LAND-USE PLANNING FOR LOW-EMISSION DEVELOPMENT STRATEGIES (LUWES)

World Agroforestry Centre

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Land-based, climate-change mitigation actions that are pro-poor and oriented towards 'green' development need spatially explicit
land-use planning processes that are inclusive, informed and integrative. Bringing multi-stakeholder land-use planning processes to life, beyond rhetoric, needs a breakthrough in political willingness, multi-stakeholder buy-in and technical capacities that allows negotiation platforms to operate. The LUWES approach is gaining followers and adopters. The application is illustrated using the case of Tanjung Jabung Barat (Tanjabar) district, Jambi province, Indonesia.

Key findings

1. Land-based mitigation actions require land-use planning processes within the overall landscape approach that are transparent, credible and accountable and which lead to land-use plans that are pro-poor and oriented towards 'green' development.
2. In an iterative process with local government agencies, six steps of the LUWES approach were developed, along with public domain software for analyzing opportunity costs, known as Abacus SP.
3. Current patterns and trends in the landscape reflect diversity of existing land uses and users, with or without formal land allocations, with various tenure regimes and pluralities of social settings, local and regional economic strategies and biophysical characteristics.
4. Quantitative and spatially explicit trade-off analysis is a key element to develop and consider potential scenarios for reducing emissions with least cost and consequences to development and livelihoods.
5. The LUWES method was selected for use in all provinces of Indonesia as part of planning for appropriate emission reduction actions.

Implications

- The planning process should involve all major stakeholders, be guided by valid and updated data and models, and consider development and conservation simultaneously within the socio-economic environmental context.
- The many stakeholders involved in negotiating land-use plans now have a set of principles, steps, and tools that allow joint exploration of scenarios of mitigation and development.
- Existing plans have only a weak link with reality on the ground; reconciliation of plans with actual conditions that link to land managers is a basis for developing planning units that address consequences and potentialities of zone-specific mitigation activities.
- Profitability and carbon stocks of land-use systems on a lifecycle basis are the first proxy but need to be expanded to labour adequacy and absorption, multipliers in the regional economy, livelihoods and food security as indicators.
- The method is sufficiently intuitive and flexible to allow entry-level use with minimal training but also caters for more advanced next steps.

LUWES in 6 steps

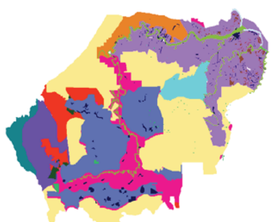
1. Development of **planning units** that reconciles current socio-economic conditions, development and spatial plans biophysical and functional zones and multiple views of land tenure and management
2. Estimation of Historical Land Use Changes and their consequences to **carbon storage**
3. **Baseline Scenario** development of future LULCC and projection of Reference Levels of Emissions
4. **Mitigation scenarios** and projected emissions
5. **Trade-off analysis** between mitigation and economic, financial and other benefit to allow negotiation process among multiple stakeholders
6. Formulation of **action plans** including necessary instruments for implementation

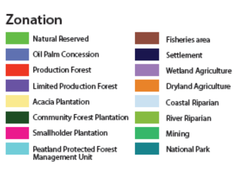
Develops planning unit

Heterogeneity within a landscape reflects existing land uses and users under formal land allocation, tenure regimes, pluralities of social setting, local and regional economic
strategies and varying biophysical characteristics. Overlap of permits may occur as a result of lack of transparency and poor coordination of issuance processes.

LUWES does not aim to solve land tenure per se but rather to clarify planning units that allow specific policy interventions o be applied and feasible action plans to be implemented. Reconciliation of plans with existing conditions that link to land managers provides a basis for developing planning units that address consequences and potentialities of zone-specific mitigation activities. This zonation is conducted on the basis of stakeholder discussions on the layers of landuse plans and allocation maps.

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).



