# Stakeholder Perspectives on 'Fair and Efficient' Benefit Distribution Along the C$_{redd}$ Value Chain

External drive for **efficiency** (low cost emission reduction) interacts with the need for **fairness** (avoiding perverse incentives)

## Project Report

World Agroforestry Centre

**BOX 1. Overview of the REDD ALERT project**

The European Union financed the REDD ALERT project (contract number 226310) to contribute to the development and evaluation of market and non-market mechanisms and the institutions needed at multiple levels for changing stakeholder behaviour to slow deforestation rates of tropical landscapes and hence reduce greenhouse gas (GHG) emissions. Its specific objectives six-fold.

1. Document the diversity in social, cultural, economic and ecological ***drivers of forest transition*** and conservation and the consequences in the context of selected case studies in Indonesia, Vietnam, Cameroon and Peru as representative of different stages of forest transition in Southeast Asia, Africa and South America.

2. ***Quantify rates of forest conversion*** and change in forest carbon stocks using improved methods.

3. Improve accounting (methods, default values) of the consequences of land-use change for ***GHG emissions in tropical forest margins including peat lands***.

4. Identify and assess viable ***policy options addressing the drivers of deforestation*** and their consistency with policy approaches on avoided deforestation currently being discussed in UNFCCC and other relevant international processes.

5. Analyse scenarios in selected case study areas of the ***local impacts of potential international climate-change policies*** on GHG emission reductions, land use and livelihoods.

6. Develop ***new negotiation support*** tools and use these with stakeholders at international, national and local scales to explore a basket of options for incorporating REDD into post-2012 climate agreements.

# Stakeholder perspectives on 'fair and efficient' benefit distribution along the $C_{REDD}$ value chain
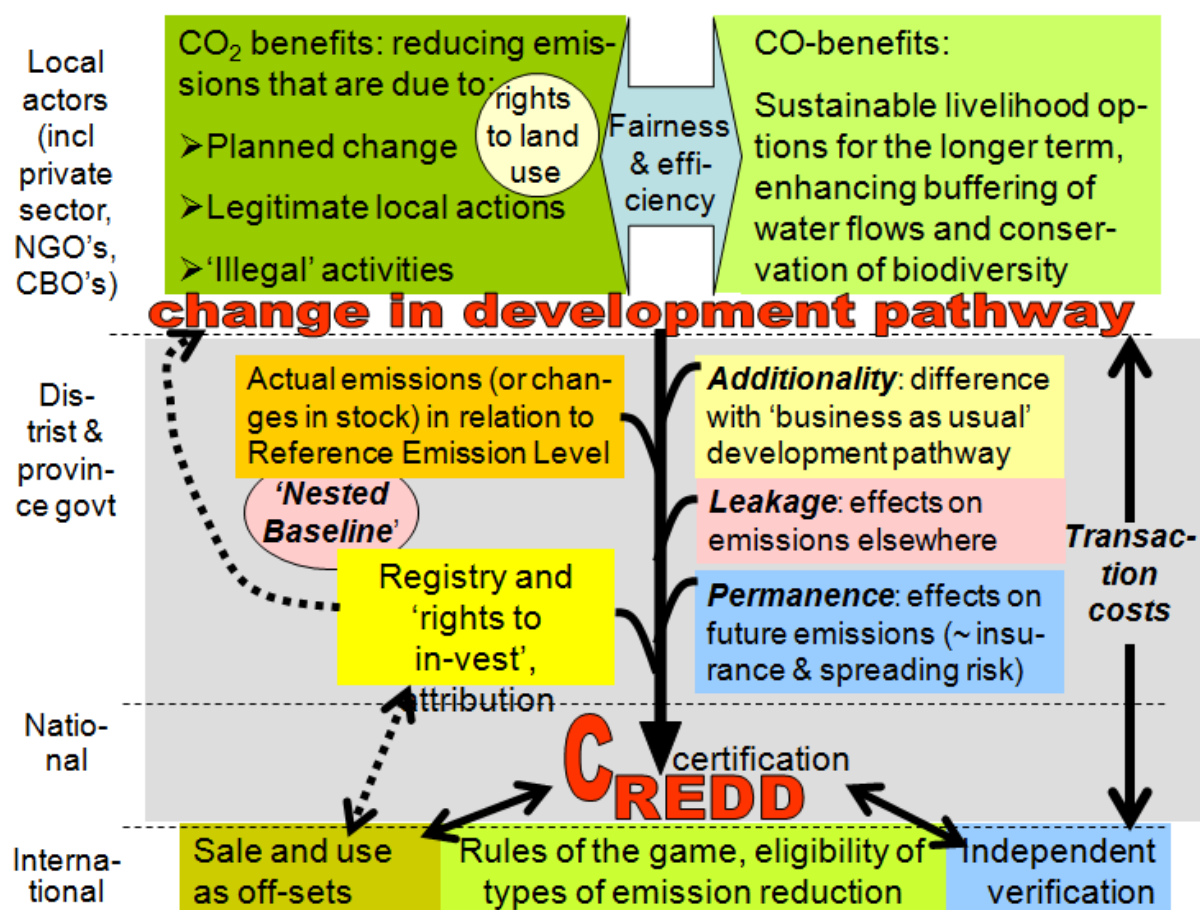
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World Agroforestry Centre (ICRAF)

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*Synopsis*

Local implementation of efforts to reduce emissions from deforestation and forest degradation (REDD[+]) can be analyzed to be part of a 'value chain'. The primary 'service' is a direct reduction of emissions and a medium-to-long term reorientation of development pathways towards the maintenance of high-carbon-stock landscapes. The ultimate 'service' for which there may be a market is a 'credible and creditable' quantification and documentation of emission reduction compared to an agreed (negotiated) baseline ('additionality' beyond reference emission levels) after corrections for leakage effects and risks of non-permanence. The steps of the value chain beyond the landscape where emission reduction takes place involve subnational + national + international levels that currently still have to operationalize rules that allow the value chain to work. In this process an external drive for *efficiency* (low cost emission reduction) interacts with the need for *fairness (*supporting conservation commitment, avoiding perverse incentives*)*. The development of operational subnational REDD[+] implementation rules involves a learning curve for all involved, the local stakeholders as well as the potential investors, regulators and facilitators of the process. Learning by the stakeholders might in future be facilitated by formal research results, but a more direct 'learning by doing' is needed at this stage. We report the development and use of a research tool FERVA for analysis of fairness and efficiency along REDD[+] value chains, and its initial use in Indonesia and Peru. For Jambi province in Indonesia we also report further steps to engage potential REDD[+] stakeholders in the design of subnational implementation mechanisms, including discussions with 'Orang Rimba' as the local forest dwellers are indicated. A simulation model that quantifies distributional effects ('equity') complements the 'perceived fairness' perspective that was expressed in the various focus group discussions. Vietnam is considering the coupling of REDD[+] funding and an existing scheme of payment for watershed functions. This approach may reduce transaction costs, but brings its own challenges to both fairness and efficiency dimensions, as discussed here.

| Publications | Policy briefs/tool descriptions |
|---|---|
|  | Attachment 1. van Noordwijk M. 2008. Fair & Efficient REDD Value Chains Allocation (FERVA). Bogor, Indonesia. World Agroforestry Centre - ICRAF, SEA Regional Office. |
| Attachment 4. Purnomo, H., Desi Suyamto, D. and Irawati, R.H., 2011. Harnessing the Climate Commons: An agent-based modelling approach to reduce carbon emission from deforestation and degradation | Attachment 2. Suyanto S, Muharrom E and van Noordwijk M. 2009. Fair and efficient? How stakeholders view investments to avoid deforestation in Indonesia. PolicyBrief 8, Bogor, Indonesia. World Agroforestry Centre - ICRAF, SEA Regional Office. |
| Attachment 5. Hoan, D.T., Hoang, M.H., Thoa, P.M., van Noordwijk, M., Minang, P. (2011??) Benefit distribution across scales in efforts to Reduce Emission from Deforestation and forest Degradation (REDD+) in Vietnam. Land Use Policy (under review) | Attachment 3. Velarde, S.J., van Noordwijk, M., Suyanto. 2009. Perceptions of Fairness and Efficiency of the REDD Value Chain. ASB Policy Brief No. 14. ASB Partnership for the Tropical Forest Margins, Nairobi, Kenya.4p http://www.asb.cgiar.org/pdfwebdocs/ASBPB14.pdf |

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# Introduction on learning curves along the REDD+ value chain

### 1. Two-way learning

Reducing Emissions from Deforestation and Degradation (REDD) will require a 'value chain' (Fig. 2) that links global beneficiaries to local actions towards high carbon storing land use patterns. The value chain includes: effectively reducing emissions, a shift in development pathways and all 'transaction costs' to make a transparent, verifiable claim on emission reductions that can obtain 'credits' and market value. Fairness in this context means rewarding stewards of current forests, and efficiency means focussing on high-emission areas for reductions. REDD in developing countries' depends on stakeholder cooperation.
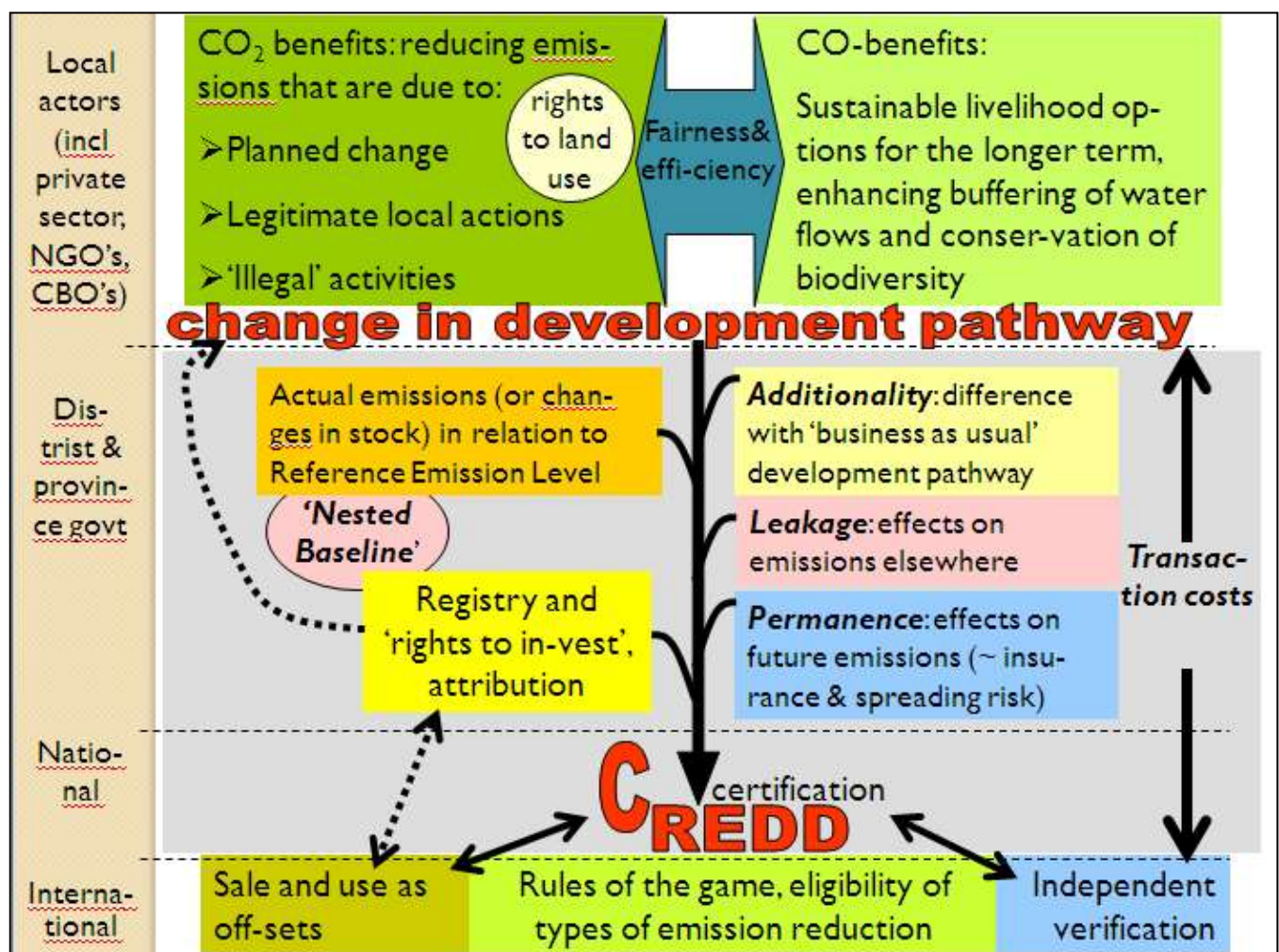


**Figure 1.** Value chain of REDD as used for discussing the relationship between emission reduction ($CO_2$ benefits), sustainable livelihood options and co-benefits of forest protection for watershed services and biodiversity conservation as important changes in the development pathway and a number of steps needed as transaction and Monitoring Reporting and Verification (MRV) costs to create credible $C_{REDD}$ emission reduction certificates.

Efforts to reduce emissions from deforestation and (forest) degradation (REDD[+]) require a learning process for local, national and international stakeholders. As elaborated in REDD-ALERT D6.1, a two-way learning process is needed where local stakeholders as well as potential REDD[+] investors and regulators can move from an initial qualitative understanding of how REDD+ might be made to achieve the double goals of emission reduction and sustainable development, towards a quantified planning and negotiated contract. Two-way learning will be accompanied by negotiation processes, but ultimately a contract needs to provide net benefits for all sides. A set of tools (Fig. 2).is available to be used in the learning process (http://www.worldagroforestrycentre.org/sea/projects/tulsea/) and has so far been tested in Southeast Asia.  The tools are classified in two groups.  One is more focused on
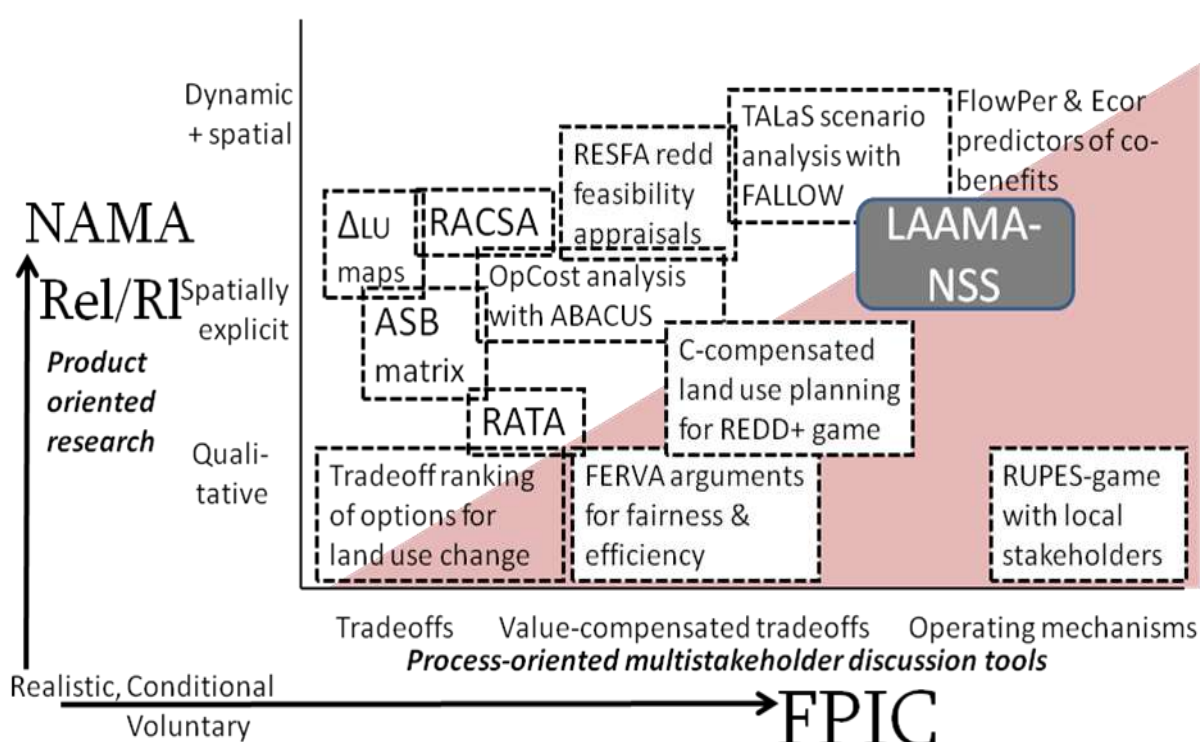


**Figure 2**. Tools available for learning by local + external stakeholders how local REDD+ implementation can achieve emission reduction as well as sustainable development pathways product -oriented research and the second is supportive of processes of multistakeholder discussion.

ABACUS = abatement cost curve calculator; ASB matrix = land use systems & their key attributes; ΔLU = land use change; Ecor = Ecological corridors; FALLOW = Forest, Agriculture, Low-value Lands or Waster model; FERVA = Fair & Efficient REDD Valuechain Analysis; FlowPer = Flow Persistence model; FPIC = Free and Prior Informed Consent; LAAMA = Locally Appropriate Adaptation and Mitigation Actions; NAMA = Nationally Appropriate Mitigation Actions; OpCost = Opportunity Cost analysis scheme; NSS = Negotiation Support System; RACSA = Rapid C stock appraisal; RATA = Rapid Tenure Claim Appraisal; REDD+ = Reducing Emissions from Deforestation and Degradation; REL/RL = reference (emission) level; RUPES = Rewarding Upland Poor for the Environmental Services they provide; TALaS = Tradeoff Analysis for Landuse Scenarios. (http://www.worldagroforestrycentre.org/sea/projects/tulsea/)

REDD+ needs to be efficient in achieving clear numerical performance targets at moderate costs, but it should be fair in stimulating sustainable livelihood options. This requires transparent participatory process that can lead to Free and Prior Informed Consent (FPIC). The trade-off between numerical clarity and procedural transparency is a challenge, common too much of current management processes. Site-level experience with a set of tools suggests that a flexible toolbox is needed to allow local context to be articulated. This report provides some highlights and references to further detail on the 'fairness versus efficiency' tool for red+ value chains developed by ICRAF-SEA.

For most local stakeholders, REDD is a new concept. They believe it favours the interests of some government institutions, NGOs, or elite individuals. Only a few government institutions and national NGOs are actively involved in REDD. Their common understanding on REDD is that it entails the sustainable management of the forest in order to get money from developed countries as compensation for the carbon those countries emit. It is seen as a means to generate a large amount of money by selling carbon without cutting trees. However, many of these stakeholders are unaware of what carbon is, what it looks like and other essential technical aspects, such as: additionality; the effectiveness of REDD schemes; rights and responsibilities; and penalties. This leads to scepticism by many stakeholders regarding the potential success of implementing REDD schemes; however, other stakeholders remain positive.

To address the awareness and knowledge gap, the World Agroforestry Centre (ICRAF) held a series of workshops in Jambi province (Indonesia) to inform stakeholders at the various project sites and initiate further debate. Focal topics of the workshops included:

1) climate change and its impact on the future environment and livelihood risk;

2) schemes developed to mitigate climate change and their differences (CDM and REDD);

3) important issues related to local level readiness in supporting and implementing an REDD scheme (REDD value chain allocation, land tenure, institutional setting, commodity marketing, and tree-based livelihoods).

4) FERVA as a discussion tool on fairness and efficiency in REDD value chains


## 2. FERVA as a method

The FERVA method (attachment 2) provides a replicable approach for involving stakeholders in the design of REDD mechanisms that will be effective, efficient and fair. It uses a preliminary definition of a REDD value chain and allows for the analysis of the divergent opinions with respect to it and, if replicated over time, analysis of progress along learning curves in local negotiations. The current FERVA analysis captures the perceptions and expectations of stakeholders at early stages of a REDD strategy and helps them to understand the different REDD value chain functions.

FERVA can serve as a tool for further discussion and quantification of divergence in opinion. It does not represent actual transactions as yet. Transaction costs of REDD activities at project scale are perceived to be 80-90%; even in a 'desirable' condition, they may represent 50-66% of the value chain. This affects both fairness and efficiency.

Different perceptions can be influenced by the scale at which the FERVA method is applied – international, national, provincial or district – and by the type of stakeholder who participates. This will also be important at the REDD implementation stage.

The tool can best be carried out as part of a focus group discussion (FGD) that covers two sessions:.

