

Linking development pathways and emission reduction at local levels:

An analysis of feasibility in the Efoulan municipality, Cameroon

Summary

Exploring subnational or landscape level development planning and emission reduction linkages is an important part of ensuring sustainable development and climate smart development in particular. Such a process can enable a realistic bottom-up reference emission level and eventual REDD+ or NAMA planning and implementation. This policy brief presents feasibility of the development pathways being pursued within the land use sector to reduce emission in the Efoulan municipality located in the South Region of Cameroon and covers 83000 hectares of tropical humid forest zone. Our focus on this municipality was borne out of consideration that with effective completion of the decentralization process in Cameroon, the council administrative system would play a key role in the natural resource management framework as embedded in the municipality development plans.



Key messages

- Applying the current government strategy of cocoa farms extension for rural development in the Efoulan Municipality with a population of 25000 people, 5000 ha of land that would consequently have been converted into cocoa farms by this population, can potentially increase the CO₂ emission between 2012 and 2016 by 4 million tons.
- The current observed cocoa farm and crop field expansion (145 ha/yr and 45 ha/yr respectively) is happening at the expense of primary forest clearance (194 ha/yr).
- However, opportunities for reducing or stabilizing emissions from land use conversions exist: 1) for cocoa farms, intensification using inputs and tree planting is considered vital; 2) for forested areas, sustainable forest management practices such as reduced impact logging and replanting of logged areas could help tremendously.
- The long-term emission simulation showed that extension of cocoa farms will continue to be the major source of CO₂ emission in the landscape in the next two decades. The lowest long-term emission was recorded in scenario focusing on sustainable forest management.

Key recommendations

- Emission scenarios that lead to a win-win situation by reducing emission while addressing the livelihoods of forest-dependent communities need to be at the core of the development plan of the municipality. For example, such practices could include cocoa intensification, suitable management of timber and other useful trees within cocoa agroforests, and sustainable forest management practices like reduced impact logging.
- Progressive devolution of power/ decentralization in Cameroon represent a tremendous opportunity for local development planning to be synchronized with sustainable development and climate change objectives at local level especially municipality or district level.

Land use systems in Efoulan municipality

The majority of the 25000 people living in this municipality rely on small scale traditional agriculture based on shifting cultivation for food crop production, as well as cocoa, and oil production. The most important farming systems are food crop production and cocoa perennial agroforestry plantations. Growing fruit trees cocoa agroforestry systems and retaining useful trees within the crop fields are usual practices among the farmers in the area. It is estimated that 30 tree species are planted or preserved for home use or market sale (Jagoret et al., 2011).

Various reports indicate that cocoa production systems in the municipality are non- profitable, with a negative Net Profitability Value (NPV) of 250000¹ FCFA per year (Eboutou et al. 2010; Gockwoski et al. 2010). However, trees associated within this system improve the biophysical conditions, sequester carbon and could thus help in climate change mitigation while strengthening the overall resilience of the system (ASB, 2000). Semi-industrial oil palm plantations are increasingly being established by local elites in the municipality by converting primary forest land and thus, avoiding conflicts with farmers who have customary rights over existing fallow land. The municipality's forest land use

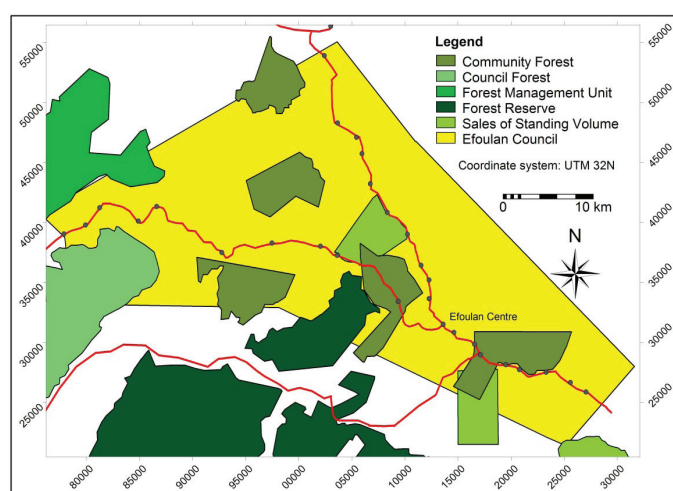


Figure 1. The 2012 Forest land use zoning and forest management plan in Efoulan

zoning and forest management plan (Figure 1) shows that council forest and community forest are among the major forest land uses.

