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Strengthening Natural Resources Management in ASEAN: National and Regional Imperatives, Targets, and Opportunities*

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Abstract: *The ASEAN Socio-Cultural Community Blueprint adopted in 2009 incorporated 'Ensuring Environmental Sustainability' as one of its six broader characteristics. A mid-term review (MTR) was carried out to evaluate the progress and effectiveness of the implementation activities both at the national level and for ASEAN as a whole. In this context, the objective of this study is to analyse the performance of natural resources management (NRM), which is crucial in ensuring environmental sustainability, of each ASEAN member country based on the MTR. Drawing on the review, an analytical framework is proposed to measure the performance of NRM with appropriate adjustments, relevant modifications, directions for the future, and corresponding way forward, whilst exploring opportunities for member countries and other countries in the Asian region. Some guidelines on time-bound short- and long-run action plans are suggested. A particular attention in this study is paid to developing some standardised concrete indicators or benchmarks that may be used for measuring the NRM activities within a common framework for all ASEAN countries.*

Keywords: Natural resources management, ASEAN Socio-Cultural Community, Environmental sustainability, bottom-up approach, Sustainable consumption and production
JEL Classification: O13, Q010, Q28, and Q5.

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1. The Context

The Association of Southeast Asian Nations (ASEAN) region, with a land area of 4.5 million square kilometres, accounts for nearly 3 percent of the world's total land mass. The region has a population over 605 million of which 45 percent lives in urban areas. It has 60 percent of the peatland areas of the world (25 million hectares). The region's natural resources of water, forests, oceans, and soil provide economic activities and livelihoods for its inhabitants. Most countries in the ASEAN region are served by river systems such as the Mekong River Basin and Lake Toba. The region has a long coastline measuring about 173,000 kilometres and has abundant freshwater resources, particularly Brunei Darussalam, Lao PDR, and Malaysia, which have the biggest water resources per capita. Indonesia, Malaysia, and the Philippines are rich in biodiversity, and these countries together account for around 80 percent of global biological diversity (Roberts *et al*., 2002). About 65 percent of the world's coral species are located in the 'coral triangle' encompassing parts of Indonesia, Malaysia, and the Philippines, which is one of the most economically productive marine regions in the world (Suuronen *et al*., 2013). About 45 percent of the ASEAN region is covered by forests, which provide a natural habitat for some 40 percent of all animal species on earth.

Amongst the ASEAN countries, Myanmar, Cambodia, and Lao PDR are agriculture-based countries with a high proportion of gross domestic product (GDP) coming from the agriculture sector. Brunei Darussalam and Singapore are the most urbanised countries in the region and the contribution of the agriculture sector to GDP in these countries is less than 5 percent. In between these two extremes Indonesia, Malaysia, Philippines, Thailand, and Viet Nam are at different stages of transformation. Overall, the ASEAN region has consistently shown positive economic growth in the last few decades. As an example, before the global financial crisis, during 2000–2007, real GDP of the ASEAN economies increased by 6 percent, and is expected to grow on average by more than 5 percent during 2014–2018, according to projections by the Organisation for Economic Co-operation and Development (OECD). Real GDP of some of the countries in the region, such as Lao PDR, Cambodia, and Indonesia, is projected to increase to above the ASEAN

average. Indonesia, the Philippines, Thailand, and Viet Nam are now part of the middle-income group of countries, as defined by the World Bank, with Malaysia approaching the upper end of that range. The scenario simulation of the OECD study revealed that Malaysia is likely to become a high-income country in 2020, Thailand in 2026, Indonesia in 2042, and both the Philippines and Viet Nam could become high-income countries after 2050 (OECD, 2013).

Table 1: Annual Percentage Change and Projected Change in Real GDP Growth, ASEAN

Country/group	2000–2007	2012	2018	2014–2018
ASEAN–6				
Brunei Darussalam	-	1.0	2.4	2.3
Indonesia	5.1	6.2	6.1	6.0
Malaysia	5.5	5.6	5.3	5.1
Philippines	4.9	6.8	5.9	5.8
Singapore	6.4	1.3	3.1	3.3
Thailand	5.1	6.5	5.3	4.9
ASEAN–4(CLMV countries)				
Cambodia	9.6	7.2	7.1	6.8
Lao PDR	6.8	7.9	7.5	7.7
Myanmar	-	-	7.0	6.8
Viet Nam	7.6	5.2	6.0	5.4
ASEAN–10*	5.5	5.5	5.6	5.4

Note :* Excluding Myanmar
Source: OECD (2013). Based on Table 0.1

Population increases and rapid economic growth, combined with existing social inequities, have exerted mounting pressures on natural resources in individual ASEAN member countries (AMCs) and the region as a whole. Countries in the region are also faced with transboundary environmental issues such as air, water, and land pollution, urban environmental degradation, and the depletion of natural resources. These forces have led to increased consumption of resources and generation of disposable waste. Despite an abundance of natural resources, the ASEAN countries are faced with the challenge of keeping a balance between environmental sustainability and economic development (Anbumozhi and Bauer, 2010). Indonesia and the Philippines are particularly prone to natural disasters such as typhoons, storms, and flooding. And the other AMCs are not immune to such

disasters. Between 1970 and 2010, people exposed to flooding are estimated to have doubled and people in cyclone-prone areas in the region rose from72 million to 121 million (UNESCAP/ADB/UNDP, 2013). AMCs are diverse in their levels of development; hence, priorities in terms of Natural Resource Management vary across these countries and their emphasis is different according to the level of risks involved. Despite these differences in national priorities, all countries in the ASEAN region have emphasised sustainable development in their development plans.

