Reduction of the GHC emission from Peatland and its Implication on Regional Economy of Riau Province, Indonesia

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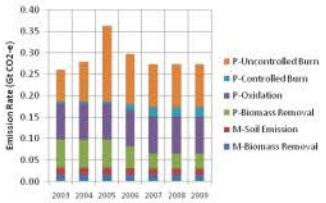
ABSTRACT

The average GHG emission of Riau Province during 2003-2009 was 0.29 Gt CO2. Emission from peatland and fires were main source of Emission in Riau Province (42%) that contribute 0.12 Gt CO2 per year. The study introduced nine mitigation actions that cover 1) compliance of rules and improvement of peatland management, 2) action 1+ peatland rehabilitation and fire prevention, and 3) action 2+land allocation revision and forest conservation. The objectives of the study are : 1) to estimate GHG emission reduction of mitigation actions from peatland, 2) to estimate abatement cost of GHG emission reduction cost by mitigation actions, and 3) to estimate impact of mitigation actions to regional economy of Riau Province.

The mitigation strategies of the compliance of rules and improvement of peatland management will decrease land use for timber plantation and palm oil. The highest contribution of land use for forest occurs if previous strategies strengthen with peatland rehabilitation and land allocation revision and forest conservation. Marginal abatement cost for compliance of rules and improvement of peatland management ranged from $ 1.42/tCO2 - $15.01/tCO2. Addional strategies with peatland rehabilitation and fire prevention abatement cost are $ 3.96/tCO2 - $22.13/tCO2. The third strategy will cost $ 31.52/tCO2 - $147.22/tCO2.

Input-output analysis used to estimate economy impact of mitigation action to regional economy. The compliance of rules and improvement peatland management will decrease land availibility for palm oil, timber and rubber. Those commodities have high output and income multiplier to regional economy, so the mitigation actions will cost Rp 101.1 billion. Previous mitigation actions strengthenin with land allocation revision and forest conservation will cost much higher (Rp151.2 billion) to regional economy.

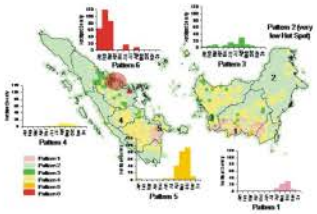
Introduction



Source : National Planning Board, 2010)

Figure 1.Historical Emission from Peat and Mineral Land of Riau Province

Average GHG emission of Riau Province during 2003-2009 was 0.29 Gt CO2 (Total Emission in 2005 was 1.28 Gt CO2) and 90% derived from peatland.



Sumber: Ardiansyah et al, 2009

Figure 2. Source of Emission of Riau Province (Hotspot 2000-2009)

Emission from peatland and fires were main source of Emission in Riau Province (42%). Average emission from peatland fires contribute 0.12 Gt CO2 per year

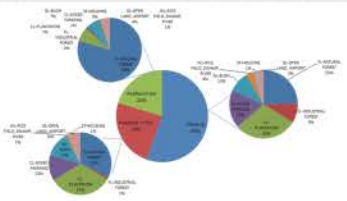


Figure 3. Land Cover of Riau Province in 2009

Objectives :

To estimate GHG emission reduction by mitigation action from peatland
To estimate abatement cost of GHG emission reduction cost by mitigation action
To estimate impact of mitigation actions to regional economy of Riau Province

Methods

1. MITIGATION ACTIONS FOR GHG EMISSIONS REDUCTIONS IN PEATLAND OF RIAU PROVINCE 2010- 2025

Policy I: The compliance of rules and improvement of peatland management.
Miti-1: The compliance of rules (only peatland less than 3 m will be used or converted)
Miti-2: Similar to Miti 1+Without burning
Miti-3: Similar to Miti 2+Water Management Improvement
Miti-4: Similar to Miti 3+Ameliorant usage

Policy II: Peatland rehabilitation and Fire prevention
Miti-5: Similar to Miti 4 + Forest/land rehabilitation
Miti-6: Similar to Miti 5 + Fire prevention

Policy III: Land allocation revision, forest conservation, and land swaps
Miti-7: Similar to Miti 6 + Conservation on all primary forests in APL and HPK
Miti-8: Similar to Miti 7 + No more new licence on peatland conversion/utilization
Miti-9: Similar to Miti 8 + all licenced peatland that have not been utilized will be converted to mineral land.