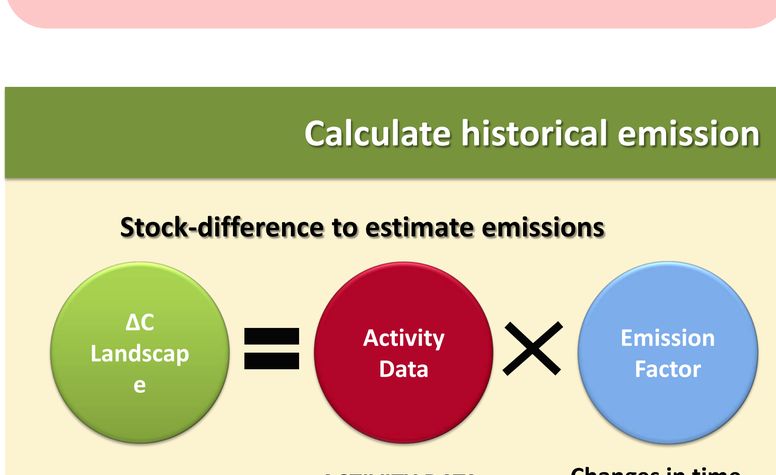


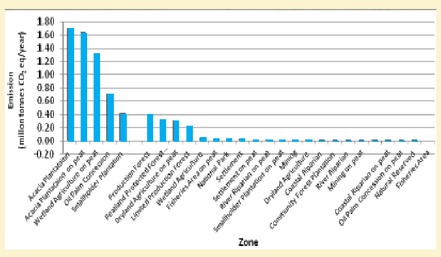
Calculate historical emission

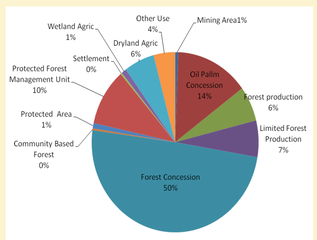
Stock-difference to estimate emissions

ΔC Landscape = Activity Data × Emission Factor

ΔC Landscape	Activity Data	Emission Factor
Annual changes in C-stocks in the landscape (ton C yr^{-1})	ACTIVITY DATA Area of changes between each pairwise of landcover types (ha y^{-1})	Changes in time-averaged C-stock between each pairwise of landcover types (ton C $ha^{-1}y^{-1}$)

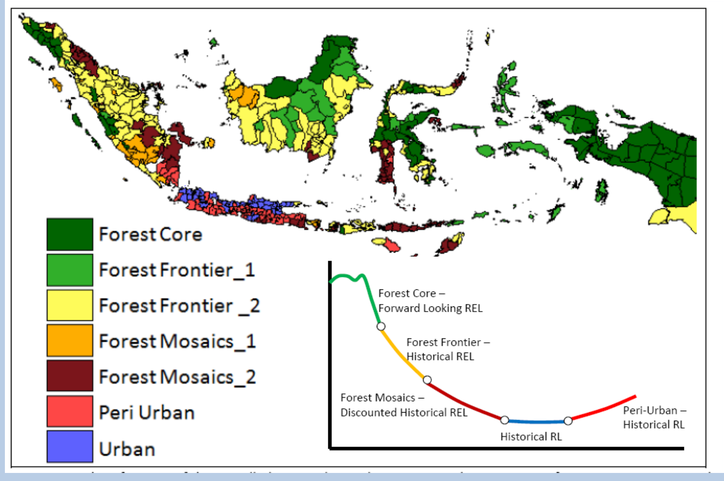




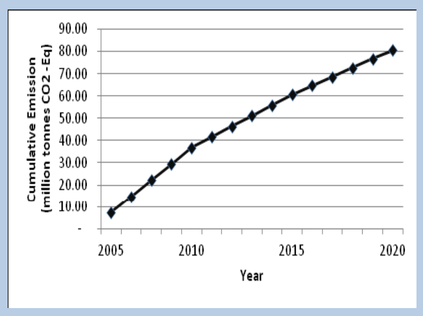


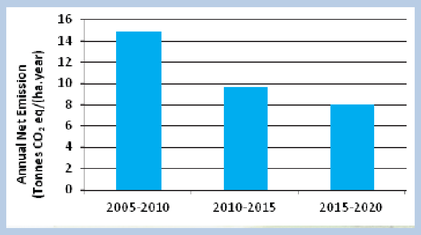
Develop baseline scenario

Reference Emission Levels (gross) and Reference Levels (net) requires the combination of a land use transition matrix and typical C stocks per land use type.
Four ways of calculating REL for any (sub)national entity are:
1. REL/RL1A: Projected emissions are based on historical emissions
2. REL/RL1B: Projected emissions are based on historical emissions relative to remaining carbon pools
3. REL/RL2: Future emissions are projected based on land use plans (forward-looking scenario)
4. REL/RL3: Emissions levels projected on the basis of political commitment



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).