1.1. Natural Resources Management: Significance

Natural resources management (NRM) encompasses not only the planning of land use, water and soil management, maintaining air quality, biodiversity conservation, and ecology. Contemporary environment economists also incorporate issues such as ensuring the future sustainability of industries including agriculture, mining, tourism, fisheries, and forestry. Natural resource availability, in general, is a function of the demand and supply of resources. The demand side shows an ever-growing trend as a result of the countries' continual efforts to achieve higher economic growth and improved living standards, whereasthe supply side is more or less unpredictable. The result could be a scarcity of natural resources, which brings with it the risk of reaching a point of no return in terms of environmental degradation in the course of time. This would not only result in a depleted ecosystem, but it could also result in excessive exploration for new resource stocks that would damage the environment's long-term sustainability. A significant portion of the impact transcends national boundaries and ultimately becomes a global concern. Increasing concern over the complex dimensions of natural resource dynamics has induced a paradigm transition to global policies focusing more on a sustainable and resilient environment in recent times. Hence, efficient and effective natural resources management has become crucial for ensuring sustained development and a better future for the region.

Since its establishment in 1967, ASEAN has been striving for accelerated economic growth, greater social progress, and regional peace and stability through enhancing mutual understanding, trust, and cooperation amongst the member states. Over time, it has widened its scope and expanded its horizon of activities. As part of

this process, with a view to achieving sustainable development whilst promoting a clean and green environment through protecting the natural resource base of the AMCs and the region as a whole, the ASEAN Socio-Cultural Community (ASCC) Blueprint adopted in 2009 incorporated 'Ensuring Environmental Sustainability' as one of its six broader characteristics – 11 different elements with a total of 98 action plans were drawn up to accomplish the goal related to this characteristic. Some of the action plans bestowed responsibility on individual member states, whereas others required a concerted cohesive effort from all the members. The ASEAN Secretariat is in charge of monitoring and reviewing the implementation of the ASCC Blueprint.

A Mid-Term Review (MTR) was carried out to evaluate the progress and effectiveness of the implementation activities both at the national level and for ASEAN as a whole. The assessment was based on primary data, documents, and interviews with concerned stakeholders from June to August 2013. An ASCC scoreboard, adopted in February 2012, provides a quantitative assessment of the achievement of goals and targets for each AMC, whilst the implementation-focused monitoring system helps analyse the procedural implications of the ASCC Blueprint.

1.2. Objectives of This Study

The objective of this study is to analyse the performance of NRM of each AMC on the basis of the MTR. Based on the review, an analytical framework will be proposed with appropriate adjustments, relevant modifications, directions for the future, and corresponding way forward, whilst exploring opportunities for member countries and other countries, particularly in the Asian region. Some guidelines on time-bound short- and long-run action plans will be suggested. Another important focus will be on developing some standardised concrete indicators or benchmarks that may be used for measuring the NRM activities within a common framework for all ASEAN countries.

Specifically, this study comprises of two major aspects:

a) Intensive efforts towards effective formulation and implementation of NRM policies, and the development of concerned institutional frameworks at the national level (for each AMC) to achieve the goals and targets set in line with their vision; and

b) Regional cooperation initiatives for strengthening NRM as a whole, in line with recent global and other regional perspectives.

2. Regional Policy Framework on Environmental Sustainability

Overall, the ASEAN strategies for NRM are incorporated in 11 priority areas outlined in the ASCC Blueprint (2009–2015). These priorities focus on climate change in general and particularly on the sustainable development of water, forest, air, coastal, and marine resources.

For each of the priority areas, the ASCC Blueprint has identified subsidiary organisations (SO) responsible for the implementation and collection of data in the selected priority areas. These SOs act as working groups, and develop programme objectives, targets, and indicators to measure the progress of work in the relevant areas. The ASCC Blueprint has also assigned a Lead Country (LC) responsible for strategic direction and overall responsibility relating to the programme. The ASEAN Secretariat is responsible for areas that have not been assigned to a specific SO or LC. The following table outlines the priority areas specified in the ASCC Blueprint with the SO and LC for each priority area:

Table 2: ASCC Blueprint: Priority Areas, Subsidiary Organisation, and Lead Country

Priority area	Subsidiary organisation	Lead country
D.1. Addressing global environmental issues	AWGMEA	Viet Nam
D.2. Managing and preventing Transboundary environmental pollution (Transboundary and Transboundary movement of hazardous waste)	AATHP	ASEAN secretariat
D.3. Promoting sustainable development through environmental education and public participation	AWGEE	Brunei Darussalam
D.4.Promoting environmentally sound technology	AWGSESC	Malaysia
D.5. Promoting quality living standards in ASEAN cities/urban areas		Indonesia
D.6. Harmonising environmental policies and databases (reporting, monitoring, and database		ASEAN Secretariat
D.7. Promoting the sustainable use of coastal and marine environment	AWGCME	Philippines
D.8. Promoting sustainable management of natural resources and biodiversity	AWGNCB	Myanmar
D.9. Promoting the sustainability of freshwater resources	AWGWRM	Singapore
D.10. Responding to climate change and addressing its impacts	AWGCC	Thailand
D.11. Promoting sustainable forest management		

Source: http://environment.asean.org/about-us-2/ accessed on 4 December 2014.

