here we also need to understand that forests are more than firewood, fodder and timber. They have huge potential to earn from many other sources like NTFP, payment for ecosystem services (PES) such as conservation of watersheds, biodiversity and environment and aesthetic beauties. Already, NTFP development is contributing significantly to national GDP. However, these opportunities are not sufficiently utilised. Improving management, NTFP production could be increased, not only increasing supply for subsistence use but also helping the economic development of rural communities through marketing of commercial species. In doing this, it will also help to alleviate poverty, which is ultimately the root cause of deforestation.

But for this, there is need to improve the technical capacity of forestry staff (as mentioned above), develop policy to promote NTFP based economic development, formulate and implement laws and guidelines for the development and promotion of forest based enterprises, develop programmes to assist processing, storing and marketing of forest products and provide privilege on custom duties to value added forest products. In such enterprises, there is a need to encourage community and public private partnership by revising the Medicinal and Non-Timber Forest Product policy 2004.

Database

Though several research activities were carried out in the forestry sector, there are still information gaps. Besides lack of collection and systematic arrangement, they are in scattered form and difficult to access. Developing a database will help planners and also researchers. Similarly, research areas within the forestry sector that need to be studied should be identified and priority should be given to carryout those studies.

Maintaining a database will also help in the process of claiming carbon credits. By mid 2008, a total of 12,25,993 hectares of national forest had been handed over to 14,389

²⁰ Karki and Banskota 2007.

Community Forestry User Groups (CFUGs) from which 16,54,529 households are benefited.²¹ There is a lack of detailed social and biometric information on these forests and this could create difficulties in future forestry planning and also claiming carbon credits.

In addition, monitoring carbon at the national level even under the REDD policy will be a cumbersome task, as on-site monitoring and validation are still very expensive over the mountainous terrain, even when the economic incentive is present to conduct field based measurements from carbon revenue. Remote sensing using medium resolution Landsat images can identify deforestation but not degradation²², while high resolution images could identify some degradation but these systems are very expensive and require expertise which is not available with the Forestry Department. Measuring and monitoring degradation and forest changes accurately could be done by linking local level data, generated by CFUGs, with national level data, generated from remote sensing technology. This helps to decrease transaction cost maintaining the level of accuracy and precision.

This is the most important for developing mitigation as well as other conservation plans or projects. Finnish government has agreed to support Nepal in assessment of the forests of Nepal. The project will be completed in five years and have following objectives:

Well functioning co-operation and open data sharing between organizations. Data sharing responsibilities and data collection mechanisms will to be negotiated and agreed between organizations; the aim of agreements is to decentralize or outsource data collection and improve usability of knowledge between organizations. Data transfer and delivery practices and standards will be developed.

Actual, integrated forest cover and natural resource data based on the data needs assessment and produced in statistically and technologically sound way. Links to other governmental statistics are assessed.

Strong data processing capacity and capability. This needs to be strengthened and capabilities will be built both at central level departments as well as at field level data collection institutions (eg. district forest offices, entrepreneurs, CFUGs, NGOs etc.). The major bottlenecks in data collection, input and processing can be removed with new data collection procedures and software tools.

²¹ MFSC 2009.

²² DeFries, 2007.

Key Issues in Assessing Financial flow

A large part of the population, from grassroots community level to policy makers' level, is not aware of consequences of climate change. This has affected policy level to grassroots level management of forests. If not addressed several issues, whether related to management, policies, violation of rights or information gaps, could affect investment in mitigation programs either by affecting implementation process or by affecting its functioning. Existence of such situation will also discourage potential investors. Here few imminent issues are described in brief.

Democratisation and deforestation

From the time of the insurgency, the security of community- as well as government-managed forests had been a problem. In the post-insurgency period also, forests were cleared to establish cantonments. The construction, maintenance of buildings/huts, and supply of daily fuelwoods for these cantonments have also affected forests. Similarly, encroachment of forest by landless, Kamaiya and other groups, either due to lack of program to address their livelihood option or due to political motivation, has also affected forests. In addition, in many community forests, democratically elected Users Committees are replaced by committees formed by political parties; this has raised acerbity among the user groups and in many places two parallel user groups could also be found.