**Fairness and Efficiency debating club**. Sub-groups are formed, based on the initial preference of participants for the 'efficiency' or the 'fairness' side of the debate. Each sub-group is asked to express its reasoning and arguments on why REDD schemes should be implemented, based on the concept of preferences, fairness or efficiency. Each sub-group presents its reasoning and arguments in plenary. In 'debating club' both sides have a chance to argue their points, with a 'neutral' facilitator and opportunities to ask questions. The session generally ends with a reaso0nable degree of agreement and mutual understanding regarding the importance of both fairness and efficiency in REDD scheme implementation.

**Value Chain Session.** Sub-groups are formed based on participants' institutional association and background, to facilitate the discovery of different institutional points of view and preferences for REDD fund value chain allocation. The concept of a 'value chain of REDD' is introduced to the participants (Figure 2), and sub-groups are requested to allocate percentages to the eight REDD value chain functions. Sub-groups can add or remove individual functions if they perceived it to be necessary in order to achieve the sustainable emission reduction goal.

**Institutional Setting Session.** The process used to form sub-groups differed by site. At some training sites, participants were divided, based on the questions posed during the session, while at others they were divided, based on their interests, from either answering questions or analyzing the Ministry of Forestry REDD regulations. The questions posed during the session stressed the necessity of creating an institution to manage the implementation of the REDD scheme and REDD funds distribution in a manner that complied with national and international regulations, as well as their principles. Critiquing (inclusive of criticizing) Ministry of Forestry REDD regulations were found to be productive, as an evaluation process by first-hand actors who would have to implement REDD schemes and be compliant with national policy and international regulations.

As an example, a FERVA workshop was held in Muara Bungo district in Jambi and attended by 30 participants from local governments, universities, NGOs, private companies and representatives from several villages. It was conducted by the Muara Bungo District Forestry and Estate Crop Agency (Dinas Kehutanan dan Perkebunan Kabupaten Muara Bungo) with assistance from ICRAF. Participants were divided into groups based on their preferences regarding the two issues related to the principle for implementing REDD. The main arguments used are listed in Table 1.

**Table 1,** Arguments on REDD implementation based on the issue of Fairness or Efficiency expressed in the Muara Bungo FERVA workshop

| Fairness | Efficiency |
|---|---|
| 1. Rewards need to be provided to communities already protecting, preserving, and sustainably managing local forest resources. | 1. Incentives should be given to private companies in order to support intensification efforts. |
| 2. Fair distribution of REDD funds is essential and workable guidelines are required. | 2. Human resources need to be enhanced in term of the skills required to engage in 'alternative livelihoods' that replace the opportunities lost due to the implementation of REDD schemes. |
| 3. In order to improve community welfare, REDD should involve all stakeholders who are using the local forests. | 3. Community welfare opportunities need to be expanded, to reduce dependence on forest resources. |

### 3. Stakeholder perspectives regarding REDD implementation issues

Overviews of REDD were delivered in the first session of each workshop. The presentations stressed the importance of fairness and efficiency in the scheme implementation. Participants then self-selected into working groups on key issues of their



preference to discuss why and how REDD schemes could be implemented. After the working group discussions, all groups reconvened in plenary to provide presentations on their reasoning on how REDD should be implemented.

At first, most working groups insisted that their preferential issue should be the principal factor in implementing REDD. But following discussions led by ICRAF facilitators, working groups realized that while all issues were important depending on the characteristics of the sites, the issue of *fairness and efficiency in the REDD scheme* was principal to successful implementation at all sites.

**Initiation of activities as an embryo for forming REDD working group**

Many of the local stakeholders perceived that the REDD scheme was an important opportunity to support the development of their region, therefore they wanted follow-up after the workshop. ICRAF supported this local aspiration by delivering information to enhance awareness and by giving sub-grants to conduct prioritized activities as the starting point to establishing an REDD working group or commission. General guidelines in forming initial teams and planning/conducting activities were also provided; additionally ICRAF staff members were available for consultation and further support as required.

**Institutional setting and REDD fund distribution mechanism**

Institutionalization is an essential support mechanism in the successful implementation of REDD schemes, because it determines the responsible parties, their role, and rights. Muara Bungo district is quite advanced in preparing their REDD support structure and scheme, because there are various community-managed forest areas, such as Lubuk Beringin forest village, the adat forests of Pelepat New Village, Batu Kerbau and Senamat Ulu which already have an established institution to manage their forest. This potential can be utilized for distribution of the REDD fund.

**Social Conflict in Forest Resource Utilization (Case Study of Bukit Duabelas (= 'Twelve Hills') National Park (TNBD), Province of Jambi)**



Conflicting interests between different stakeholder groups surrounding TNBD have been the source of latent conflict, which arose from the tense situation associated with the utilization of the forest surrounding TNBD. There was an expectation from two contradictory objectives (conservation and continuity of Orang Rimba life), with regard to fulfilling the needs of the communities in surrounding villages for social insurance, which was oriented towards the expansion of field cultivation. This was the main "runway" to develop the TNBD management concept. The study findings reflected that it was wrong if all national parks with various characteristics and issues were managed under a general management concept. In this context, there is a need to develop a discussion framework, where a national park should not be considered important only for forest ecosystem conservation purposes, but should also provide cultural conservation and protection from the outside world pressure for stranded communities. Culture conservation does not have to mean only efforts to preserve primitivism, but rather should involve an effort to provide space to the stranded community to reproduce values and transform socio-culturally with dynamic social changes.

From the aforementioned explanation, it can be concluded that manifest conflict and latent conflict over forest resource utilization are products from a one-party forest management policy. The forest management policy also contributes to the production pattern changes, social structure, and community culture in surrounding villages and *Orang Rimba* that live within the forest area.

The decreasing forest areas are pressuring government efforts to preserve the remaining forest through the establishment of conservation forests in the form of either National Park, Biosphere

Reserve, Suaka Margasatwa, Taman Hutan Raya, Peat Protected Forest, or City Forest. In addition, forest management policy has given latitude to the community to manage the protected forest through Adat Forest, Village Forest, Forbidden Forest, Community Forest, Kampung Forest, Rakyat Forest, and lately a system called Rakyat Plantation Forest. On the other hand, since the establishment of regional autonomy, forest areas are becoming the target to provide support for the increment of Local Original Income (PAD), which is causing massive forest conversion to develop large-scale plantations with investor support. It should be remembered that the forest area is now limited and the remaining forest is predominantly for conservation or protection. On the other hand, the number of groups with an interest in the forest is increasing. Therefore, access to the forest is competitive and the resulting pressure is on the protected forests, which mainly have national park status. Current forest areas contain natural resources that many parties are fighting for, including the state (for protected areas and transmigration resettlement), private companies (oil palm and industrial plantation forest), and the local community (agricultural fields expansion, timber and non-timber resource exploitation). In some areas, the competition has evolved into open conflict. Several studies, which have been carried out in several national parks, showed high levels of social conflict had occurred vertically or horizontally.

### 4. Bungo Carbon Program: Forest Preservation and Climate Change Mitigation Concept (embryo of REDD working group in Bungo)

The community-based sustainable forest management program is a form of forest management oriented towards achieving forest sustainability with regard to adat/local community livelihood through self-action. Historically, local/adat communities have depended on managing the forest based on their knowledge of and ability to utilize the indigenous species. Community-based sustainable forest management can be achieved if there the legal instruments and policy are in place that side with community interests. The recognition of the community's rights to the forest can be implemented by empowering local institutions with knowledge in managing forests.

Based on the MoF regulation No. 68/MoF-II/2008 concerning REDD funding arrangements and MoF regulation No. 30/MoF-II/2009 concerning the climate change framework convention, to implement REDD requires clear institutional and REDD payment distribution processes. The institution is needed to determine who is responsible and what their role is, and therefore determine the success of REDD implementation.

Bungo district is a suitable recipient of the REDD compensation fund, because in this area there are plenty of community-managed areas, such as: the village forest in Lubuk Beringin which is already subject to the MoF decree; the adat forests of Baru Pelepat village, Batu Kerbau and Senamat Ulu. In addition, following a decree by the district head, an REDD working group is in the process of being formed.

To support the preparations in Bungo district, there have been several actions undertaken, including two focus group discussions, with the first held in the Forest and Crop Estate Agency in July 2009 and the second in BAPPEDA during November 2009.

The Bungo district government felt that they needed to develop the REDD scheme in Bungo to respond to the emerging carbon trade opportunities at the international level. These meetings were

attended by the head of SKPD and Bungo DPRD, which resulted in the formation of the REDD management working group.

**5. Field Facilitation of Villages Surrounding the Bukit Panjang Rantau Bayur area, Bungo District**

In Indonesia, contested rules between the state and local communities over the use and protection of forest areas have been recognized as threats to forests, their biodiversity, carbon stocks and watershed functions, as well as to local livelihoods. A recent regulation by the Indonesian Minister of Forestry (No. P.49/Menhut-II/2008) detailed how a 'village forest' ('*Hutan Desa*') status could reconcile the forest management targets and livelihood interests of the villagers living adjacent to areas that were supposed to remain under permanent forest cover. As a first test case of applying these rules, the village of Lubuk Beringing (Bungo district, Jambi province) in the 'watershed protection forest' buffer zone of the Kerinci Seblat National Park applied for such an agreement. On March 30, 2009 the Minister of Forestry personally handed over to the village officials the implementation decree SK No. 109/Menhut-II/2009 that assigned an area of 2,356 ha of the Bukit Panjang-Rantau Bayur forest to the management of Lubuk Beringin, subject to the approval of annual workplans. KKI-WARSI provides the background on the process that had to be followed by the village and its supporters at the district level, assisted by NGO's and an international research organization. Previous investment in bonding and bridging forms of social capital in the village allowed the proposal to be made and approved, assisted by the ambition of Jambi province to be an early adopter of REDD schemes to reduce emissions from deforestation and forest degradation. Progress is being made on options to scale up the process to other villages at reduced transaction costs.

The decision on the village forest area of Lubuk Beringin village can be seen as the first stepping stone to develop a scheme of village forests for the villages around Lubuk Beringin. The process of replication has started from Bukit Panjang, Bukit Pohong in Telang River, and Bukit Singirik up to Bukit Rantau Bayur in Senamat Ulu village. The area makes up a single parcel of protected forest area in Bukit Panjang-Rantau Bayur that is 13,529.40 hectares in size. The results of the replication can be promoted as a model for managing forest areas together with village societies under a clear and certain legal framework.

Bungo has a Forest Governance Learning Group (FGLG), which has become a place to have open discussion on active change to improve the forest structure. This forum is informal and the topics of the discussion are free flowing. The members of the forum do not represent institutions, but are based on individuals, who want to make forestry in Bungo the best in Indonesia. They have had meetings and are working together to push the replication of village forests. The village communities of Senamat Ulu, Dusun Buat, Dusun Laman Panjang, and Dusun Sungai Telang, which are located in the area of protected forest Bukit Panjang-Rantau Bayur, have joined with KKI-WARSI to present a proposal for the adminstration of the village forest to the head of the district and then to the government of Bungo District, to facilitate the issue of the decision letter by the Minister regarding the village forest.

### 6. Multistakeholder modelling of potential REDD+ implementation at provincial scale

As followup to the stakeholder identification at provincial scale reported in REDD_ALERT D6.1, a multi-agent model was designed that allowed quantified 'equity' metrics to be derived, to complement perceived fairness). Results are presented in attachment 4.

### 7. Connecting REDD++ implementation to existing watershed payment schemes

An alternative approach has emerged in Vietnam, where existing schemes that provide payments for watershed services, can be used as a basis for a REDD$^+$ add-on, without having to set up separated institutional arrangements. Attachment 5 discusses this option, with its pro and con.

# Attachment 1. Fair & Efficient REDD Value Chains Allocation (FERVA): TUL-SEA method description



## FAIR & EFFICIENT REDD VALUE CHAINS ALLOCATION (FERVA)

*Trees in Multi-Use Landscape in Southeast Asia (TUL-SEA)*
*A negotiation support toolbox for Integrated Natural Resource Management*

## Fairness and Efficiency in the Value chain for RED

REDD stands for 'Reducing Emissions from Deforestation and Degradation in Developing Countries' and details of how this can be done are currently under investigation. The EFFERVA method was designed to help in this process.

In reducing emissions from deforestation, peatland and forest degradation and other land use change in developing countries, a major challenge is how to combine efficiency and fairness. A middle ground and combination of policy instruments is needed to actually reduce emissions and also stimulate sustainable livelihood options and development pathways.

### Fairness vs efficiency...

Key arguments for fairness

Key arguments for efficiency

Maximize emission reduction per $ invested

Reward well-managed landscapes



| Typical arguments for 'fairness' | Typical arguments for 'efficiency' |
|---|---|
| 1. Moral imperative: those effect-tively guarding forests in their landscapes deserve rewards | 1. Maximize CO2 emission reduction per scarce dollar invested: focus on real threats only |
| 2. Poverty reduction as main Millennium Development Goal mandates a pro-poor approach | 2. Markets seek the 'right' = 'fair' price, if protected from mono polies |
| 3. Avoid perverse, emission- enhancing, incentives by rewarding forest destruction | 3. We need to show success in emission reduction to maintain public support |
| 4. Respect for traditional practices of local communities | 4. Use external experts for reliable information |

## Steps in FERVA

FERVA is based on 'focus group discussions' with different stakeholder groups. Details and examples have to be adjusted to local context.

1) In the introduction a basic explanation is provided of the climate change issue and of the role of 'greenhouse gases' (roughly 80% from fossil fuel use and 20% from loss of forest and peatland carbon stocks). Depending on the degree of exposure of the participants to 'carbon markets' and expectations of 'easy money', the audience may recognize itself in one of the various phases of the ignorance/hype/crash/reality cycle (Fig. 1). At this stage we do not know for whom the 'reality' phase will have negative, neutral or positive consequences.
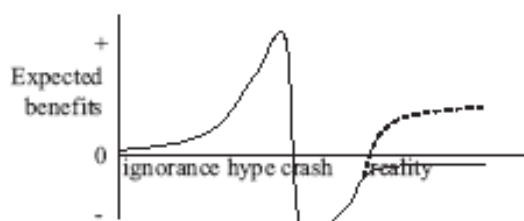


Figure 1. Schematic stages of expected benefits from 'new' topics and institutions

2) Adjusted to local context and availability of data on land use change, the discussion can then focus on opportunities of emission reduction in areas that have a track record of high emissions (e.g. Indonesia as a country compared to other forest countries, the province of Riau compared to other parts of Indonesia, active forest frontiers versus stable areas), and on the relevance of providing positive incentives for long term forest and peatland conservation. The group can be split into two groups and a 'debating club' format can be used to get the arguments for both 'efficiency' and 'fairness' across.

3) Next the concept of a 'value chain' can be introduced, using a local agricultural commodity (e.g. coffee, rubber or timber) and comparing the prices per unit weight (or volume) at farmgate, after processing and when bought by the end user. The different steps in the chain add value from the perspective of the end user, but the share they get in the net benefits may be out of proportion to the effort they put in.

In any application of mechanisms to reduce emissions we can distinguish at least 8 functions that need to be fulfilled before the 'end user' will be willing to buy a product in this case a unit of certified emission reduction (named 1 CREDD or otherwise). Depending on local context, the discussion can focus on which parts of this value chain already exist.

4) A major test on how the fairness + efficiency issue is handled is how the benefits (difference in price between legitimate opportunity costs for current CO2 emitters and the going price for certified emission reduction) will be shared along the value chain. In the 4th step of EFFERVA, we ask participants to allocate 100 units of value over the 8 steps of the value chain distinguished in step 3. This can be done by allocating 100 beans (pebbles or other items) over 8 bowls. We can ask to do this two times: first referring to what participants expect to happen (based on experience with other mechanisms), the second time referring to what they see as desirable.

Value-chain for reducing emissions from deforestation and degradation in developing countries and allocation of benefits along this chain
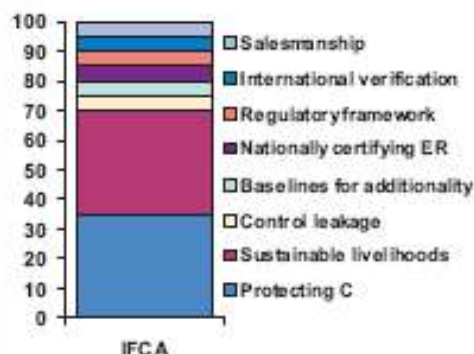
| | | Current situation, reality | Desirable situation, hope | Difference |
|---|---|---|---|---|
| 1. | Actual emission reduction by guarding existing C-stocks and off-setting legitimate opportunity costs for options foregone voluntarily | | | |
| 2. | Support sustainable livelihood pathways with less dependence on emission-causing land use | | | |
| 3. | Guarding against leak age, by integrated natural resource mana gement at local scale | | | |
| 4. | Securing additionality by clear baselines as a result of spatial planning | | | |
| 5. | Certifying credits for their 'Emission Reduction' (ER) by national standards | | | |
| 6. | Setting up conducive regulatory framework for multi scale governance | | | |
| 7. | Verifying ER by international standards | | | |
| 8. | Salesmanship to secure buyers and provide investment when and where needed | | | |
| Total | | 100 | 100 | |

## Example of results

In a recent workshop with environmental NGO's and government agencies interested in developing forest conservation projects within the REDD domain , the following results were obtained:

**4**
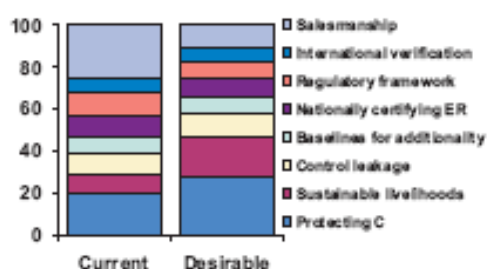
In the lead up to the 13th Conference of Parties of the UN Framework Convention on Climate Change (UNFCCC) in December 2007 in Bali, a group of national and international researchers in the Indonesian Forest Climate Allie3nce (IFCA) expressed the hope that 'transaction costs' (categories 3-8) could be kept at less than 1/3 of the value chain, and that the efforts would otherwise be split between direct emission reduction ('efficiency') and long term livelihood options ('fairness').



- Salesmanship
- International verification
- Regulatory framework
- Nationally certifying ER
- Baselines for additionality
- Control leakage
- Sustainable livelihoods
- Protecting C

IFCA

We are interested in compiling the results of similar discussions with different stakeholder groups, and would like to receive reports on FERVA exercises in different countries and contexts.

## References

(http://www.worldagroforestrycentre.org/sea/Publications/index.asp)

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TUL-SEA: A negotiation support toolbox for Integrated Natural Resource Management

**Attachment 2. Fair and efficient? How stakeholders view investments to avoid deforestation in Indonesia. PolicyBrief 8**

World Agroforestry Centre

Policybrief

08

# Fair and efficient?
# How stakeholders view investments to avoid deforestation in Indonesia

Effectively 'reducing emissions from deforestation and degradation in developing countries' (REDD) depends on stakeholder cooperation. The participatory 'fair and efficient REDD value chain allocation' (FERVA) method analyzes stakeholders' views in the negotiation process.

**Fairness versus efficiency**

Key argument for fairness:

Reward well-managed landcapes

Key argument for efficiency:

Maximize emmision reduction per $ invested

## Key Points

1. Negotiations have barely started on how to share REDD incentives along the value chain that generates certified emission reductions.

2. Interviewed stakeholders are realistic, and not overly optimistic, in expecting most funds to support transaction costs, rather than activities on the ground.

3. Considerable nuance exists on how 'fairness' and 'efficiency' are perceived, as debates on fairness focus on moral values and those on efficiency target urgent emission reduction.

4. Meeting REDD goals requires balancing fairness and efficiency, which is seen as allocation of equal fund between direct emission reduction and long-term sustainable development, while reducing transaction costs.

5. The FERVA method is a replicable platform for stakeholder discussions and data collection across diverse settings.

## Introduction

Actions to reduce emissions of greenhouse gasses need to be appropriate on global, national and local scales. They need to be efficient in the use of funds, relative to the effectiveness achieved, and fair in terms of balancing rights, responsibilities and incentives. As international agreements on climate change are primarily agreements among countries, the emphasis has been on determining what national commitments to mitigation action are 'appropriate' (which implies being fair and efficient) at a global scale. The successful implementation of 'reducing emissions from deforestation and forest degradation in developing countries' (REDD), depends, however, on fairness and efficiency at the local scale in the national context.