Carbon stocks in different land use systems and the associated temporal dynamics

The carbon stocks in four major land uses were analyzed: primary forest system - 311 TC/ha with almost 65% contained in tree biomass, fallows - 163 TC/ha, crop fields - 87 TC/ha and jungle cocoa with 185 TC/ha (Figure 2). Hence, there is a clear supremacy of the primary forest in the amount of carbon contained in this land use type. Figure 2 shows the partitioned carbon content of the biomass and the soil. Hence, any development intervention that affects primary forest area, the fallows and the jungle cocoa has a considerable impact on the loss of the carbon stock from the land uses. Therefore, it is important to be vigilant about the activities being planned by municipal planners and provide such evidence so that informed decisions can be made in tackling development needs, conservation values and climate change issues at the municipality and to the entire country.

Table 1 shows the observed land use changes between 2001 and 2007 and the resulting loss of carbon stock from the municipality from within the land use sector alone. We found a considerable decline in undisturbed forest area of around 194 ha/yr while there was an increase in cocoa plantations and crop fields by about 145 ha/yr and 45 ha/yr respectively. Logged forest area has also decreased (63 ha/yr) which is indicative of forest degradation.

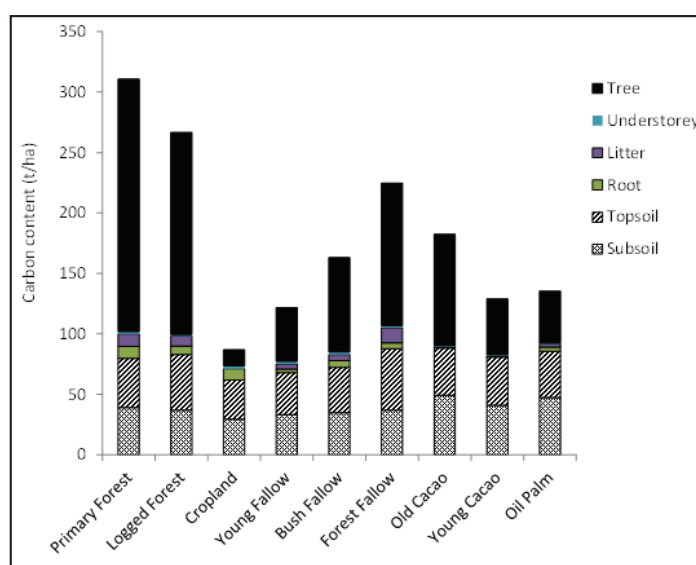


Figure 2. Total carbon stock in various land use types

In sum, the observed land use changes in the municipality has resulted in diminishing carbon stock in the area as the major changes are happening in the land uses with high carbon stocks.

¹FCFA (Franc CFA) is the national currency of Cameroon and 250000 FCFA is almost equal to 500 USD

Table 1: Land use dynamics in Efoulan Municipality and the associated carbon stock changes

| Land use type | Time average carbon stock (t C/ha) | Spatial coverage (ha) | | Relative change (ha/yr) | Net impact of land use change on carbon stock (t) |
|---|------------------------------------|-----------------------|-------|-------------------------|---|
| | | 2001 | 2007 | | |
| Mixed crop field | 87 | 1198 | 1512 | 44.86 | 27318 |
| Crop field created by clearing primary forest | 225 | 599 | 830 | 33.00 | 51975 |
| Cocoa farms | 156 | 4755 | 5771 | 145.14 | 158496 |
| Oil palm plantation | 136 | 268 | 338 | 10.00 | 9520 |
| Young/bush fallow lands | 142.5 | 2031 | 2199 | 24.00 | 23940 |
| Logged forest | 267 | 8126 | 7683 | -63.29 | -118281 |
| Undisturbed forest | 311 | 64136 | 62780 | -193.71 | -421716 |

Note: for merged land use types e.g. young fallow and bush fallow, the carbon content is computed by averaging the per hectare values of the two.