Moreover, conflict has developed due to forest demarcation, collection and distribution of forest product; this has been a threat to several forests under community management. In addition to this, a distance users' problem has developed, which has induced stealing of forest product or deforestation activities by people from neighbouring villages. These problems could intensify the impacts on forests if not addressed on time. Furthermore, it is understood that several community forests are successful at the cost of adjoining government forests. Without addressing these issues mitigation programmes could not be implemented. In the above-mentioned situations, it will be difficult to invest in mitigation programmes and also difficult to implement programs and assess investment and impact of investment.

Discouraging Bureaucratic Practices

The cumbersome bureaucratic permit system seriously discourages private forestry. Besides, lack of dissemination of information, quality seed supply, planting material and adequate technical support has not been conducive to successful private forestry. This will also discourage new investments in this sector. The delay and complication will effect private plantation objectives like providing economic benefit from selling of timber, firewood and other forest products and also meeting local demand of these products so that the pressure on the forests of protected areas and other government forest could be decreased. This situation will also make difficulties to access impact of investments in household economy or in meeting local demand for forest products.

Infrastructure

The infrastructure of many field offices of forestry sector was damaged during the insurgency. This has affected district level and range post level activities. This has affected implementation of programs and will also affect mitigation measures like afforestation/reforestation, forest and socio-economic survey, UGs capacity enhancement programs and reducing deforestation/degradation. Lack of local level institution will also affect monitoring of investment and also impact of investment. Moreover, to meet the requirement of national baseline proposed by REDD, data has to be collected and regularly updated at the local level.

National Policy Uncertainties

There is inequalities regarding authority, benefits etc. between CFUGs and BZCFUGs. This has discouraged community forests from buffer zone as they are deprived from several economic development opportunities. This will discourage forestry programmes in the buffer zones of the protected areas.

The upcoming opportunity to earn from carbon credit could help to strengthen forest management but there are several uncertainties regarding policy and institutional set up. There was an institutional gap to implement REDD and carry out tasks that are required to be coordinated at the national level. Still, the Designated National Authority (DNA) formed under Ministry of Environment (MoE) is the coordinating body for carbon trade but the forestry sector is under the jurisdiction of the Ministry of Forest and Soil Conservation (MFSC). There is only one representative from MFSC in the DNA. It is also reported that coordination and information gaps exists between these two ministries which could affect implementation of REDD in the future. Similarly, coordination with Ministry of Agriculture and cooperative and Ministry of Energy is also lacking. A recent cabinet decision has authorized MFSC as the REDD focal point but still there is need for detailed structural adjustments to develop and improve coordination and cooperation between different ministries and other stakeholders to facilitate implementation of integrated mitigation and adaptation programmes and to develop mechanisms to update information to a national database.

Similarly, through the FY2008/09 budget announcement, the government announced changes in the EIA policy regarding hydro projects. Such a sudden change of policy in such a crucial matter will have negative impact. According to new arrangement, hydro projects up to 50MW neither have to carryout EIA nor need survey permission from MFSC except for protected areas.²³ Furthermore, a recently cabinet-approved policy dropped previous rules requiring permission for surveys in forest areas from the Ministry of Forest and Soil Conservation. This arrangement threats forests, critical habitats of wildlife and indigenous people, important species and critical ecosystems of the country. These policy-related issues if not addressed will discourage investment in mitigation activities.

²³ MOF 2008.

Likewise, uncertainty of government life i.e. frequent change of government and subsequent transfer of government staff and difference in opinion and working modality of different governments also create confusion and also hamper implementation of projects, which could also discourage investors and also make assessment of investment and financial flow difficult.