'Fair and efficient REDD value chain allocation' (FERVA) is an experimental method to negotiate balance between fairness and efficiency across scales. This policy brief discusses initial results from Indonesia, the country with the highest emissions from forest and land-use change globally, and therefore a magnet for attention and funding to achieve emission reduction. Simultaneously achieving the twin goals of: (1) fair and sustainable development; and (2) efficient emission reduction is a matter of managing trade-offs (Table 1).

**Table 1.** Typical arguments regarding REDD fairness and efficiency

| Typical arguments for fairness | Typical arguments for efficiency |
|---|---|
| 1. Those managing carbon stocks effectively in their landscapes deserve reward as a moral imperative. | 1. Maximizing carbon dioxide emission reduction per scarce dollar invested requires a tight focus on real threats. |
| 2. That poverty reduction is the primary Millennium Development Goal and mandates a pro-poor approach. | 2. Markets adequately protected from manipulation seek the 'right' price, which is also the fair price. |
| 3. Rewarding only active and credible threats is a perverse incentive to enhance emissions. | 3. Maintaining public support for emission reduction requires demonstrable success. |
| 4. The traditional practices of local communities must be respected. | 4. Despite being outsiders, experts provide the most reliable and credible information. |

## Steps in the FERVA method

FERVA engages stakeholder groups in focus group discussions, the details of which must be adjusted to fit the local context. The following is the usual sequence.

1. After a basic explanation of climate change and the role of greenhouse gases, including the 15% or so derived from carbon stocks lost from forests and peat land, participants are exposed to the issues of fairness and efficiency in REDD. The issue is introduced by acknowledging that global REDD interest in Indonesia may be efficient, while asking if it is also fair. What about allocation within Indonesia? Should attention focus solely on the provinces with the largest threatened carbon stocks? Should countries and provinces with stable forests be ignored?

2. According to their affinity for either the fairness or the efficiency side of the argument, participants form two groups to strengthen the case for their point of view being essential to the success of REDD schemes.

3. Using a debating club format, a representative from each group summarizes the arguments, followed by a discussion on how the two perspectives can be reconciled.

4. The concept of a value chain is introduced at this point, using a local agricultural commodity (e.g., coffee, rubber or timber) and discussion of how well or poorly farm-gate, processed and end-user prices reward effort along the chain.

5. The concept of a value chain is then applied to the REDD carbon market for certified emission reductions (CERs).

6. At least eight functions are required before an end user buys a CER. Working in groups, participants allocate shares of benefits to 'value chain' of these eight functions under two scenarios: (1) the currently expected situation and (2) a desirable future situation (Table 2).

7. The differences in perspectives between groups are analyzed and debated to illuminate what it would take to bring 'hope' and 'reality' closer together.

8. The results are summarized and compiled for future reference. If REDD implementation makes progress, divergence in stakeholders' perspectives will likely narrow, as will the gap between hope and reality.

**Table 2.** *The REDD value chain of eight functions that link actual emission reduction with the sale of credits to end users, and the way stakeholders expect and want total value to be allocated over this chain*

| Functions along the value chain for 'reducing emissions from deforestation and degradation in developing countries' (REDD) | Current situation (reality) | Desirable situation (hope) | Difference |
|---|---|---|---|
| 1. Actual emission reduction achieved by protecting existing carbon stocks and offsetting opportunity costs for legitimate options which are voluntarily forgone | | | |
| 2. Supporting sustainable livelihood pathways with less dependence on land uses that cause emissions | | | |
| 3. Guarding against leakage with integrated natural resource management at the local scale | | | |
| 4. Securing additionality by establishing clear baselines through spatial planning | | | |
| 5. Certifying credits for emission reduction by national standards | | | |
| 6. Setting up a regulatory framework conducive to multi-scale governance | | | |
| 7. Verifying emission reduction using international standards | | | |
| 8. Salesmanship to secure buyers and provide investment when and where needed | | | |
| Total | 100 | 100 | |

## Example of results:

### Step 1-3: Palangkaraya, Central Kalimantan.

Central Kalimantan Province still has a large area of tropical forest and peat land but also suffers high rates of conversion and emissions, making it a strong candidate for REDD. The provincial government has expressed interest and started administrative arrangements to prepare for REDD implementation. However, there is no clarity yet on how REDD targets will be achieved through changes in emission practices (efficiency) and rewards for those protecting the forest (fairness). In a FERVA workshop in Palangkaraya in March 2009, about 30 participants from governmental institutions, non-governmental organizations (NGOs) and universities discussed the issues.

The local need for both efficiency and fairness was clear (Table 3). After hearing both types of arguments, everyone was keen to balance the focus on efficiency, for the sake of a market mechanism and enhanced fund availability, and on fairness, based on a moral point of view of the people who already preserve the forest. A need therefore exists for tools to negotiate allocations based on fairness and efficiency. The participants recognized the diversity of perspectives and concepts. Stakeholders from the local community and regional government tended to focus more on fairness, while potential REDD investors and brokers tended to place higher priority on efficiency.

**Table 3.** *Fairness and efficiency in group discussion at Palangkaraya, Central Kalimantan.*

| Fairness group: | Efficiency group: |
|---|---|
| 1. Benefits should not only go to the central government but also to the regional government and, first and foremost, to the local community inhabits areas surrounding the natural resource. | 1. The need for REDD effectiveness to be visible demands that schemes be implemented in areas suffering rapid deforestation, where incentives can contribute to cutting carbon emissions. |
| 2. Management must be collaborative and participatory, involving every stakeholder in the future REDD implementation area. | 2. Emission reduction is a free bonus derived from the cost of forest preservation, thereby achieving additionality. |
| 3. Ecosystem benefit through sustainable preservation is essential. | 3. Efficiently targeted REDD implementation will be fair in the end. |
| 4. Avoiding leakage of awarded incentives requires that fairness be observed. | |
| 5. A conservation area in good condition faces a low risk of forest degradation, plantation failure or land-use change. | |
| 6. Forests will be preserved if REDD incentives are distributed fairly. | |
| 7. To replace the lost opportunities to exploit forest due to forest preservation, require fairness concept as its principle. | |
| 8. The attitude of future generations hinges on fairness. | |

**Table 4.** *Factors raised regarding fairness and efficiency by group discussion at Jayapura, Papua.*

| Fairness group: | Efficiency group: |
|---|---|
| 1. Financial compensation from REDD scheme should be given for the environmental services provided by the community as a moral reward. | 1. Emission reduction in highly deforested or degraded area will lead to large amount of REDD financial compensation. |
| 2. Indigenous rights must be recognized through the legal land ownership rights of the community. | 2. Significantly, REDD will decrease deforestation the rate of and forest degradation. |
| 3. Poverty due to the community economic gap will lead to conflict. | 3. The concession system offered advanced management to control deforestation and forest degradation |
| 4. Carbon stock potential is the deciding factor in choosing which scheme has the best economics. | 4. Efficiency in carbon trading can be supported by the efficiency of production forest management (e.g. cutting cycle). |
| 5. The protected forest has the highest carbon stock potential ± 87 ton/ha. | 5. There is a replanting policy in the forest concession and industrial plantation forest. |
| 6. The community already has the skills needed for effective management | 6. Production forest has a higher carbon stock compared to protected/conservation forest. |
| 7. Three main points need to be take into account in REDD scheme: a) moral, b) poverty, c) conflict resolution. | 7. The threat to production forest is higher compared to protected/conservation forest. |
| 8. Forest protection gave promising investment potential. | 8. Multiplier effect value of production forest preservation is higher compared to any other forest type. |
| | 9. There are benefits from timber and carbon stock in terms of cutting cycle to add up the total income resulted from a certain forest area. |

## Step 1-3: Jayapura, Papua

Papua Province contains the largest remaining forest area in Indonesia, with 90% of its land state-designated forest zone. A REDD scheme there could aim to prevent Papua becoming like Kalimantan or Sumatra, where forest conversion has been widespread. Table 4 summarizes the arguments raised on both issues in the focus group discussion in Jayapura.

After each group presented its discussion results, strong debate ensued. The fairness group focussed strongly on moral consideration of people who already protect the forest and provide environmental services, as well as on avoiding forest loss and degradation in protected and conservation forests arising from the welfare gap. The efficiency group stressed highly visible emission reduction in a badly deforested and degraded area. Through discussion and facilitation, each group grew aware that both priorities were important and were mutually dependent, and that successful REDD implementation depended on both.

## Step 4-8: Palangkaraya and Jayapura

Workshops were held with environmental NGOs and government agencies interested in developing forest conservation projects within the REDD domain (Figure 1, column A).

In the Palangkaraya, Central Kalimantan, workshop, stakeholders were pessimistic regarding the expected distribution of REDD funds (figure 1, expected, column B). Transaction costs (the top six items, from 'leakage control' to 'salesmanship') were perceived to be very high, at 80–90%, and payment to the local actors ('protecting

carbon' and 'sustainable livelihoods') was very low, at 10–20%. Participants desired that the money should be distributed at least equally between transaction costs and local actors (desired, column B).

Participants in the Jayapura, Papua, workshop differed. The expectations of the university group (Figure 1, expected, column C3) were similar to those in Palangkaraya, with transaction costs reaching 80%. But NGO and government representatives were quite optimistic, expecting a 50–50 allocation of payments to local actors and transaction costs (expected, column C1–2). In the 'desired' situation, university and NGO participants hoped that payment to the local actors would exceed 40%, while government representatives hoped it could be 65% (desired, column C).

In the run-up to the 13th Conference of Parties to the United Nations Framework Convention on Climate Change in December 2007 in Bali, a group of national and international researchers in the Indonesian Forest Climate Alliance expressed the hope that transaction costs could be kept to less than one third of the value chain, with the remainder split equally between direct emission reduction (efficiency) and long-term livelihood options (fairness) (Figure 1, desired, column D).

## Policy implications

All stakeholders involved in the discussions so far see the relevance of both fairness and efficiency and that both are needed in REDD incentives. All are concerned, however, that most of the money will go to paying transaction costs. All stakeholders' preferred allocation along the value chain
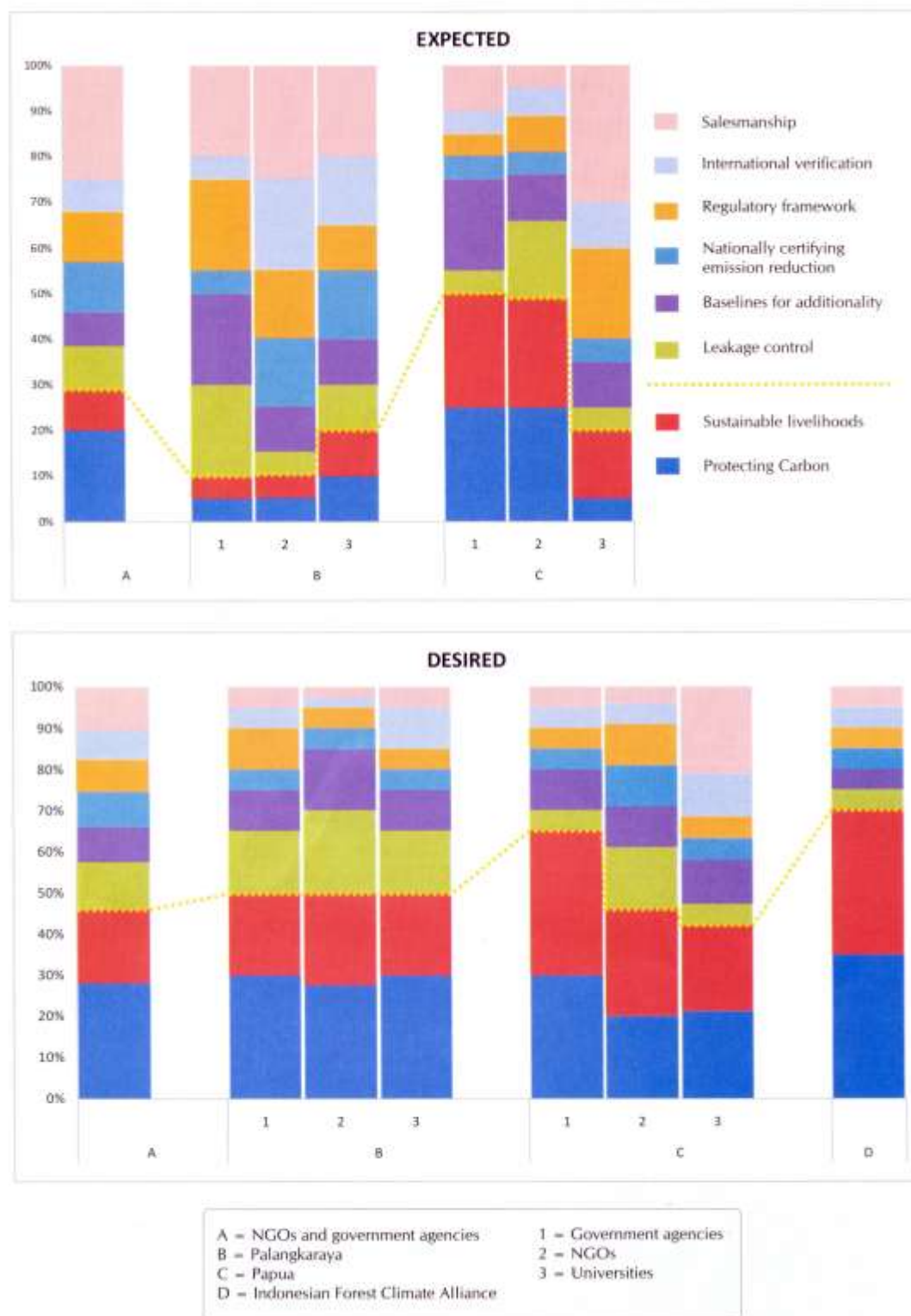
**EXPECTED**

Legend:
- Salesmanship
- International verification
- Regulatory framework
- Nationally certifying emission reduction
- Baselines for additionality
- Leakage control
- Sustainable livelihoods
- Protecting Carbon

**DESIRED**

A = NGOs and government agencies
B = Palangkaraya
C = Papua
D = Indonesian Forest Climate Alliance

1 = Government agencies
2 = NGOs
3 = Universities

*Figure 1. Workshop participants' allocations to the REDD value chain in both expected and desired scenarios.*

differs considerably from their expected allocation, indicating the need for continued negotiations and other efforts to reduce transaction costs.

Most stakeholders seek a balance between efficiency in emission reduction and the medium- and long-term benefits of fair support for sustainable livelihood options. Differences between locations appear to be larger than the differences among stakeholder groups in a given location.

FERVA provides a way to quantify the baseline inclination of stakeholders to share and cooperate and can be used for future impact assessment. Quantitative conclusions need further corroboration.
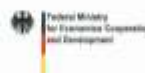
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# Policy*briefs*

**14**

# Perceptions on Fairness and Efficiency of the REDD Value Chain

## Methods and results from pilot analyses in Indonesia and Peru

Reducing Emissions from Deforestation and Degradation (REDD) will require a 'value chain' that links global beneficiaries to local actions towards high carbon-storing land use patterns. The value chain includes: effectively reducing emissions, a shift in development pathways and all 'transaction costs' to make a transparent, verifiable claim on emission reductions that can obtain 'credits' and market value. Fairness in this context means rewarding stewards of current forests, and efficiency means focussing on high-emission areas for reductions.

The Fair and Efficient REDD Value Chain Allocation (FERVA) method explores perceptions along the emerging REDD value chain. This brief reports on its applications in Indonesia and Peru.

## Key findings

**1** Efficiency and fairness need to be balanced in order for REDD to accomplish its objectives. Immediate and efficient emission reductions require a focus on 'hot spots' of current emissions, but incentives for effective stewardship ('fairness') are also needed to achieve medium-to-long term goals.

**2** Stakeholders indicate that their 'desirable' value chain allocation differs from the 'expected' allocation of REDD money; this can and should lead to further dialogue on how a realistic, conditional, voluntary and pro-poor mechanism can emerge.

**3** The currently expected allocation of funds to 'transaction costs' of monitoring, reporting and verification reduces both 'fairness' and 'efficiency' of the REDD value chain, hence transaction costs will have to be lowered through simple and clear rules.

**4** There is considerable divergence among the perceptions of different stakeholders; negotiations and dialogue are needed to reduce these gaps for mutually acceptable solutions.

## Implications

The FERVA method provides a replicable approach for involving stakeholders in the design of REDD mechanisms that will be effective, efficient and fair. It uses a preliminary definition of a REDD value chain and allows for the analysis of the divergent opinions with respect to it and, if replicated over time, analysis of progress along learning curves in local negotiations.

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REDD has been embraced by international climate change negotiations, but details of how this can be done in practice are still under research. A major challenge for REDD is how to combine *efficiency* and *fairness*. If all the attention goes to 'hot spots' and 'urgent threats', real stewards of forests feel left out (lack of fairness); if the hot spots are ignored, little emission reduction will be achieved (lack of effectiveness and efficiency).



Workshops with stakeholders help reveal expectations and preferences for REDD implementation

## The FERVA method: Fair and Efficient REDD Value Chain Allocation

There is no empirical evidence on the REDD value chain yet, as no transactions have been finalized. There is enough clarity, however, on the functions that will have to be included. The REDD value chain will have to include many stakeholders: local actions, a number of layers of government, civil society and the private sector – for monitoring, certification and verification – and global stakeholders who are willing to invest in and/or pay for certified emission reduction. An important question would be how the different actors along this value chain will be rewarded or will bargain for their share?

The Fair and Efficient REDD Value Chain Allocation (FERVA) method was designed to help in this process of negotiation (1). The method is based on the hypothesis that in the absence of data, actions and choices by stakeholders are based on their perceptions about how REDD will function. The contrast between what they 'expect' and what they see as 'desirable' may drive their effort to influence the way the REDD value chain is established. FERVA involves a number of steps, all in discussion with stakeholders.

## FERVA method in 5 steps

1. First, the climate change issue and the role of 'greenhouse gases' are introduced to ensure a leveling of the playing field and common understanding among stakeholders. Participants can be local communities, government officials, NGOs, university officials, private sector, mixed together or in separate groups (according to local conditions). Then participants are exposed to the issue of 'fairness and efficiency' in REDD.

2. Based on their preference, participants are divided into two groups, one to argue for fairness and another to argue for efficiency; the joint discussion focusses on "why should a REDD mechanism be fair *and* efficient?".

3. Next the concept of a 'value chain' is introduced, using a local agricultural commodity (e.g. coffee, rubber or timber) value chain as an example, and comparing the prices per unit weight (or volume) at farm-gate, after processing and when bought by the end user.

4. Then, the concept of 'value chain' is applied to the REDD mechanism. The traded product in the carbon market is a piece of paper called

Certified Emission Reduction (CER). Figure 1 shows 8 different functions that need to be fulfilled to produce CERs and sell them, with multiple layers in the 'monitoring, reporting and verification' process adding value to local emission reduction activities. The first two functions refer to efficiency (reduce emissions) and fairness (support sustainable livelihoods). Functions 3-8 are part of the transactions costs. Functions 3-4 (Guarding against leakage: physical and temporal, and securing additionality by clear baselines) are filters for any REDD mechanism. Then the national certification scheme (function 5) is needed and should follow international rules on eligibility (function 6), for later verification (function 7) until the CERs can be sold (function 8).

5. We divide participants into small groups (5-10 persons per group) to discuss the distribution of payments of REDD money. Then we ask participants to allocate 100 units of value among the 8 functions of the value chain noted in step 4 within two scenarios: what they expect to happen (or their current perception based on experience so far) and what they see as desirable.

Further steps can include the use of tools from experimental economics that quantify the willingness of individuals to cooperate and jointly achieve benefits for all.
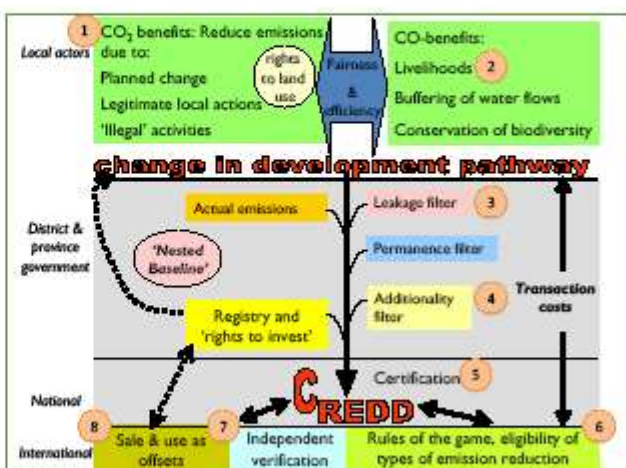


**Figure 1. Eight functions of REDD value chain: From carbon emissions to Certified Emission Reductions, adapted from (2).**

### Indonesia

Two workshops were conducted in Palangka Raya, Central Kalimantan, and Jayapura, Papua (3). Whereas Central Kalimantan has the highest emissions from deforestation and fire hazards in the country, there is still 90% of state-designated forest land in Papua. Following are key conclusions from the FERVA analysis:

- Fairness vs. efficiency: Arguments supporting fairness include moral consideration for people who already protect the forest and provide environmental services, and also the avoidance of deforestation and forest degradation threat to the protected/conservation forest. Efficiency arguments stressed on the implementation towards emission reduction in highly deforested and degraded areas.