The ASEAN Senior Officials Meeting on Development Planning (SOMDP) manages sharing of information across sectoral bodies, and monitoring results. The ASEAN Heads of Statistical Offices Meeting (ASHOM) is responsible for statistical coordination within ASEAN and the publication of statistics to measure progress in the ASEAN region's achievement of the Millennium Development Goals (MDGs)

Considering NRM as an independent focal area, it is found that some of the elements of the characteristic of 'Ensuring Environmental Sustainability' in the ASCC Blueprint 2009–2015 do not represent the core resource-based NRM elements. For example, preventing of transboundary environmental pollution, hazardous waste, haze, promotion of environmentally sustainable cities, and climate change issues reflect the 'multifaceted aspects' of natural resources management, whilst the promotion of sustainable use of coastal and marine environment, biodiversity, water resource management, and sustainable forest management reveal the 'specific aspects' of natural resources management. Although some positive trends are shown for most of the AMCs' performances in adopting and executing the action plans, the MTR and the ASCC Scorecard show that not all AMCs have been equally successfully in implementing the ASCC Blueprint. Based on the evidence provided in the MTR and by the ASCC Scorecard, country-specific reviews are described in Appendix I.

2.1. Current Issues

Overall, the ASEAN Roadmap identified some systemic issues that hamper the attainment of the MDGs, which were identified from workshop deliberations and consultations with individual AMCs. These issues are equally applicable to non-MDG indicators used in areas included in the ASCC Blueprint.

2.1.1. Data Collection and Reporting

The MTR revealed some of the facts on the challenging aspects of data collection and reporting on the sustainability of the environment. It seems that the collection, processing, and reporting of the large volume of data by the AMCs placed a considerable burden on the respective statistical bodies and other reporting agencies, some of which were considered to be overburdened with work. For example, the number of indicators recommended for use in NRM alone exceeded 50, and most of these are new and are in addition to the few environmental sustainability indicators included (Goal Number 7) in the MDG framework. Specifically, concerning water-resources alone, there are 24 quantitative indicators and 18 qualitative indicators each AMC is expected to report on, irrespective of whether any specific services/legislations are available for specific water resources. The blueprint covers many other areas that require data to produce indicators.

The relevant subsidiary bodies normally consult AMCs and relevant agencies in developing the monitoring indicators. But some member countries have not yet developed a capacity to provide such data for compiling indicators. And in some cases, the data supplied are incomplete or contain many errors. For example, the feasibility study endorsed by the ASEAN Heads of Statistical Offices Meeting (2010), found that of the 60 MDG indicators only 27 were usable and of good quality and could be compared across AMCs. And several data items provided by some AMCs needed substantial adjustments and imputations before they could be used to compile the relevant indicators.

To monitor the progress of achievements there is a tendency to ask for more data. However, having to compile and report on many indicators could burden statistical organisations in some countries, which will be counterproductive. The present emphasis on the number of indicators, in a few cases seems to have an adverse effect on timely reporting. Accountability and transparency issues are also being addressed through this process.

2.1.2. Implementation of Policies and Programmes

The AMCs faced several challenges in implementing the policies and programmes for NRM, particularly in the following areas:

a) *Alignment between national and sectoral plans*

Development plans, strategies, targets, and timelines concerning environmental sustainability and NRM of several AMCs are not in line or compatible with overall national plans and strategies. This means that in some cases national plans are not reflected in sectoral plans or vice versa. These kinds of policy imbalances are very difficult to correct, as the 'ASEAN Way' is not to interfere with other members' domestic (national) policies. Here, the building up of social capital and political capital in the form of social awareness, understanding, and cooperation across members is needed.

b) Widespread involvement of all stakeholders

In activities relevant to the attainment of respective targets set in ASCC Blueprint, some stakeholders including professional bodies, civil society organisations, non-governmental organisations (NGOs), and the private sector, seem not to be intensely involved. These stakeholders, in most cases, are interested in the activities which can bring direct or indirect benefits to them.

c) Information sharing

The ASCC blueprint recognises the importance of relying on existing databases and best practice manuals developed within ASEAN. There is also a need for academic and research institutions to undertake extensive research, particularly on the updating of best practices of NRM, and to exchange the results on NRM amongst the member countries.

d) Institutional and legal reforms

Instituting effective reforms with respect to institutional and administrative structures and legal frameworks is an issue most AMCs need to address, to build an enabling environment for NRM.

e) Coordination and partnership

Another issue that frequently emerges as a significant problem is the lack of effective coordination across agencies. For example, responsibility for the

supply of clean water and provision of sanitary facilities is divided between multiple agencies. Coordination across these agencies is essential for effective implementation and efficient monitoring of progress.

3. Future Directions

3.1. Newer Perspective – '*Natural resources management for better life'*

Changing socio-ecological and political dynamics seem to have a profound influence on the implications of recent global and regional policies. As a result, it is evident that policymakers are extensively linking the economic development agendas to socio-welfare and human development goals over time. As part of this process, the ASCC Blueprint adopted in the Cha-Am Hua Hin Declaration on the ASEAN Roadmap stated that its primary goal is 'to contribute to realising a people-centred and socially responsible society'. However, human welfare was not explicitly incorporated in most of the agendas and action plans adopted under the characteristic termed 'Ensuring Environmental Sustainability'. Especially, NRM, which is closely linked with human lives and livelihoods, could have given more emphasis to this particular issue. Therefore, 'Natural resources management for better life' can be established as the core philosophy for strengthening NRM in ASEAN for the post-2015, where all the policies and action plans should be linked with people's welfare, whilst protecting the environment and striving for the sustainable management of natural resources in the region.

In this context, it is worth noting that the United Nations, in its Sustainable Development Goals (SDG), which will replace the Millennium Development Goals for the post-2015 period, put greater emphasis on the inclusion of people in the proposed agendas. It states:

> People are at the centre of sustainable development and, in this regard, in the outcome document, the promise was made to strive for a world that is just, equitable and inclusive and the commitment was made to work together to promote sustained and inclusive economic growth,

social development and environmental protection and thereby to benefit all, in particular the children, youth and future generations of the world' (UN 2014, p.1).

