FORESTS AND CLIMATE CHANGE:
MITIGATING DRIVERS OF DEFORESTATION

Mark Poffenberger, Ph.D.

Abstract

The United Nations Framework Convention on Climate Change (UNFCCC) is exploring reducing emissions from deforestation and degradation (REDD) as a new global strategy to address global warming. This represents a major expansion of earlier forest-oriented initiatives under the Clean Development Mechanism (CDM) that focused on afforestation and reforestation activities characterized by plantation schemes. While the scope of REDD projects is still being defined, potential categories include not only forestation but conservation and stock enhancement, creating a range of new opportunities. The core concept behind REDD, however, is that deforestation trends can be slowed, halted, or even reversed conserving millions of tons of carbon that would otherwise be emitted.

A recent study in the province of East Kalimantan, for example, estimated that 305 million t CO2 could be conserved between 2003 and 2013 if the province's protected areas were effectively conserved, generating a potential income stream of $120 million per year at a price of $4 per ton of CO2.[1] Yet, optimistic projections of this type entirely depend on a REDD projects capacity to halt the powerful political and economic forces that have decimated Kalimantan's forest over the past forty years. This paper examines drivers of deforestation operating in northwest Cambodia to explore how they might be slowed in a REDD project scenario and how the future international articulation of project design parameters could enable or constrain a global REDD strategy.

Emerging REDD agreements and developing carbon markets have generated enormous interest among climate change specialists, with growing attention to potential national REDD projects. Special technical committees (SBSTA) operating under UNFCCC processes are focusing on setting standards, with an emphasis methodologies for verifying emissions reductions. Far less attention has been given to the fundamental challenges in the field involved in mitigating the impact of powerful drivers of deforestation and degradation operating in developing countries.

This paper examines experiences from Oddar Meanchey Province in northwest Cambodia where a sub-national REDD project is being designed. The author identifies nine distinct forces operating at the national, regional, and local level that are driving an annual deforestation rate of 2.1% in that province between 2000 and 2008. The paper discusses strategies that may be implemented in order to control operational drivers of deforestation, as well as some of the other underlying causes that have caused Cambodia's forest cover to decline by 31% between 1980 and 2000.

The author raises questions regarding a fundamental REDD assumption that the accurate measurement and valuation of forest carbon, and the establishment of a global forest carbon trading system will facilitate the emergence of national and sub-national projects that are sufficiently effective to control powerful political, demographic, and economic

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forces driving deforestation. The paper concludes that to be successful, national and sub-national REDD projects will need to address diverse issues at a local, regional, national, and international level requiring complex strategies and a strong partnership between diverse institutions.

1. Introduction

In December 2007, ten thousand delegates from 180 countries gathered on the island of Bali (COP-13) to continue the global dialogue on climate change. One of the key decisions to emerge from the "Bali Roadmap" was an agreement to pursue a new global strategy to combat climate change now known as REDD (Reducing Emissions from Deforestation and Forest Degradation). After several years of debate starting in Montreal in 2005 (COP 11), REDD was approved as the latest innovative approach to stabilizing the planet's forests and slowing climate change. Forests are estimated to contribute between 17%[2] about 20% of greenhouse gas emissions each year,[3] consequently effective measures to reduce this contribution to atmospheric carbon would be significant.

A key to the success of future REDD strategies to mitigate the impact of climate change by conserving existing forest cover will be its capacity to control the drivers of deforestation and degradation. There is an assumption among policy makers that by creating a framework and market for forest carbon trading, financial incentives will be established that will change forest use policy and management. The problem is that the dynamics of deforestation and forest degradation are multiple and highly complex. These "drivers" operate at a number of levels, influenced by the global economy, regional trade, national politics and economy, as well as local land markets, power dynamics, subsistence forest dependencies, population and poverty. As noted by Karsenty, "Market instruments are very effective tools for achieving specific goals, such as improving efficiency of economic agents, but they will probably be unable to change the socio-political context underlying tropical deforestation."[4] A recent CIFOR report cautioned: "REDD policies will be neither simple nor straightforward, given the complexity of the social, economic, environmental, and political dimensions of deforestation. Many of the underlying causes of deforestation are generated outside the forest sector, and alternative land uses tend to be more profitable than conserving forests. REDD policies will have to deal with the fact that institutions for aligning the behavior of individual economic actors with the public interest are generally weak…."[5]

Nonetheless, REDD strategies have tremendous promise, if structured appropriately, to enable and finance a broader historic forest transition in the developing world. In Asia, over the past twenty years, a new generation of policies is being explored after a century of industrial logging that led to the degradation of hundreds of millions of hectares of once dense tropical forests. One of the prominent approaches is community-based forest management, a model of community resource stewardship that has been widely implemented in Cambodia, India, Indonesia, Nepal, the Philippines and Vietnam.[6] The impact of CF has sometimes been dramatic. For example, in India over 21 million hectares or 33% of state forest land, has been formally allocated to 100,000 forest-dependent communities under the national Joint Forest Management scheme. In the Philippines, 37% of public forests have been allocated to approximately 6000 upland communities under CF

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management agreements. An estimated 21% of Vietnam's forests are under the administration of rural communes.[7]

After centuries of marginalization, indigenous and forest-dependent communities are seeing their forest rights recognized under newly promulgated ancestral land laws. Community-based forestry has potential to restore watersheds, conserve biodiversity, improve local livelihoods, and sequester carbon. While huge areas of forests have been devolved to rural communities in Asia over the past twenty years, funding and policy support to support sustainable forest management transitions. As a result, some of the world's poorest people dwelling in remote upland watersheds are struggling to restore degraded forests with virtually no resources, while providing important environmental services for their nations and the planet. REDD programs could create a framework for financing community-based conservation on a long term basis.

In part, the success of REDD will depend on policy makers not repeating mistakes made in the design of the Afforestation and Reforestation project parameters instituted under the Clean Development Mechanism (CDM). Rigid and narrow definitions, modalities, and rules and guidelines for forestry projects, combined with a highly bureaucratic process for project approval resulted in only two A/R project approved by the CDM up to the end of 2008. In addition, past CDM projects focused on plantation strategies which needed to be implemented on a large scale to meet substantial transaction costs involved in certification. As Skutch notes regarding CDM rules:

"Forestry is permitted as a sink measure under the clean development mechanism (CDM), but only in the forms of 'afforestation' and 'reforestation'. These tend to involve large-scale plantation systems which, although cost-effective in terms of carbon sequestered, in most cases have very limited benefits to local populations."[8]

It is important that proposed REDD project frameworks considered under an international climate change agreement be rigorously field-tested in a variety of national and sub-national contexts before they are finalized and ratified. Flawed policy and project parameters, once adopted, could constrain the emergence of an effective global strategy to link forest conservation by frustrating the efforts of communities, civil societies, and national governments by imposing high transaction costs, bureaucratic barriers, and complex and expensive methodological and certification requirements.

