

**COMMUNITY FORESTRY AS A TOOL FOR
SUSTAINABLE FOREST MANAGEMENT AND
RURAL POVERTY REDUCTION IN CAMBODIA**

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LIST OF ABBREVIATIONS

ADB	Asia Development Bank
C	Carbon
CBFM	Community Based Forest Management
CBFMA	Community Based Forest Management Agreement
CBM	Community Based Management
CBNRM	Community Based Natural Resource Management
CBNRMLI	Community Based Natural Resource Management and Livelihood Institute
CCBA	Climate, Community and Biodiversity Alliance
CDM	Clean Development Mechanism
CDRI	Cambodia Development Research Institute
CF	Community Forestry
CFI	International Community Forestry
CFMCs	Community Forest Management Committees
CFMPs	Community Forest Management Plans
CFO	Community Forestry Office
CFP	Community Forestry Programme
CIFOR	Center for International Forest Research
CMDGs	Cambodia Millennium Development Goals
CO ₂	Carbon Dioxide Gas
CPR	Common Property Resources
CTSP	Cambodia Tree Seed Project
DANIDA	Danish International Development Agency
DFW	Department of Forestry and Wildlife
DPs	Development Partners
ELCs	Economic Land Concessions
ES	Environmental Services
FA	Forestry Administration
FAO	Food and Agriculture Organization
GAP	Governance Action Plan
GHG	Green House Gases
GIS	Geographic Information System
HHs	Households
IBN/ITN	Insecticide-treated Bed Net
ITDG	Intermediate Technology Disaster Group

ITTO	International Tropical Timber Organization
JICA	Japan International Cooperation Agency
LFAs	Local Forestry Administrations
LGOs	Local Government Officers
LGUs	Local Group Users
MAFF	Ministry of Agriculture Forestry and Fisheries
MDG	Millennium Development Goal
MES	Market for Ecosystem Services
MoH	Ministry of Health
MoP	Ministry of Planning
MRCS	Mekong River Commission Secretariat
NCEM/CNM	National Center of Parasitology, Entomology and Malaria Control, formally referred as the National Malaria Center (CNM)
NFP	National Forest Programme
NGOs	Non Governmental Organizations
NPRS	National Poverty Reduction Strategy
NRM	Natural Resource Management
NSDP	National Strategic Development Plan
NTFPs	Non Timber Forest Products
NWFP	Non-Wood Forest Products
OECD	Organization for Economic Cooperation and Development
PES	Payment for Environmental Services/ Ecosystem Services
Pg	Petagram (1 Pg = 10 ¹⁵ g = 1,000,000,000,000,000 grams)
PSI	Population Services International
RECOFTC	The Regional Community Forestry Training Center
REDD	Reduced Emissions from Deforestation and forest Degradation
RGC	Royal Government of Cambodia
SCW	Save Cambodia's Wildlife
SFM	Sustainable Forest Management
SNEC	Supreme National Economic Council
UNDP	United Nation Development Programme
USAID	United State of Agency International Development
VCS	Voluntary/ Verified Carbon Standard
WB	World Bank
WCS	Wildlife Conservation Society
WUP-FIN	Mekong Water Utilization Program funded by Finland

PERHUTANAN KOMUNITI SEBAGAI ALAT PENGURUSAN HUTAN LESTARI DAN PENGURANGAN KEMISKINAN LUAR BANDAR DI KEMBOJA

ABSTRAK

Memandangkan bahawa deforestasi dan degradasi hutan masih berterusan, tren menguruskan hutan telah beralih fokus dari pengurusan pada peringkat pusat atau negeri kepada pengurusan tidak berpusat yang berasaskan komuniti. Pendekatan yang inovatif, seperti Perhutanan Komuniti (CF), memainkan peranan penting dalam menyokong kehidupan dan pengurusan hutan yang mampan. Perhutanan komuniti telah dilancarkan di Kemboja untuk menangani kemiskinan yang semakin meningkat di kawasan luar bandar. Kajian ini bertujuan untuk menyiasat prestasi perhutanan komuniti dalam membasmi kemiskinan di kalangan ahli-ahli CF di Kemboja. Ia bertujuan untuk menilai syarat-syarat pelaksanaan perhutanan komuniti di Kemboja dan kesan faktor-faktor dalam pelaksanaannya. Hubungan antara pertumbuhan penduduk di kawasan luar bandar, pengurusan mampan sumber-sumber hutan dan pengurangan kemiskinan di Kemboja juga dikaji termasuk faktor-faktor yang memberi kesan kepada pengurangan kemiskinan. Lebih khusus, kajian ini akan menentukan faktor-faktor yang mempengaruhi keberkesanan pendekatan komuniti mampan berasaskan pengurusan hutan dalam usaha mengurangkan kemiskinan di Kemboja. Enam soalan penyelidikan telah dikemukakan dan enam hipotesis telah diuji dalam kajian ini. Seramai 399 ahli isi rumah CF telah menyertai dengan jumlah yang setara responden ahli isi rumah bukan CF. Sejumlah 914 responden isi rumah telah ditemubual daripada 88 tapak komuniti perhutanan di Kemboja.

Secara keseluruhan, keputusan kajian menunjukkan bahawa Perhutanan Komuniti menawarkan cara pemuliharaan sumber hutan yang lebih berkesan. Data spatial menunjukkan bahawa liputan hutan adalah lebih sempurna di kawasan-kawasan perlaksanaan perhutanan komuniti berbanding dengan kawasan-kawasan bersebelahan. CF telah menunjukkan kemampuan untuk mengurangkan kadar deforestasi berbanding dengan kawasan hutan bukan CF. Data juga menunjukkan bahawa insiden kemiskinan adalah lebih rendah secara signifikan di kalangan ahli-ahli CF berbanding dengan mereka yang bukan ahli CF. Walaupun data menunjukkan sumbangan positif CF dalam mengurangkan kemiskinan, hasil kajian menunjukkan bahawa sumbangan hutan kepada