The above-mentioned aspect of post-2015 NRM in ASEAN would also help the member states to achieve the targets of SDG, the priority areas and broad objectives of which are outlined in the draft SDG of the Open Working Group (OWG) of the United Nations–appear comparable with the ASEAN priorities and post-2015 development agenda of the AMCs. It is also important to note that the SDG framework is based on the view that regional and individual priorities should take precedent over global priorities. This will give the AMCs flexibility to define their own routes to development within the global framework for sustainable development outlined in the Open Working Group (OWG) report approved by the United Nations General Assembly.

3.2. Reshaping the Blue Print: The NRM Perspective

The ASCC Blueprint has incorporated many of the issues concerning NRM, but they are not framed in a very cohesive way. In fact, only one specific element (Number8) under the characteristic referred to as 'Ensuring Environmental Sustainability' has incorporated the term 'natural resources'. And only one action plan under this element aims to combat land degradation, whereas the other action plans focus merely on biodiversity issues. Although NRM issues such as water resource management, forest management, coastal and marine environment management, and haze pollution management were dealt with under different elements in the blueprint, several other issues like proper land use, soil management, and the quality of air management were not included in the broader framework. Neither was the other dimension of NRM that deals with the future sustainability of industries comprising agriculture, mining, and tourism included in this current roadmap.

3.2.1. The Elements

To strengthen NRM activities in ASEAN, it is vital to treat NRM issues more specifically and concretely. This requires an emphasis on strengthening NRM

activities in ASEAN, and rearrangement of the existing framework of ASCC to take account of NRM. The format could be reframed with some reorganisation in terms of defining and categorising the elements and designing time-bound action plans for each element.

The following re-arrangement of elements could be considered:

1. Resource based elements (at the national level)
    a) Usage of land.
    b) Inland water resources management.
    c) Ensuring the quality of soil.
    d) Ensuring the quality of air.
    e) Sustainable forest management.
    f) Sustainable management of biodiversity.
    g) Promoting the sustainable use of coastal and marine resources.
    h) Ensuring environmental quality of life.
    i) Future sustainability of agricultural industry.
    j) Sustainable extraction and use of energies and minerals.
    k) Promoting green and sustainable tourism.
2. Resource-based elements (at the regional level)
    a) Transboundary haze pollution management.
    b) Transboundary movement of hazardous waste.
    c) Joint management of transboundary protected areas.

3.2.2. Action Plans

Action plans should be designed for the short term as well as the long term. The plans should preferably be 'SMART' i.e., Specific, Measurable, Achievable, Realistic, and Time-bound. A country's present status in terms of its advancement towards environmental sustainability, relevant institutional development, socio-political settings, and consumer preferences should be considered for effective formulation of action plans for NRM. To accommodate the goals set by SDG for the post-2015 period, an action plan for ASCC should be designed in accordance with the targets relevant to SDG. For proper implementation of NRM, the sequential

methodology of action plans may be set for each element (where applicable) as mentioned in Figure-1. It implies that, the foundation for widespread knowledge about each natural resource is key to NRM.

At the earliest stage, raising awareness about NRM issues amongst stakeholders is needed to create the required platform for the further enhancement of action plans through formal education and technological specialisation. Prior to the adoption of a legal framework on NRM issues, policies must be harmonised at the national and the regional/global level. The harmonisation of policies amongst AMCs presents difficulties for implementation due to the different stages of development of AMCs. Concerted efforts are needed to build 'political capital' in the form of improved political will amongst the policymakers of AMCs. Nevertheless, the enforcement of the adopted action plan under that legal frame is the ultimate stage. Table 3 shows the probable focus areas for natural resources, programmes, or action plans, and institutional development at different phases of NRM implementation. It should be noted that, along with natural resources and programmes, institutional development should be given adequate emphasis from the early phase of NRM implementation. Institutions, as we know, are the rules of the game that reduce uncertainties through shaping the interactions amongst the stakeholders. Hence, the simultaneous development of an institutional framework is as important as the other basic elements of NRM.

Planning for NRM requires a different approach from conventional economic planning. Since every small locality or area has different environmental characteristics and given the diverse nature of local demand, the local communities would better understand the challenges, prospects and the way forwards. Hence they should be involved with the NRM policy of that locality or area. A bottom-up approach, therefore, is most effective for NRM planning.

The flowchart in figure-2 depicts a 'bottom-up' approach to NRM policy formulation. Since the wellbeing and livelihoods of people living in the local community depend on the environmental settings they lived, we can assume that these local people have better information on the current state and condition of the natural assets. With their practical understanding and experience, the local

community can greatly contribute to identifying the challenges faced by and the opportunities presented by their local NRM system.

Such information, along with the customised recommendation on NRM policy measures from the local community, would help in formulating an effective and compatible policy framework for the regional level. The government would analyse the information and policy recommendations received from different parts of the country. It should also ensure that the policy formulated in this process must be aligned with the vision and goals set into the ASCC Blueprint. The government can subsequently determine the priority issues and formulate the NRM policy with some locality-specific set of actions. The resources required for proper and timely implementation of those action plans can be allocated from the top towards the down of the linkage.