The many and complex methodological steps that go into the establishment of a carbon baseline, the estimates of leakage, project scenario calculations, etc. are beyond the scope of this paper. Rather, this paper describes and analyzes the challenges a new generation of sub-national REDD projects may confront as they attempt to mitigate powerful drivers of deforestation and degradation that operate in many developing countries. The paper draws on experiences from Oddar Meanchey Province in northwest Cambodia where one of the world's first REDD projects in under development. The project methodology and Project Design Document (PDD), was one of the first REDD strategies to be submitted to the VCS for certification, a process that is currently ongoing. Whether the project is effective in controlling these drivers will determine if the "project scenario" will become a reality.

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2. Oddar Meanchey REDD Project Goals

The 60,000 hectare Oddar Meanchey Community Forestry REDD Project was conceptualized by Community Forestry International (CFI), a non-profit organization that had supported the national transition to community-based forest management in Cambodia over the past five years. With the endorsement of the Cambodian Government, support from the Danish government, and technical guidance from Terra Global Capital (TGC), a San Francisco-based carbon fund, the project sought to test emerging REDD policies with 12 CF groups in Northwest Cambodia (see Figure 1). The project will be one of the first to use a new methodology for submission under the VCS combined with the Climate and Community and Biodiversity Alliance (CCBA) guidelines. The project is expected to sequester 8.7 million tons of CO2 over the next 30 years.

In November 2007, the Forestry Administration (FA), supported by the joint donor Technical Working Group on Forests and the Environment (TWG-F & E) unanimously approved the pilot REDD project in Oddar Meanchey. Working with FA staff, Buddhist monks and local NGOs, CFI has been supporting the formation of 12 community forestry groups that protect local forests. The FA, encouraged by the prospect of REDD financing, has approved the entire area in the face of competing claims by Economic Land Concessions. The project methodology and PDD were the first to be submitted to the Voluntary Carbon Standard for certification, a process which is nearing completion.

The OM project was designed to mitigate the impact of a number of drivers of deforestation, while responding to the economic needs of the low-income rural populations that inhabit the project area. A requirement of the project design was that the Royal Government of Cambodia would recognize the use rights of people dependent on the forest under the national community forestry program, providing them with a 15 year renewable lease and a minimum 50% share of carbon revenues. The project intends to create a 30 year income stream that will enhance household livelihoods and build natural resource management capacity.

3. REDD Project Context

Cambodia provides an interesting national context to assess these problems and whether they can be addressed through REDD projects. After nearly three decades of political instability, by the mid-1990s, the national social and economic infrastructure was extremely weak and economic growth was a priority for government policy makers and donor agencies. Industrial forestry proved to be a failed strategy for the country, with unsustainable exploitation leading to widespread forest destruction, while generating little income for the national government. The FA cancelled or suspended six millions of hectares of logging concessions since 2000, and is exploring REDD strategies at the national and sub-national level as a means of generating revenues for management while engaging forest-dependent villages under the Community Forestry Program. REDD creates a new management alliance between an important national government agency and hundreds of forest communities. Whether REDD revenues can provide sufficient income to meet national economic development goals remains an important issue. Other uses of the forest, such as conversion to plantation crops under the Economic Land Concession

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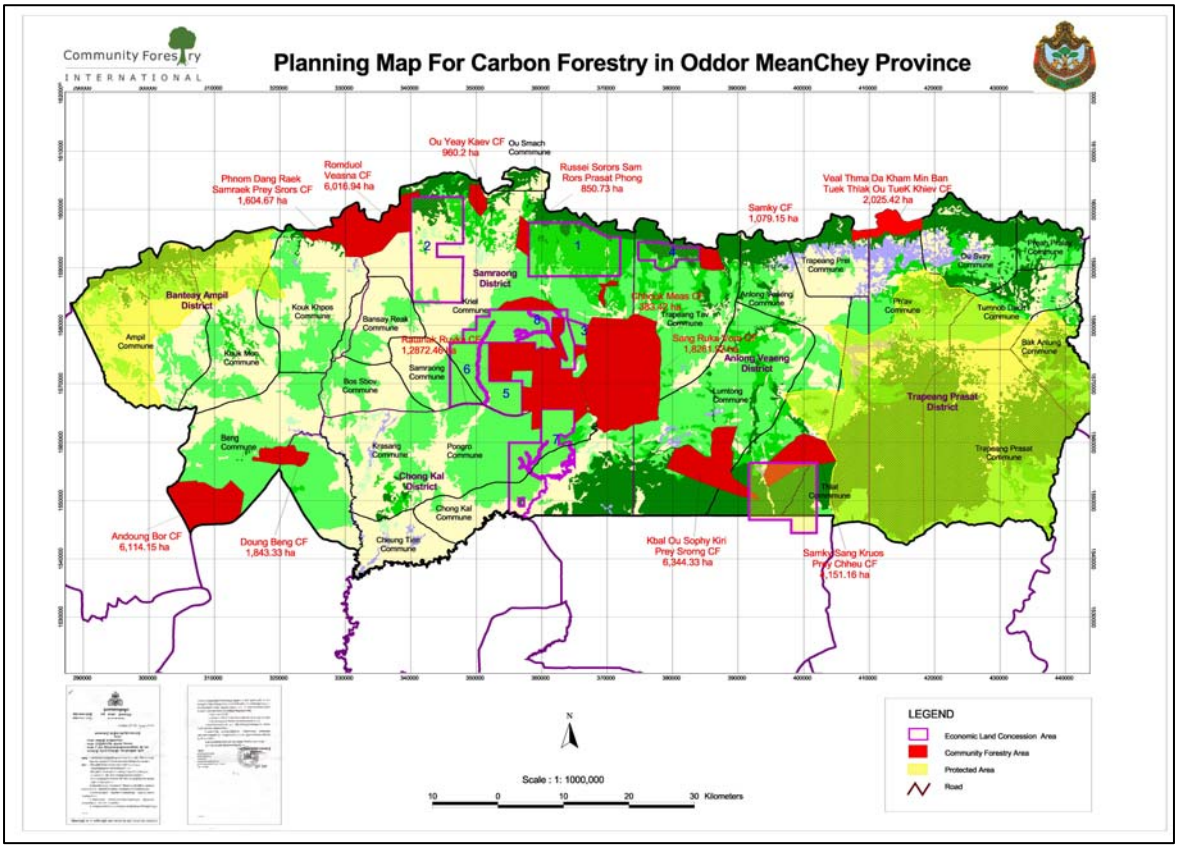
program, might generate a larger income stream, but would frustrate Forest Administration efforts to achieve the national target of retaining 60% of the land area under forest cover.

