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Analysis of National Forest Programs for REDD+ Implementation in six South and Southeast Asia countries

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Abstract

Aim of study: To facilitate REDD+ implementation and identify relevant attributes for robust REDD+ policies, this study evaluated and synthesized information from national forest programs in South and Southeast Asian countries.

Area of study: Data was collected from six countries: Sri Lanka, Indonesia, Bangladesh, Philippines, India and Thailand.

Methods: The data sources for the evaluation was an in-depth desk review of relevant documents and focus group discussion among experts from each study country.

Main results: We found out that diverse factors may influence program feasibility and the ability to achieve 'triple benefits': the nature of the forest targeted by the policy, the characteristics of the population affected by the policy, attributes of the policy instrument and the different actors involved.

Research highlights: We argue that national policies and programs targeted for REDD+ implementation should focus on the identified features to achieve REDD+ goals.

Keywords: policy evaluation; policy instruments; triple benefits; Southeast Asia.

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Introduction

Atmospheric concentrations of greenhouse gases (GHGs), such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), are higher than at any time over the last 800,000 years. It is now widely accepted that GHGs are responsible for climate change, one of the most compelling challenges faced by humanity. Consequently, there is an urgent need to identify ways to reduce net GHG emissions to combat climate change or to postpone its consequences to provide society with additional time for adaptation, learning and technological innovation (Nijnik *et al.*, 2014). Deforestation and forest degradation are responsible for approxi-

mately 12% % of annual GHG emissions (IPCC, 2014). In the developing nations, deforestation is responsible for 62% of GHG emissions (GCCA, 2012). Researchers have suggested that mitigating deforestation and forest degradation might be a relatively cost-effective measure to reduce GHGs compared to measures that focus on other types of emissions (Kindermann *et al.*, 2011), and reduction of emissions due to deforestation and forest degradation has recently become a more prominent issue in global environment discussions.

Reducing Emissions from Deforestation and Forest Degradation (REDD) is a strategy that seeks to reduce GHGs emissions due to deforestation by providing financial incentives to conserve rather than to exploit

forests (Miles & Kapos, 2008). In 2009, the Copenhagen Accord of the Conference of Parties to the United Nations Framework Convention on Climate Change included REDD+ as a climate change mitigation option for “...*reducing emissions from deforestation and forest degradation in developing countries*; and emphasized the role of conservation, sustainable forest management, and enhancement of forest carbon stocks in developing countries” (UNFCCC, 2009). The scope of the current policy, designated REDD+, includes not only forests and carbon but also actions involving livelihood, land-use planning, land-use change, improved forest management, and biodiversity conservation (UNFCCC, 2010). In addition to reductions in deforestation and forest degradation, key components of REDD+ also include rural development and conservation of biodiversity, which has been referred to as “triple benefits” (Inoue, 2012).

REDD+ has already generated significant attention in the research community (Fischer *et al.*, 2015). Although the primary issues for REDD+ implementation have largely focused on designing REDD+ (Strassburg *et al.*, 2009; Angelsen & Rudel, 2013), addressing issues related to MRV (Goetz *et al.*, 2015; Reimer *et al.*, 2015), understanding process of forest degradation (Putz & Romero, 2012), evaluation of REDD+ impact assessments methodologies (Pasgaard, 2013) and assessment of one or more of the triple benefits (Harvey *et al.*, 2010; Busch *et al.*, 2010; Gardner *et al.*, 2012; Phelps *et al.*, 2012; Matthews *et al.*, 2014; Murray *et al.*, 2015; Magnago *et al.*, 2015; Panfil & Harvey, 2015), other practical issues have also emerged. One emerging issue is identifying the form of national forest governance that produces triple benefits (Thompson *et al.*, 2011). The type of forest governance adopted for REDD+ implementation is a critical factor that determines REDD+ outcomes (Sandbrook *et al.* 2010). Hence, recent forest policy research suggested that focusing on enabling environment would deliver much of what is sought from REDD+ (Kanowski *et al.*, 2011).

Both contemporary thinking and empirical evidence regarding environmental governance, suggest that an effective REDD+ policy might be based on existing national and sub-national programs for forest conservation and management (Phelps *et al.*, 2010; Sikor *et al.*, 2010). Utilization of existing forest policy that addresses REDD+ goals is vital to maximize REDD+ effectiveness and minimize the risks associated (Angelsen *et al.*, 2009; Phelps *et al.*, 2010). The most important features of a REDD+ implementation policy are the ability to achieve triple benefits and feasibility on the ground (Inoue, 2012). Identification of important attributes with implications for these

policy characteristics is critical to adapt existing policies to REDD+ implementation. This paper has two objectives: 1) to provide a qualitative and quantitative analysis of the extent to which national forest policy and programs have achieved REDD+ triple benefits in South and Southeast Asia countries, namely Sri Lanka, Indonesia, Bangladesh, Philippines, India and Thailand; and 2) to identify the features of promising REDD+ programs that promote achievement of the desired triple benefits.