Figure 1: Chronological Action Plans

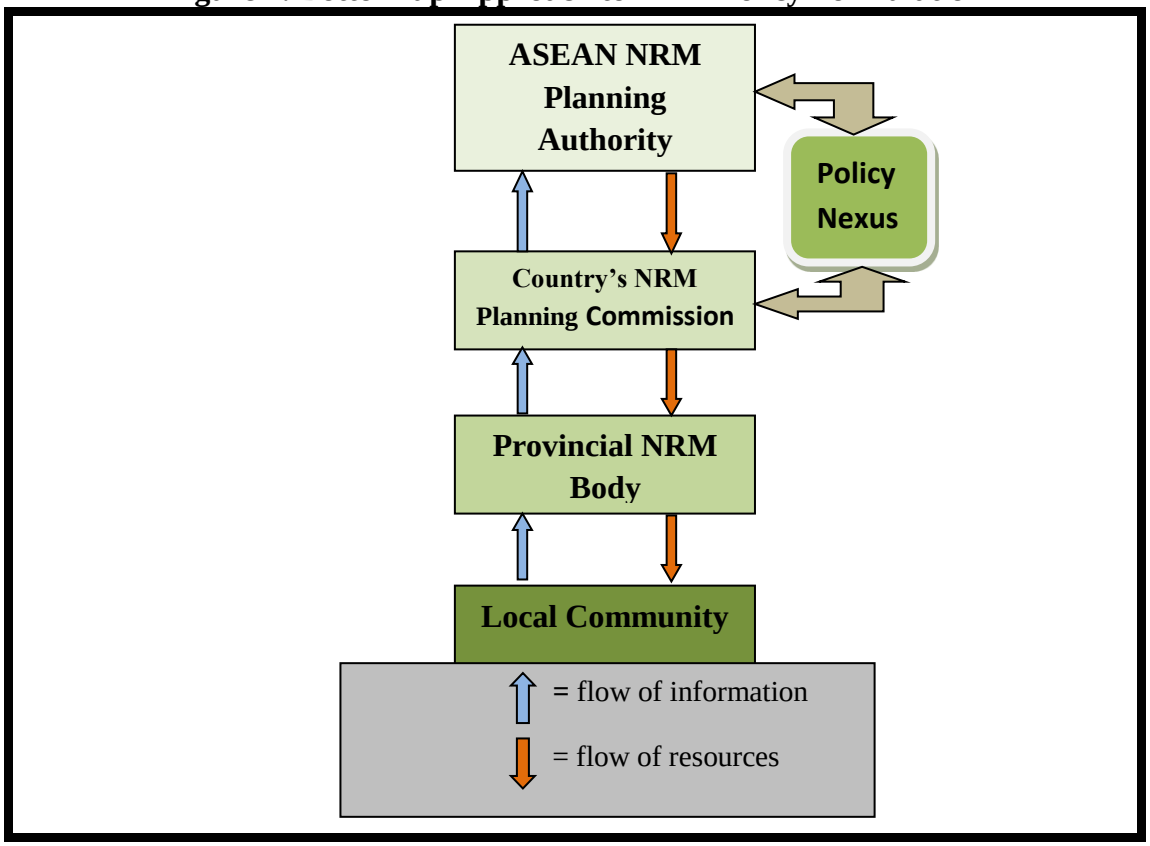
Source: Authors.

Table 3: Key Focus Areas in Different Phases of NRM

Phase	Focus areas of Natural Resources	Focus areas on Programmes/Plans	Focus areas of Institutional Development
Basic Foundational	Baseline assessment of natural resources	Awareness, skills, and knowledge development	Needs assessment and designing NRM institutional framework
Short run	Immediate priorities to tackle the disastrous state of natural resources	Enhanced NRM involvement within communities and with relevant stakeholders	Design institutional rules and tackle capacity building issues
Medium term or intermediate	Maintenance of or improvement of the state of all natural resources	Enhanced capacity and adoption of sustainable NRM practices across the broader ranges	Enhanced network amongst relevant institutions and modification/harmonisation of activities
Longer run	Natural resources conservation	Capacity to manage sustainable NMR activities independently as well as cohesively by respective stakeholders at all levels	Establishment of well-managed institutional settings with continuous drive for innovation and connectivity with global NRM bodies

Source: Authors.

Figure 2: Bottom-up Approach to NRM Policy Formulation



Source: Authors.

3.3. Monitoring and Evaluation of NRM

Concerning the policy implications of NRM, some developed countries, like Australia, have been using the ‘adaptive approach ‘with great success. It is on the whole a learning-by-doing process to address the risks and uncertainties innate to erratic systems like natural ecosystems and socio-economic environments. This approach would be more useful in adopting a resilient framework of NRM for a region like ASEAN, as it could manage the complex interactions within the diverse socio-economic and environmental systems of AMCs. The flowchart in Figure 3 shows the basic structure of the adaptive NRM model using the ‘bottom-up’ approach. Feedback on policies and action plans on NRM are transmitted from the local community to the provincial authority, and then from provincial authority to the national government. Once it has received feedback from each country, ASEAN may rearrange and harmonise its existing policies. Accordingly, the AMCs can their priority agenda for future national NRM policy, keeping the ASEAN vision in mind. The national policy would then be implemented with some modification and customisation at the provincial and, subsequently, at the local community level.

Efficient adaptive management of NRM, however, requires taking the following interconnected approaches:

- A scientific approach that can ensure access to accurate and relevant information about natural resources which can be explicitly used to measure and compare the effects of any particular activity undertaken within the NRM framework. This would help to anticipate the implications of NRM action plans.
- Robust and continual monitoring of the system (the condition of natural resources and the performance of programmes) with respect to the goals and objectives of NRM, conducting evaluations and using the results to improve understanding of the issues.
- Redesign and necessary adjustments of action plans, programmes, and the structure of the existing NRM system in accordance with the above-mentioned evaluations.