Figure 1: Map of Community Forestry carbon project sites in Oddar Meanchey Province.



In the late 1990s, after 25 years of political insecurity, peace came to Oddar Meanchey province in a remote corner of Northwest Cambodia. This sparsely populated, heavily forested region began drawing a growing flood of migrants from the Lower Mekong region, as well as from neighboring provinces. Over the next decade the population expanded at a remarkable rate of 12% per year, while forests disappeared at over 2% annually.

Oddar Meanchey Province, like most of Cambodia, has never had its extensive state public forest lands demarcated and due to its relatively low population density, it has been a target for migration and land claims. Each year tens of thousands of hectares of forests are felled by migrants with rough shacks constructed to claim occupancy. This process has been fueled by an overheated land speculation market that has driven prices up by several hundred percent each year over the past decade. Villagers, migrants, military, local government officials, and private sector investors all play a role in seeking to control forest resources. With a national policy mandate to preserve 60% of the country under forest

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cover, the FA views an alliance with local communities, financed through REDD carbon payments, as a viable strategy to address the rapid erosion of forest cover. While the FA has considerable legal rights under the Forest Law to manage much of the province's land area, it inevitably must compete with other government agencies that desire to control these resources. This includes the military, Ministry of Interior, and other units within the Ministry of Agriculture, Forestry, and Fisheries.

REDD projects generate carbon credits through slowing or reversing historic rates of forest loss. Oddar Meanchey was an attractive REDD project candidate due to the rapid disappearance of its forest cover over the past thirty years. Figure 2 and 3 dramatically illustrates the receding forest cover between 1976 and 2006. Different forces have driven this process of denudation including commercial logging sanctioned by the Khmer Rouge and then the Cambodian Government, poor rural migrants, and powerful private sector investors all competing for control over the province's forest lands. In 2007 alone, nearly 7% of the province's land area was leased to Economic Land Concessions for sugarcane, Jatropa, and rubber production. In other words, Oddar Meanchey has the 'perfect storm" scenario with a historic high rate of deforestation, multiple drivers of deforestation with powerful political, economic and demographic momentum. At the same time, much of the forest has been lost or severely degraded, so the project's goal was to protect the remaining forest "islands" and fragments while restoring the recently degraded forest that were sending up hopeful green shoots.

The community forestry groups in this remote corner of Cambodia may have a chance. They are highly motivated, not by the illusive promise of carbon payments, but by the realities of their daily lives. Sokh Smit, a 41 year old CFMC member notes: **"**The people with money in our village go to Samrong town when they are sick, the poor people go to the forest to collect traditional medicine." Not only medicinal herbs, but much of the daily requirements of rural Cambodians come from the forest. The timber to build houses, barns, and tools, fibers for basket making, foods ranging from wild fruits and berries, mushrooms, edible leaves and tubers which are a stable food between harvests – all make the forest and essential part of the village economy. Perhaps equally important are the water sources that healthy, intact forests recharge and protect.

The project communities have allies in their efforts to protected threatened forests. Venerable Bun Saluth, an energetic young Buddhist Monk who heads the Samraong Pagoda, has mobilized his fellow monks and neighboring villages to protect over 18,000 hectares of forest that still retains tigers and bears. He relies on land mines laid by the Khmer Rouge to deter encroachers. "We know where they are as one of our monks had been in the Khmer Rouge and helped place them." In addition, a local NGO has been working with dozens of local communities to help them form Community Forest Management Committees (CFMCs) and proceed through the six steps that lead to a community forestry management agreement under the Forest Sub-decree. All twelve CFMCs, comprised of 55 villages, have now completed this process and been granted 15-year stewardship rights. While many of the project communities were recent migrants who had settled in the area over the past ten to fifteen years, they were motivated to retain their local forests, had substantial local knowledge of the forest ecosystems, and were

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economically dependent upon forest resources. Due to their physical presence in and around the forests, they are well positioned to defend forest resources from illegal logging and further clearing by more recent migrants. At the same time, they lacked the political leverage to address more powerful drivers such as economic land concessions and military encroachment. Their association with external support organizations, especially the national FA, was an essential element in protecting their community forests.

In summary, the Oddar Meanchey context was selected for a REDD project because it fit emerging parameters conducive for project development including a historically high rate of deforestation, a sufficiently large amount of forest where deforestation could be avoided, and a national government willing to provide the policy and political support required to address issues on public lands. At the same time, the province had the social capital needed to address drivers of deforestation in the form of highly motivated rural communities, local NGOs, and civil society groups ready to protect forest assets on the ground and restore degraded ecosystems. Finally, the area had ecological capital reflected in recently disturbed forests that showed signs of biological resilience characterized by vigorously coppicing tree species, high seasonal rainfall, and relatively fertile soils. Given this context provided a better likelihood of project success, the project design teams desired to assess whether these components would allow for the development and implementation of effective mitigation strategies that could control powerful drivers of deforestation.

4. Without REDD Project Scenario

Without the project, it is likely that deforestation in the province will continue at the current rate over the next decade, slowing gradually as the remaining forests are cleared. Project assessments of the drivers of deforestation and degradation indicate at least nine forces are operating in the province (see Table 2).[9] The issuance of large land concessions, the encroachment of military, forest clearing for land speculation, and the influx of migrants are the four drivers that are believed to have the largest impact on forest loss based on field observations. During the 2007 to 2008 period, the Royal Government of Cambodia leased approximately 44,000 hectares of forest land to private companies representing nearly 7% of the province's land area. These concessions are currently being cleared of forest for sugar cane. Without the project, there is a reasonable likelihood that a large proportion of the community forestry project areas would be leased to economic land concessions (ELCs), cleared by land speculators, or claimed by soldiers, migrants, or local communities within the next five years. While Cambodia has passed laws to protect forests (Forestry Law, 2002), support biodiversity and conservation (Law on Environmental Protection and Natural Resources Management, 1996), and enhance the livelihoods of rural peoples (Community Forestry Sub-Decree, 2003)[10], it has also adopted policies to accelerate economic growth and encourage private sector investment. In a scenario without REDD, with no carbon credits to act as a financial incentive, the latter forces will likely prevail, resulting in rapid deforestation, biodiversity loss, and social marginalization of rural peoples.