Indigenous peoples' rights

Rural communities, mainly the indigenous people, are highly dependent on forests and are successful in managing forests from many generations. The forest policy of Nepal is considered dynamic, as it is able to address several issues of this sector; however, the only thing it failed to recognize is the indigenous management system that still exists in different parts of the country. Due to a lack of recognition of the advantages that exist in indigenous management, community forestry programs are facing several problems related to demarcation of forest areas, user group identification, sustainability of harvest, equitable distribution etc. This policy weakness has also been the cause of conflict and lack of trust between indigenous communities and newcomers (ones migrated from other parts of the country to indigenous territory), and, due to this, unsustainable harvests leading to deforestation are taking place.

Furthermore, in the present global initiatives of addressing the climate problem, it is important to recognize traditional practices and their connection with forests, as policies to reduce emissions for carbon credits will affect rural communities or indigenous people and lack of recognition will affect both the indigenous people's future as well as future of the forests. Besides indigenous people, other rural communities will not have difficulties adopting alternatives, but due to traditional belief or their character (nature) they may be reluctant to alternatives. The population of forest-dependent indigenous people is small and allowing them to utilize forest will not produce adverse effects on resource base, but rather their traditional harvest practices will keep harvest under sustainable level. Although, the Bali meeting recognized this and the COP 13 decision on REDD stressed on this, it still needs further clarification. If issues of indigenous communities rights are not addressed then this could increase conflict with these people, which, in turn, affects the implementation of mitigation programs. Moreover, lack of information on indigenous people, their practices and dependency level and type of forest products important to different indigenous groups will affect policy planning, program development and implementation. Lack of such data will also affect assessment of investment in indigenous people's program.

Baseline data

There are several means to account carbon but until now it is not clear what criteria will be adopted to account carbon under REDD. Avoiding deforestation could be accounted by measuring area while forest biomass enhancement could be accounted by recording initial and final biomass status and calculating the increased biomass based on the IPCC Good Practice Guideline (IPCC, 2003). But data gap will make difficult to analyse

deforestation and also change in forest area. Moreover, measuring degradation is very complicated and in lack of historical data it is difficult to calculate increase in diversity, density, volume or coverage. The issue of baseline under REDD is still uncertain and criteria to select reference point is still unknown. The REDD policy proposes a national baseline, which may be developed from data collected at local level. Moreover, determining baselines for deforestation and degradation and how these will be combined are major concerns for CFM as what credits they receive will be judged by the baseline construction. In Nepal, data constraints on forest area, status, trend and utilisation exist and this could create problems in claiming carbon credit. This will also affect drafting of new forestry master plan and developing mitigation programs. Lack of database will also hamper verification and reporting processes. Lack of master plan makes identification of areas of investment in forestry sector, cost estimation, understand magnitude of programs difficult. Lack of data also affects development of other mitigation programs, estimate their magnitude, estimate investment, schedule the activities and develop indicator of achievements and make difficult to assess the investment. Similarly, such information gap will also make comparison of the situation after investment difficult and analyse impact of investment.

Large quantities of NTFPs are traded illegally so exact information on trade quantity and value is lacking. Similarly, information on NTFP resource base is also lacking. In such situation it will be difficult to develop NTFP based economic development programs and also this will make assessment of change in economic situation from investment in this sub-sector.

Data gap does not allow us to develop programs on all mitigations mentioned. Therefore, initial focus is needed in data base development and preparation of new forestry master plan because this is the basis for program development as well as development of plan of monitoring investment and achievements. Besides, afforestation and reforestation and alternative energy program could be developed with some exercise to generate basic information on potential area for forestation and tentative alternative number or capacity of programs needed. Information on potential hydropower, biogas and wind energy is already available.

Proposed approach/recommendation

This section describes existing institutional arrangements and different stakeholders. Information on the available funds for mitigation and adaptation activities of the forestry sector is provided and will help to understand the deficits of funds. Coordination schemes suggested below help to address institutional gaps, lack of coordination and institutional cooperation, which helps to implement mitigation and adaptation programmes effectively and will help the assessment of investment and financial flows (I&FF).