Methods

Selection of programs for evaluation

A team of researchers from each of the countries included in this study (Sri Lanka, Indonesia, Bangladesh, Philippines, India, and Thailand), identified and evaluated key national programs that were authorized or had the potential to be authorized for REDD+ implementation. Whether a program is authorized or has potential to be authorized for REDD+ implementation was determined based on an in-depth document review and focus group discussion that included stuffs from forestry department of the country. The selected programs were the Green India Mission in India, the national forest programs in Indonesia, the Philippine National REDD Plus Strategy (PNRPS), the Betagi-Pomra Community Forestry Program of Bangladesh, the Farmers Woodlot Program of Sri Lanka, and the Protected Forest Conservation program of Thailand. These constitute a total of 37 programs of which 16 programs are from India, 12 programs from Indonesia, 3 programs from the Philippines and 2 program from each of Bangladesh, Sri Lanka and Thailand. The programs from Indonesia, Philippines and Thailand are already authorized for REDD+ implementation while the rest have potential to be authorized in the near future.

India launched an ambitious National Mission for Green India (hereafter, the Green India Mission) as part of a National Action Plan on Climate Change. The Green India Mission has acknowledged the impact of the forestry sector on environmental amelioration through climate mitigation, food and water security, biodiversity conservation and the livelihood security of forest-dependent communities. The action plan document of the Ministry of Environment and Forests state that “the overarching objective is to increase forest/tree cover in 5 m ha [million hectares] and improve quality of forest cover in another 5 m ha of lands. Thus, the Mission will help in improving ecosystem services from 10 m ha of these lands, and increase forest-based

livelihood income of approximately 3 million forest dependent households”.

In Indonesia, based on the 1983 forestland use planning, national forests under the jurisdiction of the Ministry of Forestry have been categorized as production forests, protection forests, conservation forests, and convertible production forests. The Minister of Forestry issued two important decrees to prepare for REDD+ implementation activities, and Minister’s decree No. 30 in 2009 declared that REDD would be implemented for all forest categories such as production forests, protection forests, and conservation forests and for every type of forest ecosystem such as natural forests and plantation forests.

The Philippines is one of the more dynamic countries in Asia with respect to responding to the changing environment of forest policy. The country recently developed and adopted the Philippine National REDD+ Strategy (PNRS), which provides the framework for phased engagement in REDD+ initiatives. PNRS has targeted project sites that allow emissions reduction to be achieved on a reasonable scale and cost while maximizing co-benefits. Initial priorities have been tenured areas that represent most of the remaining forests such as ancestral domains, protected areas, and community-based forest management areas.

The CF program has gained momentum in Bangladesh, and the 1994 forest policy has emphasized community participation in forest conservation programs. The first attempt at community forestry (CF) in Bangladesh can be traced back to the 1979 Betagi and 1980 Pomora CF projects in the Rangunia sub district of Chittagong (Islam, 1998; Hossain, 1998). The projects aimed to resolve problems of land rehabilitation and landlessness and reduce the rate of deforestation because it was thought that reversing the degradation of forests and adjacent agricultural lands would increase production and improve people’s livelihoods. The Government of Bangladesh has already developed a national REDD+ Readiness Roadmap. Implementation of the Roadmap is expected to identify candidate strategies for achieving emissions reductions in the forest sector. Although implementation has not yet been initiated, community forestry (CF) provides a strong candidate that requires a thorough evaluation of the extent to which the program can attain REDD+ goals and feasibility.

In 1992, Sri Lanka became the first country in Asia to prepare a National Environmental Action Plan (NEAP), and the plan was updated in 1998 and 2003. In 2002, a National Environmental Policy was developed with the vision to achieve a healthy and pleasant environment sustaining nature for the well-being of people and the economy by balancing en-

vironmental conservation and economic development. One program related to the country’s environmental policy was the Farmers Woodlot Program, (FWLP). Although the REDD+ program in Sri Lanka is in preparation and has not yet been implemented, the FWLP is a strong candidate strategy for REDD+ implementation. Consequently, the program and program activities were evaluated to determine the extent to which they achieved triple benefits and feasibility.

The government of Thailand has recently established a National Committee on Climate Change Policy and 5-year national guidelines that address climate change issues facing the country. The department of national parks, wildlife and plant conservation was established as the focal point, although many other agencies are also involved. Thailand’s REDD+ Readiness Preparation Proposal (R-PP) has identified the national parks and wildlife sanctuary selected for the greenhouse gas reduction pilot program as the Thungyai-Hui Kha Khaeng Wildlife Sanctuary, Khao Yai National Park, and the forest corridor linking the western forest complex and Kaeng Krachan National Park in Phetchaburi province.

Data collection and analysis

Following Inoue (2012), the researchers evaluated the extent to which each of the selected programs can achieve the ‘triple-benefits’ of (1) emissions reductions due to reducing deforestation and forest degradation that constitute the primary purpose of REDD+ programs; (2) biodiversity conservation in accordance with the Convention on Biodiversity; and (3) poverty alleviation in accordance with United Nations Millennium Development Goals. Because these objectives are consistent with international agreements, governments seeking to abide by the agreements are motivated to achieve these “triple-benefits”. ‘Feasibility’ on the ground is indispensable for evaluating each program. In addition to feasibility, research team members identified during the focus group discussion which program attributes are positively and negatively associated with triple benefits after quantitatively evaluating the programs.