Develop mitigation scenario

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. • Provide rubber seedlings to establish rubber systems in the area
Wetland Agriculture on Peat (S6-WA_OP)	Preserving existing Forest	• Issuing recommendation and prioritized agriculture activities in non forested land

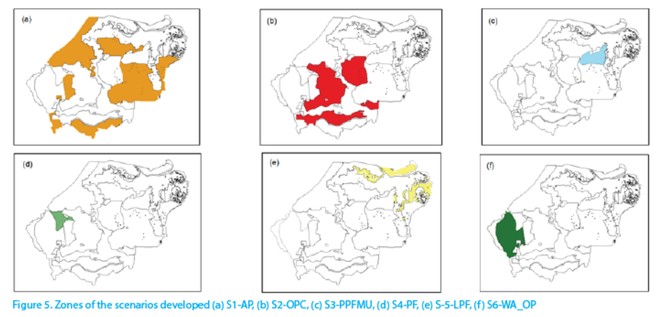
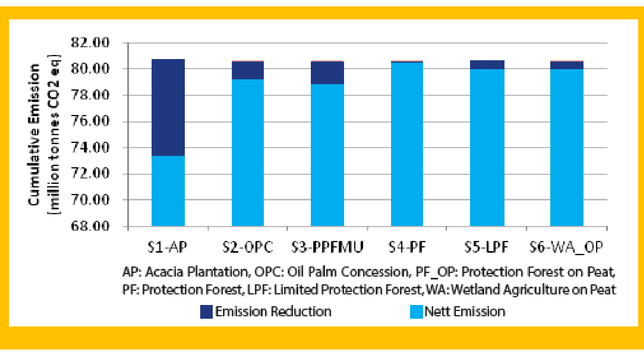
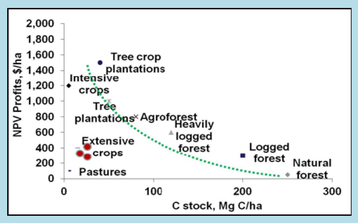


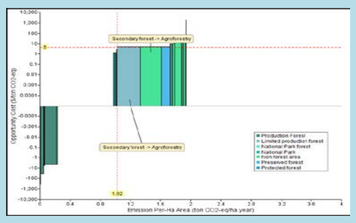
Figure 5. Zones of the scenarios developed (a) S1-AP, (b) S2-OPC, (c) S3-PPFMU, (d) S4-PF, (e) S-5-LPF, (f) S6-WA_OP



Analyze trade-off

Land and forest-based activities that generate economic benefits and produce food often cause carbon loss from the landscape. Halting these activities to reduce emissions by conserving carbon stock in the landscape can potentially have a negative impact on economic growth and food security if it is not properly planned. Regional economies, livelihoods and food securities, and land-use profitability can serve as indicators of benefit from land uses and land-use changes within a trade-off analysis in planning low emission development. Identification of potential scenarios for low-emissions development strategies include:





1) Identification of types of land uses and land-use changes that associate with Low-Low, Low-High, High- Low, High-High emission-economic benefit (Figure 3, left) and those that associate with Low-Low, Low-High, High-Low, High-High removal-economic benefit (Figure 3, right)
2) Prioritization of emission reduction and carbon-stock enhancement in suitable planning units through reducing High emission-Low economic benefit land uses and land-use changes that have been contributing a lot in the past and will potentially be dominant sources of emission in the future (Figure 4) and promoting High removal-High economic benefit land uses and land-use changes that are biophysically and socio-culturally suitable for the area. Box 3 shows some suggested mitigation scenarios based on the analysis.

Formulate action plan

- 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. Land swap policy is needed
- Within peat land areas, local government and local communities must work together to restore and maintain the protection function. Conversion of oil palm to jelutung systems (native tree species that produces resin and can grow well without any drainage system) could increase carbon stocks. However, commodity conversion needs careful consideration because it has an impact on farmers' income.
- Communities around the areas need 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 or other forms of cooperation that could strengthen the collaboration between local government and local communities.
- Funding mechanism and private sector involvements are necessary

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