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Conservation and Climate Change Mitigation:
A Framework and Principles from Regional Government's Perspective and Its Financing Implication

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Conservation and Climate Change Mitigation: A Framework and Principles from Regional Government's Perspective and Its Financing Implication[1]

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Abstract

This paper highlights the importance of regional governments in the context of Indonesian struggle to resolve the problem of climate change, in particular, and wider area of environmental problem. It emphasizes, that regional governments, more often than not, overlook the value of conservation, despite evidences that conservation not only has the benefit of securing the welfare of future generation but also can avoid various environmental problem and many natural disasters of today. There is a need to modify the paradigm of financing for climate change mitigation or adaptation from focusing on searching external financing with the basis of compensation but optimizing internal source of financing as it is the local who will benefit from many of our conservation actions.

Keywords: climate change, conservation, regional government, Indonesia

JEL code: Q54, Q58, Q56

1 Introduction

In the decentralized Indonesia, regional governments (Provincial and district governments) play a key role in regional development. In this era, regional governments have more authority, more mandate to deliver its function and responsibility to the people they serve. Now, the challenge has never been greater with the rising issue of climate change in particular and environmental problem in general.

As mandated by the Copenhagen Accord, Indonesia has committed to reduce green house gasses emissions by 26% by 2020. This target cannot be achieved without the contribution of regional and local players, including regional governments. In line with this context, questions then arise

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[1] A keynote address delivered at the International Conference on Business and Economics (ICBE) on "Business and Economics of Climate Change towards Low Carbon Economy", Andalas University, 15-17 April 2010, Bukittinggi, INDONESIA

on how this endeavor toward low emissions be financed? Or more generally, how the cost of environmentally-motivated activities be covered and from which source? This seems to be a valid and relevant question. However, as I would like to argue in this paper, putting too much emphasis on financing may lead us to forget the very basic nature of environmental problems, its root causes and how to tackle them.

First, I would like to take one step back and ask a more basic question: why should regional government care about conservation at the first place? In the discussion to follow, I would like to argue that the benefit of conservation especially the distribution of the benefit has an important part in the discussion of its financing. A question on who are the beneficiaries of a conservation activity has a direct implication on who are supposed to finance that conservation

2 Conservation and sustainable regional development: Inter-generational equity

The first and foremost motivation of conservation is to ensure that future generation of the region will have at least the same level of wellbeing as the current generation has. This is the notion of sustainable regional development.

In 1987, the World Commission on Environment and Development (WCED) or widely known as the Brundtland Commission, in its influential report has defined sustainable development to be:

> "Economic and social development that meets the needs of the current generation without undermining the ability of future generations to meet their own needs."

Economics then adopts what is known as the capital approach to sustainable development, where sustainable development is interpreted as follows (UN, 2003, p. 4):

> "Sustainable development is development that ensures non-declining per capita national wealth by replacing or conserving the sources of that wealth; that is, stock of produced, human, social and natural capital."

The capital basis for sustainable development translates into what is called "constant capital rule." Non-declining welfare per capita could be guaranteed by non-declining capital stock. Non-declining (or constant) capital stock means non-declining (or constant) well-being per

capita. Thus, in order to determine whether an economy is on sustainable development path, we only need to know the path of its capital stock over time[2].

Two interpretations arise from this concept i.e., the strong sustainability rule and the weak sustainability rule. The strong sustainability rules suggest that to ensure sustainability each type of capital, natural or man-made should be kept intact for our future generation, while the weak sustainability rule suggest that only the total matters, the components can substituted among each other's (see Figure 1).