The data sources for the evaluation was an in-depth document review and focus group discussion. The documents reviewed included government policy documents, action plans and specific program related reports. The focus group discussion comprised experts that have deep knowledge of the programs and areas where the programs are implemented or intended to be implemented. It also included stuffs from forestry department

of the study country. Long term affiliation of the researchers from the six countries with the study sites was also an important asset in the data collection and interpretation. As the research is part of a single collaborative project, there was a close and continuous communication in developing the research protocol as well as update progress among the scholars. The research team also met at the University of Tokyo to discuss on the final outcome of the research from each country team.

The quantitative evaluations were performed by assigning each program feature a numerical score of '+2' for a strong positive effect, '+1' for a weak positive effect, '-1' for a weak negative effect, '-2' for a strong negative effect, and '0' for no effect. The feasibility evaluation was performed by assigning each program feature a numerical score of '+3' for high feasibility on the ground, '+2' for moderate feasibility, and '+1' for low feasibility. The evaluations of the triple benefits and feasibility of each program were summed and compared for each country. Factors affecting the characteristics of the evaluated programs that were related to achieving triple benefits and feasibility were extracted from the team program evaluations for each country, and these factors were systematically synthesized to identify the policy attributes critical to achieving triple benefits and/or feasibility.

Results

The green India mission

To implement Green India Mission objectives, the Green India Mission was divided into five subcomponents. Table 1 provides a numbered list of these subcomponents and an alphabetical listing of these subcomponents with their physical targets. Subcomponents 1 and 5, with an estimated area of 5 m ha, have focused on qualitative improvement of forests and other ecosystems. Subcomponents 2, 3 and 4 have added another 5 m ha and have focused on increasing forest cover.

Enhancing the quality of forest cover and improving ecosystem services in moderately dense forest cover with modest degradation strongly and positively achieves "triple benefits" because conservation and sustainable development of these forests increases stocking density and enhances biomass and carbon stocks as well as the flow of goods such as NTFPs, fuel wood, and small timber/timber that provide sustainable livelihoods to local forest-dependent communities. This category also exhibits a high (+3) level of implementation feasibility because it is relatively easy to extend participatory forest programs and strengthen existing participatory forestry programs to

revitalize these forests compared to restoring degraded open forests.

Since the 1970s, India has taken the lead in agroforestry and social forestry programs, and since the 1990s, it has also played a leading role in decentralizing forest governance. Based on this experience, which has included contributions from NGOs, self-help groups and other grassroots institutions, this subcomponent exhibited a high (+3) level of implementation feasibility. There remains considerable scope for enhancing the quality of existing no forested areas by including these areas in the category of tree cover/crops. No forested areas include marginal farmland or fallow land, as well as trees on non-agricultural rural lands such as homesteads, institutional premises, roadsides, canal sides and other public spaces. Apart from homesteads in rural India, which harbour diverse vegetation, this subcomponent exerted a modest (+1) positive effect on biodiversity conservation, which was primarily due to the preference for monoculture plantations exhibited by stakeholders and the owners of private non-forested areas.

The Indian government has already exerted substantial efforts to restore wetlands in the country and has designated 25 areas as globally 'protected Ramsar sites' due to their immense contribution to ecosystem services such as groundwater recharge in a country in which groundwater depletion is a national issue. Consequently, REDD+ activities would produce strong positive effects (+2) on emission reduction, biodiversity conservation, and poverty alleviation with a high (+3) level of implementable feasibility.

Ecosystem restoration and increasing forest cover was the most challenging goal because it included ecosystem restoration and increasing forest cover in shifting cultivation areas, scrublands, ravines and degraded open forest areas, high altitude areas and abandoned mining areas. The analysis of the 'triple-benefits' of proposed REDD+ activities presented in Table 1 reveals that scores were on the lower side, with a score of '-1' for biodiversity conservation in shifting areas. REDD+ activities in shifting cultivation areas might have induced loss of the indigenous knowledge-based agroforestry system by introducing monoculture agro-horticulture-forestry systems, although this change might also be due to market forces. All categories in the subcomponent 'Restoration of the abandoned mining areas' exhibited a high (+3) level of implementation feasibility because governmental mining regulations in India mandate that private and public sector companies reclaim and/or restore abandoned mining areas. Some leading mining companies restore abandoned areas as part of their corporate social responsibility. Because the Indian government has focused particular attention on res-

Table 1. Evaluation of the Green India Mission in terms of achieving the triple benefits and its feasibility.