Institutional Arrangement/Key stakeholders

The main stakeholders of forestry sectors are CFUGs, Federation of CFUGs and different Departments under MFSC. Under MFSC there are five departments namely Department of Forest (DoF), Department of National Parks and Wildlife Conservation (DNPWC), Department of Plant Resources (DoPR), Department of soil Conservation (DoSC), Department of Forest Research and Survey, and 5 regional forest directorates under this ministry. Similarly, under the Department of Forests there are 74 District Forest Offices, 92 unit forest offices and 726 range posts. Likewise, under the DNPWC there are 17 protected areas. DFO is responsible for identifying and forming CFUGs and handover management authority to Users Groups, leasehold forest groups and certify private forests. They are also responsible to provide technical assistance to users Group and monitor forest management.

The DNPWC through their offices in protected areas besides regular conservation management activities also identify users of forest of buffer zone and hand over management authority to them. They are also responsible to provide technical assistance to these UGs and monitor their activities. Similarly, Department of Soil conservation implements programs like erosion/landslide control and protection of watershed areas.

Government of Nepal has also formed the Designated National Authority (DNA) under the MoE, which is taking part in international and national level meetings and conventions related to Climate change. The DNA was formed with an 11-member steering committee, with only one representative from MFSC. This ministry also promotes and administers alternative energy programs. Since there is limited representation from the MFSC and other stakeholders, it needs to be reformed making appropriate representations.

Besides, there are several national, regional and international organizations (UNDP, USAID, DFID, DANIDA, FINIDA, SDC, SNV, JICA, NTNC, WWF, IUCN, ICIMOD, CARE Nepal, USAID, FECOFUN etc.) contributing in various activities of the forestry sector of Nepal.

Available Funding

Funding of community forestry programmes is mainly from the regular government's budget and support from foreign donors. Besides, communities themselves also either raise money/grain and voluntary labour to support their community forestry activities.

Community Forestry (CF) is one of the priority programmes. The cost of forest protection and management in CFs are either arranged by voluntary labour or from income of the community forests or by collecting Money/grain from the UG members. Users are involved in forest protection, silvicultural operations and in CFUG meetings. People generally spend whole days for forest protection and silvicultural operations. If eight hours in a day is considered as a one person day and one person from each household contributes once a month to community forest activities (i.e. 12 days in a year) and its opportunity cost is estimated to be Rs 150 (US\$1.87) per day per person in average, the amount of CFUG contributions in terms of person days (16,54,529 person X Rs150X 12days) in monetary terms is about Rs 1489 million (US\$20 million)²⁴.

About 35 percent of the total development budget allocated to MFSC is spent on CF Program. Bilateral donors are also involved in the development of CF Programme as about 60 percent of the total development budget of the CF program is funded through foreign assistance. Each year Nepal receives between US\$ 350 and 400 million in development assistance. In addition, some NGOs and INGOs are themselves involved in establishment of community forestry programs and enhancing their managerial capacities.

In the FY 2008/09 budget, the government allocated Rs.12,690 million (US\$158.63million) for development of hydro power projects and Rs.1,520 million (US\$19million) for micro-hydro and other alternative energy programs (MOF 2008). It aims to install 65,000 solar electric units in rural areas that lack electricity, construct wind mills with local partnership scheme to generate 20MW electricity, initiate construction of 11 different hydro projects to generate 1827MW electricity, complete 3 projects under construction within this year to generate 114MW, increase subsidy to hydro projects with capacity up to 1MW, install 25000 biogas plants, 1500 improved water mill distribute 450 solar dryer/cooker and 3000 improved stoves. Government also aimed to generate additional ten thousand megawatt electricity within ten years period (ibid.).

Similarly, the government also announced its commitment to develop and implement a National Adaptation Plan of Action (NAPA) to address effect of Climate Change and programmes are being implemented with assistance of GEF/LDCF, UNDP, DFID, and DANIDA (US\$13,25,000). Similarly, the Forest Action Plan of all 75 districts will be updated and necessary acts to protect biodiversity and secure patent right will be

²⁴ Based on the author's calculation.

developed and implemented. To support plantation in public and private land, the government planned to produce 11.5million saplings of different species to plant in public and private lands, which would cover 7187ha area.