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│  Capital Approach to Sustainable │
│          Development :           │
│  ─────────────────────────────   │
│     Non-declining per capita     │
│         national wealth          │
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│   Maintenance of Sources of National Wealth : │
│ Stock of Man-made ($K_M$), Human ($K_H$), Social ($K_S$), and │
│          Natural capital ($K_N$).          │
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│ The issue of maintenance of Natural capital ($K_N$) │
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┌────────────────────────┐  ┌────────────────────────┐
│  Strong Sustainability  │  │   Weak Sustainability   │
│ $K = K_M + K_N + K_H + K_S$ │  │ $K = K_M + K_N + K_H + K_S$ │
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│ Indicators :            │  │ Indicators :            │
│ Carrying Capacity       │  │ Genuine Saving          │
│ Ecological Resilience   │  │ Change in Wealth per Capita │
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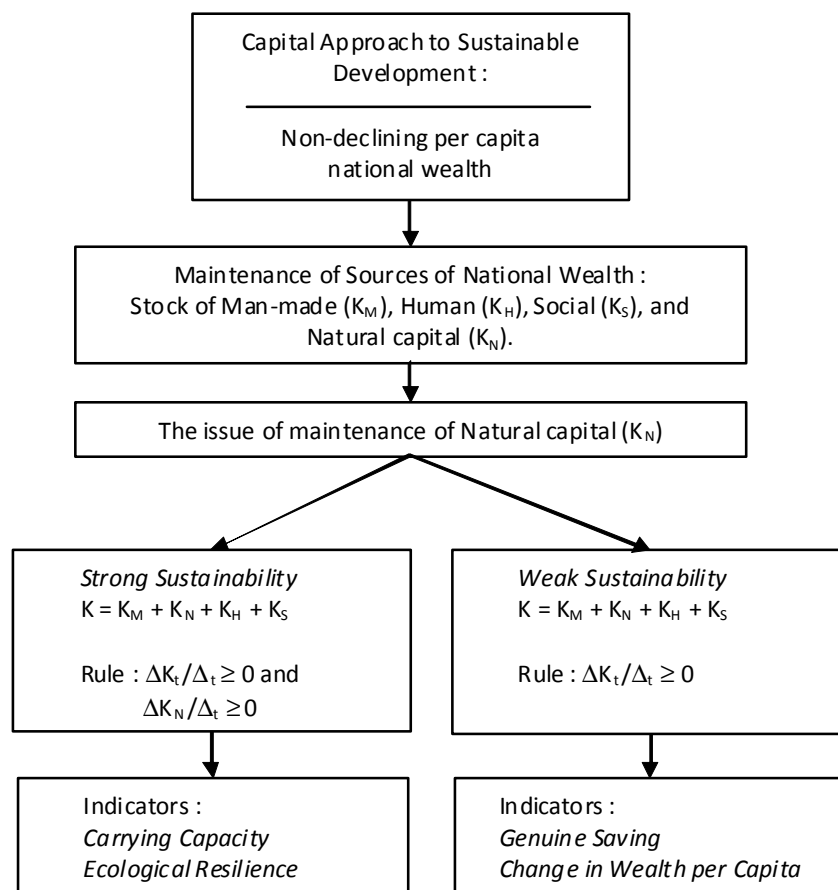
Figure 1. The Capital Approach to sustainable development

Most economists prefer the concept of weak sustainability. Besides the strong version of sustainability is too strict, another reason among others is that if we find a country is non-

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[2] For more discussions about the sustainable development framework see Alisjahbana and Yusuf (2004).

sustainable by weak standard, it is enough to say that they have to do something about it. One popular indicator of weak sustainability – which is made more popular by the World Bank – is what is called Genuine Saving. Genuine Saving can be calculated by subtracting from conventional saving, the value of liquidation of all kind of assets, man-made and natural. For the purpose of this presentation, using data for the year 2005, Genuine Saving is calculated by the following formula:

$$GS = S - D^K - D^{NR} - D^R - ED$$

Where GS Where is the Genuine Saving, S is the conventional Saving (Investment) D^K is the depreciation of capital goods; D^{NR} is the depreciation of non-renewable natural resources D^R is the depreciation of renewable natural resources, and ED is the environmental degradation that consists of ED^L namely environmental degradation from local pollution, ED^G is a global pollution. Based on data availability, the scope of component depreciation of assets (both human and natural assets) in this calculation is as follows[3]:

1. Depreciating man-made assets.
2. Depletion of non-renewable natural resource namely oil, natural gas, and all mining commodities.
3. Depletion of renewable natural resources (In this case the forest resources)
4. Local environmental degradation (Here I cover only NOx pollution)
5. Environmental degradation from the global pollution of carbon dioxide emissions.

The interpretation of Genuine Saving is straightforward. If it is negative then it is a clear indication that the development in that region is not sustainable. The region has not done enough to ensure that the future generation can have at least the same level as wellbeing as the current one.

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[3] For more detailed calculation of the method to estimate provincial genuine saving rate or Green PDRB, please refer to Yusuf (2009).

Table 1. Genuine Saving Estimates of Indonesian Provinces 2005 (Rp Billion)