Program/ mission	Stakeholders	Emission reduction	Biodiversity conservation	Poverty alleviation	Total	Feasibility
SM1a. Enhancing quality of forest cover & improving ecosystem services in moderately dense forest cover, but showing degradation	Communities, Government	+2	+2	+2	+6	+3
SM1b. Eco-restoration of degraded open forests with plenty of root stock, with little or no scope for planting	Communities, Government	+1	+2	+2	+5	+1
SM1b. Eco-restoration of degraded open forests with open blank having limited root stock	Communities, Government	+1	+1	+2	+4	+1
SM1b. Eco-restoration of degraded open forests with largely open areas with sparse undergrowth	Communities, Government	+1	+1	+1	+3	+1
SM 1c. Restoration of grasslands	Communities, Government	+1	+1	+1	+3	+1
SM2a. Ecosystem restoration & increase in forest cover by rehabilitation of shifting cultivation areas	Communities, Project Agencies	+2	-1	+1	+2	+1
SM2b. Ecosystem restoration & increase in forest cover by restoring scrublands	Communities, Government	+1	+1	+1	+3	+1
SM2c. Ecosystem restoration & increase in forest cover by restoring/planting Seabuckthorn (<i>Hippophaerhamnoides L.</i>)	Communities, Government	+2	0	+2	+4	+2
SM2d. Ecosystem restoration & increase in forest cover by restoration of mangroves	Communities, Government	+2	+2	+2	+6	+2
SM2e. Ecosystem restoration & increase in forest cover by ravine reclamation	Communities, Government	+1	+1	+2	+4	+1
SM2f. Ecosystem restoration & increase in forest cover by restoration of abandoned mining areas	Private/Public Companies, Government	+1	+1	+1	+3	+3
SM3a. Enhancing tree cover in urban & peri-urban areas in recorded or notified forest batches	Government, Urban Bodies	+2	+2	0	+4	+3
SM3b. Enhancing tree cover in urban & peri-urban areas in open spaces/green spaces like parks/wood lots	Urban Bodies, Communities,	+2	+1	+1	+4	+2
SM3c. Enhancing tree cover in urban & peri-urban areas in diffused planting such as on avenues and in households	Households, Communities, Households, Urban Bodies	+2	+1	+1	+4	+2
SM3d. Enhancing tree cover in urban & peri-urban areas in institutional lands	Societies, Trusts, Govt.	+2	+2	0	+4	+3
SM4. Agroforestry & social forestry	Farmers, NGOs, Communities, Institutions, Government	+2	+1	+2	+5	+3
SM5. Restoration of wetlands	Communities, Government	+2	+2	+2	+6	+3

toration of mangroves and coastal ecosystems following the 2004 tsunami, the implementation feasibility of this subcomponent was rated as high.

The Indonesian national forest programs

Protection forest management has been implemented in protection forests. The program has a high (+2) level of biodiversity and emission reduction potential

because the primary objective is to protect forest cover (Table 2). The government also actively monitors and evaluates the activities of actors involved in protecting the forest, including the local population. However, the effect on poverty alleviation has been modest (+1) because the primary focus on protecting the forest has reduced the local population's ability to benefit from the forest. Moreover, the implementation feasibility of this program is low due to the government's inability to implement the program in all protection forests and

because marginalization of the local population has created conflict with the government.

Conservation Forest Management has been implemented by the government in state conservation forests owned by the government. Because the program involves planting indigenous species, it was evaluated as producing a strong positive effect on biodiversity. However, like the protection forest management program, it was judged to have a weak impact on poverty alleviation because this approach has limited local access to the forest. Budget constraints and possible conflict with the local population also reduced program feasibility, which was low. Restored Forest Ecosystem Management has been implemented in conservation forests with the primary objective of restoring forests. The program has been sponsored and funded by nongovernment organizations and was evaluated as exhibiting strong emission reduction and biodiversity conservation impact because the sponsors have taken their responsibility seriously. The intense interest in increasing biodiversity and forest cover might have increased the tendency to expropriate land cultivated by local people, which might have negatively affected poverty alleviation. The program was found to exhibit high feasibility because the sponsors mostly ensure that they have the resources to proceed before committing to program implementation in a particular forest area.

In the Management of Individual/Private Forest program, which has been implemented in locally owned private lands, the local community manages forests on privately owned land, primarily for timber production. Although the program has exhibited a strong positive effect on emissions reduction, its biodiversity impact has been negative because the local population has tended to plant a limited number of rapid-growth species. However, it has had a strong positive impact on poverty alleviation because the income from forest management goes directly to the local populace. The program was judged to exhibit moderate feasibility because it is highly dependent on the local context (see Table 2).

The Management of Customary Forest program, which has been implemented by local communities, primarily involves the use of non-timber forest products and forest conservation. Because forest conservation has been a central focus of this program, it exhibited strong emission reduction and biodiversity effects. The local community has benefited economically from the use of non-timber forest products and access for subsistence needs. Nonetheless, the program was judged to be weak with respect to poverty alleviation because the local populace has only been able to extract non-timber products (Table 2). The program's implementation feasibility was judged to be high because customary forest management is based on local custom and shared norms.

Table 2. Evaluation of the Indonesian national forest program in terms of achieving the triple benefits and its feasibility.

Program	Stakeholders	Emission reduction	Biodiversity conservation	Poverty alleviation	Total	Feasibility
Protection Forest Management	Government	+2	+2	+1	+5	+1
Production Forest Management in Natural Forest	Government and/or Private companies	+2	+1	-1	+2	+3
Conservation Forest Management	Government	+2	+2	+1	+5	+1
Restored Forest Ecosystem Management	Government and Sponsor/initiator	+2	+2	-1	+4	+3
Management of Individual/Private Forest	Local community	+2	-1	+2	+2	+2
Management of Customary Forest	Local community	+2	+2	+1	+5	+3
Collaborative Forest Management in Conservation Forest	Government and /or Local Community and other stakeholder	+1	-1	+2	+2	+1
Community based Forest Management in Natural Production Forest	Local community	+1	+1	+1	+3	+1
Community based Forest Management in Plantation/Degraded Production Forest	Government and Local community; government, private company and local community	+2	-1	+2	+3	+1
Community based Forest Management in Protection Forest	Local community	+1	+1	+1	+3	+1
Village Forest Management in Production Forest	Local community	+1	-1	+2	+3	+1
Village Forest Management in Protection Forest	Local community	+1	+1	+1	+3	+1