To provide employment and economic incentives to the disadvantaged, the poor and women, the government will be establishing a herbal processing plant in the far-west Nepal and for this allocated Rs.10million (US\$0.125million) in the budget.

If a Copenhagen declaration in 2009 acknowledges carbon credits for conserving forests then that will open opportunity for benefiting from Carbon trading, which could be used for further strengthening forest conservation and management. Nepal is among the first developing countries to have been selected by the World Bank as a member of the Forest Carbon Partnership Facility (FCPF). Nepal will receive initial funding from FCPF to reduce emissions from deforestation and forest degradation (REDD). The World Bank has decided to give US\$0.2million for preparing the detail proposal and US \$ 0.8 million for capacity building programmes. Similarly, DFID provided £18,672,400 for the period of 2001-2011 for livelihood and Forestry program, IFAD provided US\$11.4 million for Leasehold Forest and Livestock Development programme for the period of 2005-2013, and US\$ 13,108,833 was jointly funded by UNDP, SNV and WWF for the Western Terai Landscape Complex Programme for the period of 2003-2011. In addition, UNDP, WWF, SNV, NTNC and several others have separate programs in this sector. With the assistance of the Government of Finland and a matching fund from government of Nepal, an assessment of the forest resources of Nepal and capacity enhancement of this sector is going to take place.

Private investors from Nepal and India, Non-Residence Nepali (NRN) and other regional and international companies/banks are interested in investing in alternative energy development. Similarly, private investors could be attracted in NTFP-based enterprises.

Most important need of the forestry sector is database. Finnish government has agreed to provide financial support equivalent to €4699736 and Government of Nepal will contribute €880032 for conducting detail assessment of forest of Nepal and establishment of national database. The project will be completed in five years.

Implementation Scheme

Recent attempts have been made to fill the existing institutional gap by forming a National Climate Change Council (NCCC). Climate change issues are complex in nature and several issues are cross cutting in terms of forestry, hence the need for integrated programmes. To make a holistic approach and implement integrated programme, coordination and cooperation between different ministries and other stakeholders is needed. In the absence of a powerful central authority, coordination and cooperation between ministries and other stakeholders is lacking. Establishment of the NCCC with representation of all ministries, experts and other stakeholders is expected to address these gaps and facilitate implementation of integrated mitigation measures smoothly

and effectively. This will deal with all Climate Change issues and the REDD mechanism without conflicting interests between stakeholders. Since the NCCC is headed by the Cabinet head (i.e. the Prime Minister) this becomes a powerful body with established coordination linkages that could help to facilitate coordination for advancing climate change activities. However, policy backing to clarify role, responsibility and authority will provide more clear direction and also help to move activities smoothly. Besides implementation of adaptation and mitigation programs, the NCCC will also coordinate with the ministries and stakeholders to collect data on various aspects directly or indirectly related to climate change and establish national database. Such data would be very useful in developing conservation plans, in monitoring and evaluation of mitigation and adaptation programs, identify gaps and develop programme interventions and coordinate with UN and other international climate bodies or partners to generate support for programs and claim carbon credits. The NCCC will also monitor and implement REDD as per REDD policy, negotiate baselines at national level and arrange distribution of payments from the national level to the grassroots level.

While functioning within this structure, each ministry (MFSC, MoE, MST, MAC, ME) will develop integrated mitigation and adaptation programs that are verifiable, reportable and appropriate to the country and bring to the NCCC meetings to discuss cross cutting issues and arrange inter-sectoral coordination and cooperation to implement them. Similarly, payment sharing across the country needs to be monitored, maintaining transparency and accountability. For payment sharing, a national level payment mechanism has to be developed that include maintaining national database by conducting forest inventories and carbon assessments. In addition, community forests and CFUG management must also be monitored by a NCCC to ensure that the local and indigenous peoples' rights are protected. At the international level, this body will bridge domestic actions and the global protocol and help to negotiate with the Parties of the UNFCCC acting as country's clearing desk for the CERs.