	Saving	Depre-ciation	Depletion			Degra-Dation		Genuine	GS Rate
	S	DK	DNR		DR	EDL	EDG	Saving	%
	S	DK	Migas	Non-migas	Forest	NOx	CO2	GS	GS/Y
1 NAD	7,039	1,582	6,045	193	254	829	568	-2,432	-4.27
2 SUMUT	31,870	6,903	439	492	961	2,411	2,474	18,189	13.03
3 SUMBAR	9,929	2,270	0	908	343	720	2,487	3,201	7.17
4 RIAU	14,190	5,611	32,998	638	5,851	1,761	2,153	-34,822	-19.34
5 JAMBI	3,563	556	2,078	126	350	660	853	-1,060	-4.71
6 SUMSEL	15,021	2,862	10,795	1,544	705	806	1,475	-3,166	-3.88
7 BABEL	1,861	640	0	1,388	39	253	252	-710	-5.01
8 BENGKULU	1,094	518	0	174	118	196	207	-120	-1.18
9 LAMPUNG	8,129	1,444	525	337	121	711	1,069	3,922	9.59
10 DKI	145,713	19,656	1,078	0	0	8,876	9,239	106,863	24.63
11 JABAR	54,306	23,310	5,934	468	178	2,416	8,802	13,199	3.39
12 BANTEN	12,522	5,747	0	48	31	359	3,210	3,127	3.70
13 JATENG	34,790	12,834	54	1,195	734	5,952	6,383	7,638	3.26
14 DIY	7,582	965	0	109	182	1,180	882	4,264	16.83
15 JATIM	56,945	29,308	466	3,950	513	6,117	9,721	6,871	1.70
16 KALBAR	10,692	1,434	0	234	775	707	722	6,819	20.13
17 KALTENG	4,023	706	0	137	604	338	316	1,922	9.16
18 KALSEL	3,580	1,829	345	2,234	230	791	1,074	-2,923	-9.19
19 KALTIM	20,109	7,757	27,386	11,313	2,230	916	825	-30,318	-16.82
20 SULUT	9,402	750	0	446	36	261	349	7,559	40.29
21 GORONTALO	831	218	0	18	16	69	108	402	11.56
22 SULTENG	4,063	638	0	176	503	586	397	1,764	10.30
23 SULSEL	7,038	3,214	69	2,512	73	733	3,380	-2,943	-5.24
24 SULTRA	2,574	986	0	397	200	128	283	580	4.47
25 BALI	5,898	2,121	0	125	1	1,657	1,239	756	2.23
26 NTB	4,202	1,252	0	5,130	10	393	361	-2,945	-11.47
27 NTT	4,232	561	0	121	22	183	295	3,051	20.60
28 MALUKU	1,059	227	10	12	52	158	186	413	9.04
29 MALUT	583	150	0	63	56	1	66	247	9.58
30 PAPUA	8,904	2,666	807	17,528	879	206	306	-13,490	-26.18

Source: Author's calculation using various data source

On the map below, it is shown the genuine saving rate for Indonesian provinces. Being red means that the regional development in those provinces is non-sustainable.
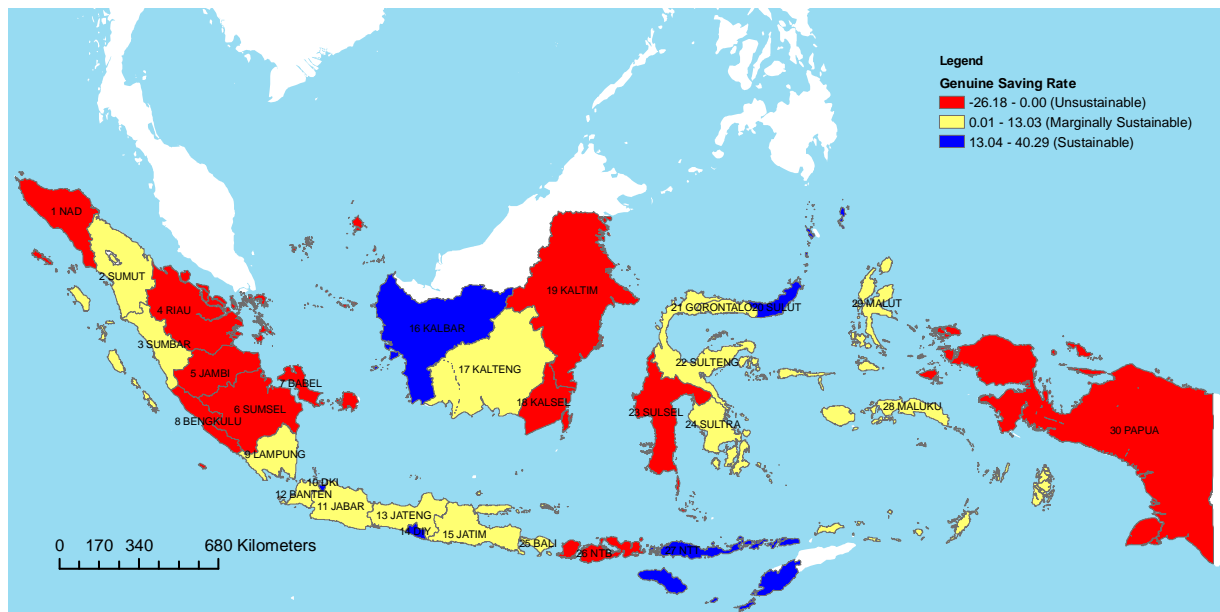
Figure 2. Genuine Saving rate of Indonesian Provinces (2005, % of GRDP).

As the above analysis suggest, using only weak sustainability test and only incorporating limited elements of environmental resources, every 1 of 3 Indonesian provinces are not in a sustainable development path. More provinces will fail the test when other elements such as other ecosystem services are included. This is an alarming message in the context of Indonesian regional development.