The government and/or local communities and other stakeholders collaboratively implemented the Collaborative Forest Management in Conservation Forests program. In this program, the local community have typically harvested the indigenous trees and replaced them with a few species of economically valuable trees (Kaskoyo *et al.*, 2014). Because the program has not expanded the tree cover and rehabilitation activities have been limited, the effect on emissions reduction was evaluated as weak. In addition, the conversion of indigenous species into a few economically valuable species has negatively affected biodiversity. Ecotourism, which has been a component of program implementation, has strongly affected poverty alleviation by generating income for the local population. However, conflicts between local communities and the government have surfaced regarding issues such as the extent to which the local populace is allowed to plant crops. Moreover, local individuals confront issues such the difficulty of complying with instructions for measuring and mapping the area they cultivate. Consequently, the program feasibility was evaluated as low.

The Philippine National REDD Plus Strategy (PNRPS)

The management of protected forests was evaluated as exerting strong effects (+2) on carbon emissions due to the strict implementation of forest protection activities in National Integrated Protected Areas System (NIPAS) areas. This was also judged to exert a strong positive impact (+2) on biodiversity, particularly with respect to the use of indigenous species. However, the program was judged to exert a strong negative effect on the local populace because it eliminated local sources of income after an area was designated as a “strict protection zone”. The program was also evaluated as weak (+1) due to low feasibility (Table 3). This was found to be the case for the management of fully operational PAs in which policies are strictly implemented.

In contrast, the Community-Based Forest Management (CBFM) program has addressed the issue of upland poverty and forest degradation and exhibited a high probability of achieving “triple benefits” (Mo-

ammed *et al.*, 2016). The primary activities in CBFM areas have included reforestation, rehabilitation and enhancement of forest cover which has exerted a strong positive effect (+2) on emissions reduction. CBFM has potentially contributed to biodiversity conservation, particularly in natural forests and protection forests in which endemic and indigenous species are being planted. In the past, conservation of biodiversity might not have been an objective in production areas, which have primarily been planted with monocrops of fast-growing exotic species such as the Gmelina, Falcata, Mangium and Auri. However, pest infestation problems have motivated farmers and PO members to diversify their planted crops and adopt agroforestry systems (+1). Employment opportunities generated by plantation development, reforestation and rehabilitation activities, and the maintenance of agroforestry farms has increased farm productivity and income, which has positively contributed to poverty alleviation (+1). However, evidence from existing CBFM sites indicates that livelihood promotion and sustainability continue to present challenges (Pulhin *et al.*, 2008; Peras *et al.*, 2015). The feasibility of the approach primarily depends on the availability of funds for project implementation and the active role of local community organizations. Past levels of funding, however, make it reasonable to be optimistic regarding program feasibility.

The Management of Customary Forests program granted indigenous people (IP) the right to manage and use forest resources in accordance with their customs and traditions through the issuance of titles (CADT/CALT)], which has allowed natural forest regeneration. These areas exhibited the potential to reduce emissions by controlling deforestation and forest degradation due to strong forest protection and imposition of customary laws by IPs (+1). For sites in which administration by the Council of Elders mandates strict adherence to the customs and traditions of the tribe or clan, IP Councils of Elders have rigorously protected forests, such as Muyong in Ifugao Province. Because IPs are able to freely access forestlands within their area, forest products and resources have contributed to livelihood improvement and poverty alleviation (+1). The Victoria-Anepahan Range, and the Municipalities of Narra

Table 3. Evaluation of the Philippines National REDD+ Strategy (PNRS) in terms of achieving the triple benefits and its feasibility.

Program	Stakeholders	Emission reduction	Biodiversity conservation	Poverty alleviation	Total	Feasibility
Protection Forests (NIPAS Areas)	Government	2	2	-2	2	1
Community-Based Forest Management (CBFM)	Local Community	2	1	1	4	2
Management of Customary Forest (CADT/ CALT)	Local Community	1	1	1	3	1

and Quezon in Southern Palawan provide examples of places where IPs are able to gather and collect rattan and almaciga resin when they secure permits from the DENR prior to harvesting, gathering and transporting products. However, governmental corruption has forced most IPs to arrange with private entrepreneurs to secure the necessary permits from the DENR, which has reduced IP income (Mayo-Anda & Torres, 2014). Implementation feasibility thus depends on the extent to which IPs are able to protect their jurisdiction. The IPRA law provided for Free Prior and Informed Consent (FPIC) to ensure the protection of rights of IPs over their ancestral lands, although this might also limit the effective and efficient application of REDD+ (1) (Table 3). REDD+ implementation on IP land is also threatened by other stakeholders with economic interests that exert pressure on IP forest management.

The Betagi-Pomra Community Forestry Program in Bangladesh

The reforestation activities involved in the Betagi-Pomra Community Forestry CF program, which contributed to the sequestering of atmospheric CO₂, exerted a strong impact (+2) on emissions reduction because the degraded land now has forest coverage. The current growing stock, which involves a plant density of 1164 trees/ha, and the above-ground biomass of 41.15 t/ha provide the opportunity to increase the CO₂ sequestration capacity of the Betagi-Pomra CF program. Plant density is typically 2500 trees/ha in a well-stocked forest, which indicates that the number of trees on the project sites might be doubled to increase the CO₂ for exchange under the REDD+ program.