kehidupan dan pendapatan isi rumah adalah terhad. Memandangkan pendapatan dari hutan adalah terhad, isi rumah meletakkan nilai kepentingan yang sangat tinggi kepada sumber hutan yang mereka lindungi. Paradoks ini mampu menunjukkan faedah tanpa pendapatan yang mungkin diperolehi daripada hutan. Kebanyakan hutan yang masih pada peringkat pemuliharaan, memberi faedah untuk menyara kehidupan seperti makanan, perubatan dan bahan api, antara lainnya. Hutan komuniti belum sampai ke tahap untuk dieksploitasi secara komersial kerana hutan ini kebanyakannya masih muda dan di peringkat pemuliharaan. Malahan, banyak CF yang masih belum menyediakan pelan pengurusan CF mereka, yang merupakan syarat sebelum mereka boleh bertindak mengeksploitasi hutan komuniti secara komersial. Penilaian bagi faedah-faedah ini selalunya kompleks tetapi pasti akan terus meningkatkan jumlah nilai faedah yang diperolehi isi rumah. Tambahan pula, pendapatan isi rumah terukur yang senang dilihat dan didedahkan oleh responden semasa kajiselidik, sudah pasti akan meningkatkan CF, sebaik sahaja mampu membangunkan pelan pengurusan CF mereka (CFMPs). Maka, dengan mengeksploitasi hasil hutan komuniti secara komersial, pendapatan isi rumah dijangkakan akan terus meningkat. Berdasarkan hasil kajian ini, beberapa langkah perlu diambil untuk membuat Perhutanan Komuniti lebih berkesan termasuk: memperkukuhkan hak harta, tempoh penggunaan hutan yang terjamin, dan akses kepada sumber-sumber hutan dan faedahnya; menangani masalah kesihatan yang berkaitan dengan malaria; mengukuhkan pendapatan dan pengurusan hutan masyarakat secara lestari; untuk memperbaiki lagi keadaan sumber hutan; memberi tumpuan kepada pembangunan tenaga manusia perhutanan komuniti; meningkatkan penyertaan keahlian perhutanan komuniti; menggalakkan pembangunan perusahaan dan menambah nilai hasil hutan; dan mengakses dana alternatif dari pasaran karbon di bawah REDD dan perkhidmatan alam sekitar oleh perhutanan komuniti.

COMMUNITY FORESTRY AS A TOOL FOR SUSTAINABLE FOREST MANAGEMENT AND RURAL POVERTY REDUCTION IN CAMBODIA

Abstract

As rural poverty persists, and deforestation and forest degradation continue, the trend of managing the forest has advanced from centralized or state managed to decentralized and community-based management. Innovative approaches, such as community forestry (CF), play an important role in supporting livelihood and the sustainable forest management. Community Forestry (CF) was launched in Cambodia to address the growing poverty in the rural areas. This study is aimed at investigating the performance of community forestry in alleviating poverty among the CF members in Cambodia. It seeks to evaluate the conditions of the implementation of community forestry in Cambodia and the effect of the factors in its implementation. The relationship between the population growth in the rural areas, sustainable management of the forest resources and poverty reduction in Cambodia is also being examined as well as the factors that affect the poverty reduction. More specifically, the study will determine the factors influencing the effectiveness of community based sustainable forest management approaches in reducing poverty in Cambodia. Six research questions were posed and six hypotheses were tested in this study. A total of 399 CF member households participated with an equivalent number of non-CF member household respondents. A total of 914 household respondents were interviewed from the 88 community forestry sites in Cambodia.

Overall, the results of the study indicated that Community Forestry offers an effective means of conserving the forest resources. The spatial data indicated that forest covers are significantly intact in areas covered by the community forestry compared to its adjoining areas. The CF has demonstrated to reduce the rate of deforestation in the CF areas compared to the areas outside the CFs. The data also showed that there is significantly lower poverty incidence among the CF members compared to those who are non-CF members. Whereas the data pointed to the positive contribution of CF in alleviating poverty, the results of the study showed limited contribution of the forest to the livelihoods and income of the households. Nonetheless, despite

the limited income from the forest, the households attached a very high importance value to the forest resources they are protecting. This paradox could indicate the possible non-income benefits from the forests. Most of the forests, which are still recovering, provide benefits that are for subsistence such as food medicine, and fuel among others. The community forests have not gone to the extent of commercial exploitation of the forests since these forests are mostly young and are still recovering. Moreover, many of the CFs has not yet prepared their CF management plans that are requisites before they can proceed to the commercial exploitation of the community forests. The valuation of these benefits are often complex but nonetheless, will surely increase the total value of the benefits that the households will received. Furthermore, the measureable household income which can be easily discerned and revealed by the respondents during the survey, may undoubtedly increase the moment the CFs are able to develop their CF management plans (CFMPs). Hence, by commercially utilizing the resources of the community forests, the household income is expected to continue to increase. Based on the results of this study, several measures need to be pursued to make Community Forestry more effective including: strengthening the property rights, security of tenure and access to resources and benefits; addressing malaria-related health problems; strengthening the livelihoods and sustainable management of the community forest; further improving the condition of the forest resources; providing focus on community forestry capability building; increasing community forestry participation; promoting enterprise development and value-adding of forest products; and accessing alternate funding from carbon market under REDD and other environmental services of the community forest.

CHAPTER ONE

INTRODUCTION

This chapter presents the context of the study in Cambodian setting. It also presents the background of community forestry, its potential and success as a tool in addressing poverty. Aside from providing the general context, this also presents a discussion on the problem that was investigated, the research questions tested, the objectives, the contribution of the study to science and natural resource management. The background of the study presented some problems and the important role of Community Forestry and the factors that influence the performance of Community Forestry. The influence of malaria and the voluntary carbon market were also discussed how they may influence the implementation of community forestry in Cambodia.

1.1 Background and Rationale

1.1.1 Significance of the Forestry Sector in Poverty Reduction

Worldwide, some 350 million of the world's poorest people are heavily dependent on the forests for their survival and about 20 percent of world's population relies on remnant woodlands for fuelwood, food and other household needs (Nurse and Malla, 2005). In the case of poverty reduction or elimination, the forests widely serve as "safety nets" for the rural poor (FAO, 2007; FAO, 2006; Scherr et al., 2004a; Nurse and Malla, 2005) as it directly contribute to livelihoods of 90% of the 1.2 billion people living in extreme poverty (FAO, 2007; Scherr et al., 2004a). Small-scale harvesting and marketing of timber or non-timber forest products (NTFPs) enabled many poor to escape from poverty (Sunderlin et al., 2007). In some areas, rural communities living in or near forest land may use forest resources

according to some form of indigenous management systems (Nurse and Malla, 2005) and often the ancestral homes of ethnic minorities and traditional peoples (Sunderlin et al., 2007). Forests provide a number of valuable goods and services to society (CIFOR, 2007a). It is vital for the functioning of the world's ecosystem by storing atmospheric carbons. The estimated global forest cover in 2000 of 3.9 billion hectares (Nurse and Malla, 2005) is central in the global, regional and local water cycles and for the functioning of river systems. They provide protection to many landscapes from erosion (FA-RGC, 2010; Bhatt, 2005). In underdeveloped and developing countries, two-thirds to three-quarters of the human population is dependent on the forest and land for their livelihood (Bhatt, 2005).