What does it have to do with conservation? In a strong-sustainability sense, non-sustainable development is a failure to conserve each type of our assets for our next generation. In a weak-sustainability sense, non-sustainable development is a failure to re-invest the proceed from natural resource exploitation or environmental services into other form of assets such as infrastructure or education. In a more general term, non-sustainable development is a sub-optimal allocation between conservation and development. It is a mismanagement of assets portfolio for a sustainable development. In short, the first motivation of a regional government to care about conservation is simply its own interest to put its development into the sustainable path, to make sure that the future generation of that regions can at least enjoy the same level of wellbeing as what the current generation has today. It is a motivation from within, assuming that

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the regional government is a benevolent representative of the regions. If the regional government wants a sustainable development, then the region needs to conserve more and not only liquidating all its assets especially environmental assets. This is the very basic idea of the motivation for conservation: to meets its own need, to balance its present and future wellbeing of the region's people. Looking at the numbers (Genuine Saving), it is imperative to re-think the way the regional development is currently being managed.

3 Efficiency Principle of Financing Conservation

Sustainability perspective of conservation motivation put emphasis on future generation. However, most environmental problems of today affect our current livelihood. Thousands of life has been lost because we under-value the ecosystem function of forests to protect us from landslide. Water has been scarce because we deliberately destroy forest ecosystem. For the last ten years, for example, every time a flood occurs, on average, it will cost around 40 million dollar and kill 36 people (see table 2). For the last ten years alone, it cost us 1.5 billion dollars and kills more than 1 thousand people.

Table 2. Summarized Table of Natural Disasters in Indonesia from 2001 to 2010

		# of Events	Killed	Total Affected	Damage (000 US$)
Drought	Drought	1	-	15,000	1,000
	ave. per event		-	15,000	1,000
Flood	Unspecified	5	55	4,930	-
	ave. per event		11	986	-
	Flash flood	17	1,239	879,068	90,200
	ave. per event		73	51,710	5,306
	General flood	35	1,243	2,036,938	1,411,433
	ave. per event		36	58,198	40,327
Mass movement wet	Landslide	23	900	275,579	60,404
	ave. per event		39	11,982	2,626
Wildfire	Forest fire	3	-	400	14,000
	ave. per event		-	133	4,667

Created on: Apr-13-2010. - Data version: v12.07
Source: "EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium"

Many of those disasters can be linked to the destruction of ecosystem, especially, forest or even climate change. But for sure, it can be attributed to the suboptimal management of conservation and development. The impact however is today, not tomorrow.

Economics explanation to most of the environmental problems of this sort can be referred to the problem of under-valuation of environmental resources. The true efficient allocation of resources has to take into account any externalities. Conservation has value, but most of the time the value is simply overlooked. The value is directly related to both current and future people's livelihood.

4 Climate Change Impact and the Need for Mitigation and Adaptation

In regards to climate change, it is also regional government's interest to pursue a low carbon development. In April 2009, ADB released the long-awaited regional review of climate change. The review, sometimes coined the Southeast Asian Stern Review, concludes that Southeast Asia is highly vulnerable to climate change. The study shows evidences that climate change is already happening in the region: mean temperature increased at 0.1–0.3°C per decade between 1951 and 2000; rainfall trended downward during 1960–2000; and sea levels have risen 1–3 millimeters per year (ADB, 2009).

The vulnerability of Southeast Asia countries can be seen notably from the impact of sea level rise. The long coast line of Southeast Asian regions makes it very vulnerable as millions of people live along coastal zones. It is estimated that in Indonesia, around 10 million people will be displaced by 1 meter sea level rise, only a little lower than Vietnam, the highest in the world[4] (table A1). Indonesian islands are also home for many densely-populated coastal cities (see Figure A1).

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[4] Dasgupta et al (2007)

Table 2. Population displaced by sea level rise

Country	1m SLR	5m SLR	Population	1m SLR (%)	5m SLR (%)
Cambodia	31,311	969,266	12,656,700	0.25	7.66
Indonesia	10,762,734	19,959,934	203,296,806	5.29	9.82
Laos	0	0	5,891,982	0	0
Malaysia	2,024,703	3,573,497	26,044,000	7.77	13.72
Philippines	1,949,331	3,368,402	82,128,690	2.37	4.1
Thailand	376,080	9,044,620	58,733,951	0.64	15.4
Vietnam	12,313,156	25,346,874	72,042,197	17.09	35.18