Once living hand-to-mouth, the farmers now enjoy a productive life with new houses, educated family members working in the private and public sectors, and small businesses, revealing a strong impact (+2) on poverty reduction. Plantation activities and growing agricultural/horticultural crops have created employment opportunities for local people, which reduce dependency on local forest resources and leakage during implementation the REDD+ program. Due to the higher levels of education supported by

CF income, farmers' children have become aware of the importance of forests in mitigating climate change. Improved education and household economic solvency has motivated farmers to conserve plantations for the long-term, which addresses the permanency principle of the REDD+ program. Although farmers practice mixed planting patterns, they plant only certain species, reducing the effect of the program on biodiversity conservation (+1). However, biodiversity might be increased by motivating farmers to plant native fruit trees that provide fruit for household consumption as well as enhancing the migrations of birds and other animals. Overall, the Betagi-Pomra CF activities exerted positive effects on emissions reduction, biodiversity conservation and poverty alleviation. The CF activities exhibited a high level (+3) of feasibility due to strong institutional support, farmers' awareness of the benefits of CF and the availability of land for the CF program (Table 4).

The Farmers Woodlot Program in Sri Lanka

The implementation of the farmers' woodlot program involved four key activities, establishing teak plants (the woodlot), establishing agricultural crops, reinvesting income in home garden development and developing small industries. Overall, the program was evaluated to have a strong positive effect on emissions reduction and poverty alleviation (Table 5). The strong positive impact on emissions reduction was associated with changes in the land cover because the program initially converted degraded land to agroforestry land and then to mature teak plantations with a high canopy. Teak woodlots have a plantation monoculture with a vegetation cover similar to the full cover of a canopy forest. The high income obtained from teak also improved the livelihoods of the local population. The requirement to reinvest a portion of the income in home gardens compensated for the carbon stock lost by harvesting the teak by cultivating other carbon-sequestering plants. Because the initial mixed agroforestry land use later changed to teak monoculture, the program was evaluated as having a weak effect on biodiversity (see Table 5).

Table 4. Evaluation of Betagi-Pomra CF Bangladesh in terms of achieving the triple benefits and its feasibility.

Program/ activities	Stakeholders	Emission reduction	Biodiversity conservation	Poverty alleviation	Total	Feasibility
CF Management	Farmers, Forest Department	+2	+1	+2	+5	+3
Establishment of Mixed Plantations	Farmers, Forest Department	+2	+1	+2	+5	+3

Table 5. Evaluation of the Farmers Woodlot Program (FWLP) of Sri Lanka in terms of achieving the triple benefits and its feasibility.

Program/ activities	Stakeholders	Emission reduction	Biodiversity conservation	Poverty alleviation	Total	Feasibility
Farmers Woodlots Management	Farmers, Banks Forest Department, Agriculture Department, Small Industry Department	+2	+1	+2	+5	3
Establishment of Teak Plants (Woodlot)	Farmers and Forest Department	+2	0	+1	+3	+2

Establishing teak plantations was evaluated as exerting a stronger effect on emissions reduction due to the longevity of plantations compared to agricultural crops. Agricultural crops were planted during the initial 3 years until the teak tree canopy covered the ground. Although farmers were able to obtain a high income from agricultural crops during the initial tree years, the teak plantation contribution to poverty alleviation was weak due to erratic income during the program. Because the agroforestry system was replaced after four years by a monoculture teak plantation, both activities contribution to biodiversity was modest.

The Protected Forest Conservation program in Thailand

The protected forest conservation program was evaluated as exhibiting strong emissions reduction (+2) because the national parks targeted by the policy were those with the least degradation compared to other community forests or state forests. Another reason for choosing these three parks was that these national parks did not experience the problems associated with shifting cultivation, which is the major force driving land use conversion. Moreover, because the national park already had strong rules that restricted free access and the harvesting of forest products, there were no visible forces driving deforestation in these areas. Consequently, the forests have good carbon stock and less

danger for permanence of the carbon stock. Due to restricted access and harvest rules, forest-dependent communities have not been allowed to harvest forest products. Consequently, the effect of the program on poverty alleviation impact was evaluated as negative (see Table 6).

Although the program has successfully trained park officials and related stakeholders to monitor the forest carbon content and identify various deforestation drivers, capacity building activities have been restricted to government officials, and there have been few attempts to transfer knowledge and experience to local communities. Many agencies and stakeholders have criticized the program for not being participatory and for failing to resolve conflicts between park officials and the local population. Consequently, the program's effect on the forest and forest biodiversity was evaluated as weak (+1). Although strong mechanisms guard protected areas, feasible alternatives to reduce forest-dependent communities' reliance on the forests have not been identified, which has limited the program's contribution to poverty alleviation.

The protected areas exhibit less degradation compared to other community forests or state forests. Forest density is already high in these national park areas, and forest biodiversity is likely to be maintained because there are few drivers of deforestation and reduced opportunities for new plantations. However, replanting activities in the national park areas have not produced sufficient carbon increments.

Table 6. Evaluation of the protected forest management program of Thailand in terms of achieving the triple benefits and its feasibility.