- REDD value chain: It can be concluded that the stakeholders were pessimistic about REDD money distribution based on their current expectations, where the transaction costs were perceived to be very high (80% - 90%) and the payment to the local actors itself to be very low (10% - 20%). They hoped that at least the money could be distributed equally for transaction cost and the local actors (50% - 50%) (Figure 2).

- Differences in views among governments, NGOs and university groups relate mainly to different functions of the value chain, within the transactions costs, in an 'expected' scenario. However, allocations are very similar in a 'desirable' scenario for all stakeholders (Figure 2).

- In Papua where forest cover is still large, participants perceived forest as a potential resource for investment, supported by local actors' strong land ownership rights. On the other hand, local actors supporting efficiency argued against the forest management practices by concession holders without respect to indigenous knowledge.

- Overall, the local community and regional governments tended to prioritize fairness arguments, while donors and brokers may put more priority on efficiency.

### Peru

Three workshops were conducted in the most deforested regions of the Amazon in Peru: Ucayali, San Martin and Loreto in October 2009 (4). REDD value chain analysis was based on their own knowledge and experience on development and conservation projects. Participants were divided randomly in multi-stakeholder subgroups of 5-8 people. Key messages that came out of these workshops are:

- There is a need for a REDD mechanism to be significantly more fair and efficient, that is, to reduce deforestation on the ground and to contribute to sustainable livelihoods in the Amazon.

- Fairness and efficiency: Resources spent on actually reducing emissions should at least double in an ideal situation and the ones spent on securing sustainable livelihoods should increase. High transaction costs, in particular, of certification and verification, are currently benefiting mostly international consulting firms, making the regulated carbon market an 'exclusive' mechanism. It is not clear how communities and indigenous populations will be included in the REDD process and benefit from it.

- Rules of the game: The Ministry of Environment (MINAM) needs to present a position about the issue and to partner with other countries in the international climate change negotiations. It should also clarify how REDD carbon credits would relate to current government rewards for conservation schemes and how it would fit with the new environmental services law under discussion.

- Change in development pathway: The Peruvian government needs to change its 'primary development' model, based on exploitation of natural resources, to one of sustainable economy, where financial interests would not be above environment and social interests.

- Transparency and participation: Lack of availability of information about REDD to local stakeholders in formats and languages they can understand (the most recent information is only available in English), in order to build an effective mechanism with the direct participation of local communities, indigenous population and other actors, and to avoid future conflicts.
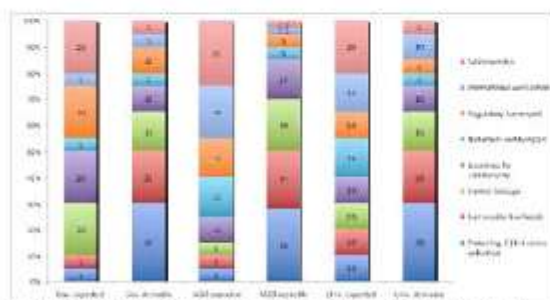


Figure 2. Stakeholder perceptions of the REDD value chain in Central Kalimantan by stakeholder group (government, NGO and University: Expected vs. desirable)
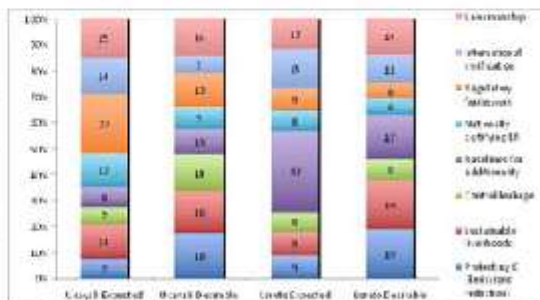


Figure 3. Stakeholder perceptions of the REDD value chain in Ucayali and Loreto (Peru): Expectations based on current experience and desirable.

### Conclusions

The current FERVA analysis captures the perceptions and expectations of stakeholders at early stages of a REDD strategy and helps them to understand the different REDD value chain functions.

FERVA can serve as a tool for further discussion and quantification of divergence in opinion. It does not represent actual transactions as yet.

Transaction costs of REDD activities at project scale are perceived to be 80-90%; even in a 'desirable' condition, they may represent 50-66% of the value chain. This affects both fairness and efficiency.

Different perceptions can be influenced by the scale at which the FERVA method is applied – international, national, provincial or district – and by the type of stakeholder who participates. This will also be important at the REDD implementation stage.

### Recommendations

Recommendations from participants and the authors call for complementary research on REDD value chain analysis, adding time, cost, technical capacities and governance implications to the different value chain functions identified. This would bridge the knowledge gap between what is desirable and what is realistic for a REDD mechanism. For example, Peru has estimated that it needs US$ 347 million per year for implementing an effective forest management policy at the national level (5), a basic component of a REDD strategy.

In the near future, research will be needed to find a minimum threshold that a REDD scheme should meet in terms of its contributions to livelihoods, and water and biodiversity co-benefits, in order to participate in a post-Kyoto regulated market.

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### Correct citation

### Key Terms used in this brief

**Additionality** refers to the emisison reduction achieved in comparison to a 'business as usual' development pathway.

**Effectiveness** means success or achieving the results that you want (targets).

**Efficiency** means effectiveness (achieving targets) per unit invested focusing on areas to reduce emission.

**Fairness** means rewarding stewards of current forests for their efforts.

**Leakage** is the unintended effect on emissions elsewhere (beyond the project scale).

**Permanence** or temporal leakage refers to future emissions (beyond project accounting period).

**Value chain** is a representation of a sequence of actions that transform raw materials (or land use enhancing C sequestration) into marketable products (certified emission reduction) that an end user could buy.

# Attachment 4. Harnessing the Climate Commons: An agent-based modelling approach to reduce carbon emission from deforestation and degradation

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**Abstract**

Humans have created a worldwide tragedy through free access to the global common atmosphere. Forest land use change contributes 18% of greenhouse gas emissions, which cause global warming. The 15th Conference of the Parties in Copenhagen increased political commitment to reduce emission from deforestation and degradation and to enhance carbon stocks (REDD+). However, government sectors, political actors, business groups, civil societies, tree growers and other interest groups at different levels may support or reject REDD+. This paper describes REDD+ dynamics through the following methods: identifying key actors that influence REDD+ policy; categorizing their objectives and interests, types of rationality and policy preferences; pointing out the strategies they used to fulfil their goals and simulating their actions and behavior with an agent-based modelling approach. Through analysis of actors, arenas and institutions, various possible REDD+ options are explored. The model simulates: (1) how providers are likely to decrease or increase carbon stocks on their landscapes for their livelihoods under 'business as usual' institutions; (2) how they are likely to negotiate with potential buyers to implement REDD+, with regards to the involvement of brokers (governments or nongovernmental organizations); and (3) how they are likely to implement REDD+ after the agreement. The model has been/was developed as a spatially explicit model to consider the complexity of REDD+ target landscapes. The simulation results are examined against the 3E+ criteria, i.e. effectiveness in carbon emission reduction, cost efficiency and equity among involved stakeholders and co-benefit of other activities. This study took the Jambi landscape in Indonesia as a case/case study. The results explain why REDD+ works and does not work, who wins and who loses, and develops scenarios for REDD+ institutional arrangements which would help to harness the global commons of climate change.

Keywords: Climate change, deforestation, agent-based modeling, Indonesia, institutional arrangement

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## I. Introduction

Global warming is a fact that all parties need to quickly act upon, otherwise humanity will not survive. The United Nations Framework Convention on Climate Change provides a global common framework for all parties to combat global warming. Stern (2006) and Chomitz (2007) found that reducing emissions from deforestation and degradation is highly cost effective. Successive meetings of the Conference of the Parties produced structure and agenda to provide incentives for non–Annex 1 countries to reduce emissions from deforestation and degradation. Nevertheless, many civil society organizations are concerned about the effectiveness of REDD+, particularly in relation to unclear forested land property, weak governance and fairness of payment distribution of REDD+ credit ($C_{REDD}$).

Forest land use change/Change in forest land use is estimated to contribute 18% of greenhouse gas (GHG) emissions. GHG emissions from the forestry sector are projected to be the same in 2030 as in 2004 at 5.8 Gt $CO_2$ equivalent. This excludes conversion of peat land and other carbon-rich swamp lands. UNFCCC (2007) revealed three global direct drivers of deforestation and degradation: (a) commercial agriculture for commercial crops and cattle ranging; (b) subsistence farming of small-scale agriculture, shifting cultivation, and fuelwood and non-timber forest products (harvesting); (c) legal and illegal commercial timber extraction and traded fuelwood. These drivers determine the opportunity costs of maintaining the forest.

The mitigation options for the forestry sector are (a) reduce deforestation; (b) improve the management of productive forest; and (c) afforestation and reforestation to increase forest area. About 50% of global forestry mitigation options can be achieved at a cost of under US$ 20 per tonne of $CO_2$. The financial flow needed to reduce deforestation and degradation is estimated as the opportunity cost of converting forest to other land use. The estimated opportunity costs is US$ 12.2 billion annually, to reduce deforestation and degradation of 12.9 million ha globally (UNFCCC, 2007).

The direct drivers for deforestation and degradation differ in each country. Drivers of deforestation and degradation in Indonesia can be categorized into direct drivers and underlying causes. The direct drivers are natural causes (e.g. El Nino, natural fires and high rainfall) and human activities (e.g. logging, illegal logging, forest fires related to land preparation for forest plantation and estate crops and mining). The underlying causes of deforestation and degradation are market failures (e.g. underpricing of stumpage value and an abundance of illegally logged timber), policy failures (20-year concession periods, overlarge concession areas and premature implementation of regional autonomy), weak governance (e.g. weak law enforcement and land tenure), and broader socio-economic and political issues (e.g. economic crisis, reform era and high population growth) (Contreras-Hermosilla 2000).

In many countries, most forests have already been distributed to different actors for various uses. To obtain commitment on behalf of forest users, national governments must negotiate with these forest users including forest concessionaires, companies that plan to convert forests, local communities, forest conservation managers and local governments. Local communities in particular do not have the power and capacity to negotiate on a level field with national governments. Under such a circumstance REDD+ could produce more negatives than benefits for local communities. Equally, REDD+ may well cause conflict between local communities and the national government, and among community members. Conscious intervention to level the playing field is therefore a necessary condition for REDD+ to be successful.

REDD+ aims to reduce carbon emissions to the atmosphere. The atmosphere is a carbon sink.  The atmosphere is a global common, which no one person or state may own or control and which is central to life. Paavola (2008) indicates how crucial parts of the institutional framework for governing atmospheric sinks are still missing, a shortcoming which maintains the "tragedy of the commons" in their use.  The tragedy of the commons is a dilemma arising from the situation in which multiple individuals, acting independently, and solely and rationally consulting their own self-interest, will ultimately deplete a shared limited resource even when it is clear that it is not in anyone's long-term interest for this to happen (Hardin, 1961).

Understanding people's behavior in relation to land use is key to making REDD+ work. Agent-based modeling (ABM) is suggested by institutionalists  to model common property.  The Implementation of ABM in land use planning and policy has been reviewed by Matthews et al. (2007).  They categorized applications of agent based land use models under the headings of (a) policy analysis and planning, (b) participatory modelling, (c) explaining spatial patterns of land use or settlement, (d) testing social science concepts and (e) explaining land use functions.  They believe that it is important to see the rural economy and land use as properties of 'socio-ecological systems' (SESs), consisting of social, economic and biophysical components interacting together. SESs show external variables i.e. policy, climate and demographic changes which 'drive' the system. The socio-ecological system itself containing its various components and their interrelationships.

ABM focuses on social dimension,  modeling particularly human cognitive process.   The hallmark of ABM is the recognition of "agents", which are entities with defined goals, actions, and domain knowledge. Agents operate and exist in an environment. The environment might be open or closed, and it might or might not contain other agents. If it contains other agents, it can be seen as a society of agents. Simulating the stakeholders' activities and interactions requires a tool that is able to represent the individual's knowledge, beliefs, communication and behavior. Individual agents are typically characterized as having bound rationality. They are presumed to be acting in what they perceive as their own interests, such as reproduction, economic benefit, or social status, using heuristics or simple decision-making rules. ABM agents may experience 'learning', 'adaptation', and 'reproduction'.

This paper describes a model of a general district/provincial landscape with a forest core, forest margin, and agricultural mosaic with various actors i.e. local government, service providers, buyers, DNA, national government, international supervisory body.   We use a conceptual map rather than a real map to enhance the usability of the model. The model will be primary for policy makers.   Issues pursued are related to the effect of carbon prices and institutional arrangements on the effectiveness, efficiency and equity of the reduction of carbon emissions.


**.II. Approach and Methods**

This paper uses Arena-Actor-Institution (A2I) concept to understand that in every system there are arenas, actors and institutions that  interact dynamically.  'Arena' is defined as a playing field, i.e., a field or arena in which actors act; 'Actor' is a set of actors; and 'Institution' refers to formal and informal rules and their enforcement. We adopted the Structure-Institution-Actor (SIA) approach of Sato (2005) but replaced 'structure' with 'arena' to better illustrate the playing field in the so-called A2I approach. (If we applied the SIA approach to a sumo wrestling match, then the sumo ring is the structure, the rules of the sumo game are the institution, and the two sumo players

and the referee are the actors.) Ostrom *et al*. (1994) used the term 'action arena' in their framework for institutional analysis to illustrate the playing field where actors meet and negotiate. Institutions can change the arena only through the actors' work and intervention.

Institution is defined as "the rules actually used (the working rule or rules-in use) by a set of individuals to organize repetitive activities that produce outcomes affecting those individuals and potentially affecting others" (Ostrom, 2004). Weber (1995) defines institution, by contrast, with agreements issued by an organization. An institution is an agreement, which compels more people than the members of the group, which issued this agreement. An organization produces agreements, which apply only to its members. Institution is developed by and a result of actors' interactions among themselves in order to use or manage landscape.

Actors were identified according to their role in deforestation and degradation, legal or traditional rights over the forest and those impacted by REDD+. Actor characteristics were recognized through a literature review and discussions (Bernard 1994). Researchers facilitated the discussions to establish stakeholder identities, their rationale, and their behavior and actions. These characteristics formed the basis for the ABM model developed subsequently. The pattern of interaction among these actors can be collaboration, conflict or competition and individualized strategy. In this context the arena is defined as the landscape where actors are located or concerned. The landscape follows patterns in general (Chomitz 2007), which consists of forest core, forest margin and agricultural mosaic land.

There are four key phases in the development of a model (Grant et al. 1997) i.e. (a) Forming a conceptual model is to state the model's objectives, bound the system of interest, categorize its components, identify relationships, and to describe the expected patterns of the model's behavior; (b) Specifying the model is to identify the functional forms of the model's equations, estimate the parameters, and to represent it in NetLogo; (c) Evaluating the model is to re-assess the logic underpinning the model, and compare model predictions with expectations; (d) Using the model is to develop scenarios. At the current stage we emphasize the development of a general model of REDD+. Thus, the model is more a general model rather than a site-specific model. The model was implemented with ABM software, NetLogo. 4.1.

Railsback *et al.* (2006) reviewed ABM software platforms i.e. NetLogo, MASON, Repast, and Swarm for scientific agent-based models by implementing example models in each. NetLogo is the highest-level platform, providing a simple yet powerful programming language, built-in graphical interfaces, and comprehensive documentation. It is designed primarily for ABMs of mobile individuals with local interactions in a grid space. NetLogo is highly recommended, even for prototyping complex models.

## III. Results

### 3.1. Forming a conceptual model

The model is conceptualized as A2I as shown in Figure 2. The arena is a general landscape, which consists of a forest core, margin and mosaic land. The forest core represents pristine forests and contains many indigenous people. The forest edge is the area where agricultural expansion is occurring. Mosaic land is the area with the highest land value, which is where agriculture is mostly located and only contains a small fraction of forest. Each part can be an object of REDD or its

extension e.g. REDD+ or REDD++. This different scope will give different magnitude of carbon emission reduction and credits. The actors are those who are involved and are impacted by REDD+. The institution is all the rules related to the current REDD+ debate, which comprises payment mechanisms and distribution, scope, reference level, leakage/liability, emission monitoring, reporting, verification (MRV), and governance.
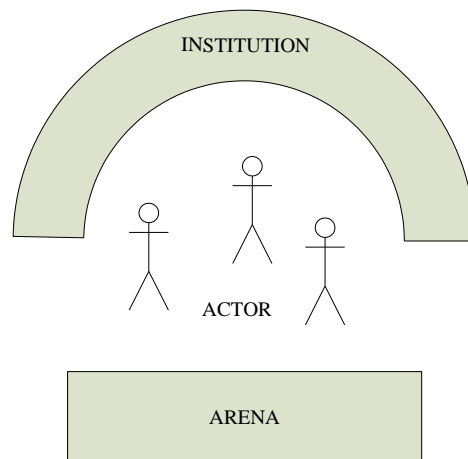


Figure 2. Arena-Actor-Institution (A2I) approach

The identified actors of REDD+ are service providers, local government, buyers, Designated National Authority (DNA), national government, and international supervisory bodies. The service providers develop environmental services (ES) i.e. emission reduction and sell them. They can be individuals, local communities, NGOs, private companies and/or local government. The local government can act as a facilitator for ES development. Some NGOs or private companies may act as brokers between sellers and buyers of ES. A verification body is an independent third party responsible for verifying the ES. The DNA that works at the national level provides approval of ES development and credit. The national government provides policy and measure for developing ES, while international supervisory bodies, such as the UNFCC secretariat, provide guidance on REDD+ trade. The table provides the goal, strategy and social group of issues for each actor.
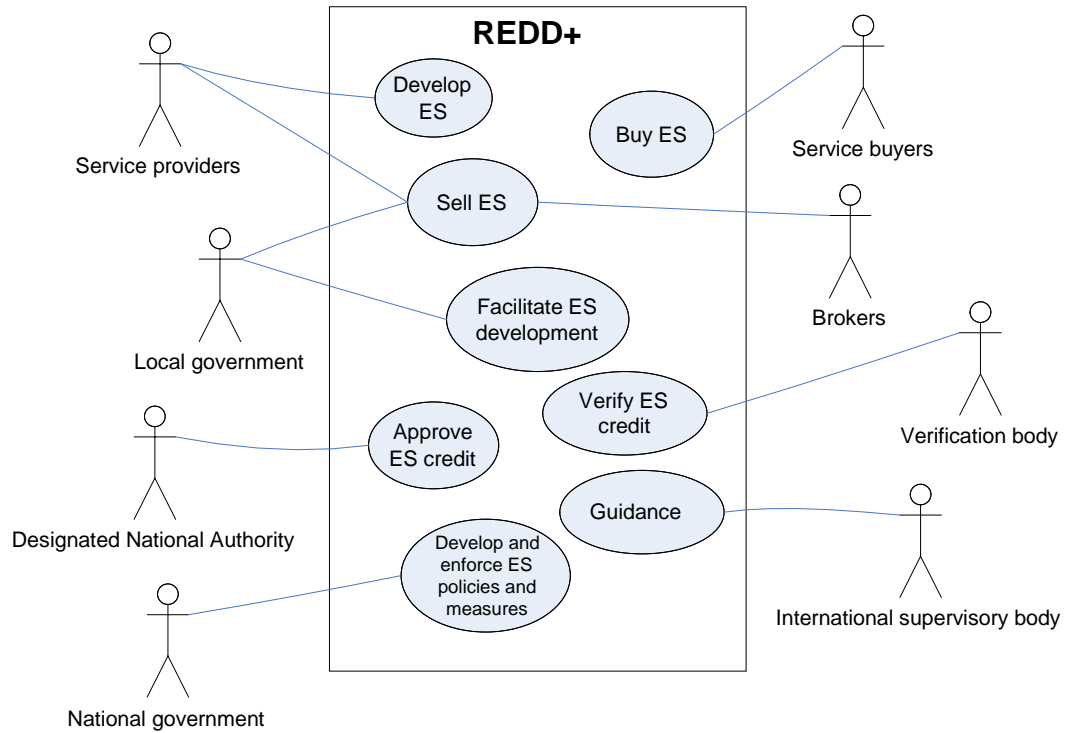
Figure 4. UML use case diagram of REDD+ showing actors and some of their roles