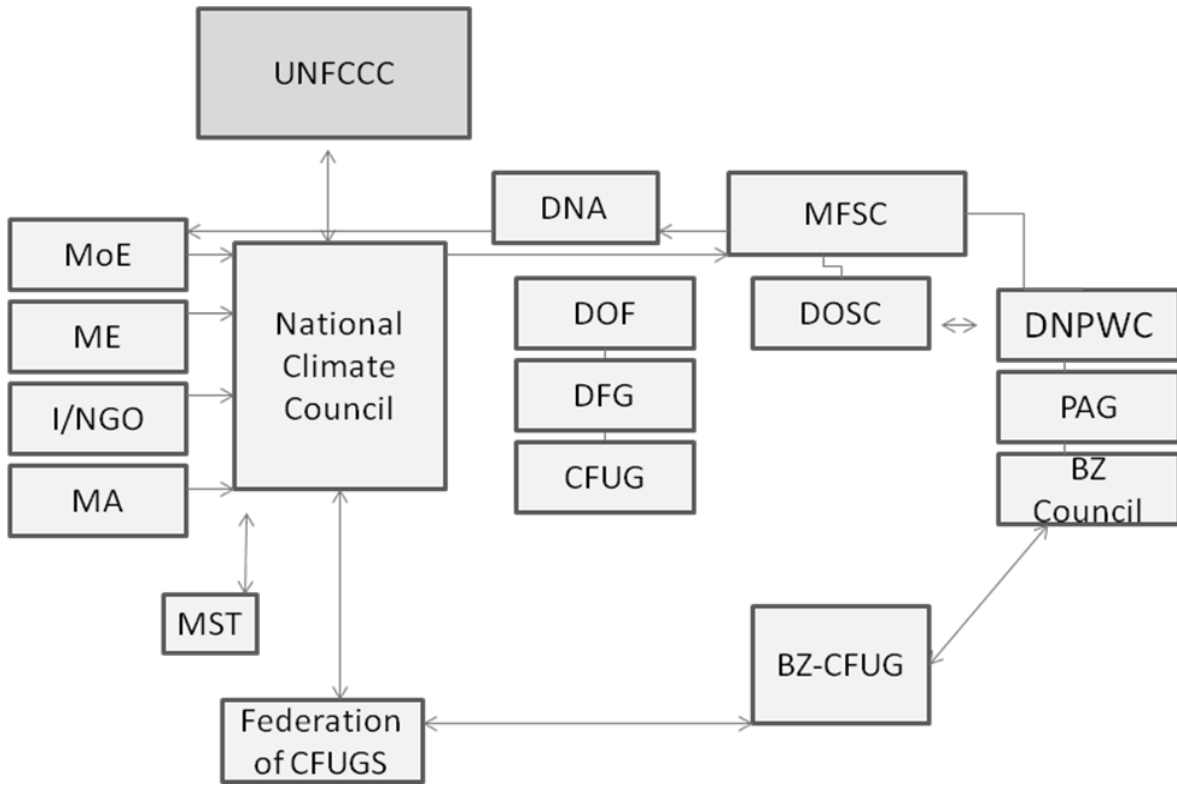
Under the global REDD policy, a national level baseline is expected. To generate database of forests of Nepal a detailed national survey of forests needs to be carried out. Similarly, socio-economic information of these forest users groups or forest dependent people also needs to be generated and stored in the database of the ministry. Other ministry will also generate database of their field. Database of all ministries should also be provided to the NCCC to establish a national database. This information should be linked to remote sensing satellite imagery. Such satellite images with ground information will be very useful in conservation planning and planning of other development activities.