Program/ activities	Stakeholders	Emission reduction	Biodiversity conservation	Poverty alleviation	Total	Feasibility
National Park conservation	Government, academia,	+2	+2	-1	+1	1
Regenerating the degraded land	private sector, non-government organization, local forest dependent community, international organization	+1	+1	-1	+1	1

Discussion

Synthesizing the qualitative and quantitative program evaluations of the six countries revealed four general categories of factors associated with achieving triple benefits and feasibility on the ground: the nature of the forests targeted by the program, the characteristics of the population affected by the program, the characteristics of program instruments and implementers and actors involved in program implementation.

Nature of the forests targeted by the programs

The characteristics of the forests targeted by a particular program was one of the most frequently mentioned factors related to the program's ability to achieve triple benefits and revealed the need to distinguish between a designated forest area (the resource system) and the resources provided by the forest such as biodiversity, timber, and non-timber products (the resource units). As Ostrom (1990) has noted, a resource system is a stock that under favorable conditions provides maximum resource units without harming the resource system itself. The key attributes of the resource system that affect both program feasibility and the achievement of triple benefits are productivity and location. There is a direct relationship between productivity and triple benefits. Programs that target degraded forest land with low potential productivity, such as the program targeting eco-restoration of degraded open forests and grasslands in India, achieved only modest triple benefits. These programs were judged to exert weak effects due to the low productivity of the targeted land.

Location involves a number of aspects that are related to a particular program's ability to achieve triple benefits. The first aspect is the geographic location of the forest, which influences the program's ability to achieve triple benefits through its impact on productivity. An example is the program to restore grassland in arid or semi-arid zones in India. The second aspect is the topography of the location, which affects the accessibility of the forest for various purposes. For example, the negative effects of the program to rehabilitate degraded land in the Indian eco-restoration program were due to the relative inaccessibility of the area.

A resource unit comprises stock in the forest such as forage, logs, fuelwood and/or nontimber forest products. The size of the resource unit, its subsistence and commercial value, and species diversity are important features of the resource unit that affect the program's ability to achieve triple benefits. For most programs

targeting protection and conservation forests, the effects on biodiversity and emissions reduction were evaluated as high while the effects on poverty alleviation and the implementation feasibility were judged to be low. The program to enhance the quality of forest cover and improve ecosystem services in moderately dense forest cover in India, most of the programs for protection and conservation state forests in Indonesia, and the management of protection forests in the Philippines were all evaluated positively with respect to effects on emission reduction and biodiversity conservation because the resource units exhibited ample biodiversity and carbon stocks. In contrast, programs targeting production forests or reclaiming degraded but productive forests exhibited low effects on biodiversity due to the tendency to limit tree planting to a few species with a high economic yield. Production forests in the CBFM area in the Philippines were evaluated to have a strong effect on emissions reduction but a weak effect on biodiversity due to the limited number of species planted; the same was true for similar programs focusing on production and/or degraded forest in Indonesia and the farmers' woodlot project in Sri Lanka. The only exceptions occurred when the local population employed agroforestry practices, such as the CBFM program in the Philippines, VFM and customary forest management in Indonesia and the community forestry program in Bangladesh.

Characteristics of the population affected by the program

Program feasibility and the achievement of triple benefits were influenced by the existing livelihood strategies engaged in by the targeted population. Programs that conflicted with the existing livelihoods of the local populace exerted weak effects on triple benefits and/or low feasibility. For example, programs that targeted shifting areas of cultivation and indigenous land use systems, such as the ecosystem restoration and forest cover mission in India and the CBFM and VFM programs in Indonesia, were judged as low in feasibility due to strong opposition from the population targeted by the program. These programs also negatively affected the goal of poverty alleviation by expropriating land cultivated by local people, such as private companies' management of the plantation forest for timber in production forest management in Indonesia.

For example, the Philippines CBFM, which involved crop diversification and the planting of trees in an agroforestry system exerted positive effects on carbon emissions because the local population were

willing to improve local carbon stock through agroforestry, which was part of their livelihood strategy. The program also had a strong effect on poverty alleviation due to the diversified income produced by the livelihood strategy. However, because farmers selected only a few species with proven yields, the effect on biodiversity was weak. Similarly, for the Management of Customary Forest (CADT/ CALT) program, the effects on emissions reductions and biodiversity depended on IP livelihood strategy decisions. In some cases, IPs preferred to protect and appropriately utilize the forest, while the economic interests of other stakeholders involved liquidation of the forest and conflicted with achieving triple benefits.

Attributes of Policy instruments and policy implementers

Another important factor revealed by synthesizing evaluations of the various programs for REDD+ implementation was types and strength of the policy instruments utilized. Gupta *et al.* (2013) categorized environmental policy instruments as regulatory, economic and market-based and/or suasive. Regulatory instruments restrict or require certain actions or choices by individuals and organizations, usually through legislation. The most important mechanism that regulatory instruments employ to determine the actions that can be performed in the forest (and thus affect feasibility and triple benefits) is classification of the type of forest, which generally involves identifying a forest as a production, protection or conservation forest. Due to the different restrictions enacted by regulatory instruments, protection and conservation forests typically were associated with positive emissions reduction and biodiversity conservation but weak effects on poverty alleviation and low feasibility. In contrast, production forests tended to exhibit higher levels of feasibility and poverty alleviation but modest effects on biodiversity. The protection forests management using indigenous species of Philippines and the national park management program of Thailand were evaluated as exhibiting have strong carbon emissions reductions and biodiversity conservation but a negative effect on poverty alleviation as well as low feasibility due to possible conflicts with local populations.