Effectiveness, efficiency and equity (3E) will be used to measure the REDD+ model. Effectiveness refers to the magnitude of the emission reduction so-called 'carbon effectiveness'. Efficiency refers to whether the given emission reduction is achieved at a minimum cost. While equity refers to fair distribution of benefits between and within countries and the effects of REDD+ activities on local communities (Angelsen *et al.* 2008)

### 3.2. Model Specification

The arena is spatially explicit, in a sense that it simulates the dynamics of carbon-related patches in space, but it is not aimed at simulating geographically verifiable outputs at pixel level. Thus, the model outputs should be evaluated at an aggregate level of pixels. In order to incorporate various possible patterns of Chomitzian landscape at an initial state as shown in Figure 2, the landscape is stratified in a vertical arrangement from top to bottom into three main sub arenas as described in Table 1, *i.e.*: forest core, forest margin and mosaic (Figure 1). At a fixed width of the landscape (*i.e.* 100 pixels), the height of each sub arena is defined based on an area fraction as follows:
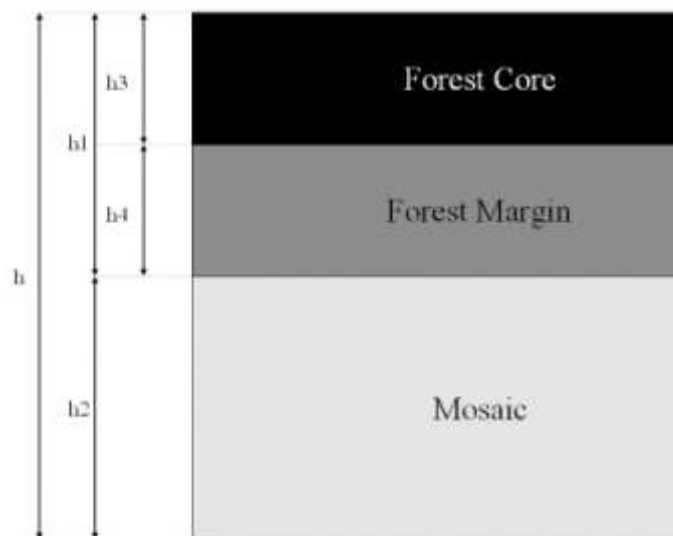
Where:

| h | : | height of the landscape (*i.e.* 90 pixels), |
| $h_1$ | : | height forest core ($h_3$) or forest margin ($h_4$) in pixels, |
| $h_2$ | : | height of mosaic in pixels, |
| $h_3$ | : | height of forest core in pixels, and |
| $h_4$ | : | height of forest margin in pixels. |

Figure 5. .Vertical arrangement of Chomitzian landscape into sub arenas: forest core, forest margin and mosaic.

The forest core of the landscape is managed as conservation forest that could be part of REDD+.  However, illegal logging which happens randomly can  occur. Forest conversion concessions and logging are located in the forest margin, which are objects of RED and REDD+ respectively. Small-scale forest, agroforestry and plantations such as rubber and oil palm are located in agricultural mosaic land, which could be objects of REDD.  Illegal logging can occur anywhere in  the forest core and/or margin.   Table 1 shows the arena-actor-institution ($A_2I$) approach of the model.

**Table 1.** The model design based on Chomitzian landscape and used  $A_2I$ approach

| Sub Arena | Actors | Activity |
|---|---|---|
| Forest core | Local community in the forest core | Random logging |
| Forest margin | Local community in the forest margin | Random logging |
| | Forest concessionaires | Systematic logging |
| | Plantation companies in the | Large-scale rubber plantations |

| | forest margin | (establishment) |
|---|---|---|
| | | Large-scale oil palm plantations (establishment) |
| Mosaic of agricultural lands | Local community in the mosaic | Random logging |
| | | Agricultural lands (establishment) |
| | | Small-holder rubber (establishment) |
| | | Small-holder coffee (establishment) |
| | | Small-holder cacao (establishment) |
| | | Small-holder oil palm (establishment) |
| | Plantation companies in the mosaic | Large-scale rubber plantations (establishment) |
| | | Large-scale oil palm plantations (establishment) |

The dynamics of the landscape are induced by logging both legal and illegal and forest growth. Forest concessionaires log the forest in their area, while illegal logging will occur randomly. This dynamics are so-called 'business as usual' (BAU). Drivers of landscape change are policy, population and climate. Legal logging occurs in the forest core and margin systematically. It is based on a rotation period.

To show how the model works, it is applied to a generic REDD+ target landscape (Figure 6), where 30% of the landscape was occupied by forest core, 30% by forest margin and 40% by mosaic. Under BAU institution, carbon providers transformed the landscape through logging, mining and other land use conversions.
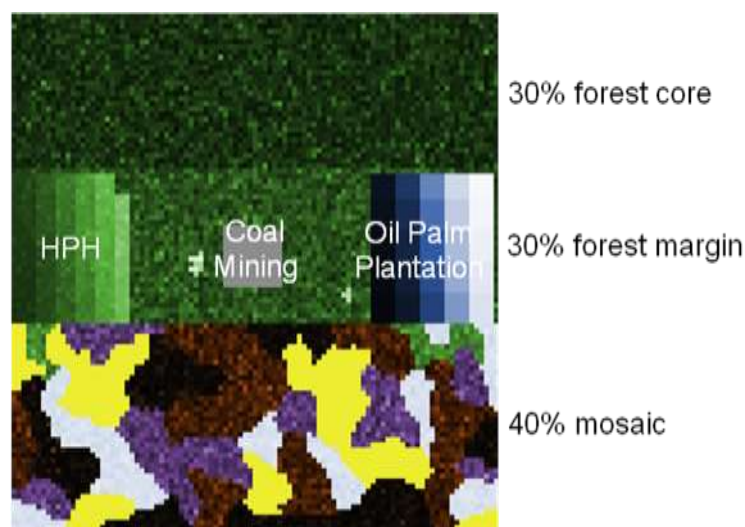


Figure 6. The initial state of the area

The way actors interact with each other is described using a Unified Modelling Language (UML) sequence diagram. In this negotiation, carbon price at the provider level ($.t$^{-1}$) is the price on the global market, corrected to 'threat' of the patch and 'trust' between buyer and provider. Threat and trust are qualitative, ranging from 0 to 1. Threat is calculated based on patch historical records of carbon growth and removal, while trust is randomly generated. The accounted quantity of carbon for trading (t) is determined by BAU carbon-stocks, expected carbon-stocks under REDD+, and agreed reference level between buyer and provider. Considering transaction costs from brokering and facilitation, providers will have expected REDD+ profits from their patches ($/ha). Only if this profit is greater than the current land rent under BAU ($/ha), will providers sell their patches to buyers. All actors are assumed economically rational or benefit maximizers.

Figure 7 provides a simplified sequence of actor's interactions in carbon trade. News on carbon trade from carbon buyer brokers has been spread out among potential credit providers. Providers then ask the facilitator to assess their patches on land rent, carbon stock, reference level, additionality and threat. The facilitator then informs the patch owners/managers of the available carbon creditThe facilitator also offers the carbon credit to carbon provider brokers that want to buy carbon credit. The negotiation occurs at this point. Meanwhile the potential buyers will assess the degree of trust that the providers hold. Negotiation between two kind of brokers i.e. buyer brokers and provider brokers will or will not produce an agreement on the carbon trade. The facilitator is a local government, with help from central government, DNA and international supervisory bodies. The verification body works to verify the carbon emission potential from the patches facilitated by the facilitator.
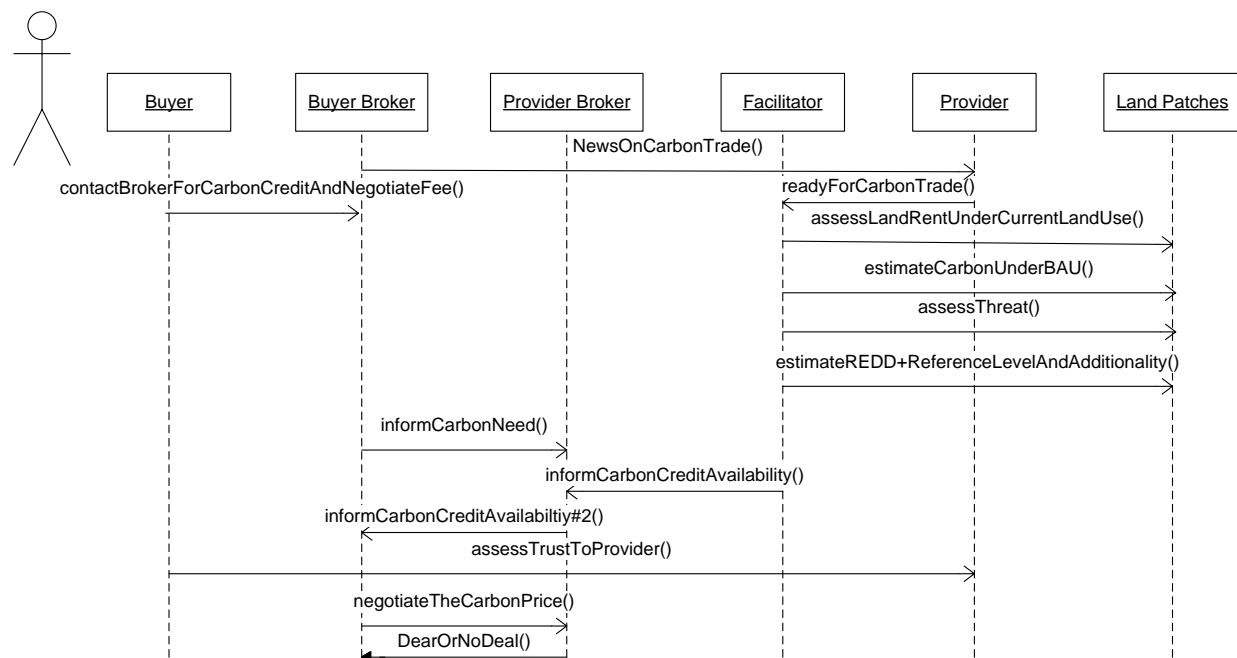


Figure 7. UML sequence diagram of the actors' negotiations

Table 2 provides assumed actors goal and rationalities. The main actors are all economically rational wanting to maximize their own interests and benefits.  Their rationality determines the way they negotiate to reach an agreement.  Only when they can all  benefit can REDD+ work.

Table 2.  REDD+ actors, goals and rationalities

|  | Category | Actor | Goal | Rationality |
|---|---|---|---|---|
| Outside the landscape area | Buyers | | Reduce emission and minimize cost | Economy |
| | Buyer broker | | Maximize benefits | Self interest and economy |
| | Provider broker | | Maximize benefits | Self interest and economy |
| | Verification body | | Maximize benefits | Economy |
| | Facilitator | NGO | Reduce emissions | Common interest |
| | | Local government | Reduce emissions and increase government income | Public interest |
| | | Central government | Reduce emissions | Public interest |
| | | DNA | Reduce emissions | Public interest |
| | | International supervisory body/ies | Reduce emissions | Public interest |
| Inside the Landscape area | Providers | Local communities | Maximize benefits | Self interest and economy |
| | | Forest concessionaires | Maximize benefits | Self interest and economy |
| | | Big plantations | Maximize benefits | Self interest and economy |
| | | Small plantations (rubber, coffee, cacao) | Maximize benefits | Self interest and economy |
| | | Mining companies | Maximize benefits | Self interest and economy |
| | | Protected area managers | Maximize benefits | Self interest and economy |

There is no collective action based on the common goal and interest among actors.  All are driven by self interest and economic rationality to maximize their benefits from the resources they exploit and manage.  Altruism is  not characteristic of the actors.

### 3.3. Verification of the Model: Business As Usual

The model considers both biophysical and socio-economical factors causing changes in c-stocks in a REDD+ target landscape under business as usual (BAU) and REDD+ scheme. Business as usual (BAU) is a condition when the current situation continues. Under the BAU institution, carbon providers transformed the landscape through logging, mining and other land use conversions. Here, the carbon provider is defined as the actor who has direct responsibility for carbon-stock changes within the REDD+ target landscapes, either under BAU or REDD+ institutions. It includes local communities (farmers and loggers), forest concessionaires, plantation companies, and mining companies. REDD+ target landscapes are stratified based on general patterns of forested landscapes as described by Chomitz (2007), *i.e.* forest core, forest margin and mosaic of annual crop lands. Outside the REDD+ target landscape, government, NGOs, carbon buyers and brokers are considered to have significant roles to play in changing carbon stocks under REDD+.

In a BAU scenario, if a REDD+ credit area and carbon stock are identified but because there is no carbon market and then no- carbon deal, the forest area may well decrease, while agriculture, oil palm and mining increase. Coffee, cacao and rubber plantations are dynamics that tend to remain the same. The forest decreases because it is converted to other land uses such as oil palm, agriculture and mining. Those conversions are triggered by economic logic i.e. greater economic rent. The landscape pattern after the simulation is given in Figure 8. Figure 9 shows how the landscape changed over 30 years.
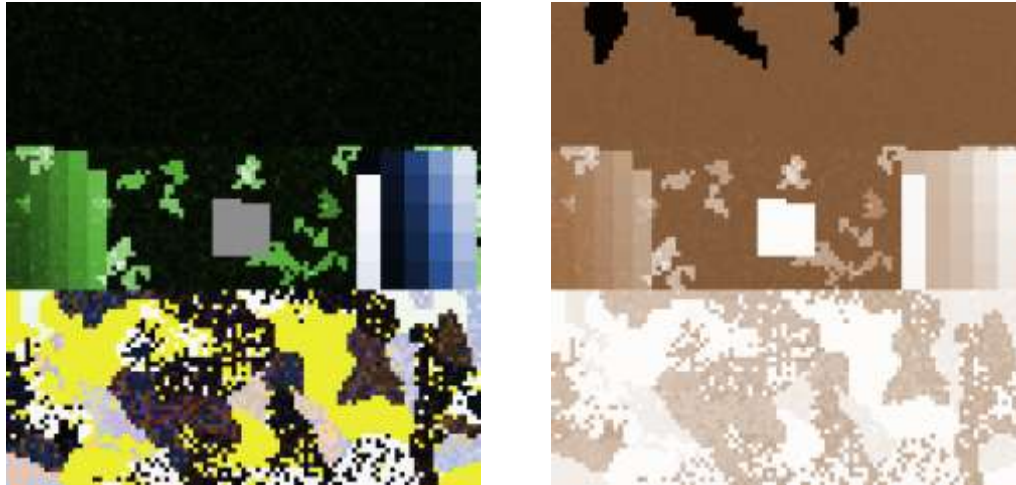


Figure 8. End of (a) Landscape vegetation pattern (b) Carbon stock under BAU
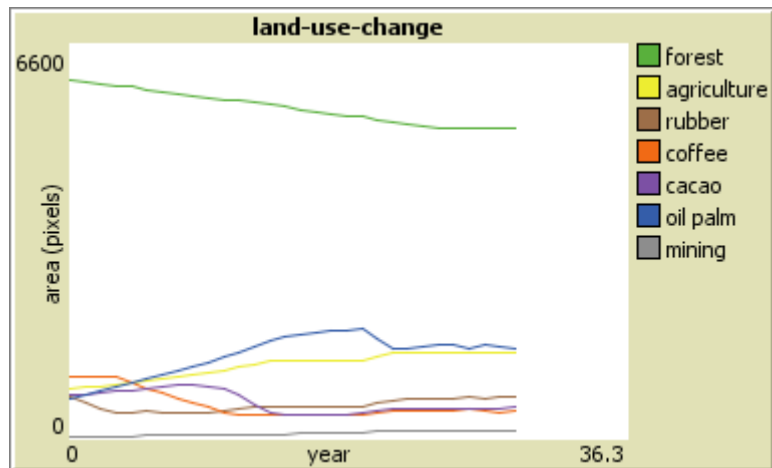
Figure 9.  Landscape dynamics under BAU

Because the REDD+ market has not functioned  nobody enters it or becomes a REDD+ credit seller.  No one receives any benefits or detriment.  No change! The carbon stock has not been affected as given in Figure 9.  The total carbon stock is about 1.5 Mt and depleting.
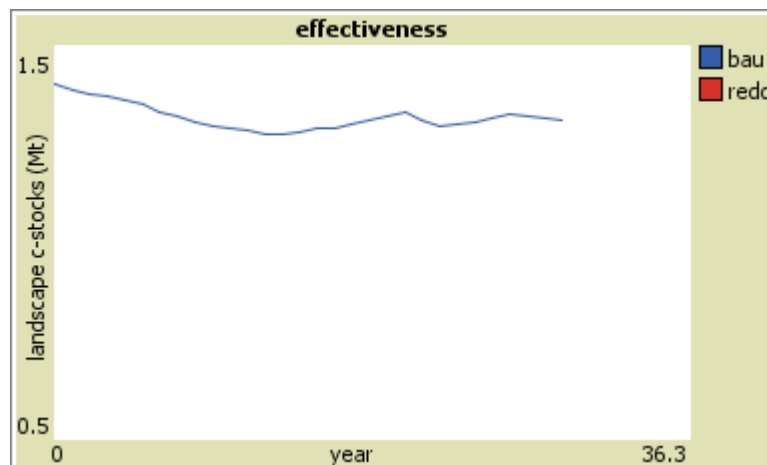


Figure 10.  Carbon stock under BAU when REDD+ has/does not functioned

Equality distribution is given in the Lorenz curve (Figure 11).  The curve is a graphical representation of the cumulative distribution function of the empirical probability distribution of wealth. The percentage of actors is plotted on the x-axis, the percentage of income on the y-axis. The 45 degree represents the line of equality.  The figure clearly shows that the BAU provides unequal distribution of income.  However, it does not mean REDD+ will guarantee better equality.
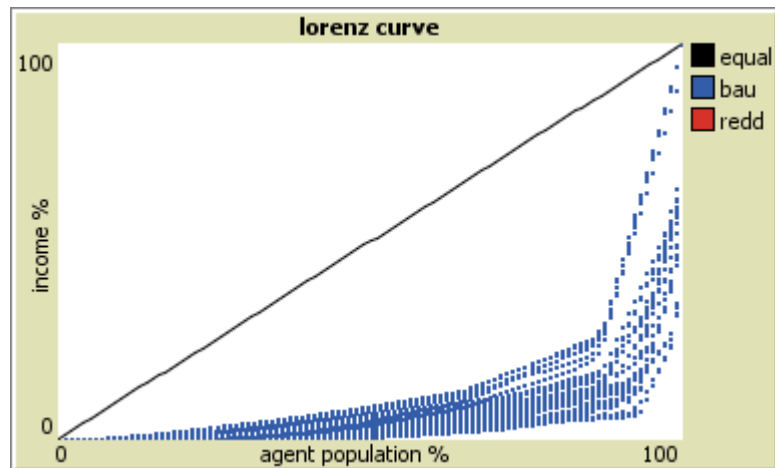
Figure 11. Inequality distribution under BAU

The verification process was conducted by scrutinizing the simulation results.

3.4.  Model Use: Price scenarios

In the price scenarios, we simulated global carbon prices of $10 and $15 $35 per ton.  Price of carbon at $10, no REDD+ area is generated. Increasing the area of REDD+ zones occurs by increasing the carbon prices as seen in Figure 12.