Source: Author's GIS analysis using data from CIESIN and CReSIS
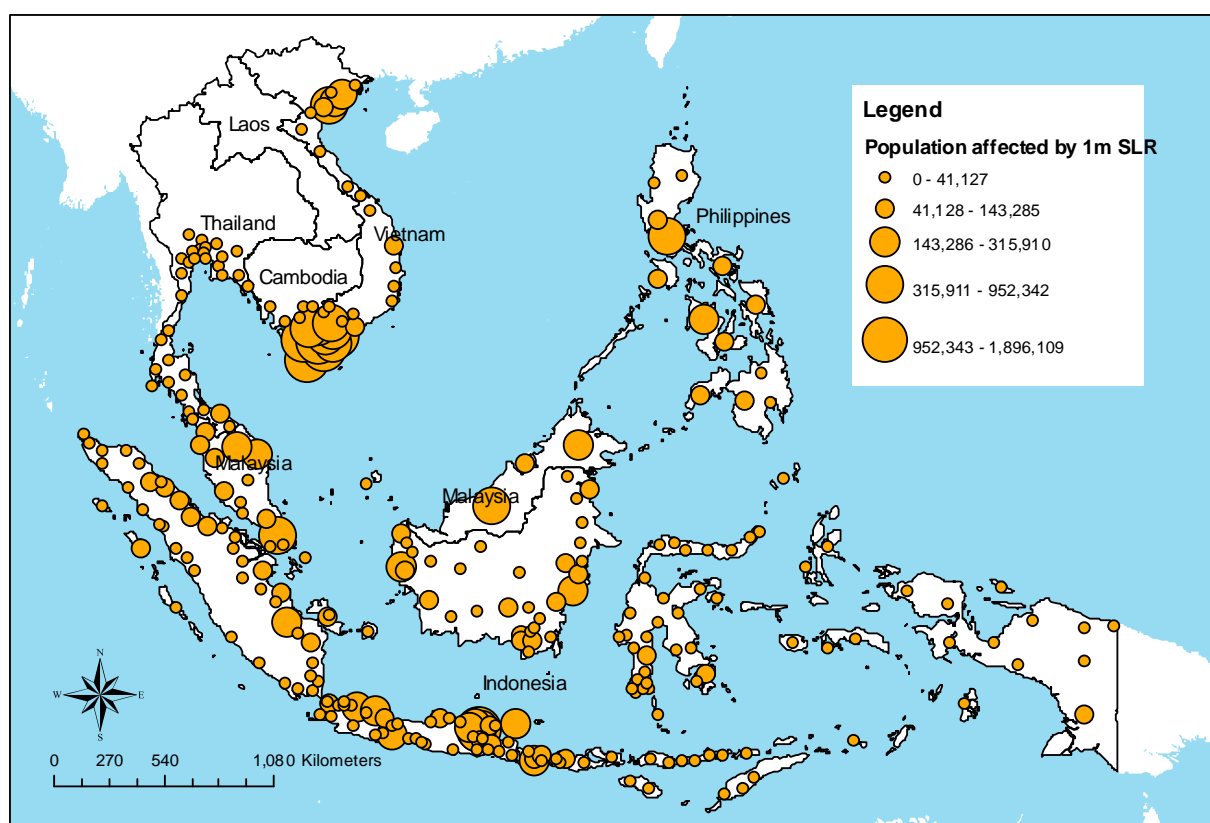
Figure 3. Population affected by 1 meter sea level rise (author's GIS analysis)

The economics of the ADB report is even more alarming. Southeast Asia is likely to experience lot higher economic cost from climate change than the global average. The combined typical geographic and socioeconomic condition of Southeast Asian countries is the main reasons of the

severity of the impact. Southeast Asian regions have relatively long coastlines, densely-populated coastal zones, high dependence on agriculture and primary products, relatively low adaptive capacity, and mostly tropical climates. As a result, the study predicts that without appropriate action, the regions will loss 6.7% of GDP on average annually by 2100, almost three times the global average of 2.6% of GDP.

A report released by the Economy and Environment Program for Southeast Asia (EEPSEA) -- a Singapore-based environmental economics research group – complement the ADB's report by producing a map of climate change vulnerability in Southeast Asia (Figure 4). The map pinpoints that regions in Indonesia are among the most vulnerable to climate change in Southeast Asia. The study assessed the vulnerability of 530 districts or province in 7 countries[5] based on its exposure to multiple climate hazards risk (the historical frequency of floods, droughts, landslide, typhoon, and the extent of sea level rise), sensitivity to the exposure, and the adaptive capacity to climate change.

The study found that districts in Jakarta are occupying four of the top ten hotspots out of a total of 530 sub-national regions in Southeast Asia, with Central Jakarta come out as the most vulnerable city in Southeast Asia. Not only does the city lie at the intersection of many climate-related hazards — floods and sea level rise — it is also densely populated. These risks are beyond the city's current capacity to adapt. Other densely-populated cities in Java such as Bandung and Surabaya are also on the top list of vulnerable regions in Southeast Asia (Yusuf and Francisco, 2009).