The natural forests are home to rich biodiversity (FA-RGC, 2010). They provide timber for construction and other uses and wood for fuel (FA-RGC, 2010) and a variety of essential goods and a variety of by-products such as rattan, medicines, resins, leaves and fruits, all of which contribute to livelihoods (Chan and Acharya, 2002; FA-RGC, 2010; DANIDA-SCW, 2006; Scherr et al., 2004a; Bhatt, 2005). In some countries, firewoods provide the most important products to the poor (WB, 2006). The fact that so many poor people live in and near forest areas suggests that there is an intrinsic relation between forests and poverty (FAO, 2007). The forest also acts as savings account for people as poor people can harvest trees and other products for their own use or to sell. A significant number of people living in poverty depend on forests and trees to generate income through employment and through the sale of surplus goods and services (FAO, 2006). The poorest depend especially heavily on community forests (Scherr et al., 2004a). They significantly protect the people from economic decline in times of emergency needs.

About 85% of the population in Cambodia is dependent on farming and on the forests for their basic needs (Butterfield, 1998; McKenney and Prom, 2002) and more than 70% of the total population in Cambodia is employed in the agricultural sector. Agriculture in Cambodia is still largely subsistence oriented and the average productivity of crops is generally among the lowest in Southeast Asia (Chan and Acharya, 2002). The forest resources become the second largest source, next to agriculture, which together with agriculture and animal husbandry can provide major livelihood opportunities to the rural communities (Bhatt, 2005; CBNRMLI, 2005).

Traditionally, forests in Cambodia have provided food, construction materials and medicines (FA-RGC, 2010) and important source of livelihoods, safety net and nutrition for the poor in Cambodia (WB, 2006; McKenney and Prom, 2002). The forests provide cooking fuel, timber for construction, materials for tools and household items, livestock fodder, resins, vines, wild fruits and vegetables (McKenney and Prom, 2002). Naturally grown vegetables, fruits, and tubers from forests also provide considerable income to many households in some of the villages (Chan and Acharya, 2002; WB, 2006). For villages that have access to forests, the wildlife also provides a source of proteins (Chan and Acharya, 2002). Cambodia's forests also provide important ecological functions such as ecosystem preservation, biodiversity conservation and the protection of soil and water resources (CIFOR, 2007a; CBNRMLI, 2005; McKenney and Prom, 2002), cultural and spiritual values (McKenney and Prom, 2002) and potential for the development of ecotourism (DANIDA-SCW, 2006) and other opportunities for socio-economic development of the country (CIFOR, 2007a; Lic, 2004). The forests not only provide food and raw materials, but also serve as an important life support function by generating oxygen and particularly fresh water through preserving watersheds (Lic, 2004).

It is commonly perceived that incomes from forestry are declining, as most of Cambodia's forests are not commercially attractive (McKenney and Prom, 2002) or underdeveloped and needing rehabilitation if they were to help in alleviating poverty (FAO, 2007). There is a strong dependence of the community on the forest for basic needs (Butterfield, 1998; Vickers and Dickinson, 2006) and the degradation of the forest resources will have a significant effect on the communities who generally live below poverty line. In 1965 forests covered an estimated 73 % of the country's territory but it has declined to an estimated 61% of the total land area in 2002. The forest cover further declined to 59% in 2006 (FA, 2008), and then 57% in 2010 (Source: updated assessment by FA in 2011). In the Plateau region, where most forest resources remain, 53 percent of rural households remain below the poverty line. Poverty rates may have actually increased in this region (WB, 2006).

Although the forest occupies 63 percent of the country's area (WB, 2006), the agricultural sector dominated national output in the 1995 accounting for more than 40% of GDP until 1999. However, this trend has declined, mainly as a result of floods and droughts and the depletion of natural resources such as forestry and fisheries. During the last ten years, agriculture, fisheries, and forestry only grew at an annual average of 3.5%. Crops have been the main contributor to the agriculture sector, particularly rice production. The agriculture, fishery and forestry sectors contributed 34.4% to the GDP of Cambodia, with the forestry sector contributing only 2.4% of GDP (MAFF, 2010). However, the low contribution of the forestry sector is likely to under-report illegal logging, the real value of non-timber forest products (NTFPs), and ignore the reduction in value of remaining forest assets (WB, 2006).

1.1.2 Poverty Alleviation and Forestry Reforms

The incidence of poverty in Cambodia is widely recognized and has been the focus of many government programs and goals of the Royal Government of Cambodia (RGC). Based on the international “dollar-a-day” poverty line, poverty in Cambodia still stood at 18.5 % based on the 2004 poverty headcount (WB, 2006). To achieve environmental sustainability, the Cambodian Millennium Development Goal (CMDG) has set benchmarks for 2015 related to forest resources (FA, 2008):

- Maintain national forest cover at 60% of the total land area; and
- Reduce fuel wood dependency from 92% to 52%.

In achieving the CMDG, the Royal Government of Cambodia has set its strategic directions for the forests of Cambodia to increase the contribution from forests to the overall socio-economic development, become South East Asia's leading supplier of high-value timber and associated high-value non-timber forest products, and become a leading supplier to the emerging carbon sequestration markets. The strategic development also aims towards exploitation of higher-value markets for wood and wood-based products as well as NTFP's, obtainable through sustainable forest management, certification and proper social distribution of benefits (FA-RGC, 2010).