Economic and market-based instruments are policy tools that encourage behavioural change through economic incentives and market signals that make it possible to modify the balance net returns from the different land use options available. In the evaluated programs, economic provisions took the form of job creation and funding. This included government-initi-

ated programs, the CBFM program in the Philippines, the Farmers Woodlot Program in Sri Lanka, the Betagi-Pomra Community Forestry Program, and the Restored Forest Ecosystem Management and CBFM program in production forests in Indonesia. These instruments were primarily associated with poverty alleviation and feasibility.

Finally, suasive instruments encourage changes in behaviour by providing information through channels such as general education programs, practice guidelines and codes, training programs, extension services, and research and development. These instruments were primarily employed in programs in which the local population as a main actor, such as the CBFM program in the Philippines and Indonesia, the Farmers Woodlot Program in Sri Lanka, and the Betagi-Pomra Community Forestry Program. The extent to which these instruments produced positive effects on triple benefits and feasibility depended on the locale. In Indonesia, the local community's difficulty in complying with guidelines was associated with low program feasibility; in Sri Lanka, Bangladesh, and the CBFM program in the Philippines, training was effective in modifying the local population's land use behaviour, which positively affected one or more of the triple benefits.

Actors involved in program implementation

The last program factor affecting triple benefits and feasibility was the type of actor implementing the program. Four major actors were involved in implementing the evaluated programs: governments, local communities, the private sector and NGOs/donors. The results for the Protection Forest Management program, the Conservation Forest Management program, the Restored Forest Ecosystem Management program in Indonesia and the Protection Forests (NIPAS Areas) in the Philippines indicate that government-implemented programs produce strong effects on emissions and biodiversity compared to programs implemented by the private sector and community.

In contrast, only programs implemented by local communities (either alone or in collaboration with the government and/or donors) exhibited strong effects on poverty alleviation. Examples included ecosystem restoration and increase in forest cover through restoration of mangroves, agroforestry and social forestry in India, the Management of Individual/Private Forest program, the Collaborative Forest Management in Conservation Forests program, the Community-based Forest Management in Plantation/Degraded Production Forests program in Indonesia, the Betagi-Pomra CF

project in Bangladesh and the Farmers Woodlot Program in Sri Lanka. With respect to feasibility, government programs that involved collaborations with the private sector, donors, and/or local communities exhibited higher feasibility than programs implemented only by a single actor such as the government or a local community.

Conclusion

To contribute to the ongoing international discussion of feasible methods for implementing REDD+ to achieve ‘triple benefits’, the present study analysed 37 programs that have been authorized or have the potential to be authorized for REDD+ implementation in six South and Southeast Asia countries. The methods employed by the programs ranged from centralized forest management to co-management and forest management by local communities. The results revealed several factors that influence program feasibility as well as the extent to which the policy achieved REDD+ goals: characteristics of the forests targeted by the program, characteristics of the population targeted by the program, the nature of the policy instruments, and the types of actors implementing the program.

The primary characteristics of the forests targeted by the program with implications for achieving triple benefits were the location and productivity of the forest system and the size, subsistence value, commercial value, and diversity of species in the resource unit. There was a direct relationship between productivity and triple benefits. Programs targeting degraded forest land with low potential productivity had modest effects on triple benefits. The geographic location of the forest influenced the program’s ability to achieve triple benefits due to its impact on productivity, and topography affected the accessibility of the forest and the purposes for which it could be used. Typically, programs that targeted protection and conservation forest were evaluated as producing strong effects on emissions reduction and biodiversity but modest effects on poverty alleviation and low program feasibility. In contrast, programs targeting production forests or reclamation of degraded productive forests were associated with modest effects on biodiversity due to the preference for planting a few trees species that generated a high economic yield.

The livelihood strategy of the target population was a critical program feature that influenced the achievement of triple benefits and program feasibility. When the program conflicted with the existing livelihood of the target population, it exhibited a weak effect on triple benefits and/or low feasibility. Policy instru-

ments, which can be regulatory, economic and market-based, and/or suasive, also affected triple benefits and program feasibility. Due to the different restrictions produced by regulatory instruments, programs in protection and conservation forests typically exhibited positive effects on emissions reduction and biodiversity conservation but weak effects on poverty alleviation and low feasibility. In contrast, production forest programs tended to exhibit higher levels of feasibility and poverty alleviation but weak effects on biodiversity. Economic and market-based instruments were primarily associated with positive effects on poverty alleviation and feasibility, while the effect of suasive instruments on triple benefits and feasibility was locally dependent.

The final critical factor was related to the actors involved in the implementation of the program. The effects on emissions reduction and biodiversity impacts were stronger for government-implemented programs compared to programs implemented by the private sector and/or local communities. In contrast, effects on poverty alleviation were stronger for programs implemented by local communities and programs supported by donors compared to programs implemented by the private sector or government. With respect to feasibility, government programs involving collaboration with the private sector, donors and/or local communities exhibited higher levels of feasibility compared to programs implemented by the government alone or a local community alone. Consequently, we suggest that national policies and programs targeting REDD+ implementation incorporate the critical features identified above to design feasible policies to achieve REDD+ goals.

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