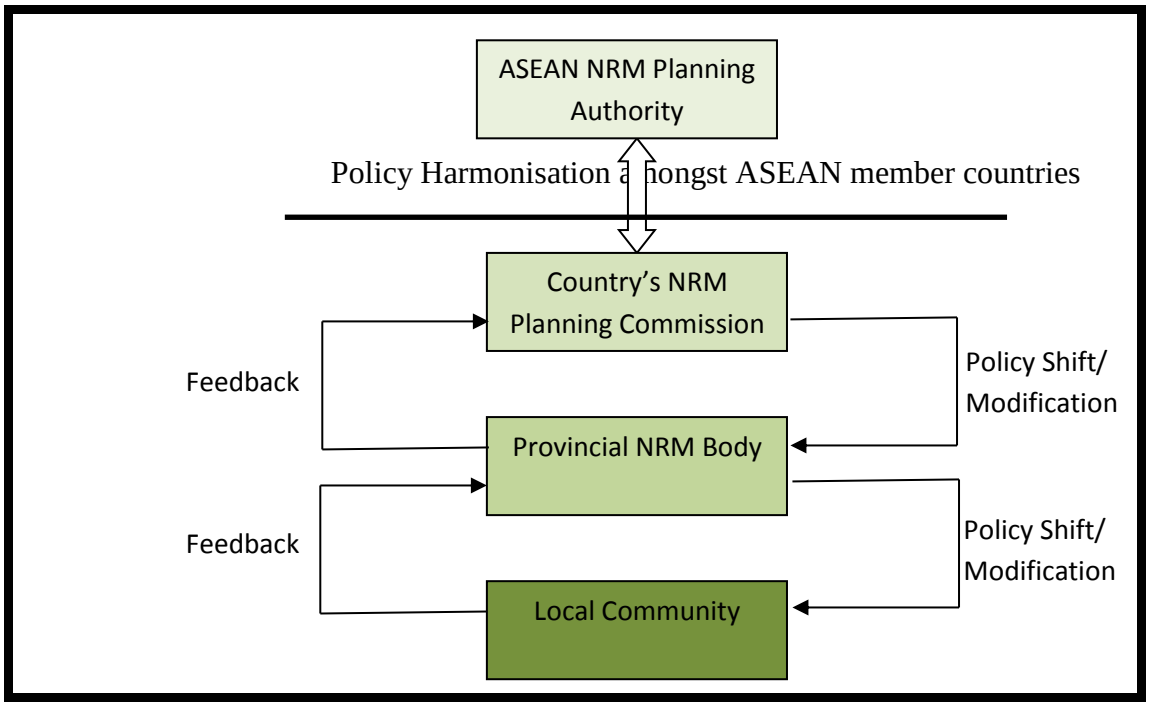
3.3.1. Two Areas of Monitoring

Monitoring is vital in the case of the adaptive approach to NRM, as it ensures quality control of natural resources and programmes' performance through an evaluation function that plays the key role in continuous improvement. Two broad areas of NRM monitoring are as follows:

a. **Natural resources (asset) condition**: to monitor the changes in the state of natural resources along with portraying the trends of their condition using set indicators and benchmarks.

b. **Programmes' performance**: to scrutinise the outcomes of the NRM programmes or action plans and to analyse the role and nexus of the people, institutions, methodologies, and policies for outcomes of the programme.

Figure 3: The Policy Feedback Process



3.3.2. Indicators for Performance Measurement

Indicators are essential for proper monitoring and assessment of the situation. Since there are two broad areas of monitoring, indicators may be grouped accordingly:

1) Indicators of the status of natural resources;
2) Indicators to assess the programmes' performance.

Some key aspects of effective indicators:

a) Indicators must be measurable and meaningful.
b) The definition of each factor used for the indicator must be explicitly described in the blueprint. Even for assessing the programmes' performance, the action plan should not only concentrate on the initiation or completion of that programme, but the appropriateness, impact, effectiveness, efficiency, and legacy aspects of the programme must also be defined. (Refer to Box-1 for guideline.)
c) For comparison between targeted and actual status or performance, a benchmark must be set, both by the national authority and ASEAN as a regional body.

   In this NRM Framework, three types of targets can be considered:

   i. Immediate or short-term targets (usually set for three to five years);
   ii. Longer-term targets (usually for five to 10 years);
   iii. Aspiration targets (this is the ultimate ideal target i.e., best possible).

d) Harmonisation is very important from a regional perspective. It must be ensured that similar indicators are used in all ASEAN countries for the purpose of NRM.
e) Based on the priority or severity of the status or performance measures, frequency of assessment may be determined.

Most of the key NRM indicators are considered as global best practice indicators and are used by some developed countries and organisations including the OECD, the World Trade Organization (WTO), the United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS), and the World Bank. All the indicators are presented with explanation and source in Appendix 2. It is worth noting that few of the indicators require advanced techniques and tools to be implemented in the short term. Therefore, constant efforts involving not only the concerned government departments, but also national/regional universities and research institutions should be made by the AMCs in this regard to strengthen their NRM system in the long run.

3.4. Reporting System for NRM

a) National Level: The reporting system is important for dissemination of the development status of the NRM factors to all relevant stakeholders. At the national level, these reports could provide effective performance assessment for all levels from the key policymakers of the country to the local level implementer. Moreover, such reports would help identifying performance issues that require action in terms of identifying, developing, and analysing management options, and evaluating and recommending adjusted management options. Such reports should be published at regular intervals, preferably more than once a year.

b) Regional level: Reporting of NRM issues at regional level requires the completion of reports from all ASEAN countries on time. Reports received from the AMCs must be well synchronised and compatible with the requirements of ASEAN. The report should be published as early as possible after collecting all AMCs' reports, so that quick policy adjustments can be made. This report should not only analyse the performances of AMCs, but also predict the potential areas of concern in the near future so that preventive or precautionary measures can be taken. Based on the reports, the post-2015 ASCC Blueprint may maintain provisions for regular modification of the models and methodologies.