The Royal Government of Cambodia (RGC) has expressed its strong commitment to continue its forestry reforms in order to strengthen sustainable environmental management (FA, 2008). Recently, the RGC adopted the National Forest Program (NFP) as a way of using institutional and legal means to achieve forest development objectives involving government organizations, communities, companies, non-government organizations, international donors and individuals in

forestry, and how they interact in a national development context. The NFP of Cambodia presented a shared vision of how to manage and provide benefits from forest resources with the purpose of establishing a workable social and political framework for the sustainable management of all forests comprises policies, as well as mechanisms for their implementation, monitoring, and evaluation. The NFP aims at setting directions and milestones for the development of the forests of Cambodia and their management to help society gain maximum, long-term sustainable benefits, in term of livelihoods and in terms of environmental services for the overall socioeconomic development.

Forest policy formation is a continuous process to respond to the changing physical and economic circumstances and changing demands by the various sectors of society (Bhattacharya, 2001). In response to the growing demand to support community forestry (Appanah, 2004), the Royal Government of Cambodia pursued a comprehensive forestry reform designed in combating illegal activities and managing the forest resources of the country in a sustainable way. The Forestry Administration has prioritized the *National Community Forestry Program* and the *Forestry, Climate Change, and Innovative Financing* as two of six prioritized implementation programs of the National Forest Program (CFI, 2008). The Community Forestry Sub-decree was subsequently passed taking into account the welfare of the different stakeholders and sectors in the country and international commitment on the conservation and sustainable management of the forest resources (RGC, 2002b). The Community Forestry has slowly been recognized at the central level and in 2002, about 64,000 hectares of community forest was identified by FA (Heov et al., 2006). The Royal Government of Cambodia has taken steps in the reforming the Forestry sector and it is an important development that effectively promotes people's participation in

sustainable forest management, improves the living standards of the rural Cambodians and contributes to reducing poverty in the rural areas.

Recognizing the importance of community forestry in combating poverty, the RGC promoted Community Forestry as a strategy in addressing rural poverty and sustainable forest management. Community forestry involves developing capacities and processes for local people, acting through community based organizations and institutions, to manage a defined set of forest resources. It is essential for meeting the forest- related needs and development objectives of local people, both in terms of resources needed to sustain livelihoods (CBNRMLI, 2005).

As community forestry is becoming more popular in many developing countries as a tool in combating poverty, the Royal Government of Cambodia (RGC) also made a policy declaration of promoting Community Forestry as a strategy in addressing rural poverty. In all the reforms made, sustainable forest management is the centerpiece in pushing for poverty alleviation. One focus of sustainable forest management is the implementation of community forestry as a strategy of pursuing a balanced development in the rural areas. The coexistence of conservation and production to realize the full potential of forests for poverty reduction is recognized (WB, 2008).

In addition to the forestry reforms, the Royal Government of Cambodia adopted the National Forest Program that spells out the specific strategic directions of improving governance of the country's forest resources. The NFP of Cambodia follows several principles in governing the country's forests, to wit (FA-RGC, 2010):

- Sustainable forest development observing social, economic, cultural and environmental aspects

- Country leadership, commitment, responsibility and ownership, including alignment with national policies and donor harmonization.
- Participation through multi-stakeholder consultations
- Holistic and cross-sectoral approaches using landscape planning through collaboration among ministries, local governments and civil society;

The Forestry Reform was an important development that effectively promotes people's participation in sustainable forest management, improve the living standards of the rural Cambodians and contribute to reducing poverty in the rural areas. The Royal Government of Cambodia is strongly committed to continue its forestry reforms in order to strengthen sustainable environmental management (FA, 2008).

1.1.3 Implications of Malaria on Community Forestry

The mismanagement of the forest resources is compounded by the health problems threatening the rural communities. Among others, malaria, caused by protozoan parasites carried by female *Anopheles* mosquitoes (Schuettler, 2006), is among the leading causes of morbidity in the rural areas in Cambodia. Malaria still poses a considerable health burden, especially to high risk groups such as forest workers and inhabitants, the Cambodian military, refugees, and other temporary migrants (URC, 2010). Cambodia is the 32nd world's highest country rate of malaria (WHO, 2007). Mortality attributed to malaria is four times higher than in neighboring Thailand and almost 23 times more than in Vietnam (CNM, 2003). An estimated 2,000,000 people are at risk of being infected with malaria and 500,000 of these live in the high transmission forest areas, which are breeding sites of *Anopheles* species mosquitoes. Malaria incidence rates in 2007 were 22 per 1000 population of confirmed malaria cases (URC, 2010). The vulnerable population may comprise only

15% of the country's population, yet, the potentially affected site covers approximately 60% of the country's land area. The malady has significant economic impacts to household economy in terms of medical treatment, foregone income and other socioeconomic impacts such as deprived education, reduced savings, among others. Aside from the governance issues that affect poverty in the rural areas, cross cutting issues such as health among others provide a significant factor in understanding poverty. In Cambodia, malaria has affected several community forestry sites. It is caused by protozoan parasites and passed from person to person by female *Anopheles* mosquitoes. Malaria remains a public health concern worldwide (Yé et al., 2011) particularly in Asia (Maude et al., 2008; Anand et al., 2011). It is a major cause of death and illness in children and adults in tropical countries (WHO, 2006) and a major killer among children under five years of age in Sub-Saharan Africa (Yé et al., 2011). Malaria related mortality is estimated at over a million people per year (WHO, 2006) and as of 2007, malaria accounts for about 1,311 deaths in India (NVBDCP, 2007). The World Malaria report (WHO, 2010) estimated that about two-thirds of all confirmed malaria cases is located in South-East Asia region (Anand et al., 2011). It is one of the world's oldest diseases infecting between 300 million and 500 million per each year, killing up to 3 million of them, or one person every 30 seconds (RTI, 2006). The impact of malaria infestation will undoubtedly affect the government efforts in untangling the community from the bondage of poverty. Ung et al. (2005) noted the influence of the type of forest on the incidence or prevalence of malaria. Aside from forest types, other factors such as the proportion of forest, the distance from the forest edge was observed to influence the incidence of malaria (Ung et al., 2005).