2. ABATEMENT COST

$$Abatement\ Cost = \frac{Discounted\ Total\ Cost}{Total\ Emission\ Reduction}$$

$$Discounted\ Total\ Cost = \sum_{t=1}^{n} \frac{Opp\ Cost + Implementation + Transaction + Institutional}{(1+i)^n}$$

3. INPUT OUTPUT ANALYSIS

Pilot project of mitigation actions in Peatland was conducted in Bengkalis district, Riau Province. The study used Inpout-Output Bengkalis district of 44 sector in 2006.

$$DFL_i = \sum_{j=1}^{n} a_{ij}$$

DFL = Direct Forward Linkage

a_{ij} = technical coefficient matrix element

$$DBL_i = \sum_{j=1}^{n} a_{ij}$$

DBLi = Direct Backward Linkage

a_{ij} = technical coefficient matrix element

Scenarios	Scenario in IO Simulation
BAU	Land extention (business surplus) of 96,7 Bill and 15,9 Bill rupiah in palm oil and rubber commodities
Mitigation 1-6	Land extention (business surplus) of Y64,5 Bill and 10,6 Bill rupiah in palm oil and rubber commodities
Mitigation 7-9	Condition without injection

Result and Discussion

1. Land Cover and Land Use by BAU and Mitigation Action

BAU scenario: land use for palm oil increase to 4.6 million ha and timber 2.3 million ha. Forest decreased 7.3 milllion ha.

MITI 1-6 decreased land use for timber plantation and palm oil into 1.9 million and 4.3 million Ha respectively.

MiITI 5-6 increased land use for forest from semi natural and degraded land by 1.4 million ha.

Best management practices, peatland rehabilitation and fire prevention and land reallocation that contribute highest land use for forest are MITI 7-9

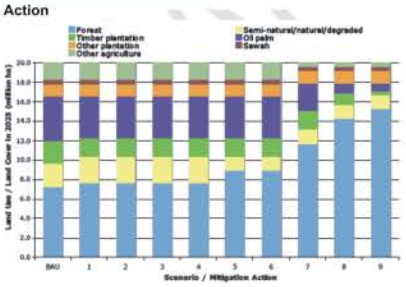


Figure 4. Land Cover and Land Use by BAU Scenario and Mitigation Action

Table 1. Change of Sectoral Output by Mitigation Action

Sector	BAU/SIM 1	SIM 2 Value	SIM 2 Percent	SIM 3 Value	SIM 3 Percent
Rubber	173447.27	167638.5	-3349%	156021	-10047%
Palm oil	778524.07	746052.7	-4171%	681009	-12526%
Other plantation products	71262.60	71260.73	-0.003%	71257	-0.008%
Timber	1641135.06	1641090	-0.003%	1640999	-0.008%
Other forest products	416911.78	416910.9	0.000%	416909	-0.001%
Sawn timber and plywood industry	1522200.57	1522158.4	-0.003%	1522074	-0.008%
Goods from timber, rattan, and bamboo industry	2413216.90	2413207.3	0.000%	2413188	-0.001%
Paper and printed good/publishing industry	1552685.49	1552646.4	-0.003%	1552568	-0.008%
Fertilizer and pesticide industry	702322.70	700727.26	-0.227%	697532	-0.682%
Goods from metal industry	13281.69	13.236.504	-0.340%	13146	-1022%
Metal, machine, vehicle, and electronic industry	5474871.89	5474460.9	-0.008%	5473638	-0.023%
Other industries	74661.32	74.656.883	-0.006%	74648	-0.018%

2. Estimated GHG Emission

Estimation of GHG emission in 2025 based on BAU and 9 mitigation actions show that fire prevention has significant contribution to GHG emission reduction.

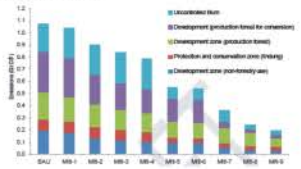
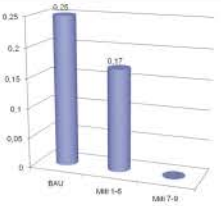


Figure 5. GHG Emission by BAU and Mitigation Action

3. Marginal Abatement Cost

Figure 6. Marginal Abatement Cost by Mitigation Action



BAU potential to increase GDRB 0.25 %. Mitigation 1-6 can potentially GDRB by 0,17%. Meanwhile, there is economy growth under mitigation 7-9.

Figure 7. RGDP Potential by Mitigation Scenarios

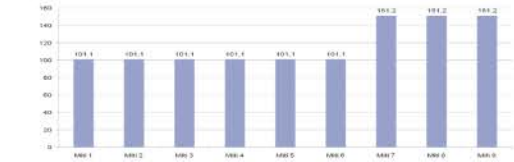


Figure 8. Potential Economy loss by Mitigation Scenarios

Policy Implications

Regional government has to anticipate decrease of regional output by mitigation action by supporting competitive sectors with high output and income multiplier.

Pilot project low carbon development in Riau Province (Bengkalis district) should integrate peatland management, institutional empowerment,and economy & human resource development.

Further analysis on mitigation cost by field research should be conducted to collect all financial mitigation cost.

Acknoledgment

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