Figure 12. REDD+ area deals at carbon price $10, $15 and $25

The carbon sellers of can be seen in Figure 13.  At $15 per ton of carbon, local communities and large-scale plantation managers operating in the mosaic area expected profits through REDD+. At a higher carbon price, more providers/sellers joined REDD+, including national parks.
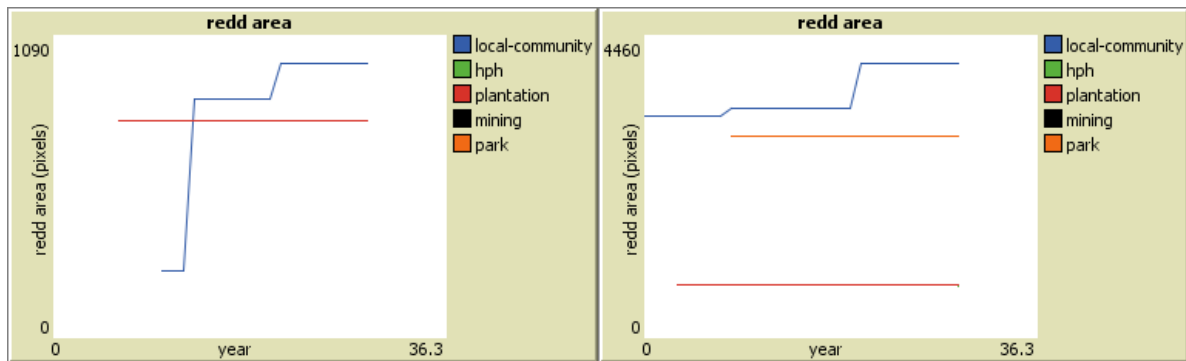
Figure 13. Carbon sellers at $15 and $35

In this case, REDD+ can effectively maintain carbon stock in the landscape starting from a carbon price of $15 per ton (Figure 14). Effectiveness refers to the magnitude of the emissions reduction. If the price of carbon stock is increased to $25, the carbon stock will increase.
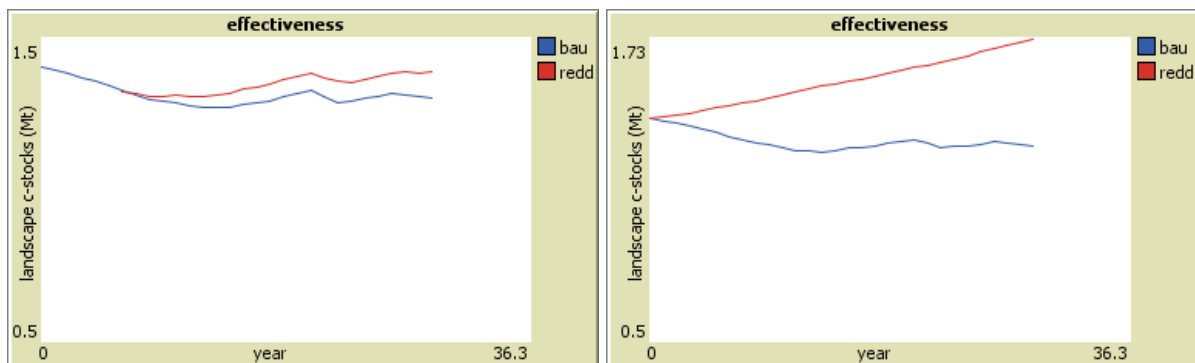


Figure 14. Effectiveness of REDD+ in reducing emission at $15 and $25

Efficiency refers to whether the given emission reduction is achieved at a minimum cost. Figure 15 shows that REDD+ in a mosaic area is less efficient than in a forest margin at a carbon price of $15 per ton. The forest core is the least efficient at a carbon price of $25 per ton. At an appropriate carbon price, more forest concessionaires in forest margins would be attracted to sell carbon than timber.
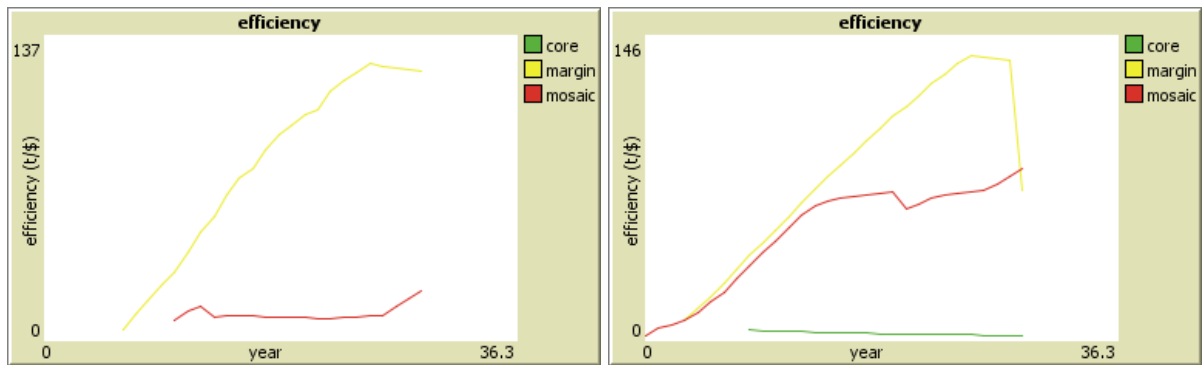
Figure 15. Efficiency at carbon price $15 and $25

The threat consideration in REDD+ would create disparity in carbon pricing at the 'farm gate' in space. Thus REDD+ would give negative impacts on wealth distribution, as shown by Figure 16, where the Lorenz curves are skewed more to the right, indicating more unequal distribution. However with the increase of the carbon price the wealth distribution is better giving more agents the chance to participate in REDD+.
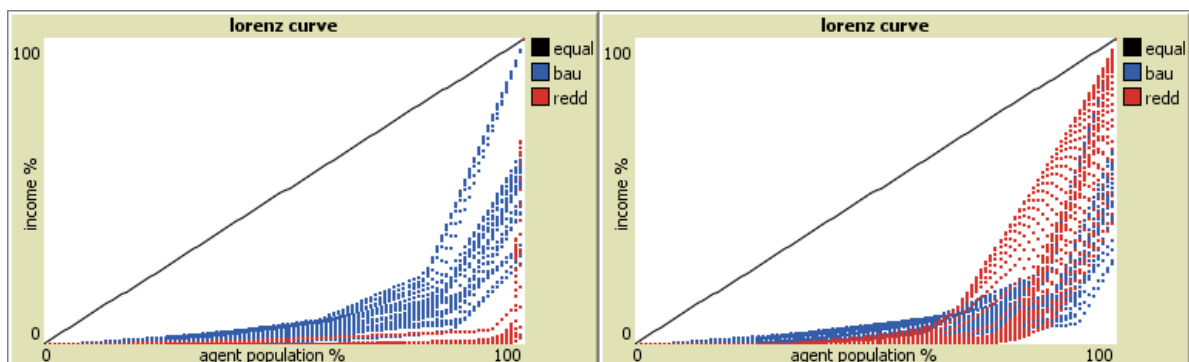


Figure 16. Lorenz curves at carbon price $15 and $25

## IV. Discussion

Clearly from the simulation above, if, and only if, the global price of carbon is more than $25, will the carbon stock be enhanced firmly. in the landscape The problem is whether this price will always be possible. The global simulation of the carbon price in the next 30 years is oscillated at $16. So, it is impossible to use solely the carbon price to reduce carbon emissions. Given all actors maximize their own interests, all individuals are selfish, norm-free, and maximizers of short-run results. the tragedy of the climate commons is happening. The question is how to solve this problem? Can moral and ethics be alternative solutions to wisely maintain the atmosphere?

Ostrom et al. (1999) provide possible solutions to this dilemma Solving commons problems involves two distinct elements: Restricting access, and Creating incentives (usually by assigning individual rights to, or shares of, the resource) for users to invest in the resource instead of

overexploiting it.  Both changes are needed. Limiting access alone can fail if the resource users compete for shares, and the resource will  become depleted unless incentives or regulations prevent overexploitation.  Furthermore, self maximization is not always a common behavior of all actors. Ostrom et al (1999) categorized the commons user into (i) those who always behave in a narrow, self-interested way and never cooperate in dilemma situations (free-riders); (ii) those who are unwilling to cooperate with others unless assured that they will not be exploited by free-riders; (iii) those who are willing to initiate reciprocal cooperation in the hope that others will return their trust; and (iv) perhaps a few genuine altruists who always try to achieve higher returns for a group.

Developing Institutions for governing and managing atmosphere is tremendously important if climate change is to be tackled. Collaboration can be established, self sustaining, and even grow if the proportion of those who are always will to act in a narrow, self-interested manner is initially not too high. When interactions enable those who use reciprocity to gain a reputation for trustworthiness, others will be willing to collaborate with them to overcome climate dilemmas, which leads to increased gains for themselves and their offspring (Ostrom *et al.* 1999).  Creating incentives for collaboration is a key for this climate dilemma. To make collaboration possible we have to design institution or working rules so that perceived benefits are greater than costs.   They must commonly highly value the future sustainability of the resource. Perceived costs are higher when the resource is large and complex, users lack a common understanding of resource dynamics, and users have substantially diverse interests.

Since REDD+ is currently being studied, it is hard to find this kind of collaboration on the ground.  Fortunately, ABM is a tool that can be used to investigate how changing rationality can affect the common resources.  Can common interests of stakeholders be improved so that they can collaborate to reduce carbon emissions, even with a lower carbon price?  The following equation will show how the common interest can probably be improved, collaboration can be institutionalized and carbon emissions  reduced, even with a lower carbon price.  How can this collaboration arrangement work better in terms of equity?

If campaigns (say 'c') of global warming is intensified and actors are willing to pay for reducing global warming then it is possible to reduce carbon emission even with a lower price through collective action.  The altruism index (a) of each actor is influenced  by welfare (w), equity (e) and how they perceive environmental risk (p).  If 't' is the actual threat to the landscape then we formulate altruism as:

$$a = p + e*(1 - p)$$

where,

a  = 0 (selfish)…1 (perfectly altruist)
e  = 0 (equal) …1 (not equal)
p  = 0 (don't care) … 1 (very responsible)


if equity is very bad (=0 or very selfish) then altruism is determined by the actors' perceptions of environmental damage (p).  On the other hand if equity is perfect (=1) then altruism is perfect (=1 or perfectly altruist). Thus 'p' can be formulated as:

$$p = c + w*(t-c)$$

where,

'c' is affectivity of campaign ranging from 0 (not effective) to 1 (very effective).

't' is a threat of environmental damage which threatens the actors.

't' ranges from 0 (not threatened) to 1 (very threatened).

From the above formula the perceived risks are determined by the affectivity of the campaign for emission reduction and welfare. The welfare influences the perceived risks by comparing real threats and affectivity of the campaign. If actors' welfare is very bad compared to the other actors then "p" is determined by 'c' only. And to the contrary, if welfare is very good (w=1) then 'p' is determined by the threat of environmental damage (t).

From this scenario we found that an environmental awareness campaign on carbon may well work and help improve the effectiveness of REDD+. Figure 17 provides Simulated effectiveness of REDD+ at various carbon prices (t/ha) with or without altruism triggering campaigns. Starting from a carbon price of $15/t, effectiveness increases as the price increases and the campaign is carried out effectively.
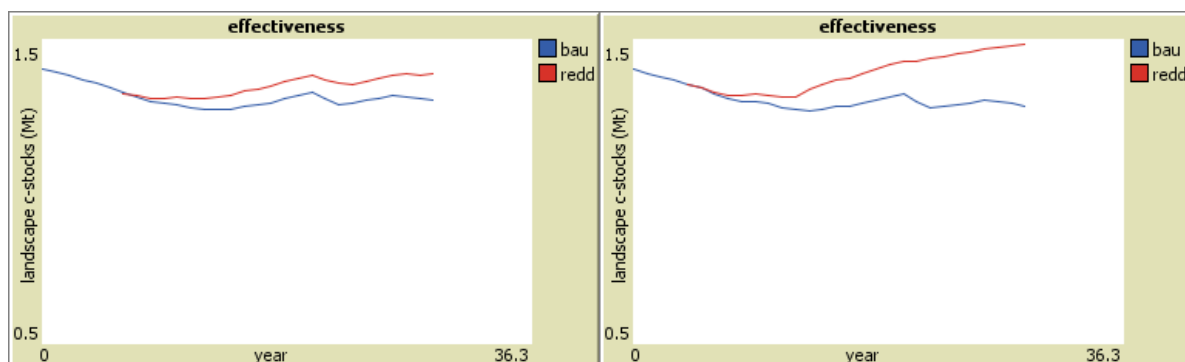


Figure 17. Effectiveness of REDD+ at $ 15/t carbon price but different social awareness

This shows that awareness of global problems such as climate change can make a difference. If effective campaigns and collective action work then carbon prices are not everything. It is in line with what Paavola (2008) who suggested that a workable governance solution for global atmospheric sinks needs to create institutional solutions for enhancing participation in environmental decisions in order to guarantee progress in and legitimacy of the governance framework. The other suggestions are that the outlines are to cap the use of atmospheric sinks; provide for a more equitable benefit sharing; and provide compensation for climate change impacts and provide assistance for adaptation to climate change impacts.

## V. Conclusion

Agent-based models are useful for simulating actors' behavior vis-à-vis REDD+ initiatives. When REDD+ enters the implementation phase in the targeted landscapes, carbon pricing will

determine whether it will succeed.  REDD+ can  work if the carbon price starts no lower than US$15 per tonne of carbon.   REDD+ agreement areas increase with higher carbon prices, e.g. US$25 or US$35.  The carbon price is important, but not everything.  This  simulation shows that even with low carbon prices GHG emissions will decrease if the 'altruism' index of the actors increases.

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# Attachment 5. Benefit distribution across scales in efforts to Reduce Emission from Deforestation and forest Degradation (REDD+) in Vietnam. Land Use Policy (under review)

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At very high policy levels efforts to reduce emissions from deforestation and forest degradation (REDD+) are considered to be innovative and cost-effective ways to make forest more valuable standing than cut. International funding to support such efforts in response to climate change need to balance conservation and development. With forest cover of 56.6% and a poverty rate of 36.6%, Bac Kan is among the most heavily forested and poorest provinces of Vietnam, making it a potential site for pioneering REDD+ schemes in the country. Such schemes need to address the local drivers of deforestation and degradation but also find appropriate ways to distribute net benefits down to community level, learning lessons from past of Government forest protection and development programs. In Bac Kan the main threat to forest in the past few decades has been a combination of unsustainable, mono-crop cultivation on sloping land, shifting cultivation, over-logging and illegal logging. Underlying factors have been poor land-use management and weak development planning of alternative livelihood options for the upland poor in the province. Some carbon-rich land uses were found to be promising as alternatives to deforestation and forest degradation in the province because they can provide both income to local farmers and contribute to reducing emissions. The land uses are community forest management (mostly in young, regenerating, over-logged forest), agroforestry practices such as taungya, forest plantations and forest gardens. Existing payments for forest environmental services' schemes in Vietnam, based on hydrological functions of forest, do not provide enough compensation for lost livelihood opportunities, especially when payment is made to individual households rather than groups. Ways of bundling of such schemes with REDD+ 'service' payments and income streams from forestry and agroforestry 'goods' are discussed to provide short-term food-security/economic return and long-term environmental benefits. This combination is expected to provide sustainable incentives, but further effort is needed in the use of participatory methods and a 'bottom–up' approach to provide a strong basis for an effective and equitable REDD+ mechanism at landscape level.

**Key words**: *REDD+, benefit sharing system, payment for environmental services, equity, transparency, accountability, effectiveness, watershed management, participatory*

## 1. Introduction

Forests are important for mitigating and adapting to climate change. However, forest resources in many parts of the world, in general, and in Vietnam, in particular, are still not being managed sustainably. The estimated emission from deforestation and forest degradation and forest land-use change in Vietnam is 19.38 Mt $CO_2$, 1.58 Mt CO and 0.18 Mt $CH_4$, that is, 20% of annual greenhouse gas emissions; greater than the emissions of the energy sector (Government of Viet Nam 2010). A decision on REDD was adopted at the 13th Conference of Parties (COP) in December 2007. At COP 15

in December 2009 in Copenhagen, REDD+ was emphasized because it recognizes the importance of promoting sustainable management of forests and co-benefits, including biodiversity, that may complement the aims and objectives of national forest programmes and relevant international conventions and agreements' (Draft decision CP.15). After COP 16, REDD+ was understood as the innovative and cost-effective mechanism that included five key issues: reducing emission from deforestation; reducing emission from forest degradation; conservation of forest carbon-stock; sustainable management of forests; and enhancement of forest carbon-stock.

Vietnam was one of the first countries to turn the corner on 'forest transition' without having first completely depleted forests. However, while reported forest area increased, net emissions continued to rise as carbon-rich forest was lost and plantations of low carbon-stock were added (Hoang et al. 2010). REDD+ is now understood as the means for balancing conservation and development, actively contributing to poverty reduction and thus to sustainable development in Vietnam. The Government of Vietnam is fully committed to REDD+ and is responsible for designing a comprehensive benefit-distribution system (BDS) for REDD+ revenue as one of the necessary activities of the readiness process. The Government will also be responsible for converting certified net emission reductions into REDD+ revenues and, therefore, for distributing the revenues to local partners, especially to the ultimate beneficiaries, in a transparent, equitable and cost-effective manner. REDD involves the development of mechanisms to make payments to developing countries for reducing emissions from deforestation and forest degradation (relative to a reference level); and readiness activities that prepare countries to participate in these mechanisms. One of the core issues in REDD is how to create a multi-level (international, national and local) 'payments for environmental services' (PES) scheme. Further research questions are: (i) Can REDD payments alone protect the forest?; and (ii) How to sustain and manage funding for rewarding or paying for environmental services, including REDD+ revenues, for an efficient, effective and equitable scheme?

The perspectives on BDS at the national and sub-national levels introduced in this paper are the first findings of on-going activities in Vietnam in Bac Kan province. The perspectives were obtained to ensure that REDD+ initiatives at national and sub-national levels are informed by scientific knowledge and to produce as much new knowledge as possible regarding 'what works'. The BDS to be developed, based on perspectives from different levels of REDD+, aims to address international regulations, national requirements and local contexts. Since there is no internationally agreed set of principles for balancing fairness (rewarding forest stewardship and supporting high carbon-stock economic growth), efficiency (low-cost emission reduction) and equity (bringing in the voice of indigenous people) for the carbon environmental services providers, a theoretical framework was developed to guide the research.

## 2. Theoretical framework

### 2.1. Payments or rewards for environmental services' paradigms and benefit distribution systems in REDD+

Several payments and rewards for environmental services (PES/RES) approaches and mechanisms are being tested in Southeast Asia, in particular in Vietnam, by different international and national organizations. Such initiatives became popular during the last decade, with pilot sites in different

agro-ecological zones and socio-economic and political contexts, facilitated by various intermediaries. It is timely to evaluate such approaches to ensure that PES/RES is innovative enough to increase effectiveness and efficiency in conserving environmental services and to benefit local stakeholders. This is also the way the UN-REDD Vietnam program has been being carried out since 2010, in order to develop a fair BDS for REDD+ revenues.

Four principles have been recognized in the scoping stage of RES mechanisms. These are that mechanisms need to be 'realistic' (linked to measurable change in environmental services' levels), 'conditional' (based on performance and, if possible, outcomes), 'voluntary' (based on free and prior, informed consent of all parties, with rewards that are deemed appropriate by all involved) and 'pro-poor' (or at least not increasing inequity). At the implementation stage, PES/RES pilot mechanisms have varied in the way these principles have been addressed, mostly influenced by the objectives of intermediaries or implementing agencies' project characteristics. For example, when the implementer is a development agency, the scheme might focus more on designs that are biased towards the poor. However, conservation agencies might concentrate on how to maximize tangible environmental benefits with a given amount of funds. There is a need to assess the effectiveness, efficiency and pro-poor characteristics of the various PES mechanisms. This knowledge is needed for expansion, especially when the participation of the 'grassroots' is important. According to van Noordwijk and Leimona (2010), the global PES cases seem to belong to three PES/RES paradigms: 1. Commoditized Environmental Services (CES); 2. Compensating for Opportunities Skipped (COS); and 3. Co-Investment in (landscape) Stewardship (CIS). The different paradigms result from different socio-economic and political settings in different places. The three are useful for comparative analysis among the cases. Minang and van Noordwijk (this issue) posed the hypothesis that the various paradigms can be combined at different scales in a REDD value chain that links local action to global benefits and van Noordwijk et al. (this issue) discuss this hypothesis on the basis of a case study in Indonesia. We will review the emerging multi-scale mechanism in Vietnam in this framework after describing the steps currently undertaken to operationalize REDD+ in Bac Kan.


