Low Emission Development (LED) Initiative as Part of Maintaining Local Ecosystem Services in Tanjung Jabung Barat (Tanjabar) District, Province of Jambi, Indonesia

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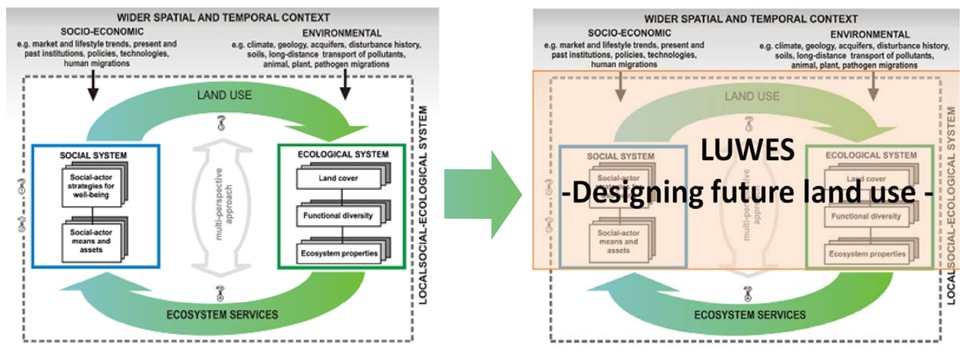
A. Background

Land use planning is an effort in realizing land use type in the future. Future land use associated with social actors in complying their needs. Land use decision determines the type of ecosystem services to be accepted by the social actors, but on the other hand the need for ecosystem services will determine land use decisions. It is very important matters about relationship between ecosystem services and land use. It requires method to conduct a land use planning efforts to maintain environmental services in a region. Low emissions development exert implementation of development activities directed in controlling carbon emissions from land use change activities. Development of low-emission is closely related to land-based efforts to maintain the presence of trees and tree biomass sector in the landscape. The control system is one of effort in maintaining ecosystem services.



Sources : Modify from Diaz et al, 2010

LUWES is a framework to formulate future land use recommendations related to the efforts in controlling carbon emissions, which is one component in environmental services. LUWES uses of generic concepts used by the IPCC in climate change mitigation that can be responsible scientifically. LUWES fit well with the use of local data with higher accuracy, as well as community involvement in the process of building and land use solutions in the future.

B. Method

The design and construction of the planning steps for emission reduction strategies in this exercise applied the framework strategy of Land Use Planning for Low Development (LUWES) which contains a systematic set of steps to integrate the processes of identifying emission sources, calculating historical emissions, predicting future emissions by considering historical emissions and local development plans, setting up a reference emission level (REL) and mitigation action plans, and determining an implementation strategy.

Integrating the land based development plan and spatial plan

Developing the zone is a very appropriate way to integrate all existing planning documents into single template. A planning unit was defined as a 'zone' where any land use change process was recorded and the zone contains factors affecting the activity and preparation in developing appropriate mitigation actions. Zone is developed based on spatial-based integration between various planning documents such as the District Spatial Plan (RTRW), Long-term Regional Development Plan (RPJP)/ Medium-term Regional Development Plan (RPJMD), forestry land status, land use permits and bio-physical elements (peat).

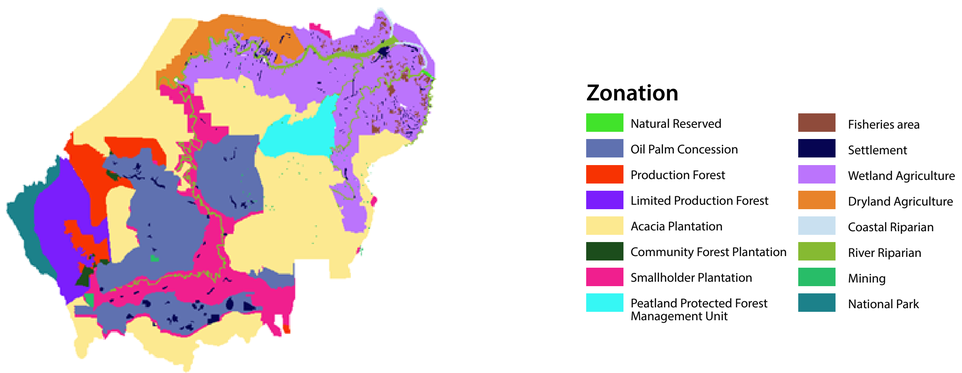


Figure 1. Zonation Configuration Agreed by Stakeholders in Tanjabar District

Estimating historical and future greenhouse gas emissions

Spatial analysis and the use of software REDD Abacus SP resulted in identification of land use changes are the largest emission sources in Tanjabar. The emissions resulted by land use change from higher carbon stock to lower carbon stock (stock difference).