Box1: Evaluation of a Programme's Performance

Appropriateness:

- To what extent is the programme aligned with the needs of the intended beneficiaries?
- To what extent is the programme compliant with recognised best practice processes in the field—e.g., the type, level, and context of associated activities?

Impact:

- In what ways and to what extent has the programme or initiative contributed to changing natural resources' condition, management practices, and institutions?
- What, if any, unanticipated positive or negative changes or other outcomes have resulted?
- To what extent were the changes directly or indirectly produced by the programme interventions?

Effectiveness:

- To what extent have the planned activities and outputs been achieved?
- Are current activities the best way to maximise impact or are there other strategies that might be more effective?
- To what extent is the programme attaining, or expected to attain, its objectives efficiently and in a way that is sustainable?

Efficiency:

- To what extent has the programme maximised value given the available resources?
- How could resources be used more productively and efficiently?
- What could be done differently to improve implementation, and thereby maximise impact, at an acceptable and sustainable cost?

Legacy:

- Will the programme's impact continue over time and after the programme ceases?
- How should the legacy be managed and by whom?

3.5. Coordination amongst Respective NRM Bodies

NRM governance, in general, faces multidimensional challenges. An effective NRM system has multiple levels of policy implementation, multiple players of different calibre as policy implementers, numerous policy instruments, and complex multi-organisational settings for implementation of those policies. For example, in

the case of water supply, there are different agencies responsible for different areas – such as urban, islands, and rural – without much coordination between them. Concerted effort and coordination are key to successful implementation of NRM activities, but it is more challenging under the adaptive approach of NRM, especially within a bigger regional framework like ASEAN.

Division of responsibilities for different jurisdictions of activities on NRM should be specifically assigned for each of the following levels:

- ASEAN
- Country
- Province
- Local Community
- Individual

According to the model put forward by Bellamy and McDonald (2005), an integrated and systemic national approach (for each AMC) to NRM should incorporate:

- Increased collaboration amongst national government, local government, different agencies, civil society, media, and citizens in terms of dialogue, debate, and social involvement;
- Improved democratisation in decision making, preferably under a legitimate framework;
- Encourage individual emancipation and moral development whilst ensuring accountability for collective decisions.

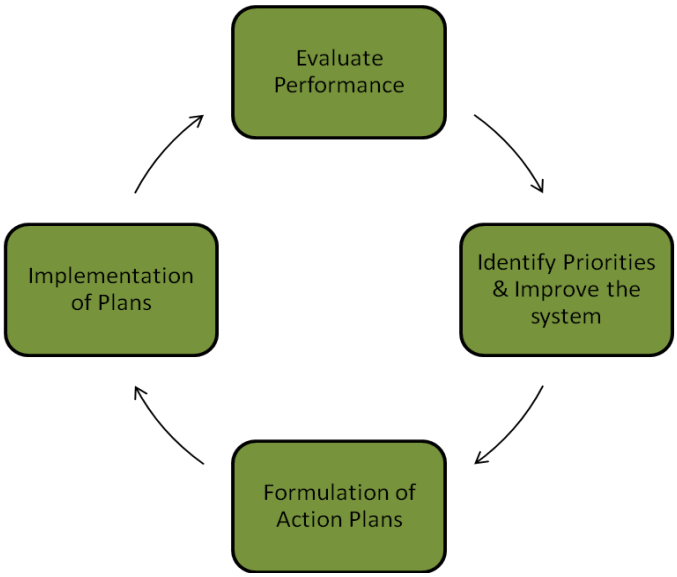
Once AMSs have coordinated their efforts, ASEAN as a whole can be managed in a more coordinated way.

Protocol on enforcement of the transboundary haze pollution agreement needs to be created. There should be greater sectoral cooperation. Currently, in most AMCs, only the environment minister is involved. The agreement should be raised to the Prime Ministerial level to have broader participation. The initiative should also include indigenous populations and the private sector. Furthermore, the ASCC should have an outcome-oriented scorecard for which further research and analysis needs to be carried out and its results implemented.

3.6. Continuous Improvement of the System

Improvement in NRM results from frequent monitoring, learning, and adaptation. To ensure the NRM continues to improve, the whole system needs to operate in a continuous improvement cycle, as shown in Figure4.

Figure 4: Continuous Improvement Cycle



Source: Government of South Australia (2012), *Our Place, Our Future, State Natural Resources Management Plan South Australia 2012–2017*, Department of Environment, Water and Natural Resources, Government of South Australia.

In the NRM context, a learning environment is important, which should be conducive to encouraging all stakeholders to investigate the effectiveness of their role and policies in the process of sustainable management of natural resources. With this self-evaluation of performances, the strategies may be refined and rearranged to improve the system. Accordingly, a new set of action plans may be formulated and shared with those stakeholders once again. Importantly, as argued above, the ASCC should have an outcome-oriented scorecard as in AEC; not just an action-oriented scorecard.

4. Opportunities through Strengthening the NRM

Strengthening the NRM would open up several areas of potential opportunities for ASEAN member countries and others outside the ASEAN. It would not only expedite the long-term sustainability of the member countries, but could also ensure increased welfare through the following approaches:

4.1. Participatory Approach to NRM

Participatory development is a widely accepted approach for effective NRM. It empowers local communities to discuss and address the issues of NRM and involves the related stakeholders in creating a superior policy environment. Participatory communication in NRM is an effective tool to develop people's knowledge and perception of natural resources, environmental sustainability, and the adaptability in terms of their lifestyles and livelihoods. It also helps to improve their attitudes and towards nature, encouraging them to voluntarily engage in protecting and conserving their natural resources. A recent report in the *Jakarta Post*, published on 14 January 2015, about protecting the forest in Terong village in Yogyakarta, is worth mentioning in this context. People in Terong village had let their trees grow up by not cutting trees too early, which is a sign of awareness and good attitude of people concerning natural resource management. There has already been much research on community-based fisheries management in ASEAN (Persoon, Van Est, and Sajise, 2003). Community-based fisheries management helps to avoid conflicts amongst fishermen of ASEAN countries. For example, as argued by Pomeroy *et al*. (2007), statistical evidence has shown that community- based management of fisheries in Indonesia, the Philippines, Thailand, and Viet Nam has reduced conflicts over marine resources over the years. Another example of effective community-based coastal management is that of Malaysia in Langkawi, where the community actively participates in the management and conservation of marine resources (Saleh, 2008).Government can also ensure better results in such cases by providing legislative frameworks such as property rights, leasing of natural resources, and insurance.