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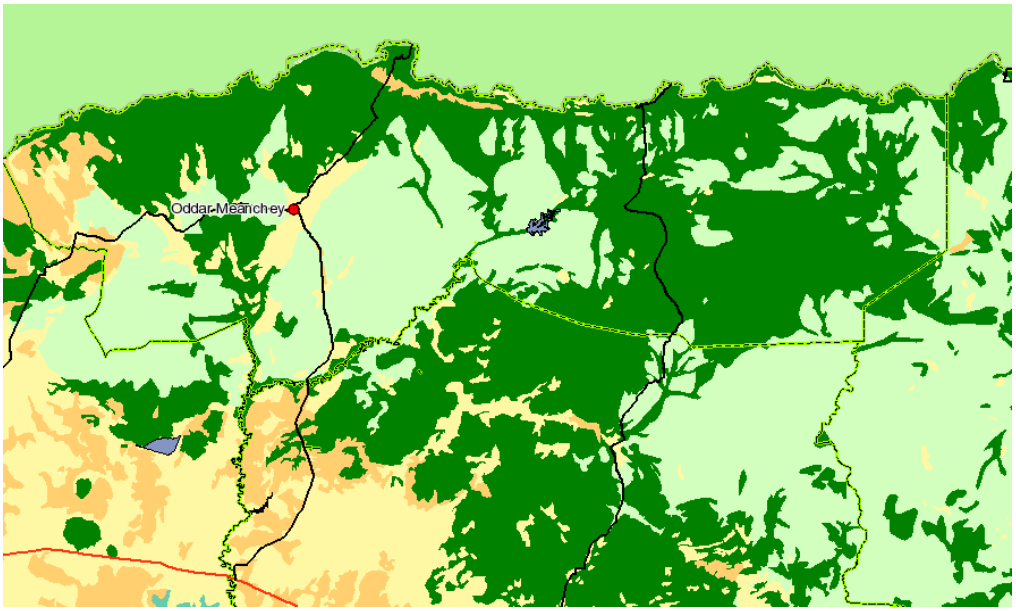

Figure 2: Forest cover in Oddar Meanchey Province. (1976)

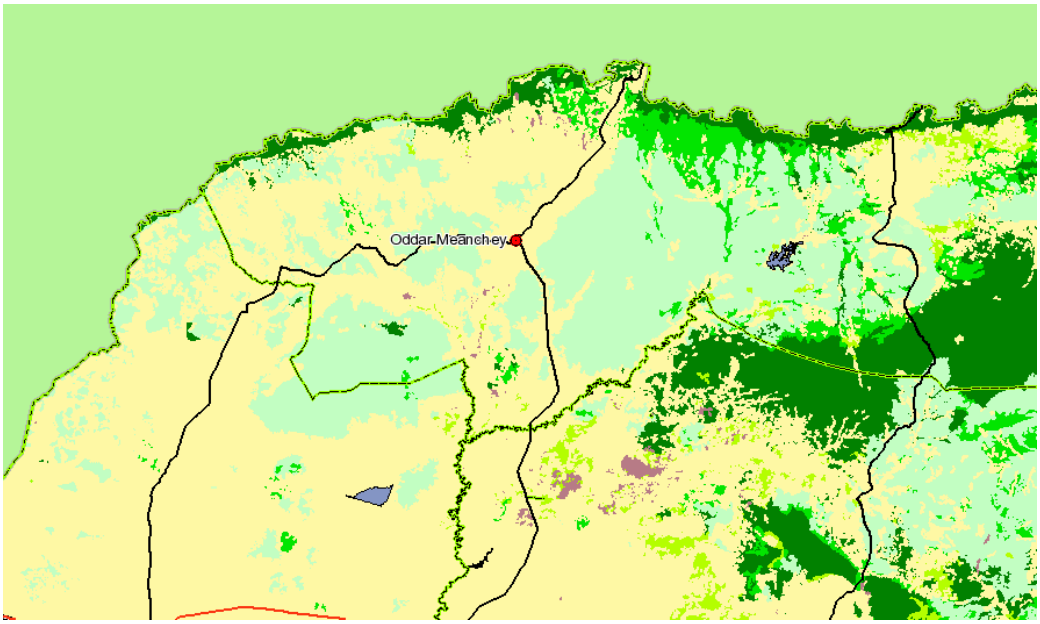

Figure 3: Forest cover in Oddar Meanchey Province. (2006)

While the FA seeks to achieve the national goal of retaining 60% of the country's land area under forests, other government ministries and policy makers see economic development opportunities in converting the province's forest to uses that might generate revenues for the state and the private sector. To that extent, forest conservation policies are in competition with other national goals, including ELC development and other government

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programs. The Ministry of Interior, for example, is interested in allocating forest lands for social concessions that can provide settlement and agricultural lands. Some stakeholders view migrant relocation as a means of increasing the local labor force and clearing forests for agriculture. Oddar Meanchey may also be seen by some politicians as a good environment to resettle retired soldiers, police and civil servants. A number of the 12 proposed project sites have already been targeted for ELC leasing, but community and FA protests and the prospect of a REDD project has blocked the issuance of land concessions in the project areas. Without a REDD project, it is unlikely that the CFMCs responsible for protection will have the financial, technical, or political support required to ensure the conservation of the areas targeted for the project.

Over the past decade, it is estimated that between 8 to 9 thousand migrants move into Oddar Meanchey each year in search of agricultural land, in part due to the province's substantial forest tracts, as well as its rapidly increasing land values. During that period the population increased nearly three fold from 68,279 in 1998 to 185,443 in 2008.[11] In contrast to Lower Mekong provinces like Prey Veng and Sbya Rieng where the population was unchanged over the past decade, in Oddar Meanchey and Palin in the Northwest, the rural population expanded at 9.23 and 12.27 respectively. The Royal Government of Cambodia and local government offices have limited resources to control immigration effectively, and to demarcate the Permanent Forest Estate. As a consequence, without the project to establish control over "contested domain," migrants will likely continue clearing forests often financed by land speculators.

Illegal logging contributes to forest degradation along with forest fires, often induced by hunters or local communities to 'clean' the land. High-value "luxury wood" is selectively felled for the booming hotel market in Siem Reap which over two million foreign tourists visit annually. Illegal timber smuggling is widespread, often organized by private sector operators who obtain support from local military and police. Without project intervention it is likely that forests throughout the province, including those targeted for inclusion in the proposed project, will continue to lose forest cover at a rate of at least 1.5 to 2% per year.