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[5] Indonesia, Malaysia, Thailand, Lao PDR, Vietnam, Thailand and Cambodia
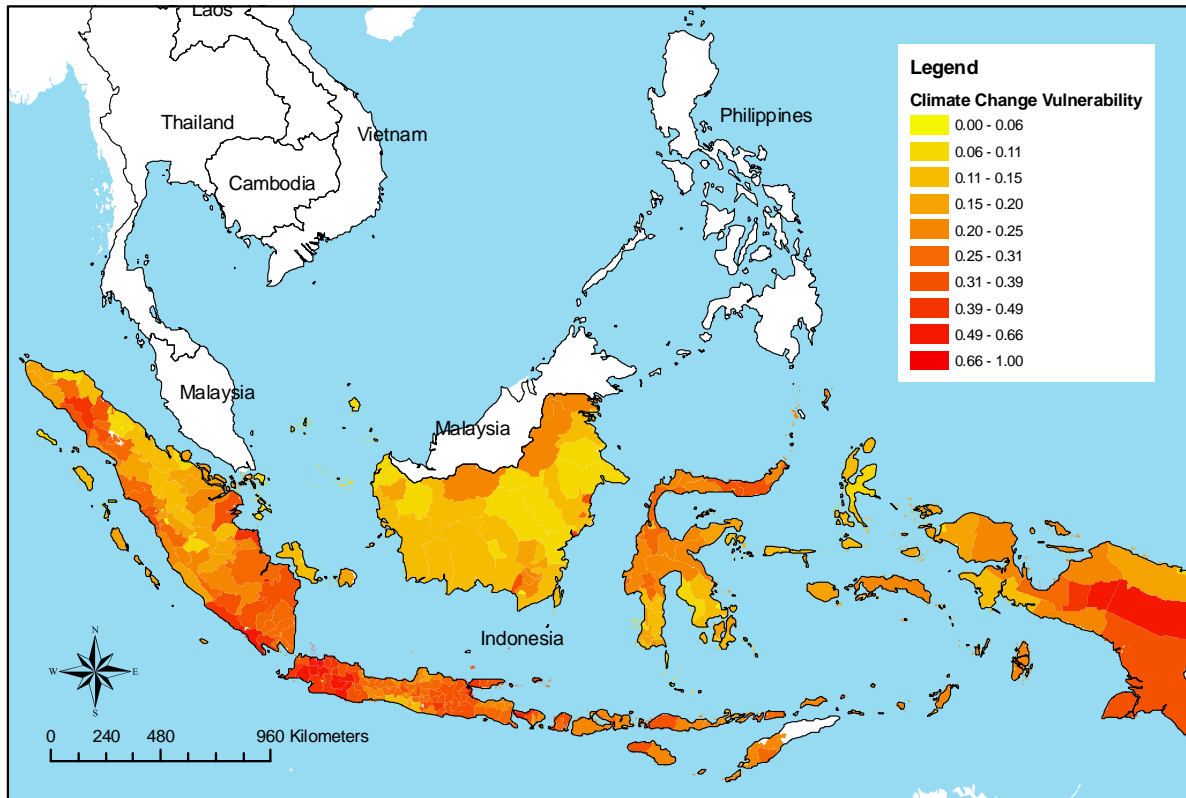
Figure 4. The map of Indonesia's climate change vulnerability (Yusuf and Francisco, 2009)

Although there are previous reports suggesting the vulnerability of Indonesia to the impact of climate change, the finding of these two recent reports signify its magnitude to the extent that the risk that Indonesia face can be among the highest in the world. This has important policy significance in the way climate change should be mainstreamed into the policy arena as it gives more emphasis to the cost of business-as-usual scenario. Annual loss of 6.7% of GDP as the ADB report suggested is so large that it can reverse the decades of economic progress and poverty reduction. This high vulnerability calls more attention toward climate change adaptation. When the success of mitigation depends much on the action at the global level, adaptation at national and local scale may have more foreseeable benefit

5 Implication for Financing

As it is argued earlier, the first motivation for conservation is sustainable development. The beneficiary of the sustainable development is the future generation of the region in question. If

one region cares about the future well being of its offspring, then it needs to make sure that the regional development is on sustainable path.

The first source of financing to make sure that we conserve our wealth for future generation are the proceed from natural resource exploitation. Proceed from natural resource exploitation should be invested for sustainable development. Regional government needs to follow Hartwick Rule: Invest all proceed from natural resource depletion into other form of capital. For this case, there is a need to monitor the sustainability indicator of region (such as the Genuine Saving), province or district, in addition to other conventional economic indicators. In this context, it is necessary that natural resource rich provincial or local government should carefully spend the revenue from its natural resource exploitation.