1.1.4 Governance of Natural Resources

It is essential to have a certain proportion of land under forests to maintain the microclimate of the area and to promote socio-economic development of the local people (Bhatt, 2005). In spite of industrialization, natural resources provide the biggest livelihood opportunities to a large population in the world (Bhatt, 2005). Like other "wildlands", the advantage of natural forest is that nature provides for multiple commodities that can be harvested without capital inputs and human production efforts (FAO, 2007). However, it has been recognized that maintaining natural forests under strict protection without generating income sufficient to compete with alternative land uses such as agriculture and urban and infrastructure developments would be a great challenge (Scherr et al., 2004b) especially that many of the poorest of the poor in developing countries live in or near forested areas (Sunderlin et al., 2007). In most settings, natural forests tend to have little comparative advantage for the large-scale alleviation of poverty compared to agriculture (FAO, 2007). It is unfortunate that natural resources are not being utilized in a development-oriented manner for providing livelihood strategies. Natural resource removal is not able to foster the socio-economic progress in an effective manner (Bhatt, 2005).

An abundance of natural resources does not necessarily translate into wealth for the poor. To make nature a source of prosperity for poor communities requires supportive governance conditions like policies and laws that protect the rights of the poor, coupled with responsive institutions that promote their interests (FAO, 2007). Somehow, Sunderlin et al. (2007) cited the link between the problems of poverty and deforestation. The patterns and institutions of governance are usually the critical factor determining how effectively the poor can harness ecosystems for their

livelihoods (FAO, 2007). Restrictions on the access of forests have resulted in the resource loss and degradation (McKenney and Prom, 2002). The deteriorated forest environment increases poverty, which in turn increases population pressure on the remaining forest (Sim et al., 2004).

The present status of the forest resources of Cambodia is very degraded and uncertain. Case studies and anecdotal evidence indicate that many remaining forest areas are significantly degraded (McKenney and Prom, 2002). The problem of forest management is linked to the rural poverty and overexploitation of the forest resource. The most significant loss of forests occurred in the north-west of the country notably Banteay Meanchey, Battambang, Siem Reap, Otdar Meanchey and Pailin Provinces (FA, 2008). The perceived loss of forests was also severe in the mountain or plateau regions where households depend on forest resources for their income (WB, 2006). In 1965, the forest cover area was 73.04% of the total land area of Cambodia but it decreased to 59.09% in 2006 (FA, 2008). The average deforestation rate from 1973 to 1993 was 70,000 to 90,000 hectares year⁻¹ with deforestation rates appearing to have increased beginning in the mid 1990's (McKenney and Prom, 2002). The fastest rates of forest degradation occur in areas surrounding (expanding) villages, and alongside new road corridors (WB, 2006).

Many forests are cleared for agriculture, fuel-wood, food, pole, construction timber, other form of cash, and deplorably, for land speculation. Most of the poor people resort to farming by clearing or converting forestlands to agriculture through slash and burn cultivation. Forests are often target for migration because they often overlie fertile agricultural lands or pasture that can be converted by colonists (Sunderlin et al., 2007). Even if natural forests are formally the property of the state,

the state is often unable to enforce exclusionary laws, in part because of the remoteness of some forests (Sunderlin et al., 2007). One of the greatest challenges in the protection of the forest resources is the lack of human resources and financial funding for implementing these forest protection measures (Lic, 2004). But in some areas, the problems of resource loss and degradation are attributed to restrictions on access to resources (McKenney and Prom, 2002).

The dependence of 85% of the Cambodian population on farming and land resources underscores the importance of considering the role of rural people in development planning (Butterfield, 1998). In response, the Royal Government of Cambodia then has taken important steps in greater community participation in resource management and good governance (Lic, 2004). Among others, government reforms to slow down tropical deforestation that could realistically include devolution of land tenure and forest land decision-making to those whose livelihoods are directly linked to the quality and quantity of tropical forests (CIFOR, 2007). The Royal Government of Cambodia has instituted reforms whereby the local government units, through the Commune Councils, districts and provincial governments take greater role in the management of the forest resources. But sometimes, despite the legal provision exists for devolution of authority in the governance of natural resources, real devolution has been restricted (RECOFTC and FAO, 2003). The constraint in devolving the management of the forest resources could be attributed to the lack of commitment on the part of forest authorities to let go their power (RECOFTC and FAO, 2003). Professional foresters still hold the view that timber production can only be attained through exclusion of humans from the forests (Appanah, 2004).

Achieving better forest governance requires processes that enable effective participation of different stakeholders in decision-making about forest management (CBNRMLI, 2005). But on the perspective of the government and natural resource managers, development of the natural resources are constrained by the limited capability and predominant animosity among the forestry stakeholders. In some cases, the antagonism among stakeholders during public consultation and participation processes has restricted development instead of serving a vehicle for sustainable developments. The constraint in development is further aggravated by the conflicting roles and functions of some government institutions.

Only with good governance and sustainable forest management can the potential of natural forests be used to the benefit of the national economy as such and for poverty reduction (FA-RGC, 2010; CBNRMLI, 2005; FAO, 2007). Areas of good governance that affects the forests include transparency in governance and management, public participation, inter-institutional coordination and adherence to the law and law enforcement (FA-RGC, 2010). Recently, there is a significant shift in conservation and natural resource management from greater state control to more community control or Community-Based Natural Resource Management (Shackleton et al., 2002). This includes livelihood strategies based on sustainable use of the forests and wildlife habitat and planning strategies that sustain livelihoods of poor farmers who are dependent on the nearby forests. The growing opportunities for community participation in the management of the forest have evolved and could be categorized as follows: (1) transfer of forest tenure to communities and individuals; (2) promoting access to markets; (3) community forestry, including community forest enterprises and company-community partnerships; and (4) payments for forest environmental services (Sunderlin et al., 2007).

Community forestry involves the governance and management of forest resources by communities for commercial and non-commercial purposes, including subsistence, timber production, non-timber forest products, wildlife, conservation of biodiversity and environment, social and religious significance. It also incorporates the practices, art, science, policies, institutions and processes necessary to promote and support all aspects of community based forest management (Nurse and Malla, 2005). Local communities have developed knowledge systems and institutions that regulate well the use of forest resource (Appanah, 2004) and community forestry seeks greater involvement of the community in the management of the forest or making use of their local knowledge.