Table 1. Type of Land Use Change as Biggest Emission Sources in Tanjabar

Zone	Land Use in 2005	Land Use in 2010
Wetland Agriculture on Peat	Coconut/ Betelnut agroforest	Coconut/ Betelnut agroforest
	Coffee agroforest	Coffee agroforest
		Coconut/ Betelnut agroforest
Acacia Plantation	Logged over forest-high density	Acacia plantation
		Oil palm monoculture
		Rubber monoculture
		Oil palm monoculture
		Acacia plantation
	Logged over swamp forest	Acacia plantation
Acacia Plantation on Peat	Undisturbed swamp forest	Shrub
	Logged over swamp forest	Shrub
		Acacia plantation
		Coconut/ Betelnut agroforest
	Shrub	Shrub
Oil Palm Concession	Rubber agroforest	Oil palm monoculture
	Logged over forest-high density	Oil palm monoculture
	Logged over forest-low density	Oil palm monoculture
Peatland Protected Forest Management Unit on Peat	Undisturbed swamp forest	Logged over swamp forest
Dryland Agriculture on Peat	Coffee agroforest	Coffee agroforest
Production Forest on Peat	Logged over forest-high density	Rubber monoculture

Figure 2 shows the share of emissions per year respectively based on 27 zones in the District of Tanjabar.

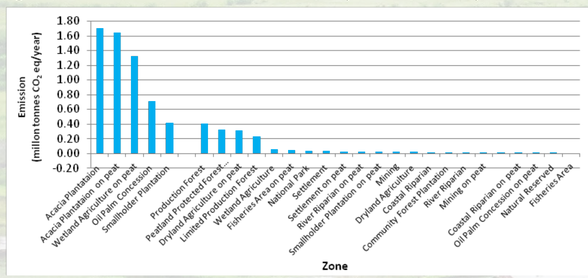


Figure 2. Historical Emission Share in Each Zone

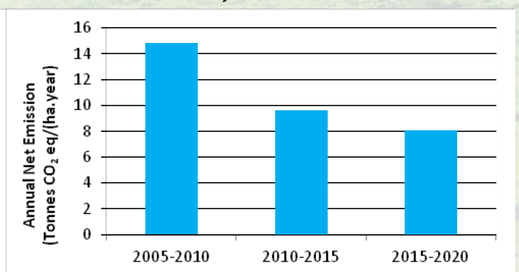


Figure 3. Rate of Annual Historical Emission and The Projection for 2010-2015 and 2015-2020

Annual historical emission rate in Tanjabar for 2005-2010 around 14.8 tonnes CO_2 eq/(ha.year). Since rate of future emissions are projected based on the rate of land use change from historical period than we obtained the annual emission rate for 2010-2015 was 9.6 tonnes CO_2 eq / (ha.year), and the emission rate of the period 2015-2020 about 8 tonnes CO_2 eq / (ha.year).

Setting Up The Reference Emission Level (REL)