Aside from forest loss, without the project many communities will increasingly lose control over their community forests. These communities depend on these forests for a wide range of products including forest foods, fodder, fuel-wood, timber, honey, rattan, bamboo, and resin oils (among others). A 1997 study by the World Bank indicated that nearly 78% of Cambodia's population subsisted on less than $2 per day.[12] Most rural families face seasonal food shortages that are often met through forest resources including the consumption of "famine foods" from the woods such as edible leaves, bamboo shoots, tubers, fruits, etc. Loss of access to these resources will create economic hardships and undermine the achievements of the Millennium Development Goals. The social and economic marginalization and possible displacement of thousands of rural families could create conflict between concessionaires, migrants, and local populations.

In the absence of the project it is likely that forests will decrease in quantity and quality resulting in a loss of key habitat and refugia placing pressure on flora and fauna, already in jeopardy. Without the project, community efforts to control illegal logging, poaching and

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regulate hunting will not be implemented with the same level of effectiveness. Many of the highest value tree species are already listed on the IUCN threatened species list. As these trees and forests are depleted, so too are important indigenous sources of seed, reducing the potential for regeneration[13]. Without the forest fragments that comprise the project area, the last habitat for tigers, bears, and other species will disappear. This will almost certainly contribute to the extinction of the last tiger population in northwest Cambodia as the final *refugia* included in this project are deforested.

The province has experienced severe erosion as forest cover has been removed. Erosion problems have accelerated over the past decade. This region experiences an extended dry season and often torrential wet season. This mosaic of open, dry, deciduous forest, combined with lowland evergreen or semi-evergreen forest, transforms into extensive wetlands and swampy areas during the annual monsoon. The lowland forests of Oddar Meanchey supply the Tonle Sap (Great Lake) with water, helping regulate the annual hydrological cycle of the greater Mekong basin. The clearing of forests from the upper watersheds of Oddar Meanchey Province accelerates erosion of soil and promotes the sedimentation of the Tonle Sap, currently estimated at 20 to 40 millimeters per year[14]. Forest conservation is a key element in any strategy to preserve Cambodia's complex hydrological systems and avoid further loss of soil through erosion.

During the extended dry season, many rural areas in the Oddar Meanchey province experience chronic water shortages. Forest loss exacerbates these drought conditions by creating a hotter microclimate and accelerating water run-off rates. Without the project, land degradation will be more extensive; there will be greater soil erosion and reduced water infiltration and aquifer recharge. Also, it is expected that existing water tanks will silt up rapidly since there is no financing mechanism to de-silt water tanks or build new water storage facilities.

5. Deforestation Drivers and REDD Mitigation Strategies

In the following section a number of drivers will be described (see Table 1), including a review of mitigation strategies being proposed by project communities, the FA, and the project design team. The drivers are broadly divided between those that operate at a national policy level and require higher level political interventions to mitigate their impact and those that are local drivers involving communities and migrants. The later can often be addressed by the community itself, sometimes with assistance from local NGOs and forestry field staff. Without a coordinated effort by local communities and national planners the complex, multi-tiered interaction of deforestation drivers cannot be effectively addressed. This case study illustrates Cambodia's emerging strategy to mitigate a diverse range of forces operating in Oddar Meanchey Province.

6. National Level

6.1 Military Personnel: Oddar Meanchey has been contested domain since the mid-1970s when it was first occupied by the Khmer Rouge who continued to use it as a guerilla base until the late 1990s.[15] More recently, tensions with neighboring Thailand has made the province a sensitive area and consequently the presence of the military is widespread. As

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Table 1: REDD Drivers of Deforestation, Risk Indicators

RISK	INDICATORS
NATIONAL DRIVERS	
Military Personnel	Uniformed soldiers clearing forests, establishing bases within forests
Government Officials	Local government officials engaged in illegal land sales and forest clearing
Economic Land Concessions	Large tracts of forest land allocated to private sector firms for sugar can production. Accelerated forest clearing and capturing of local water resources. Aside from creating additional pressure on neighboring forests, ELCs displace local residence and stimulate social conflict
	-
SUB-NATIONAL DRIVERS	
Forest fires	- Suppressed natural regeneration of degraded forests - Carbon emissions from forest destruction
Migrant Encroachment	- Increase in migrant forest clearing
Land Speculation	- Forests are felled to establish a claim on land that is later sold, or resold as land prices increase
Agricultural Expansion	- Population growth drives additional forest clearing for agricultural land creation
Illegal Logging	- Further forest degradation, removing larger, high value hardwoods, while undermining community control
Firewood Consumption	- Rapidly growing domestic consumption; - - Growth of community-based commercial fuel-wood collection; - Existence or growth of charcoal industry

in other parts of Asia, in Oddar Meanchey the military have often used forests and forest land as a source of income. According to the senior officials of the FA's Siem Reap Inspectorate, the most immediate and damaging driver is military encroachment into CF areas, with over 20 cases of military encroachment into CF areas. Since defense strategies are classified it is difficult to get information from the military regarding their operations in the area. In some cases, soldiers are involved in illegal logging, forest clearing for agriculture and land sales, while in other situations their presence is part of an effort to establish approved "camps."

According to FA senior staff, each CF area had a unique set of issues and social hierarchy that needed a special approach. In one of the 12 forest blocks, where the military are clearing several hundred hectares of forests in the southwest corner of the CF area, the local FA had trouble responding to the problem. A senior officer notes that:

> *The FA's field staff lives and interacts with the military and this may prevent their ability to confront the soldiers due to their friendships and existing local relationships. Also, the local FA officials may not have the*

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status to gain the attention of senior military officials. The level of FA response needs to reflect the status of the actor.

Mitigation Strategy: The Director General of the FA has consulted military commanders operating in Oddar Meanchey regarding the CF Carbon project and the need to respect these areas and control their soldiers. A follow-up visit by other senior FA officials together with a military unit successfully evicted soldiers illegally occupying CF areas. The high-level commitment of the FA to resolve this issue is necessary in order to raise the awareness among military commanders. The FA has the authority to defend the integrity of CF carbon project areas due to the endorsement of the project by the Office of the Prime Minister, however existing and potential future conflicts with the Thailand could give the military priority over project areas including building roads and establishing military camps.