1.1.5 Challenges of Community-based Forest Management

The Royal Government of Cambodia is committed towards sustainable forest management and has initiated and supported initial developments of such practices. However, there are various sectors that tried to undermine the commitment of the Royal Government of Cambodia (FA-RGC, 2010). In Cambodia, natural resources are endanger of being overexploited (Lic, 2004). Cambodia's forests face many pressures including logging, the encroachment of agriculture and an increasing population, all of which have contributed to varying degrees of forest degradation (DANIA-SCW, 2006). The encroachment of some forest remnants from logging companies for agriculture has posed a serious threat to community forestry. The problem on deforestation becomes more pronounced with the growing interest on forestlands (DANIDA-SCW, 2006). Expectedly, many of the local communities will be deprived of their traditional user rights over the non-timber forest products (DANIDA-SCW, 2006). Under this condition secure land and forest resource tenure

plays a very crucial role (Sunderlin et al., 2007). Meeting the needs of the poor communities and involving them in the work is needed for conservation to succeed (Pollisco, 2005). Although community-based natural resource management (CBNRM) is considered the most appropriate strategy for reducing poverty, limited benefits remains a major threat to its sustainability. Participation of stakeholder communities and user groups in the design of natural resource management projects is relatively new in Cambodia. Professional foresters still hold the view that timber production can only be attained through exclusion of humans from the forests (Appanah, 2004).

Implementing reforms in the forestry sector and achieving the goals stated in the Cambodian National Forest Policy face many challenges. Among them is surviving with meager budgets and limited capabilities. Nurse and Malla (2005) reported that Community Forestry in Cambodia has not been able to scale-up the localized benefits to the poorest of poor people as many of the Community Forestry sites are still at an early stage of development (DANIDA-SCW, 2006; Sunderlin *et al.*, 2007). Likewise, the experiences from other countries indicated that many community organizations are still relatively weak particularly in carrying out their obligations. Most Community Based Forest Management (CBFM) recipient communities have insufficient income to finance their CBFM Agreement's obligations and many fear that recipient communities may revert to their ecologically destructive resource use practices (Eslava, 2004). Timber and non-timber products from the community forest still offer limited benefits. Typically, forest resources closest to villages tend to be the most degraded, and as a result, these are the areas where many of the intensive community based programs are focused (DANIDA-SCW, 2006). Many of these organizations need for support and assistance in the

areas of organizational management, enterprise development, financial management, field level technical forestry and community planning (Eslava, 2004).

To date, there are limited assessments on the progress in promoting natural resource management by local communities including its impacts and there is still a poor understanding of the relationship between the type and condition of a forest and the corresponding benefits to the local communities and the experiences in community-based timber production within the tropics are generally poorly documented. Although community forestry has made useful contribution towards poverty alleviation, environmental sustainability and forest governance, its full potential has yet to be tapped (Malla, 2006). The ability of the forest to support the livelihoods and basic needs of the community depends on its condition. But so far marginal success has been achieved in community involvements for Sustainable Forest Management (SFM) and, therefore, more efforts are required to institutionalize community participation as a system (Bhattacharya, 2001). Spatial analysis conducted by Sunderlin et al. (2007) shows a strong correlation between high forest cover and high poverty rate. It should be noted that most of the community forests are located in remote areas. Even in countries where economic growth occurs, remote areas are often the last to experience its growths (Sunderlin et al., 2007).

The potential for Community Forestry to alleviate poverty and develop a sustainable forestry program needs thorough study. There is no *single Community Forestry* model for the development of social/community forestry that will suffice (Gilmour et al., 2004) and approaches used for Community Forestry (CF) or Community-based Forest Management (CBFM) vary from country to country

(Petheram et al., 2002; Nurse and Malla, 2005). Thus, the shortcoming in the early implementation of Community-based Natural Resource Management (CBNRM) calls for its continuous improvement. Suitable approaches emerge from local experiences and knowledge although elements such as devolution of natural resource management to local authorities, the right to self-determination, and user participation in management decision making are common in all successful CBFM, specific pro-poor strategies (Malla, 2006) and well-defined tenurial rights (FAO, 2007).

The limited financial returns from the community forest and declining financial support to community forestry development (mainly due to financial limitations of the government) have dampened the interest of some stakeholders to participate (Eslava, 2004). It must be noted that many of the Community Forestry sites are still at an early stage of development (DANIDA-SCW, 2006) and their community organizations are still relatively weak in carrying out their obligations under the CBFM Agreement (Eslava, 2004). Combined with poverty and strong demand for wood fuel, existing forests and even young and recovering forest stands are constantly under pressure. The resulting overexploitation of the forest resources that afflict many CBFM sites greatly compromise their capacities for collective effort in performing their tasks as resource managers. Despite the devolution of some environment and natural resource functions to them by the national government, there is an inadequate involvement of Local Group Users in the implementation of CBFM (Eslava, 2004) and very few countries have devolved any real level of authority for decision making over forest resources to communities and tenurial rights are usually heavily restricted (RECOFTC and FAO, 2003). Also, some Local Group Users do not clearly understand their roles and responsibilities in

environmental governance (Eslava, 2004). Unfortunately, some community forestry sites have limited participation since government retains full control in local forest management (Eslava, 2004).

It is believed that the access and the condition of the natural resources could have a strong influence on poverty. Despite the widespread recognition of the role of the forests in alleviating poverty, the direct relationship between forest condition and condition of the forest are still poorly established and empirical data to support the role of Community Forestry is still very limited, and the problem remain ubiquitous. Poverty rates remain the highest in those areas with the richest forest resources (WB, 2006; Sunderlin et al., 2007).

The multidimensional aspects of poverty in the upland require understanding of its nature, particularly in the forest communities. It is complicated by many factors such as diversity of forest conditions, diversity of forest communities and differences in their rights and opportunities to use their resources (CIFOR, 2007; FAO, 2007). The extent to which the ‘poorest’ of the poor were able to benefit from the program is unclear, mainly due to the lack of specific pro-poor community forestry strategy (Malla, 2006). Whether the incentives created through CBNRM are sufficient to engage communities in the long term, and ultimately support poverty reduction and sustainable Natural Resource Management needs to be evaluated (Mahanty and Nurse, 2007). It is interesting to note that in some areas, like in Tonle Sap, poverty is widespread despite the vast natural wealth (ADB, 2003). Interestingly the timberland concentration showed negative correlation to per capita income and positively related to the poverty rate (Overdeest and Green, 1994; Sunderlin et al., 2007).