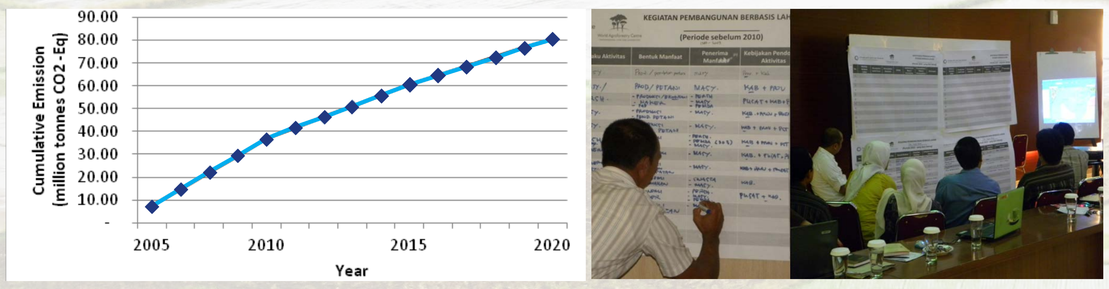


Figure 4. Historical Based Reference Emission Level

Setting up Reference Emission Levels are an important part in the implementation of LED. REL is used as a reference of any emission reduction actions, meaning that the size of how big the impact of the mitigation action to emission reduction compared to the baseline. REL made using several approaches such as historical, adjusted historical, and forward looking. Process of developing REL in not only technical aspects but also involves policy considerations.

C. Result

Scenarios to reduce emissions about ways to reduce emissions from sources of emission activities were held with the district's government agencies is one of the result of the research. The low-emissions development scenarios needed to consider the consequences of reduction activities not only for the environment but also for the economic prosperity of the district.

Table 2. Type of Land Use Change as Biggest Emission Sources in Tanjabar

Zone	Scenarios	Planned Activities
Acacia Plantations (S1-AP)	(1) Avoid conversion of primary forest to acacia (2) Maintain existing smallholders' tree-based systems (3) Expedite planting acacia in bush fallow and grassland areas within the concession zone.	• Persuade concession holders to maintain primary forest by promoting HTI and HCVF (High Conservation Value Forest) spatial regulation. • Implement results of agreement between Tanjabar government, community and concession holders on forest boundaries. • Implement moratorium on use of wood from natural • Forests for pulp and paper industries
Oil Palm Concession (S2-OPC)	Prohibit conversion of forest to oil palm (± 8759 ha)	• Persuade concession holders not to convert high-density forests and primary forests to oil palm systems in support of the Government's commitment to reduce emissions by 26%
Peatland Protected Forest Management Unit (S3-PPFMU)	(1) Maintain existing forest area (2) Establish systems with jelutung (*Dyera* sp) to rehabilitated oil palm area.	• Promote the concept of Conservation/Protected areas and their purpose to communities around the KPHLG. • Request more Forest Police from the Ministry of Forestry. • Establish relevant local institutions to support KPHLG. • Promote the value of jelutong (*Dyera* sp) to the local community and explore access to its national and international markets
Production Forest (S4-PF)	(1) Maintain primary forest area (2) Establish rubber systems in non-forested areas	• Promote the concept of Conservation/Protected areas and their purpose to communities around the KPHLG. • Provide rubber seedlings to establish rubber systems in the area
Limited Production Forest (S5-LPF)	(1) Maintain primary forest area (2) Establish rubber systems in non-forested areas	• Promote the concept of Conservation/Protected areas and their purpose to communities around the KPHLG. • Issuing recommendation and prioritized agriculture activities in non forested land
Wetland Agriculture on Peat (S6-WA_OP)	Preserving existing Forest	

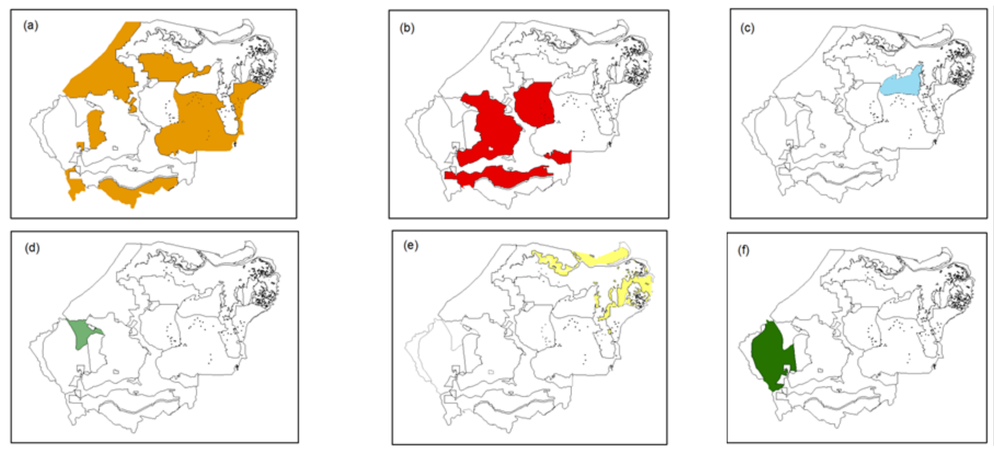
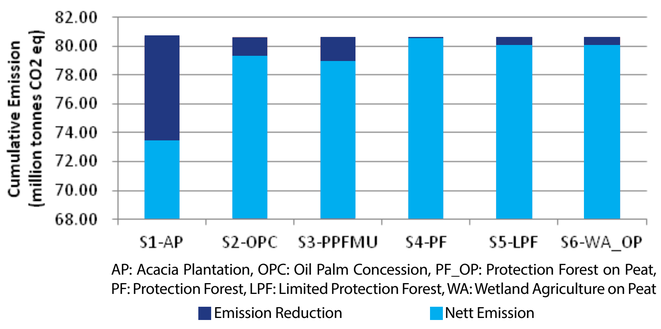