6.2 Local Government Officials: In a number of CF areas, commune chiefs, district, and provincial government officials are reported to be involved in encroaching on forests within the CF areas. Local government officials have some authority to legitimize forest occupancy, though such letters and documents are often reversed by judicial courts and higher levels of government. Community forestry groups are reluctant to challenge their authority, however, and often need to appeal to higher authorities in order to control encroachments that have the endorsement of local government officials. In northeast Cambodia, recent studies indicate that local government officials are frequently involved in land sales taking place in forest areas.[16]

Mitigation Strategy: CFMC's are being supported to actively patrol forest boundaries and install boundary posts and signage to reinforce their claim to project areas. A series of workshops at the district and provincial levels are being organized for government officials to inform them regarding the national government's recognition of the CF areas and their inclusion in the REDD project. Still, local government officials have considerable influence and often can only be controlled through communications from more senior levels of government in Phnom Penh. Judicial systems are weak and subject to corruption and can not be expected to efficiently address all cases of illicit activities involving local government officers supporting land encroachment.

6.3 Economic Land Concessions (ELCs: As a major driver of deforestation it is important to understand the economic and political dynamics driving the issuance of concessions. Some government planners maintain that underutilized lands need to be developed to generate revenues for the state however critics argue that past timber and other leases have produced minimal income for the country. Cambodia has also been criticized by Global Witness and other international organizations for allowing powerful individuals to allocate public resources for their personal profit.[17] According to a recent report, over the past 15 years 45% of the country's land has been purchased or leased by private interests.[18] Reports indicate that applications for large ELCs are often initiated by business interests supported by well-placed Cambodian politicians, senior military officers and their wives, with the MAFF ELC committee providing formal approval. Large ELCs are being criticized, including by the Provincial Governor of Oddar Meanchey Province in

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a recent Cambodian press articles, for a failure to follow through on their commitment to implement management plans. There is some speculation that some business interests seek ELCs simply to harvest high value luxury wood, with no intention or financial capacity to invest in the development of their land. As a consequence, between 30% to 40% of all ELCs are cancelled within a few years of issuance for failure to perform. In the case of Oddar Meanchey, the FA sought the support of the Prime Minister to conduct the pilot project as a test case. Without this support, it is unclear if the project would have had the political backing needed to secure the 60,000 hectare project site in a region that was actively sought for ELCs. Aside from the large ELCs of up to 10,000 hectares,

Figure 4: My Li Heng Sugar concession neighboring REDD project site. (2008)

Figure 5: Cleared, burned and fenced land concession in central Oddar Meachey Province. (2008)

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provincial governors are allowed to issue small concessions of a maximum size of 1,000 hectares. Local government no doubt gains more direct revenues from these smaller concessions and certainly has greater control over where and to whom they are issued.

Mitigation Strategy: Mitigating the impact of ELCs on deforestation is certainly beyond the capacity of communities and REDD project teams. ELC issuance takes place at senior levels of government, often with the backing of powerful political forces. In the case of the Oddar Meanchey REDD project, because this initiative had the support of the Office of the Prime Minister and the Director General of the FA discussions where held with MAFF to ensure that ELCs did not conflict with the project area. The potential for REDD projects to generate carbon revenues allowed policy makers to view this strategy as comparable with other income generating development initiatives that would compete for land in the project area.

7. Sub-National Level

7.1 Forest Fires: Forest fires are natural events in dry deciduous forests in Oddar Meanchey Province (see Figure 7). The frequency of fires, however, is greatly increased by human activity. Perhaps 90% of dry season forest fires are caused by people including hunters, children, careless smokers, and farmers burning agricultural residue. In the case of degraded dry deciduous forests, natural regeneration is suppressed due to almost annual ground fires that destroy or damage coppice shoots and saplings. As a result, biomass is lost and re-growth is slowed, at the same time fuel wood and timber is extracted leading to a gradual erosion of vegetative material and forest health.

Mitigation Strategies: A number of community members noted that the key to restoring local forests was fire control. If fire can be stopped for 4 to 5 years, many young regenerating trees can develop the height and bark thickness to withstand future ground fires. This would indicate that Assisted Natural Regeneration (ANR) strategies implement by CFMCs under the project should focus on halting fire in degraded forests that have "high potential" for rapid re-growth. Project activities may include identifying degraded forests sites that have a high density of coppice shoots and saplings characterized by at least 250 to 300 shoots per hectare, with good soil conditions and moisture levels. The project participants suggest beginning with areas with close proximity to communities so that fire protection is relatively easy. The project would also train community members in fire prevention and control techniques providing equipment and hiring unemployed village youth to act as fire watchers. Project funds should support the construction of fire lines with at least 5 meter width. It is suggested that an area of 200 to 300 hectares be identified for ANR which is divided into 50 to 60 hectare blocks when can be treated over a five year period (one each year) this will facilitate protection from fire in high priority areas.

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Figure 6: Ground fire in dry, deciduous forest suppresses forest regeneration.

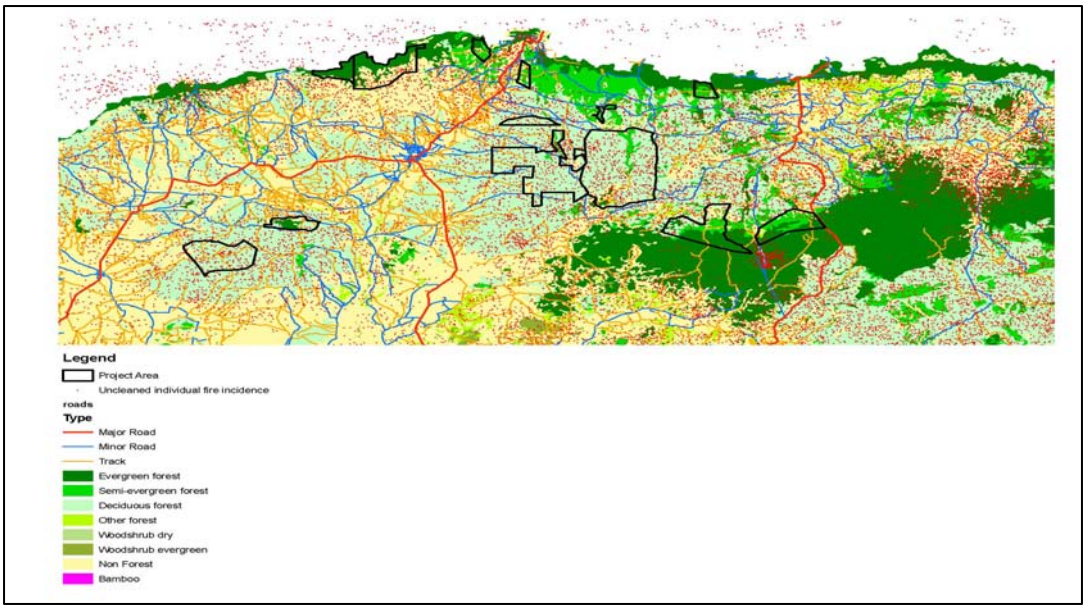

Figure 7: Fire incidence in Oddar Meanchey Province, based on Modus Satellite Data. (2000-09)