Development pathways in Efoulan municipality and their impacts on GHG emission

Four key development scenarios, three of which are strongly interlinked with greenhouse gases emission were compared against the business as usual scenario in which no emergent intervention takes place to improve the GHG emission.

- **Scenario 1- Business As Usual (BAU):** this scenario reflects the current trend from the historical baseline if no measures are taken to reduce emissions at the landscape level. Here it is assumed that the rate of forestland conversion to other land uses continues at a similar pace as in the past due to lack of interventions.
- **Scenario 2- Cocoa Extension:** a scenario reflecting the current interest of the government and the local population to increase cacao production by extending the cocoa farm in the area. In the Government of Cameroon rural development strategy (SDSR, 2006), it is clearly stated that the government will promote the extension of cocoa farms by more than 50 000 ha from 2010 to 2015. Forest zones in different municipalities are the targets of this expansion plan.
- **Scenario 3- Sustainable Forest Management:** a scenario involving the implementation of good forest management strategies (like reforestation and reduced impact logging) in production forest, community forest and communal forest.
- **Scenario 4 - A Combination of Sustainable Forest Management and Cocoa Extension:** a scenario involving cocoa extension and sustainable forest management

practices application whereby intensification using input and integration of timber and fruit trees are applied in the cacao plantations, afforestation/ reforestation and reduced impact logging practices are applied in forested areas.

In most of the scenarios except the BAU, most of the land use conversions are occurring due to the expansion of cocoa farms. We assumed that one-tenth of the envisaged cocoa expansion in the country happens in the Efoulan municipality thus resulting in 5000 ha of cocoa farms creation by 2016.

The long-term emission analysis showed that the strongest potential for emission reduction happens when sustainable forest management scenario is implemented in the municipality (Figure 3). This is mainly due to the fact that sustainable forest management practices such as reforestation and reduced impact logging both help in enhancing the carbon sequestration potential in the municipality. The fact that this scenario reduces emissions strongly as compared to other scenarios is because the highest carbon sequestration potential of the municipality is due to its forested areas.

We found that the envisaged development pathway through cacao extension is going to result in increased emission of greenhouse gases in the municipality. One thing to note here is that the rate of emission along the years stabilizes when the cacao plants have grown and begun to sequester carbon. Despite the emission stabilization over time, cacao extension occurs at the expense of converting forests and fallow lands that have highest sequestration potential and hence the cumulative effect of this development pathway is increased emission.

The development pathway which involves integrating cacao extension, intensification of cocoa farms, and sustainable forest management was the second strongest potential pathway for reducing emissions in the municipality (Figure 3). This mainly is due to the potential of the cacao plants to sequester carbon after growing, the sustainable intensification pathways within the cocoa plantation and

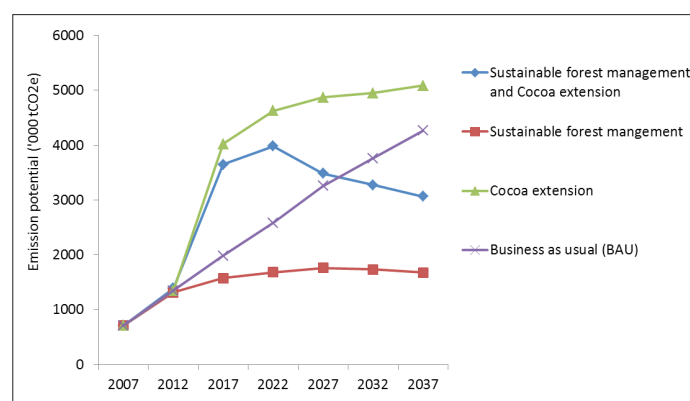


Figure 3. Greenhouse gases emission potentials (CO₂e) from the various development scenarios simulated over 30 years period

the implementation of good management measures within the forest area such as reduced impact logging. The main reason why this development pathway does not exceed the sustainable forest management scenario is that there is growing emission in areas where cacao extension takes place, while in areas where intensification and sustainable forest management practices are applied, there is net sequestration. Hence, the net effect of these compositions i.e. cacao extension, intensification, and sustainable forest management development pathways is low relative to intensification and sustainable forest management where we only have sequestration potential alone.