Pursuing a participatory approach in managing the forest resources in Cambodia will be a challenge since it is in nascent stage of implementation. Experiences and success of community forestry needs thorough evaluation. Understanding the status or performance of the Community Forestry is indispensable in understanding its potential or viability as there is still a poor understanding of the relationship between the type and condition of a forest and the corresponding benefits to the local communities. The question of how to generate wealth through community forestry will remain recurrent (Appanah, 2004) and the challenge is to find ways how community forestry might include more income generating activities, especially for the poorest of the poor (Malla, 2006). In fact, in many established community forestry projects, there is still a need for continued support and assistance as no community forestry schemes generated enough profits to undertake their own resource management (Guiang et al., 2001). The understanding on the relationship between the resources and poverty is further constrained by the relatively little analysis of the contribution of forests to rural livelihoods (WB, 2008) due to difficulty in quantifying the contribution of forests and trees to livelihoods (Warner, 2006).

1.1.6 Evolving Markets for Environmental Services– Carbon Market and Reduced Emission from Deforestation and forest Degradation (REDD)

Sustainable income generation through payments for environmental services, tourism, timber, agroforestry and other non-timber forest products (NTFPs) provide opportunities in eradicating poverty for forest-dependent people (FAO, 2007). Forests mainly serve as source of livelihoods and providing ecosystem functions that are useful to humans (FA-RGC, 2010), particularly water quality and flow regulation, provision of habitat for crop pollinators and predators of agricultural

pests, microclimate regulation and to some for spiritual and religious values (Scherr et al., 2004). The forest in Cambodia does not only provide timber but is also a host to rich flora and fauna that could have immense medical and scientific value. For instance, medical experts have found only recently that artemisinin, a compound extracted from a Chinese herb, is the best drug against malaria (Tan, 2007). The value of the forest does not only confine to the extractable timber since globally, the environmental services of the forest are also recognized in sequestering the carbon from the atmosphere.

The growing concern for environmental degradation has become too serious that it now becomes a global issue. Climate change is among the most serious threats to sustainable development, with adverse impacts on human health and food security and the role of the forests in mitigating climate change and based on activities, can be as both source and sink of greenhouse gases. Deforestation in the tropics is a major source of carbon emissions and an active contributor to global warming (CIFOR, 2007; Lasco and Pulhin, 2004; FAO, 2007). Tropical deforestation is a significant net source of CO₂, accounting for 1.6 Pg.yr⁻¹ out of the total anthropogenic emissions of 6.3 Pg.yr⁻¹ (Lasco and Pulhin, 2004) or an annual carbon release of 1.7 billion tons (CIFOR, 2007). It causes the highest C emissions where more than 90 per cent of the aboveground C stocks of natural forests being lost (Lasco and Pulhin, 2004).

People historically have enjoyed but not paid for many forest services leaving the environmental services of the forest at the global (carbon, biodiversity conservation, etc.) and national/regional level (ecotourism, hydrological benefits, etc.) uncompensated (FAO, 2007). This current "free-rider" character of forest eco-

services is detrimental both to the forest-dwelling poor who lose a potential income (FAO, 2007). But as wilderness and natural habitats shrink, environmental services (ES) previously provided free by Mother Nature are becoming increasingly threatened. This emerging scarcity makes them potentially subject to trade (Wunder, 2005). Fortunately, over the past two decades, the international forestry community has come to recognize the linkages between meeting the needs of people for natural resources and conserving or protecting the natural environment (Bhattacharya, 2001; CFI, 2008). The pressure to protect primary forests from unsustainable logging and commercial exploitation and to manage other forest resources that will increase their environmental services kept mounting (Scherr et al., 2004a) for both economic reasons and human survival.

The growing concerns on the carbon emissions from land conversion have opened a window of opportunity for avoiding deforestation (WB, 2008) that could support the sustainable forest management. Innovative financing mechanism to support community forestry has recognized the environmental services of the community forests, particularly, in sequestering atmospheric carbon, the main cause of global warming. Markets and payment schemes for forest ecosystem services are emerging in many parts of the world (Moluar et al., 2007). Carbon financing offers the potential for new forms of financing for community forestry (Luttrell et al., 2007). It is a new and more direct conservation paradigm and a highly promising conservation approach that can benefit buyers, sellers and improve the resource base (Wunder, 2005) and it is designed to have users compensate those who must bear Costs or are prevented from developing the resource (FAO, 2006).

Under the ambit of mitigating climate change, forestry carbon credits can be obtained through negotiated Reduced Emissions from Deforestation and forest Degradation (REDD). In Cambodia, the voluntary carbon market initiative builds on the results of the forest cover change analysis conducted by the FA in 2006 which found that although the aggregate net annual rate of deforestation in Cambodia had declined to 0.5% during the period 2002-2006, in some provinces such as Otdar Meanchey (CFI, 2008). The Royal Government of Cambodia is now pushing for the market for environmental services of the forests, particularly those managed by the communities. In advancing REDD for forest conservation and poverty alleviation, the author is leading a pilot project to prepare carbon credit for community forestry in Otdar Meanchey in Cambodia. Although Payment for Environmental Services is a highly promising conservation approach that can benefit buyers, sellers and improve the resource base (Wunder, 2005) it is still relatively new strategy in considering the environment (Moluar et al., 2007; Wunder, 2005) and its viability in financing development programs such as community forestry (Luttrell et al., 2007) still needs to be verified.

1.1.7 Role of Community Forests in Alleviating Poverty and Potential Market for Environmental Services

The role of the forests in alleviating poverty is incontrovertible (Singh, 2005). It aims to support and empower communities to continue their traditional uses of forest resources and encourage sustainable practices and harness local knowledge and skills regarding forest management and ensure communities to have a stronger voice in forestry sector decision-making (McKenney and Prom, 2002). Implementing forestry enterprises in community forestry sites showed considerable success earning from 10-50% from their timber and non-wood forest product (NWFP) activities