7.2 Migrant Encroachment: Migration into Oddar Meanchey has been very rapid over the past decade. The increase of the rural population is estimated to be over 12% per annum between 1998 and 2008, of which around 9% is due to in-migration. Migrants from the Lower Mekong provinces, where land is scarce, have heard by word of mouth that the frontier forests of the northwest offer opportunities to secure land. One person from Svey Rieng noted that in recent years, "over 20 people from my extended family had moved to Oddar Meanchey. They opened 3 to 5 hectares of forest land to establish a farm and houseyard. They also try to buy additional plots of land and then sell that again within a few months or years."

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While some migrants come from distant, land-poor provinces like Svay Rieng and Takeo, it appears that many families are also coming from neighboring Banteay Meanchey and Siem Reap Province. Usually, migrants follow other family members who have already established a "base" in the province. News is sent by word of mouth when opportunities emerge for establishing land claims through forest clearing. In 2008, this process appears to have begun to decrease. Part of this reflects the global economic recession and the absence of buyers for cleared forest land. It is also apparent that as an increasing amount of the frontier (unoccupied) forest is claimed by local villages settled by earlier migrants,

Figure 8: Migrant encroachment in forest land creates an illusion that new settlements are being created, however often they are abandoned by migrants or the migrants are evicted. (2008)

ELCs, and designated as CF areas, the "word of mouth" message is changing from "come there's land here" to "no land available." A number of villages noted that migrants were no longer welcomed to their communities and that even local families have no "free" land to expand their agricultural lands.

Mitigation Strategy: Where migrants have settled and communities can accommodate them, they need to be included in CFMC activities and participate in land use planning activities. Where no available forest or unused land exists, migrants need to be informed by communities of that situation and encouraged to communicate the information to their home villages so that no further in-migration to that area occurs.

7.3 Land Speculation: While migrants may participate in forest clearing for future land sales, land speculation is often driven by businessmen, officials, and local villagers who seek to claim and clear forest land for sale. According to reports, "power men" hire migrants or local villagers to fell and burn off forest cover for $50 to $100 per hectare. Small huts are constructed to indicate residence, although these are frequently not occupied. This pattern reflects attempts to grab available public forest land and hold it

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until it can be resold at a higher price. While these actions are usually illegal, letters from local officials are used to create an appearance of legitimacy. Once one plot is opened it appears to encourage other migrants to open forests in neighboring areas. In some cases, poor migrants may sit on the plot for one to two years waiting for land values to rise. These plots are then sold to a "consolidator" or businessman who buys a number of them to form a larger plot. In 2007, the Prime Minister ordered all provincial governors to confiscate illegal encroachments of forest areas. In Oddar Meanchey, the Provincial Governor reclaimed over 20,000 hectares of occupied forest land. Since the province has no budget to protect, rehabilitate or develop these lands are either leased by MAFF as large Economic Land Concession or reclaimed by migrants.

Mitigation Strategy: Land speculation is slowing as the frontier forests disappear and are claimed by legitimate stakeholders. With 10% of the province's land area secured under Community Forestry Agreements and another 10% under Economic Land Concessions, much of the available forest has been legally allocated to local communities and private companies. The global economic concession rapidly cooled local land markets during 2009 and with few buyers, forest clearing for sale has slowed. This is likely a temporary phenomenon given rapid population growth and consequently community-based land use planning and forest land demarcation need to be accelerated to clarify tenure over remaining forest land in the province. It may be possible to extend CF areas to establish social fencing (patrolling, etc.) around some of this land and facilitate natural regeneration.

7.4 Agricultural Expansion: With the rural population expanding at a rate of 15,000 per year, demand for farm land will require an additional 5,000 to 6,000 hectares annually based on 2 hectares for each household. Aside from migrant pressures on forest clearing, local communities also require an increasing amount of farmland as children marry and establish independent farms. In the past, village elders were responsible for identifying forest areas that are suitable for rain fed padi fields. Young families or migrants requiring land approach the elders to request a farmland allocation. Usually a 2 to 5 hectares plot with good soil moisture was selected within the forest. For the most part, these were created before the formation of the CFMCs and it is difficult for the poor farmers that own them to be evicted. Many committees are accepting these plots are on the basis that the "owner" agrees not to expand the existing fields.

Mitigation Strategy: Interviews with communities in Oddar Meanchey indicate that rainfed rice yields are averaging between 1 to 1.5 metric tons per hectare, while Thai and Vietnamese farmers may obtain yields 4 to 5 times this much for the same area. The Director of the FA he noted that rapid deforestation in Cambodia has expanded potential agricultural land to approximately 3.5 million hectares. He noted that Cambodia's need is not to clear more forests for farming, but rather to intensify agriculture on existing farm lands. Improved farming systems, as well as better access to irrigation, financing, and markets could allow existing farmland to become two to three times as productive. The project seeks to finance the development of water resources, organic farming, the introduction of new varieties and improved access to markets as key components to increase crop yields, shift to higher values crops, and enhance cropping intensity. This should help mitigate the impact of population growth on increasing demands for

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agricultural land. Community-based natural resource management plans also need to consider needs for agricultural and settlement expansion around the REDD project site.

7.5 Illegal Logging: Illegal logging remains an important driver of forest degradation. Due to the presence of high value "luxury" timber that is popular for furniture and buildings in cities and tourist areas, timber smuggling is profitable and widespread. Armed soldiers are often involved in these activities presenting control problems for weaker community forestry committees. In some cases forest patrols, including a group of Buddhist monks were captured and held hostage after confronting soldiers involved in illegal logging.

Mitigation Strategies: While illegal logging operates locally, it requires the political leverage of senior government officials to gain the support of local military commanders who may be able to restrict soldiers engaged in these activities. One CFMC reported that in 2008 it had been successful in reducing illegal logging from an estimated 100m3/year to 20-30 m3/year. This has largely been accomplished through community patrols, and the support of the local military commander after a series of meetings.