**2.2. 'REDD+ landscape'**
As debate on the reduction of emissions from forest change has progressed from RED up to REDD[++] it has highlighted the complexity involved in managing multifunctional and multipurpose landscape mosaics. A brief summary of the development of the concept reveals a hint of the underlying complexities: 1. RED (reducing emissions from (gross) deforestation) only includes changes from 'forest' to 'non-forest' land cover and details very much depend on the operational definition of 'forest'; 2. REDD is RED along with (forest) degradation or the shift to lower carbon-stock densities within a forest and details are also strongly dependent on the operational definition of 'forest'; 3. REDD+ is REDD and restocking within and towards 'forest' (as specified in the Bali Action Plan). After COP16, REDD+ is understood as the innovative and cost-effective mechanism that includes the five key issues: Reducing emission from deforestation; Reducing emission from forest degradation; Conservation of forest carbon stock; Sustainable management of forests; and Enhancement of forest carbon stock; and 4. REDD++ or REALU (reducing emissions from all land uses) is REDD+ and all transitions in land cover that affect carbon storage, whether peatland or mineral soil, trees-outside-forest, agroforests, plantations or natural forest. The concept does not depend on the operational

definition of 'forest'. In this paper, we use this concept but employ the term 'REDD+ landscape' to highlight the landscape approach in addressing REDD+.

Equipped with the research framework above, this paper translates BDS across scales (international, national and local) in an effort to develop an equitable, effective and efficient REDD+ mechanism in Vietnam.

## 3. Material and methods

### 3.1. The study site

The study site includes the three Bac Kan districts of Pac Nam, Ba Be and Na Ri[1]. With total natural areas of 2012 km$^2$ and a population of 117 807, the three districts occupy 41 percent of the province and contain 38 percent of its population. The total forest land in the area is 164 850 ha, compared with only 19 058 ha of agricultural land. This shows the high potential for forest resources to play a role in improving local livelihoods. The limited agricultural land (0.8 ha per average five-person household) and unexploited forest resources could be the main reasons for the high level of household poverty in Pac Nam, Ba Be and Na Ri (52 percent, 56 percent and 37 percent respectively).

Ba Be, Pak Nam and Na Ri districts are considered 'hot spots' of the province in terms of forest protection and development (Hoang et al. 2008). Of the three, Na Ri has the largest natural area, plantation forestry and special-use forest. Ba Be district has the highest protection forest area; while Pac Nam has less of all kinds of forest categories (see Table 1). For all three districts, there is a high potential for selling carbon from forest protection and planting as additional income for local communities. Forest in Pac Nam and Ba Be districts directly contribute to the water sources of Na Hang hydropower plant, which is subject to payments for watershed functions following the recent Government of Vietnam's Decree No. 99[2]. Na Ri district has about 2000 ha of *B. hsienmu*, a rare timber species with very high market value. Since the end of 2005 and early 2006, deforestation has increased dramatically owing to rising prices and demand from China for *B. hsienmu* timber (Hoang et al. 2008). PES/REDD+ payments are expected to contribute to protection of this valuable forest.

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[1] The study sites cover three districts under the Pro-Poor Partnership for Agroforestry Development in Bac Kan (Bac Kan 3PAD) project. The World Agroforestry Centre collaborates with 3PAD in designing a RES/PES mechanism. The Bac Kan 3PAD project is funded by the International Fund for Agricultural Development 2009–2015.

[2] Government of Vietnam's Decree No.99/ND-CP dated September 24, 2010, on the Policy for Payments for Forest Environmental Services. The Decree regulates PFES policy in Vietnam, including types of environmental services, providers and users and their rights and responsibilities, management and use of payments.

**Table 1. Main characteristics of the study site (**Hoang et al., 2008)

|  | Ba Be | Pac Nam | Na Ri | Total |
|---|---|---|---|---|
| Number of rural communes | 15 | 10 | 21 | 46 |
| Estimated project village communities | 150 | 100 | 210 | 460 |
| Total households | 9886 | 5198 | 8310 | 23 394 |
| Population | 47 748 | 29 080 | 40 979 | 117 807 |
| Percentage of households classified as poor | 56.0 | 52.3 | 36.9 | 48.4 |
| Average persons per household | 4.8 | 5.6 | 4.9 | 5.0 |
| Ethnicity (number of ethnic groups) | 7 | 7 | 6 | 7 |
| Agriculture area (hectare) | 65 493 | 46 127 | 82 459 | 194 079 |
| Cropped fields (hectare per household) | 0.69 | 0.85 | 0.94 | 0.81 |
| Forest area (hectare) | 54 876 | 35 214 | 74 761 | 164 850 |
|  - Special use forest (hectare) | 9022 | 0 | 11 072 | 20 094 |
|  - Protection forest (hectare) | 11 451 | 8959 | 7763 | 28 173 |
|  - Production forest (hectare) | 34 403 | 26 255 | 55 912 | 116 570 |
| % forest under commune management | 46 | 84 | 66 | 63 |
| Production forest (hectare per household) | 6.2 | 9.7 | 18.2 | 10.3 |

## 3.2. Materials and methods

The research process, of two main steps, has been carried out since June 2010. Step 1 is to obtain the national REDD + perspective on BDS; and Step 2 is to reflect the national perspective in the context of the study site in order to develop a local perspective together with local stakeholders. In each step, a review of relevant literature was carried out followed by additional surveys using Participatory Rural Appraisal/Rapid Rural Appraisal (PRA/RRA) methods (McCracken et al., 1988), livelihood framework (DFID, 2000) and Geographic Information System (GIS) tools. While the GIS tool was used to define watershed borders of the study site, PRA/RRA and the livelihood framework were used to obtain local perspectives and data on five assets: natural, physical, social, financial and human. The policy dialogues were carried out at the national level, while stakeholder meetings were organized at provincial and district levels (Table 2).

**Table 2. Research steps and methods**

| Research aspects | Materials and methods |
|---|---|
| **Step 1. Studying the national perspective on BDS** | |
| 1  Lessons learnt from piloting Payment for Forest Environmental Services (PFES) government policy 380[a] and existing PES-like mechanisms. | -  Review findings from UN-REDD studies in Vietnam (UN-REDD and MARD, 2010) and carried out additional surveys of PFES piloting in Son La, Lam Dong as well as community forestry activities in Thua Thien Hue province |
| 2  National perspective on BDS for REDD+ | -  Four policy dialogues with REDD national leaders at the Ministry of Agriculture and Rural Development since May, 2010 |
| **Step 2. Reflecting the national perspective in the context of Bac Kan province** | |
| 2.1  Issues of conservation and livelihoods of the study sites in Na Ri, Pak Nam and Ba Be districts as a basis for understanding feasibility for REDD and PES in Bac Kan province | Review of scoping study report of Bac Kan for designing IFAD-PES project (Hoang at al., 2008) |
| 2.2  Reflecting PFES policy guideline and lessons learnt from 380 in Son La and Lam Dong province for REDD+ BDS | Feedback findings of testing PES payment scheme to province, district and communal stakeholders at a stakeholders' workshop in Ba Be district in January, 2011 |
| 2.3  Review of existing carbon-rich land use to be promoted as a part of BDS at community level | Rapid appraisal in Na Ri, Ba Be and Pac Nam in November 2010 and Ba Be stakeholders' workshop (see above) |
| 2.4  Identifying livelihoods' options for the estimation of opportunity costs for BDS at community level | Community surveys being carried out since December, 2010, using PRA/RRA methods |
| 2.6  Piloting PES/RES schemes at community level as a part of BDS of REDD+ | To be carried out in the second half of 2011 |

[a]: Prime Minister's Decision No 380/2008-QD-TTg on piloting payment forest environmental services

Both structured and semi-structured methods were used for RRA/PRA surveys. The tools used were wealth ranking, timeline, village sketch, transect, focal group meetings, questionnaire, stakeholders policy dialogues and workshops at all levels (central, provincial, district, and community levels) for obtaining diversified perspectives. Some key socio-economic parameters found in the four studied villages obtained through PRA/RRA showed the diversified living condition, ethnicity, poverty, and land tenure condition on the ground in the studied districts (Table 3)

**Table 3. Socio-economic conditions of the studied villages** (data from PRA/RRA survey, 2011)

| Parameter | Leo Keo (Quang Khe, Ba Be) | Khuoi Tuon (Nghiem Loan, Pac Nam) | Na Muc (Van Minh, Na Ri) | To Dooc (Lang San, Na Ri) |
|---|---|---|---|---|
| Foundation of the village | 1963 | 1945 | 1951 | 1977 |
| Number of households in 2010 | 45 | 36 | 23 | 29 |
| Main ethnicity in the village | Tay | Red Dzao | Tay | Nung |
| Presence of the ethnic group at the commune level (%) | 75 | 46 | 85 | 33 |
| Village poverty rate, including two poorest groups (%) | 78 | 59 | 26[1] | 66 |
| Commune poverty (poor HH/total, %) [a] | 39 | 54 | 58 | 28 |
| Electricity (year of installment) | 2005 | Not installed | 2003 | 2001 |
| Average income of richest group in village (VND/person/month) | > 520,000 | No cash, subsistence agriculture | > 300,000 | No cash, subsistence agriculture |
| Average income of poorest group in village (VND/person/month) | < 400,000 | No cash, subsistence agriculture | < 200,000 | No cash, subsistence agriculture |
| Lack of food (months/year) | 1–2 | 0–4 | 0 | 2–5 |
| Farm size per HH of richest group: rice and maize (m$^2$) | > 700 | 2500 and 6000 – 8300 | 500 | 3000 and 5000 |
| Farm size per HH of poorest group: rice and maize (m$^2$) | < 500 | 1000 and 1600 - 3300 | 500 | 2000 and 3000 |
| Forest land allocation | All allocated under the National Park | No allocation, but cadastral survey was conducted in 2007 | All allocated, including 1 Red Book for community forest | Partly allocated, including 1 Red Book for community forest and 3 ha production forest |

[a]: The number was not obtained by PRA but is the Government's official figure

**Figure 1. Study sites in Bac Kan province**

## 4. Results and discussion

### 4.1. Lessons learnt from existing PES, PES-like and REDD+ schemes: opportunities and constraints

A REDD+ mechanism under the United Nations Framework Convention on Climate Change (UNFCCC) would see benefits made ex post or 'on delivery' of verified reports of emission reductions, according to a reporting schedule. The gap between achieving the emissions reduction, verification of the report, and conversion of the performance credits into revenue, while unknown, is potentially quite substantial. Therefore, without measures to address this problem, participants may face a prolonged period of carrying the costs and waiting for payment, which may cause commitment to waver and the risk of inadequate final results. Some intermediate arrangement is likely to be optimal.

Participation payments, for example, can be one of the intermediate arrangements that helps to encourage the participants active involvement in the process toward emission reduction (such as participatory carbon monitoring), while waiting for concrete results of emission reduction to be certified. The participation payment from the REDD+ Fund then does not need to follow the

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UNFCCC-defined reporting and verification schedule. In this regard, there are two types that UN-REDD Phase 2 in Vietnam proposed for payments to participants in the National REDD+ Program (UN-REDD and MARD, 2010).

1. Participation payments to be made when participants deliver evidence of their participation to the monitoring, reporting and validation system.

2. Performance payments to be made periodically on the basis of verified net emission reductions.

The participation payments are likely to be distributed from the central to provincial and then to lower levels to directly pay participants, preferably into a treasury system or a Social Policy Bank account in order to facilitate the process and reduce costs. This payment much resembles the existing FPES scheme for watershed functions, according to Decision 380/QD-TTg of the Prime Minister on piloting policy on payment for forest environmental services (Table 4).

Performance payments are likely to be managed through a Provincial REDD+ Fund and may be delivered to the participants in a variety of modes, including cash transfers and delivery of services. The decision on how these performance payments are made lies with the participants, but it may be expected that there will be some guidance or requirement to allocate some of these resources to a purpose that benefits the whole community, beside payments to households or others as the direct forest manager or owner. This could take the form of, for instance, a tree nursery, establishment of a small workshop to process raw material from the forests, building roads to markets, a new school etc. The indirect payment also forms a very important part of an incentive scheme to encourage the non-forest stakeholders to actively commit to protecting forests in their area. The challenge of this way of payment is how to obtain conditionality and how the monitoring should be conducted to be efficient (Table 4). A key concept in FPES is the K-factor, which differentiates the amount of payment to forest owners according to forest status, types of forest, origin of forest, and level of difficulty in forest management. The K-factor is to be specifically decided by provincial people's committees based on specific local conditions.

**Table 4. Some dilemmas of PFES Vietnam piloting 2008–2010 (**UN-REDD and MARD, 2010, and findings from ICRAF surveys in Son La, Lam Dong in 2010-2011**)**

| PFES according to Decision No. 380 | PFES in reality |
| --- | --- |
| <ul><li>PES by hydropower plant and water companies downstream to watershed functions provided by foresters in the upstream</li><li>Payment norms range 5–10 USD/ha/year depending on K-factor (forest functions and forest quality)</li><li>Payment to forest owners who have a forest land allocation certificate</li><li>Forest will be better protected</li><li>A fixed percentage of gross revenues (10% at each level of government administering the funds; in the case of PFES, which involves central and provincial levels of administration, this means a total of 19%) used for operation and transaction costs</li></ul> | <ul><li>PES (1 USD /m$^3$) was put into water price to the whole society</li><li>Different data on forest quality among forest and land managers and at different levels leading to no consensus on K-factor</li><li>Low speed of land allocation process leading to no clear border and land areas for payment</li><li>Son La received about USD 3.5 million from water companies but only 10% has been spent</li><li>Lack of equity among farmers within PES and outside PES project areas. Final decision was to allocate equally to all foresters in the PES and non-PES areas</li><li>The actual transaction and operation costs were higher than 19%</li></ul> |

**Table 5. PES-like schemes[3] in Vietnam that seem to be not yet PES** (UN-REDD and MARD, 2010; Bui and Hong, 2009; ICRAF survey in Son La in 2011)

| Voluntary | Conditionality | Realistic | Pro-poor |
|---|---|---|---|
| • Top-down approach<br>• No negotiation | • Not yet based on performance<br>• Unclear conditions<br>• No efficient monitoring, leading to no new action in forest uses<br>• Some community forestry management cases piloted by KWF[a] and EPSEA[b] for forest protection and sustainable harvesting, with clearer conditionality, but still too early to know impact on forest coverage | • Transaction cost is high owing to complicated procedures | • Focus on poverty reduction (equal payments to all forest users of 100 000–150 000 VND/ha/year for forest protection and management as in PFES in Son La) |

[a]KWF (KfW Entwicklungsbank) is a German non-governmental organization that is very active in forestry development work in Vietnam.
[b]EPSEA is the Economy and Environment Program for South East Asia.

Furthermore, the greater the number of hierarchical levels at which revenues is managed, the less cost-effective the mechanism is likely to be. There will tend to be higher implementation costs and a higher risk of rent-seeking and corruption. On the other hand, fewer hierarchical levels make it harder to ensure efficiency and equity in disbursement because of the 'distance' between the source and target of the funds. Civil society organizations, such as farmers' associations, women's unions etc, with their active participation in past initiatives (for example, rural micro-credit programs), are also potential partners in fund management and disbursement monitoring at all levels.

### 4.2. Principles of BDS design: a national REDD+ perspective

The design of the BDS needs to balance these issues to minimize the risks, while being fully compliant with government regulations on financial management and UNFCCC or other international requirements with regards to equity, participation and transparency.

The principle for implementation should be to place the management of the different tasks at the lowest possible level but with due regard to efficiency, transparency and manageability. This implies that for the national level the role should be disbursement from central to provincial levels based on provincial reports certified by an independent body according to the information contained in the national monitoring, reporting and validating (MRV) system. The provinces then make further payments to districts and so on. All levels need to have their own MRV system.

Another important principle is the separation of the tasks and responsibilities of individual offices or administrators. Those who are responsible for implementation should not also be responsible for determining benefits due to participants.

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[3] The PES-like schemes are grants to communities for forest planting (Decision 327, 661), financial support to community forest management and PFES.

According to Decision No. 39/QD-BNN-TCCB by the Ministry of Agriculture and Rural Development, dated 7 January 2011, coordination and monitoring of the activities of the National REDD+ Program will be the responsibility of the Ministry of Agriculture and Rural Development (MARD), with involvement of other ministries such as the Ministry of Natural Resources and Environment and the Ministry of Planning and Investment. The management of revenue and disbursement of the fund will be the responsibility of the Ministry of Finance or some other national institution with a legal mandate to manage funds such as the Treasury or the Social Policy Bank, based on the results verified by MARD.

A National REDD+ Fund will be established as part of the National REDD+ Program, but with an independent management structure. Operational and transactional costs of the National REDD+ Program will be administered at the national level. All payments and operational and transaction costs of the activities conducted at local level in a certain province will be transferred to a Provincial REDD+ Fund. Disbursements from the Provincial REDD+ Fund will be made by the fund managers at provincial and district levels to the beneficiaries in that province, through some decision-making process sanctioned by the National REDD+ Program. The transaction and operational costs should rightly be covered from REDD+ revenues, but there is also an obvious need to ensure that as large a proportion as possible of the REDD+ revenues are used to secure emission reductions, that is, in performance payments to participants. An effective National REDD+ Program also requires that the revenues retained by government to cover transaction and operational costs should be transparently managed and clearly justified.

There are, therefore, two main options in establishing government revenue retention: 1) an approach based on actual costs; or 2) one based on a fixed percentage of gross REDD+ revenues. The latter is simpler to establish and manage but can potentially result in a much larger amount being retained compared with actual costs, as in the PFES case.

Local-level benefits for avoided deforestation and forest degradation, and for conservation, sustainable forest management and enhancement of carbon stocks, should ideally compensate at least the implementation and opportunity costs incurred to provide clear incentives to land and resource users to change practices. Current procedures for calculating benefits for forest conservation and the provision of environmental services in Vietnam do not reflect the variation in costs. They also do not balance the need for monetary and non-monetary incentives. In addition, they are not based on performance and some level of elite capture has been observed. Owing to the highly specific nature of opportunity costs, as well as implementation costs, we recognize that there are practical limitations on making these estimates for all REDD+ participants.

BDS should also be designed to meet socio-economic and natural conditions in parallel with rewarding performance. This is the intent of the K-factors developed for the PFES pilot projects. But difficulties still remain owing to technical issues and the weak capacities of local authorities in delivering benefits based on K-factors. As REDD+ is expected to address local social and economic needs while rewarding performance, similar considerations should be incorporated into REDD+ benefit structuring. However, REDD+ considerations will not be the same as those applicable to PFES as there are additional actors influencing the criteria used for benefit structuring, notably international investors.

As part of its commitment to establish a comprehensive benefit-distribution system, the Government should identify all beneficiaries and ensure that all are paid, including village communities, who successfully reduce emissions, with equal performance payments per unit of net emissions reduction. These payments also need to reflect social or other environmental goals by application of carefully constructed R-coefficients.

### 4.3. Reflecting the national perspective on BDS in Bac Kan province

#### 4.3.1. K-factor for PES and R-factor for defining commoditized environmental services

In accordance with the national perspective and local context, consulted local stakeholders in Bac Kan agreed that PES payments from the national down to commune level could follow governmental guidelines in Decision 99, that is, applying K-factors (to differentiate impacts of different forest categories on water provision) and three different forest categories (protection, production and special-use forests) to define payment levels to each commune. But at the community level, more appropriate modes of payments, rewards or co-investments are needed (Figure 2). The R-factor proposed for the REDD+ revenue BDS may differ from the K-factor in calculation method, given that an equation should be applied for the carbon sequestration levels of different forest categories the year to be used for the reference emission level needs to be taken into account. In order to apply a uniform BDS across provinces, the R-factor estimation should be guided by the national REDD+
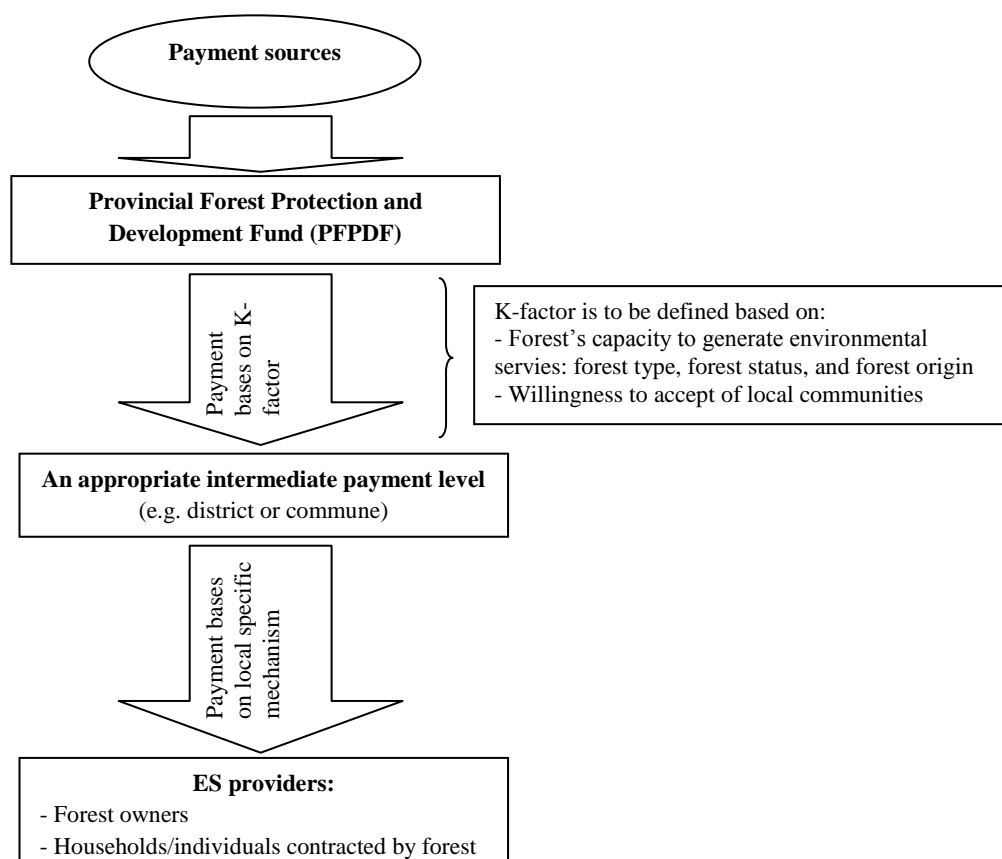


**Figure 1. Process of suggested BDS piloting in Bac Kan province** (from Ba Be stakeholders' consultation workshop, 2011)

committee. However, this approach is still very much focused on forestry alone. With a broader concept of REDD++/REALU (see Section 2.2), a more appropriate mechanism need to develop. Applying local perspectives to differentiate REDD+ payment levels as well as ways to compensate should go hand in hand with the needs of local livelihoods and forest protection.