Before commencing forest surveys, a handbook of forest plants needs to be developed with detail information and pictures or sketches. While conducting the survey, there should be involvement of members of community forest user groups and field level staffs of district forest office and protected areas. In addition, the programmes should carryout training on survey methodology and plant identification methods. This will help

to train grassroots level staff that could latter carry out future follow up surveys to update database. Similarly, training for community Forest Users Group members on forest surveys, record keeping of forest resource information, forest harvest, distribution of resources, administrative and financial activities is very important to maintain transparency. By enhancing monitoring and record keeping capacity of each UGs, field level staffs of all ministries regular updated data could be generated which will update the national level database on regular basis through departments of MFSC.

Similarly, data on alternative energy programs carried out by MoE and ME, agro-forestry programs of MAC will also be updated to the central database. Such a database will also control double claiming for the same projects from different vendors. The same channel could be used to distribute carbon credits to grassroots level institutions or individuals based on their performances to prevent carbon emissions. This has several advantages for the CFM. Firstly, it may develop a systematic approach in controlling deforestation at a national level based on the country's performance, giving the country the authority on how it achieves its targets domestically. Secondly, this could lead to a national level payment system that will be based on a reward and penalty system for those that manage forest and or fail to comply--therefore developing a fair system. Thirdly, national level payment system may be more transparent, legally binding, more market oriented than if negotiations and payments are made directly at local project level. Leaving the dealing to the project level could be non-transparent and without the usage of a uniform standard methodology. Local level payments with individual CFUGs dealing with individual credit buyers would never consolidate and institutionalize the effort to reduce emission at a national level and it would be futile to keep the effort at piece-meal level. Fourthly, the transaction cost would be lower when negotiating payments and credits are made at the national level. This scheme could also be used for PES information collection and payment distribution. Below is the diagram showing coordination, cooperation, program implementation and monitoring channels.

I. Implementation and Coordination Scheme Diagram



II. Work plan for assessing investment and financial flows I&FF

Activities/Work	Indicator	Implemented by	Funding
Establishment of NCCC	Establishment of NCCC.	GoN	GoN
Formulation of clear policy describing role and responsibilities of NCCC	Policy document.	GoN	GoN
Formulation of Coordination plan to coordinate with stakeholders	Coordination plan.	NCCC	GoN
Reform DNA	DNA with appropriate representation of all stakeholders and experts.	NCCC	GoN
Develop clear policy regarding carbon credits	Carbon credit policy document.	NCCC	GoN
Preparation of handbook of forest plants of Nepal	Handbook of Forest Plants of Nepal.	DoPR	GoN / Donor assistance
Forest and socio-economic survey training	Accomplishment of training.	DFRS/DoF	GoN / Donor assistance
Forest survey and socio-economic survey	Completion of survey and available of survey data.	DFRS/DoF	GoN / Donor assistance
Purchase remote sensing satellite images	Satellite images. Purchased.	DFRS	GoN or Donor assistance
Establish database at each ministry with data on their activities and survey data	Database established.	MFSC, MoE, ME and MAC,	GoN
Make regular forest survey arrangements to update National database	Follow up survey data.	UGs, DFO, PAO	GoN
Establish National database with information from all ministries and other stakeholders	National database Established.	NCCC with support from MoE, MFSC, ME, MAC.	GoN
Link field data with satellite images	Satellite images with ground information.	NCCC with the assistance from DFRS.	GoN
Conduct training for Forest Users Groups on record keeping, harvest data, distribution of resources, administrative and financial activities	Forest Users Groups trained.	DFO	GoN and/or Donor assistance
Afforestation and Reforestation	Increased plantation area.	DFO, Agro-forestry section of MAC, I/NGOs and UGs.	GoN, UGs, I/NGOs, other donors
Alternative energy program implementation	Information on accomplished alternative energy programs.	MoE, ME, MFSC, I/NGO, Private sectors.	GoN, private sector, I/NGOs, donor

			agencies
Amendment of policies that is affecting conservation and forest based economic development programs.	Policy amended.	MFSC	GoN
Necessary policy formulation	Policy formed.	MFSC	GoN
Handover forests to communities	Number of new forest user groups and increase in areas of forest handed over to UGs.	DFO and PAO	GoN

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