7.6 Fuelwood Consumption: In Cambodia 95% of the population is dependent on wood fuel for cooking.[19] A study in the neighboring province of Kampong Thom found that the per capita wood fuel consumption rate was approximately 200 kgs of greenwood per year.[20] A typical household might consume between 1 to 2 mt/year of fuel wood annually, reflecting a 6,000 to 12,000 mt of fuelwood used in the project area each year. Some households also burn biomass to create smoke that inhibits mosquito attacks on livestock.

Mitigation Strategies: Fuel efficient stoves are likely the most immediate and cost effective approach to reducing fuel consumption. Depending on stove type and use practices, this type of technology can decrease wood use by 25 to 50%. Some stoves also include piped smoke stacks that can reduce pollution inside the home and improve family health. Over the longer term, the introduction of LPG distribution centers and increased household income can reduce dependency on fuelwood. Mosquito control combined with low-cost mosquito nets can eliminate the need for burning biomass to protect livestock.

8. Conclusion

There are diverse forces that are causing deforestation and degradation in Oddar Meanchey Province and ways in which they operate at a number of levels. Land markets and Economic Land Concessions are linked to international markets. In the case of Oddar Meanchey Thai investors play an important role, negotiating with senior Cambodian government officials regarding long term investments. Cambodian policies regarding military operations in this border province and the allocation of military bases and social concessions are also made high levels of government. The project participants, design team, and even the national FA sponsoring the initiative, may have limited capacity to impact these drivers. Nonetheless, such international and national drivers may have the greatest impact on long term forest cover in the province and the ultimate success of the REDD project.

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Forest-dependent communities, because their livelihoods are integrally linked to these ecosystems are well-positioned to control local drivers of deforestation such as forest fires, illegal logging, community agricultural expansion, and fuelwood consumption. With the support of government agencies like the FA, legally empowering them to act as forest stewards they are more formally authorized to deal with illegal logging and forest encroachment by migrants. This project has also found that social organizational and technical support for local NGOs and monks have been important in building management capacity.

Still, project communities must operate in a context where population growth is extremely rapid, both through natural increase and migrant pressures and at current rates of growth will double by 2018. The expanding population is almost entirely natural resource dependent, rather than working in manufacturing or services and as a consequence, even without land speculation, demands for agricultural land will likely continuing growing rapidly. The project scenario is based on the assumption that deforestation and degradation rates can be slowed and gradually reversed in the project area, and that this will require a number of years as forest cover stabilization activities are implemented.

To date, the Oddar Meanchey Project has received an extraordinary level of political support from the Office of the Prime Minister, based on the strong endorsement of the FA.[21] All 12 community forest areas proposed for inclusion in the project were approved by MAFF in 2008 with few delays or problems, reflecting the political will of the government to move forward with this project. This likely reflects the desire of the government to 1) conserve a substantial proportion of forest cover, 2) respond to the needs of forest dependent communities, and 3) generate income from forest land. The REDD project framework offers a mechanisms to address the first two goals, while still achieving the 3rd element of economic revenue flows. The Royal Government of Cambodia views the Oddar Meanchey REDD project as a "test case" to see if payments for forest carbon are a viable alternative to other economically oriented forest management strategies. In this paper the discussion focuses on the challenges confronting project managers and participants in controlling the drivers of deforestation. To be successful, the project will also have to show it is financially viable and that the transaction and implementation costs can be met through carbon sales on international markets. Since these markets are nascent and volatile, this will require a number of years to assess.

The success of the Oddar Meanchey REDD project in controlling the drivers of deforestation will not be determined for at least five years until the first verification of carbon stocks are made. Can the communities slow deforestation in the project areas? Will funding agencies provide financing to implement project activities until carbon revenues begin to flow? Will carbon payments create sufficient incentive to retain the political commitment of the Royal Government of Cambodia to support the project?

The Conferences of Parties to the UNFCC spend an inordinate amount of time discussing the measurement modalities for REDD project development, protocols for carbon trading, and are currently leaning to national carbon accounting. Enormous attention is given to the difficulties of establishing accurate "baselines" for REDD, problems of preventing leakage,

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ensuring permanence, and anticipating the impact of REDD on global carbon markets.[22] [23] Yet, for forest communities and REDD project designers and implementers the more immediate question is will financial and political support be provided to enable local groups to successfully implement REDD strategies?

Initial experiences from Oddar Meanchey indicate that reducing emissions from deforestation and degradation will not be done with a stroke of a pen or a successful vote at an international meeting. Nor will it be achieved through the certification of a Project Design Document. It will be done by forest-dependent communities, FA field staff, local NGOs, and other stakeholders who have their own reasons for saving the forest. Often this has more to do with ensuring the presence of forests to meet basic economic needs and the provision of critical environmental services related to water supplies and micro-climate. Rural communities like those in Oddar Meanchey also see opportunities in conserving forests to obtain carbon payments. As one women CF group leaders says expectantly:

We are going to sell the air to the people who are polluting in the city.

REDD therefore presents a framework for collaboration to achieve multiple goals. REDD projects that focus exclusively on carbon may not reflect other complementary goals of primary stakeholding communities. For that reason, it is important to consider tenure concerns, livelihood needs, and cultural considerations to allow forest dependent communities to be beneficiaries and strong partners in future REDD projects.

As climate change policy negotiators meet and define the "rules of the game," they must do so in ways that enable project designers and stakeholders to create strategies that address multiple goals. At the same time, policy makers must allow for flexibility to respond to diverse contexts and problems. Since communities and development field specialists are rarely members of policy making groups, there may be a tendency to give priority to the methodological rigor of carbon calculations and monitoring systems and tight bureaucratic control over certification and registration processes. This approach may inhibit the capacity of local organizations to develop REDD projects. By raising the technical bar so high that only a team of highly trained specialists can calculate carbon, while imposing transaction costs for certification and verifications that are beyond the capacity of local groups with limited start-up financing, REDD policy makers will ensure that grassroots participation in this potentially promising strategy will be curtailed. Instead, user-friendly methodologies that can be adopted by communities,[24] technical and financial support for project design, local certification centers, and streamlined approval processes could accelerate the emergence of a global network of REDD projects that would not only address deforestation problems, but enable rural communities to emerge as empowered resource managers with new sources of income. Alternatively, small sub-national REDD project participants and designers may be better served by voluntary markets and a diverse group of certifiers that can compete to cut transaction costs and allow flexibility in project design, financing arrangements and monitoring mechanisms.

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For more information about this article:

Mark Poffenberger, Ph.D., Executive Director
Community Forestry International, Inc.
1834 Crystal Air Dr.
South Lake Tahoe, CA. 96150
Tel. 530-573-0361
mpoffen@aol.com
www.communityforestryinternational.org

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