A decision to conserve or not to conserve (let's say to develop or conserve a large piece of forested land) is a result of benefit cost calculation of the agent in question. One agent is regional government. Conserving a large forested land which function as watershed protector serving the population of a region has a huge benefit compared to the alternative use such as for residential area. Conservation is an optimal decision. A regional government as the benevolent representative of its people acts rationally through its spatial planning to conserve the forest. There is no issue of financing the conservation in this case. If any, the cost of the conservation is the benefit foregone from alternative use as a residential which in this case is lower than the benefit of conservation. In short, conservation where its benefit exceeds its opportunity cost does not necessarily require financing.

The term financing may perhaps need to be redefined. In a resource constraint world, there is always opportunity cost of any action that we do including conservation or climate change mitigation.

The problem is more complex, however, when more externalities occur i.e. when the benefit of one region's conservation action is accrued to beneficiaries in other jurisdiction. From the actor who holds the property right, the benefit is then underestimated making it less likely that the conservation will happen. Many environmental problems have this character in nature including the problem of climate change. In this case, the solution is either to let the higher jurisdiction or cooperation make the decision or let the beneficiaries compensate the property right holder the

amount of their Willingness to Pay (WTP). This compensation is one form of conservation financing. The fund, however, is not intended to pay for the conversation per se, such as to pay for the natural park management, but inherently to help compensate the opportunity loss from not conserving the forest.

6 Climate Change and Conservation with global benefit

As discussed earlier, the impact of climate change to us is clear and to some extent is happening, meaning that the action to mitigate climate change is in our interest, is in our benefit. However, our mitigation action will also have positive externalities i.e. benefiting others the global citizens as climate change is a global problem. It is because at the first place, climate change problem, similar to biodiversity loss or ozone depletion is environmental problems caused by what is called global appropriation failure. Local or national resource has value to global community but the value cannot be captured.

As an illustration, table 3 below shows that the value of carbon sequestration of Indonesian forests is so high. By only assuming a conservative value of $5/ton of CO2, the CO2 sequestration value of Indonesia is around 2.6 times GDP. For certain province, it is a lot higher. For Papua for example the ration of the carbon sequestration value to its GRDP is 53 times. However, the service of the forest for preserving the carbon stock is benefiting global community. To local decision maker, this value may rationally be a lot less than the alternative use of forest. To tackle this problem, a scheme called Reduction of Emissions from Deforestation and Forest Degradation (REDD) is among the most innovative incentive system ever established for tackling global environmental problems. With REDD the global community can top-up the benefit of conservation making the value of the forest alternative use is comparably lower. It gives regional government a different setting of benefit-cost calculation of conservation and development.

 REDD scheme is not the only available incentive mechanism for climate change mitigation that may involve regional government. Ministry of Finance is considering a special Regional Incentive Mechanism (RIM) as an incentive system for climate change mitigation from land use change (See Figure 4). It will be a mechanism to reward provincial or local government for doing conservation through the existing inters government fiscal transfers. The detail plan or

implementation of this scheme is still at its infancy. The biggest question is that its effectiveness will depend on whether the size of the fund is significant enough to compete with the benefit of alternative use of land development.

Table 3. The Value of Carbon Sequestration by Provinces

Province	Area (Ha)	Average Carbon density (TC/ha)	Total Carbon Stock (MT CO2)	Value (Rp Trilion, $5/tCO2)	PDRB (Rp Trilion, 2000 Price)	Ratio to PDRB
Nanggroe Aceh Darussalam	5,650,051	149.1	3,083	146	36.04	4.06
Sumatera Utara	7,242,781	163.2	4,325	205	99.79	2.06
Sumatera Barat	4,222,465	162.3	2,509	119	32.91	3.62
Riau	8,784,423	149.9	4,818	229	86.21	2.65
Jambi	4,534,849	141.9	2,356	112	14.28	7.84
Sumatera Selatan	6,030,254	113.0	2,494	118	55.26	2.14
Bengkulu	1,979,515	143.9	1,043	50	7.01	7.07
Lampung	3,773,515	86.5	1,195	57	32.69	1.74
Kepulauan Bangka Belitung	1,642,414	124.8	750	36	9.47	3.76
Kepulauan Riau	808,401	149.9	443	21	34.71	0.61
DKI Jakarta	74,029	5.0	1	0	332.97	0.00
Jawa Barat	3,692,505	86.4	1,168	55	274.00	0.20
Jawa Tengah	3,279,971	76.3	916	44	159.11	0.27
DI. Yogyakarta	313,315	56.3	65	3	18.29	0.17
Jawa Timur	4,668,964	68.6	1,172	56	287.81	0.19
Banten	901,864	104.7	346	16	65.05	0.25
Bali	544,937	105.3	210	10	23.50	0.42
Kalimantan Barat	12,011,432	157.1	6,909	328	26.26	12.50
Kalimantan Tengah	15,356,450	172.5	9,698	461	15.75	29.24
Kalimantan Selatan	3,888,428	118.1	1,681	80	25.92	3.08
Kalimantan Timur	21,484,908	158.7	12,478	593	97.80	6.06
Sulawesi Utara	1,393,073	163.2	832	40	14.41	2.74
Sulawesi Tengah	6,808,983	158.6	3,952	188	13.68	13.72
Sulawesi Selatan	4,611,645	122.3	2,064	98	41.33	2.37
Sulawesi Tenggara	3,675,745	164.8	2,217	105	9.33	11.29
Gorontalo	1,216,544	152.2	678	32	2.34	13.76
Sulawesi Barat	1,678,721	159.3	978	46	3.57	13.03
Nusa Tenggara Barat	2,170,879	100.3	797	38	16.37	2.31
Nusa Tenggara Timur	4,613,787	49.5	835	40	10.90	3.64
Maluku	4,735,042	169.2	2,933	139	3.63	38.34
Maluku Utara	3,995,999	202.8	2,966	141	2.50	56.34
Papua	42,450,080	180.7	28,071	1,333	25.11	53.10
INDONESIA	188,235,969	149.3	103,982	4,939	1878.02	2.63