(Moluar et al., 2007). Based on the Input-Process-Output model, Figure 1.1 presents the role of CBFM in alleviating poverty in the rural areas. It also shows how the different factors influence the performance of CBFM. The figure below is also a presentation of a systems theory whereby all variables are presented how they are related to each other. The theoretical framework is very important to picture what relationships we are trying to investigate. It is from this where our variables are derived. The framework describes the condition of the community (Box A) which includes the health attitudes, poverty, etc. These socio-economic conditions (Box A) are mostly the major factors that cause deforestation (drivers of deforestation) (Box I). The determinants of the socioeconomic condition can be affected by the livelihood and poverty reduction (Box B), the incidence of malaria (Box C) and possibly, the opportunities from funding from REDD/Carbon markets (Box D). The socioeconomic condition of the household will finally determine the status of the community forestry (Box E). But aside from the socioeconomic condition, the government's support (Box F) is also one of the factors that affect the status of CF. Depending on how the CF is managed and operated (Box E) could have an effect on the sustainable management of the community forests (Box G) and ultimately the condition of the community forests (Box H). However, the condition of the community forests (Box H) is also determined by the drivers of deforestation (Box I) prevailing in the area. The condition of the community forests and the prevailing biophysical condition of the area such as rainfall, climate, etc. (Box J) could determine the suitability of the site provide a favorable condition to mosquitoes/incidence of malaria (Box C). But the incidence of malaria (Box C) is also affected by the malaria eradication program of the government (Box K).

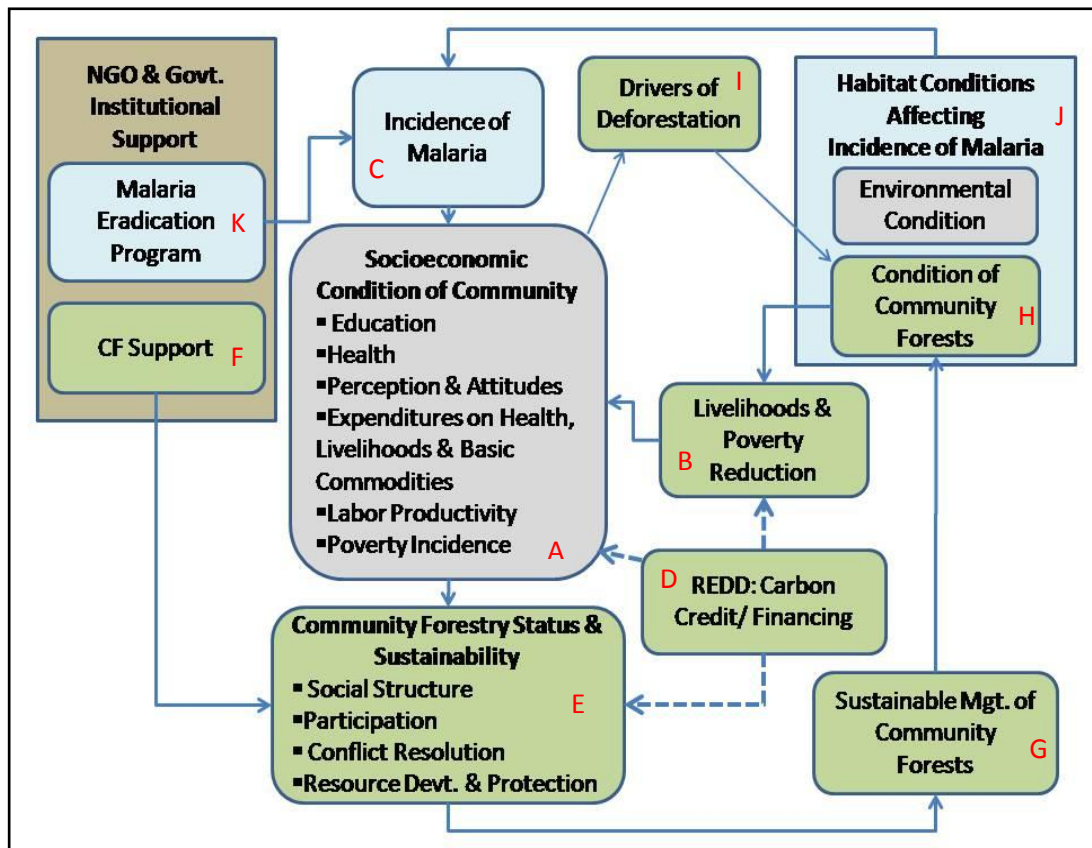


Figure 1.1: The inter-relationship of the different factors influencing the performance of Community Based Forest Management

The sustainable management of the community forests depends on the effectiveness of community forestry (Mahanty et al., 2007). The active participation of the community depends on the support provided by the government and NGOs and the condition of household members. The high demand, massive exploitation and inefficient utilization of forest products caused depletion of the forest resources leading to poverty. The condition of the forests therefore is a significant factor that contributes to the socioeconomic condition of the community forestry members. The viability of forest-based livelihoods is affected by the condition of the forest. Keeping the forest in good condition could address poverty in the rural areas as it could act as safety net to the rural communities. The sustainable utilization and management of the forest will ensure a continuous stream of products that support the livelihoods of the rural communities. The condition of the forest on the other

hand, predisposes the site to higher incidence of malaria that affects the socioeconomic conditions of community forestry members. The forests are known to be common habitats of *Anopheles* mosquitoes, the carrier of malaria, although human activities and other disturbances may affect the habitats of vector mosquitoes. The forest factors considered in the study include the conditions of the forest (i.e. type of the forest: dense, evergreen or deciduous and predominant land uses). Aside from the biophysical factors, the incidence of malaria could also be influenced by the government's malaria eradication and treatment programs.

Payment for Environmental Services (PES) is increasingly discussed as appropriate mechanisms for matching the demand for environmental services (Swallow et al., 2005). The promise of environmental protection and economic efficiency has fueled the current trend in the forest sector to adopt market-based instruments rather than command and control systems of incentives (Landell-Mills, 2002; Mayrand and Paquin, 2004). The opportunities for payment for ecosystem or environmental services needs to be explored (Malla, 2006; Sunderlin et al., 2007) as alternative funding options for sustainable environments and livelihoods (Gutman, 2001). The PES approach is a market-based approach to conservation financing based on the twin principles that those who benefit from environmental services (such as users of clean water) should pay for them, and that those who contribute to generating these services should be compensated for providing them (WB, 2008; Mayrand and Paquin, 2004). An examination of the markets created for carbon sequestration services shows that markets are useful and effective tools for environmental conservation (Bayon, 2004). However, payments for environmental services are still experimental (FAO, 2007). The small scale of PES application generally also constraints poverty alleviation as some access rules and structural