Figure 5. Zones of the scenarios developed (a) S1-AP, (b) S2-OPC, (c) S3-PPFMU, (d) S4-PF, (e) S-5-LPF, (f) S6-WA_OP



The graph shown the impact of the each scenarios to emission reduction. Scenario S1-AP resulted highest magnitude of emission reduction meanwhile scenario S4-PF in opposite.

Box 1 Practical Issues

Reducing emissions in the oil palm sector requires commitment from concession holders to optimize the use of abandoned and degraded land rather than opening land with high carbon stock. Similarly, reducing emissions in the HTI zone implies the commitment of pulp and paper industries to use raw materials from their planted trees and reduce (or even forego) the use of wood (mixed tropical hardwood/MTH) from natural forests.

There will be challenges in implementing low emissions development in the field. For example, use of abandoned land (with low carbon stock) by concession holders is regulated under the Agrarian Law. However, in reality, various land claims by local communities create difficulties for concession holders to use the land. Concession holders need clear legal status and secure tenure on concession land.

Similarly, to reduce emissions from the PPFMU (KPHLG) zone, local government and local communities must work together to restore and maintain the protection function of KPHLG. Conversion of oil palm to jelutung systems could increase carbon stocks. However, commodity conversion needs careful consideration because it has an impact on farmers' income. Currently, oil palm systems make a significant contribution to farmers' incomes. Thus, besides jelutung, local government should consider the inclusion of other trees in the systems that could also provide income to farmers.

To provide communities around the PPFMU with clear legal status and tenurial access in order to effectively manage the land, the local government should consider provision of village forest permits for community forest (Hutan Kemasyarakat/HKm) or other forms of cooperation that could strengthen the collaboration between local government and local communities.

D. Discussion

- In the context of maintaining ecosystem service, low emission development concept by land use planning seems very appropriate to be implemented, due to relation between land use and ecosystem services as mentioned in the first diagram.
- As a new concern at the local level, climate change and the LED need understanding and new skills in its efforts to inventory and developing action plan. Achievements in Tanjabar then early stage of the overall long-term process that must be guarded so that the emission reduction goals can be realized.
- Regional characteristics of Tanjabar is a challenge in LED applications due to the orientation of the region's economic development is still dependent on land-based activities, so the area should be able to combine and synergize both the need of implementation of the LED and economic development activities.
- The process of developing scenarios should also be able to include all stakeholders of the national and local level to be involved and committed to low emission development, the absence of the two then serve targeted emission reduction efforts will not be success.
- Emissions reduction activities in Tanjabar district should focus on the three land allocation zones hat contribute to 78,57 % of total emissions of carbon dioxide equivalent : Acacia Plantation (HTI) on Mineral and Peat, Wetland Agriculture on Peat, Oil Palm Concession, and Smallholder Plantation.
- Low emissions development can take place in the district if all stakeholders; local government, communities and private companies are committed as a part of maintaining ecosystem services to their tasks and undertake their responsibilities.
- Implementation of LED in Tanjabar for the future is to do a more detailed identification of the necessary conditions in implementation stage. Implementing one mitigation action could be one big effort that may be implemented with existing resources, at least it can be used as a pilot activity at the site level. Another benefit is to test the accuracy of the forecasting/ calculations have been done before in order to get a lesson learned in the context of the possibly implementation of LED in the other area.

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