Source: Author's calculation using various data sources

Figure 4. Inter-Governmental Fiscal Transfer: A "Green Paper" Proposal
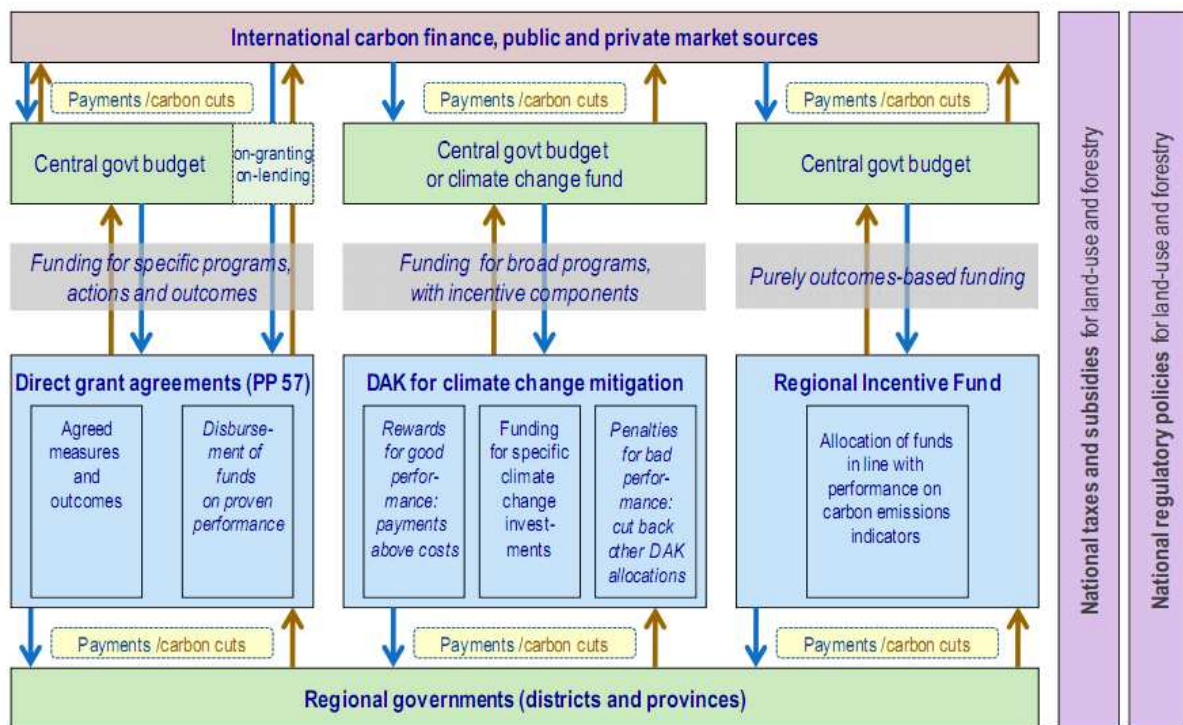
Source: Figure 5.8 in MOF (2009).

7 Concluding remarks

Conservation has always been linked to sustainable development, including in the regional or sub-national development context. Conservation of natural assets or at least conservation of total combined assets of a region (weak sustainability) is crucial for the interest of the region's future generation. Today, many of Indonesian regions fail even the weak sustainability test. Therefore, in the interest of sustainable development, an optimal balance between conservation and development needs to be established. Conservation then is in the interest of regional government, the benevolent representatives of the region's people.

When the total benefit of conservation, which is now in many cases are undervalued, has been included, then again it is in the interest of regional government to opt for conservation. For those two reasons above, if financing the conservation is needed, the source to look has to be from

internal sources within the regions, as its benefit accrued to the citizen of the region, its current and future generation.

Whenever a conservation action benefit others outside the region's jurisdiction, then transfers of compensation is needed to rebalance the benefit of conservation with its opportunity cost.

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