### 4.3.2. Local BDS mechanism design, applying COS and CIS

According to the national principles for designing a local BDS mechanism (see section 3.2 above), the paradigms 'compensating for opportunities skipped' (COS) and 'co-investment in (landscape) stewardship' (CIS) are appropriate. For testing COS, Bac Kan would have to be able to compensate at least the implementation and opportunity costs incurred to provide clear incentives to land and resource users to change practices. Our initial results show that the main threats to Bac Kan's forest have been shifting cultivation and over-logging in the past few decades, practices that have been partly induced by poor land-use management and planning. To date, there are still over 17 000 ha of shifting cultivation in the province, mostly on production forest (15 545 ha) but also on protection forest land (1548 ha) (Department of Forest Protection of Bac Kan province, 2009). A project to stablize the shifting cultivation area of Bac Kan through incorporating shifting-cultivation managment into land-use planning and management was approved in 2005, but not implemented owing to a shortage of funding. From 2000 to 2010, provincial land-use plans allowed conversion of 1257 ha of forest land to other land-use purposes, but in reality the area of converted forest land was as high as 5020 ha, of which 4105 ha of both over-logged and burnt forest were converted to unused land.

The opportunity cost analysis in Dak Nong applied OPCOST modelling to show that most of the forest conversion from 1994 to 2004 was to shifting cultivation, with a net present value of around USD 1–5 per ha (Palm et al., in press). As the carbon price on the voluntary carbon market is around this level, one could think that most of the land-use changes associated with a low carbon price (around USD 1–5 per ha), such as the shifting cultivation in Bac Kan, could have been stopped if REDD payments were in place. However, lessons from the forestry sector in Vietnam during the last two decades (327[4],661[5] programs) show that the same payment to forest owners seemed to be successful in forest planting but did not lead to changes in forest protection and uses. Deforestation and degradation is still occurring, particularly in natural forest (Hoang et al., 2010). Therefore, 'good practice' in forest protection seems to depend on many more factors than only the payment level. Most of the existing cases of community forest managment in Bac Kan province are not successful because they lack a clear benefit-sharing mechanism, there are no regulations on the right to take timber and other commercial products nor is there any accompanying legal backup (personal communication with Deputy-Director of Bac Kan's Department of Forest Protection in 2010). However, when the community obtained land with a use-right certificate (known as a Red Book[6]), as in Na Muc, Khuay Lieng, To Dooc, and Ban San villages in Na Ri district, local forest has been more

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[4] The 327 Program is named after Chairman of the Council of Ministers of Vietnam's Decision 327/ CT dated 15/ 9/1992 on some Policies on the Use of Bare Land and Denuded hills, Forest, Coastal Sedimentary Deposit areas and Water Bodies

[5] The 661 Program is named after Prime Minister of Vietnam's Decsion No 661/QDTTg on Objectives, Tasks, Policies and Organization for the Establishment of Five Million Hectares of New Forest

[6] Issuing a Red Book to a community (village or group of households) has been piloted in 30 communes in Vietnam, following Decision No.106/2008/QD-BNNPTNT of the Ministry of Agriculture and Rural and Development in 2008.

effectively protected compared to other community forests, while the Government's incentive support for forest protection and plantation was unchanged.

For CIS, the variation in opportunity costs also goes together with balancing the need for monetary and non-monetary incentives. According to local policies in Ba Be district, benefits gained from the forest differ for different types of forest: individuals or households contracted for protecting special-use forest receive 200 000 VND/ha/year but are not allowed to collect non-timber forest products (NTFPs); those are contracted to protect protection forest receive 200 000 VND/ha/year for protection and 100 000 VND/ha/year for forest care, plus the right to exploit NTFPs and low quality timber from the forest; those contracted for forest plantation receive approximately 4 million VND/ha/3 years (in both cash and kind such as seedlings) for forest planting and managment and the forest owners take all timber and NTFPs (according to the stakeholders' consultation workshop in Ba Be). This seems to agree with the low income level found in the study villages. The average income for 'rich' groups in the study villages starts from 300 000 VND/ha/person (Table 3). The total income for a family of five would reach about 1 500 000 VN/ha/year. Even the highest payment mentioned above is still far lower than the expected income from forest of local farmers, which ranges from 3 million to 6 million VND/ha/year/household, according to the local stakeholders' consultation workshop.. We can conclude that current monetary incentives for forest protection and plantation are not sufficient for effective forest protection and development activities and those non-cash incentives should be given more attention, considering local budget constraints.

### 4.3.3. Bundling environmental services' payments and encouraging local farmers to invest in carbon-rich land uses for better income

With the current level of PES payments in the study areas at just 2–3 USD/ha for watershed functions, according to Decree 99 (see Table 6), and around 1–5 USD/ha for carbon (applied estimation from OPCOST modeling in Dak Nong for forest conversion to shifting cultivation (Palm et al., in press), the total income from PES would be around 3–8 USD/ha (equal to 60 000–160 000 VND/ha, with an exchange rate of USD 1 = VND 20 000). This is much less compared to what farmers need for their livelihood, which ranges from 3 million to 6 million VND/ha/year. Ideally, local farmers would be supported to shift from current unstainable practices to carbon-rich land use that can provide both PES payments for carbon and water as well as a good income from land-use products.

The main land-use issues found from PRA/RRA in the four villages that are representative for the three study districts of Na Ri, Ba Be and Pak Nam in Bac Kan province are shown in Table 7. Given the high dependence of local people on forest resources, some of the current practices observed during the study are considered unsustainable because they would potentially degrade forest and forest land faster than it can recover under local conditions. Those uses are slash and burn, illegal logging, agriculture on sloping and forest land, mono-cropping of maize, and unrestricted cattle grazing.

**Table 6. Estimation of PES according to Decree 99**

| No. | Step | Source/Implementer | Output |
|---|---|---|---|
| 1 | Mapping of border of Nang River watershed | National Institute of Agricultural Planning and Projections (NIAPP) | Topography map of Nang River watershed (scale: 1/50 000) with watershed border |
| 2 | Defining total forest area of Nang River waterhsed | 2010 statistical and inventorial data on land, Bac Kan and Tuyen Quang provinces | Total forest area of Nang River watershed (125 755 ha), Na Hang (40 742 ha), Ba Be (57 694 ha) and Pac Nam (27 319 ha) |
| 3 | Estimating amount to be paid by Na Hang hydropower plant | Report on commodity electricity of Na Hang hydropower plant (2009 and 2010) | Commodity electricity of Na Hang hydropower plant: 1238 million KWh in 2009 and 1005 million KWh in 2010. Estimated payment by Na Hang hydropower plant: 13 billion VND/year in 2009 and 12 billion VND/year in 2010 |
| 4 | Estimation of amount of PES payment per hectare of forest in Nang River watershed | Outputs of Steps 2 and 3; K-factor is assumed to be 1 for all types of forest | PES amount for 1 ha of forest in Ba Be, Pac Nam and Na Hang districts paid by Na Hang hydropower plant: 53 206 VND/ha/year in 2010 |

**Table 7. Unsustainable land-use practices in the study villages** (PRA/RRA survey, 2011)

| Unstainable practices | Leo Keo | Khuoi Tuan | To Dooc and Na Muc | Main causes |
|---|---|---|---|---|
| Slash and burn | | x | | Lack of individual responsibilities; unclear land tenure and rights; population pressure; customarily practiced and intensified in cooperative time (before 1990) when deforestation for food crops was uncontrolled |
| Agriculture on sloping land | x | x | x | Same as above |
| Agriculture on forest land | x | x | | Lack of agriculture land; Population pressure; |
| Mono-cropping of maize | | x | x | Same as above |
| Illegal logging | x | | | Lack of an affordable and accessible alternative for house construction; and ethnic customs |
| Unrestricted cattle grazing | x | x | x | Lack of capacity to invest for cattle fattening; unclear or common ownership of land; customarily practiced and intensified in cooperative time |

It is clear from Table 7 that poverty and food insecurity related to infertile or lack of suitable land and, in some cases, either unclear land tenure or customary agricultural practices, may push farmers

into unsustainable land uses. Developing alternatives to such practices would require a comprehensive constriction of the main drivers. Towards this, a PES system in the studied site should focus on securing forest land tenure for local farmers as a reward for forest conservation and development. At the same time, it should aim at encouraging agroforestry or other alternatives together with the development of markets so as to overcome the limitations of current extensive agricultural systems that require larger areas of land. Another option is to develop new practices that are more sustainable but still familar to local customary practices by working closely with farmers. The cost of these actions would be counted as a part of PES. The following paragraph discuss several alternatives to existing unsustainable practices

**Table 8. Some carbon-rich land uses at the study site**

| Land use/location | Current activities | Contract/property | Potential extension |
|---|---|---|---|
| Sloping agricultural land technology/ Khuoi Tuan village, Pac Nam district | Stylo grass growing together with maize on sloping land to reduce soil erosion and for cattle fodder | Household or individuals' land (no Red Book)<br>Contracted to IFAD project in Bac Kan for grass growing and sell seeds back to the project | Can be expanded to all sloping land currently occupied by maize in the village (about 0.5 ha/household), and to other villages |
| Community forestry/Na Muc village, Na Ri district | Village nursery, improved hybrid cuttings, capacity building at community (agroforestry and forest development) and government levels, and technical and institutional support, in participatory forest land-use planning, land allocation and extension services as part of community-based forest management. | Red Book for forest land issued to the community (village)<br>No contract with external bodies<br>Existing village community forest regulations, including benefit sharing mechanism | Can be expanded to all unallocated forest lands which are currently under management of Commune People's Committee |
| Agforestry (*Phyllostachys edulis*)/ Leo Keo commune, Ba Be district | Bamboo plantation in the forest and selling bamboo products | Household or individuals' land (no Red Book)<br>No contract with external bodies | Production forest and protection forest land in the area but investment is needed |

Potential, targeted, carbon-rich land uses in the study sites that can provide both products and PES for both water and carbon have been identified: community forest (mostly young regenerated and poor forest) for obtaining government grants or payments, such as the 30A[7] and147[8] programs, stylo

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[7] The program is named after Government of Vietnam's Resolution No. 30a/2008/NQ-CP of December 27, 2008, on the support program for fast and sustainable poverty reduction in 61 poor districts.

grass on hilly and bare forest land for local cattle raising, and some agroforestry practices such as taungya and forest gardens (see Table 8).

The simplified pathway for a BDS system to push forward the shift from current unsustainable practice to carbon-rich land uses, or alternatives, is shown in Figure 3. Since the income from carbon-rich land uses (Y) may be less than that of status quo practices (X), especially in the initial years, the incentives of a BDS system must at least compensate for the gap between X and Y. The RRA results shows that 1 ha of maize mono-cropping on forest land (status quo practice) generates gross income (in this case, X) of about 15 million VND/ha/year, 10 million VND/ha/year and 14 million VND/ha/year for Leo Keo, Khuoi Tuan and Na Muc village, respectively, while the Government's payment for forest plantation through the 661 program is about 6 million VND/ha over three years (in this case, Y). Since the payment offered for forest plantation is much lower than what people earn from maize mono-cropping on the same land, the program has not been successful in changing the land use in the area.

On the other hand, the carbon-rich land uses mentioned above (such as promoting community forests or taking up agroforestry) have been only recently introduced to the community. Although there is an expectation that these practices would generate relatively higher income to local farmers compared to current PES-like payments, there are no reliable estimates of how much income can actually be earned from them. Moreover, there are significant risks and uncertainties attached. For instance, in Na Ri district, local people will have to wait for at least 7 or 8 years before they receive any income from community forests, while in Pac Nam, stylo grass that was planted on hills was destroyed by cold weather before it could be harvested. Even within a district, there can be significant differences across returns from the same practice: in Dia Linh commune of Ba Be district, *Phyllostachys edulis* agroforest brings about 2.4–3 million VND/ha/year after eight years, while in Leo Keo (Ba Be district), the bamboo forest was not growing well at all. Another crucial point to consider for an effective payment system is that a new practice may fail if local farmers are not equipped with adequate knowledge and techniques, especially when it requires longer time than current crops. In this case, even when Y is greater than X, a 'participation incentive' is still needed for farmers to cover their upfront risk.
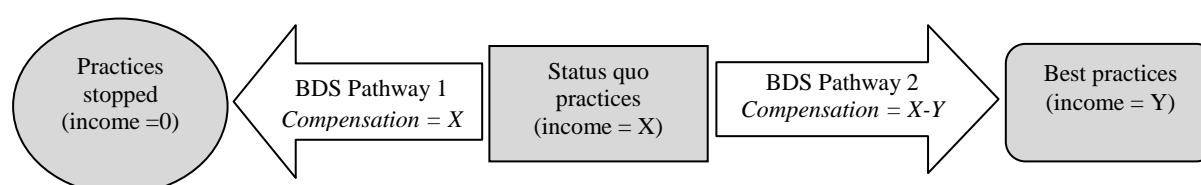


**Figure 3. Options for a BDS system**

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[8] The program is named after Prime Minister of Vietnam's Decision No. 147/2007-QD-TTg of September 10, 2007, on the Production Forest Policy for the period of 2007–2015.

**Table 9. Potential REDD+ revenue governance systems at different levels** (from Ba Be stakeholders' workshop, 2011)

| | Potential governance | Principle | Readiness |
|---|---|---|---|
| National | To create a sub-fund for REDD+ under the FPDF system similar to PFES and TFF, but with different regulations to meet the global requirement. Or to create a new, dedicated fund for REDD+ revenue management and distribution. | Government ensures the REDD+ Fund is governed by a broad-based, multi-stakeholder board subject to independent external audit. Any other requirements stated in the UNFCCC decision on REDD+ need to be incorporated.<br><br>MARD has indicated that REDD+ revenues will be managed separately from the government budget | The current policy for FPDF already allows for REDD+ sub-fund to be managed as a trust fund[a]. |
| Watershed management sub-nationally | Setting up **Watershed Management Board (WMB),** containing land users' representatives within the watershed (votes are on the basis of percentage of forest land areas and forest types) **Conservation fund**, including all payments of water, carbon and biodiversity, will be managed by the WMB | **WMB** is for (i) negotiation with other sectors having conflicting interests with forest protection; (ii) with individuals and communities on contracting forest management and protection; (iii) MRV to funders; **Social and state organizations** provide TA and training to WMB; **Foresters, communities** work with forest protection, sustainable land-use management and participatory monitoring | Government's Decree No. 120/2008/ND-CP dated 1 December 2008 on watershed managment |
| Commune and village level | Community Development Fund (CDF) | CDF is the core of 'income generation opportunities' for the IFAD-funded project in Bac Kan, which supports costs associated with decentralised investment at the village/hamlet level .It is used for three investment streams: infrastructure; pro-poor agro-forestry investment grants; and service delivery contracts | Vietnam Law on Forest Protection and Development, 2004 |

[a]: Government of Vietnam's Decree No. 05/2008/ND-CP dated 14 January 2008, on setting up the Forest Protection and Development Fund, especially Articles 2,4 and 6, mentioned the FPDF as a trust fund for all contributors

More detailed investigation is designed to estimate both the potential income from the carbon-rich land use as well as the losses that farmers may suffer owing to environmental risks or non-familiarity with the new set of practices. Generally, a bundling payment will help to raise the compensation level and reduce the risk of BDS failure. However, compared to the first pathway of BDS, where communities receive payment for stopping their present set of activities (that is, compensation for opportunities skipped), it would still be more effective to instead promote the second pathway of BDS where participation payments are bundled with payments for ecosystem services produced by the new set of 'best practices' (that is, co-investment in landscape stewardship). More evidence is required to test this first observation.

### 4.3.4. Possible REDD+/PES funding management mechanism

Several possible mechanisms do exist. One example is the Forest Protection and Development Fund (FPDF), created in part to manage PFES revenues that incorporates a national FPDF mirrored by provincial and, potentially, district funds. The principle of governance of REDD+ revenues implies the need for broad participation in the management of the revenues which may need further consideration on how to use the existing FPDF system. Another potential management mechanism is watershed management. At the community level, PES/REDD+ payments could be combined with various other funds such as the Community Development Fund (CDF), as already occurs as part of the IFAD-funded project in Bac Kan, or community forestry, which exists in most of the forest communes. Principles of, and readiness for, possible different governance regimes are given in Table 9.

### 4.4. Conclusions

This study shows that an appropriate benefit-sharing system for REDD+ revenues can be developed in such a way that meets international regulations as well as national and sub-national circumstances, particularly from the environmental services' providers who directly protect forest. Bundling PES with REDD+ incentives will provide more sustainable funding for forest protection and improvement of livelihoods and should be used in ways to address the main causes of local unsustainable practices and make use of, and further develop, 'good practices' of carbon-rich land uses. Sub-nationally, managing PES/REDD+ revenues can use a watershed management approach or existing local funding structures such as the community development fund in Bac Kan province. Full participation of stakeholders at all levels, through merging top–down with bottom–up approaches, is the key to an effective and equitable REDD+ at landscape level.

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Local implementation of efforts to reduce emissions from deforestation and forest degradation (REDD+) can be analyzed to be part of a 'value chain'. The primary 'service' is a direct reduction of emissions and a medium-to-long term reorientation of development pathways towards the maintenance of high-carbon-stock landscapes. The ultimate 'service' for which there may be a market is a 'credible and creditable' quantification and documentation of emission reduction compared to an agreed (negotiated) baseline ('additionality' beyond reference emission levels) after corrections for leakage effects and risks of non-permanence. The steps of the value chain beyond the landscape where emission reduction takes place involve subnational + national + international levels that currently still have to operationalize rules that allow the value chain to work. In this process an external drive for efficiency (low cost emission reduction) interacts with the need for fairness (supporting conservation commitment, avoiding perverse incentives). The development of operational subnational REDD+ implementation rules involves a learning curve for all involved, the local stakeholders as well as the potential investors, regulators and facilitators of the process. Learning by the stakeholders might in future be facilitated by formal research results, but a more direct 'learning by doing' is needed at this stage. We report the development and use of a research tool FERVA for analysis of fairness and efficiency along REDD+ value chains, and its initial use in Indonesia and Peru. For Jambi province in Indonesia we also report further steps to engage potential REDD+ stakeholders in the design of subnational implementation mechanisms, including discussions with 'Orang Rimba' as the local forest dwellers are indicated. A simulation model that quantifies distributional effects ('equity') complements the 'perceived fairness' perspective that was expressed in the various focus group discussions. Vietnam is considering the coupling of REDD+ funding and an existing scheme of payment for watershed functions. This approach may reduce transaction costs, but brings its own challenges to both fairness and efficiency dimensions, as discussed here.