The simulation results show that doing nothing as an emission reduction effort will lead to an increase in emission in a linear manner across the years. However, despite the linear increment, the aggregate emission from this scenario

Table 2. Interventions in the different mitigation scenarios in the Efoulan municipality

| Planning Units | Scenario 1: Business as Usual (BAU) | Scenario 2: Cacao extension | Scenario 3: Sustainable Forest management | Scenario 4: Mix of sustainable forest Management and properly managed Cacao extension |
|----------------------------------|--|--|---|--|
| Community Forest | No measures are taken to reduce emission | 2000 ha of this unit are converted into cacao plantation | Good management measures are applied | - Good management measures are applied and - 2000 ha are converted into cacao farm with applicable intensification pathways |
| Communal Forest | Same as above | 1000 ha of this unit are converted into cacao plantation | Good management measures are applied | - Good management measures are applied - 1000 ha are converted into cacao plantation with applicable intensification pathways |
| Concessions of Forest Production | Same as above | Only selective logging and no total conversion takes place here. | Good management measures are applied | - Good management measures are applied - Limited areas of concession forests converted into cacao plantation with applicable intensification pathways |
| Shifting Cultivation landscape | Same as above | 2000 ha converted into cacao plantation | Good management measures are applied | - Good management measures are applied - 2000 ha converted into cacao plantation with applicable intensification pathways |

The ASB Partnership for the Tropical Forest Margins is working to raise productivity and income of rural households in the humid tropics without increasing deforestation or undermining essential environmental services.

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in the 30 years analyzed was not as huge as that of the cacao extension.

It should be noted that as we are analyzing possible development scenarios in the municipality which are also intended to supply products and services to the community, the interpretation of the emission scenario should not be seen separately from the potential economic or livelihood contribution of the scenario both in the short and long-term. When such dimensions of economic and or livelihood contributions are accounted for, the cacao extension scenario exceeds the business as usual scenario considerably. This implies that the opportunity cost of emission reduction in cacao extension scenario is much higher than that of the business as usual one.

Implications: reducing emissions while ensuring livelihood benefits

In this policy brief, we have demonstrated that opportunities for reducing emission exist within various land use systems at the landscape level in the Efoulan municipality of South Cameroon. That said, any municipal plans formulated to reduce emission from the different land use systems must ensure that sustainable livelihoods practices that serve to improve the livelihoods of forest-dependent communities are adopted and promoted.

They include among others intensification and diversification of cocoa agroforestry systems, suitable management of timber and other useful trees within cocoa agroforestry systems, reduced impact logging, afforestation and reforestation.

Besides such a bottom up approach has two major implications: 1) it helps to design realistic REDD+, NAMA and REL/RL that can be negotiated with national government; and 2) it offers an opportunity for synergies/ integration of REDD+, adaptation and or development plans at local level in a way that is cost effective.

References

- Alternative to Slash and Burn (ASB) (2000). Summary report and synthesis of phase II in Cameroon. ASB Partnership for the Tropical Forest Margin World Agroforestry Centre Nairobi. Kenya. 72p.
- Eboutou L.Y, Degrande A., Jaza F. and Kamajou F (2010). More than chocolate: Diversifying cocoa agroforests for higher profitability in Cameroon. World Agroforestry Centre. www.worldagroforestry.org/downloads/publications/PDFs?PO10198.PDF.
- Gockwoski J, Tchata M, Dondjang JP, Hietet G, Fouda T (2010). An empirical analysis of the biodiversity and economic returns to cocoa agroforests in southern Cameroon. *Journal of Sustainable Forestry*.
- Jagoret P., Michel-Dounias I., Malézieux E (2011). Long-term dynamics of cocoa agroforests: a case study in central Cameroon. *Agroforestry Systems* 81: 267-281.
- SDSR (2006). Stratégie de Développement du Secteur Rural (SDSR): Synthèse du volet Agriculture et Développement Rural. Ministère de l'Agriculture et du Développement Rural -MINADER Cameroun.

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