An example of the provision of a legislative framework to manage natural resources is a recent case in New Zealand. Under an agreement signed between *Whanganui River iwi* and the Crown on 30 August 2012, the Whanganui River became a legal entity. This is the first time a river has been given a legal identity in New Zealand. Under the legal agreement– called 'Te Awa Tupua'– two guardians, one from the Crown and one from the Whanganui River iwi, will be given the role of protecting the river (Shuttleworth, 2012).

The ASCC Blueprint (2009–2015) incorporated *'Promoting the involvement of local community to maintain biodiversity conservation and forest health by 2015'* as one of the action plans. However, the scope may be enhanced in other areas like water resources, mining, land use, and tourism.

4.2. Pricing of Natural Resource Usage

Natural resources are limited unless we find new stocks either through extractions or innovation of renewable technologies. This implies the fact that if we overuse or waste our resources, then it will result into quicker depletion of natural resources. For example, in the case of India, in some States, such as Tamil Nadu, electricity is provided free of charge to farmers, which has encouraged them to use pump sets to draw water from deep wells resulting in overuse of water resources. Hence, to achieve a balance between existing supply and demand, a fair pricing mechanism is important. It will not only help to ensure efficient use of existing resources, but also encourage equitable distribution and ensure future availability of these natural resources.

Although it is difficult to determine the pricing mechanism for all types of natural resources, if we can impose pricing technique for more type of resources (e.g. pricing for using forest), then it can ensure more efficient use of those resources. For example, a well-designed payment system for ecosystem services, as in Viet Nam, can help to conserve forests and preserve the services they provide in terms of providing shelter for biodiversity, protecting localities against the damages from storms, also providing the sources of livelihood for poor people (Ingram *et al*., 2014). Another aspect of a fair price mechanism concerns subsidies, particularly agricultural inputs such as fertiliser. Fertiliser subsidy, which is aimed mostly at achieving food self-sufficiency in AMCs, it is however, turn into an expensive tool

for the government as government needs to pay to the farmers. Top of that, it also negatively affects the environment. The cost-benefit analysis of providing fertiliser subsidy to attain food-sufficiency while ensuring environmental protection may be a key issue for in-depth research. The ASEAN Secretariat can play a major role in initiating such research in association with universities and research institutions, such as the Economic Research Institute for ASEAN and East Asia (ERIA).

4.3. Effective Data and Information Management

Data management is one of the most vital elements of effective implementation of NRM. Timely access to data would improve decision making. An ASEAN Spatial Data Directory may be created that would enable any stakeholder from any part of ASEAN to find out what spatial data is available throughout the region. Household surveys are useful, but do not provide data by sub-national areas, unless they are conducted specifically to provide lower level estimates. Although data derived from such sources can be very useful, they are not capable of providing data fast enough to measure progress in natural resource management.

ASEAN may benefit from establishing a system of data collection at the community level, so data can be aggregated where necessary, at different higher geographic levels. Data collections at the community level are important as many of the differences in achievements arise due to disparities in socio-economic and infrastructure developments at the regional levels. Most indictors are relevant when they are related to the population at risk. For example, water supply and sanitation data can be expressed as the number of persons with access to clean water or the number and share of households with sanitary toilets, respectively. Therefore, to develop these indicators it is necessary to have accurate population figures (or household numbers) for particular areas. Population and housing censuses and the complete vital registration system are the major collections that can provide small area level data. Population and housing censuses are conducted at five-yearly or 10-yearly intervals, making it necessary to produce population and household projections for the post-census years. It is worth noting that there is a problem of inconsistency in coverage of the size or appropriateness of population, for example,

how many population is covered? Does the sample really represent the whole population, etc. in the vital registration in many AMCs?

Hence, detailed population and household estimates are needed for both national and sub-national levels. But for smaller geographic areas, it is only possible to provide estimates of the total population, disaggregated by broad age groups (such as those under 15 years of age, 15–64,preferably with a male/female breakdown, 15–49, and over 64), and household estimates, for which detailed disaggregation is not needed.

Finally, based on the current capacity of the individual member countries, a Minimum Data Set (MDS) that includes the United Nations' Sustainable Development Goals and core indicators essential for NRM in AMCs may be developed to monitor ASEAN's post-2015 development agenda. AMCs may consider developing an MDS for all other areas included in the ASCC Blueprint, not just for NRM. Introduction of an MDS will effectively reduce the burden on statistical agencies to produce data, and greatly improve the quality and timeliness of data. Generally, for effective data management and usage, the following features must be ensured:

a) Accessibility: must be easily accessible at minimum cost.

b) Consistency: methodologies for data collection and interpretation must be consistent over time and for all AMCs.

c) Interoperability: Information exchange systems and data management organisation, both at the ASEAN and national levels, must work together with transparency and efficiency. National protocols should be used for data transfers with adequate security provisions.

d) Custodianship: Fundamental dataset on NRM should be assigned to particular custodians at each level (national, provincial, and local).

4.4. Sustainable Consumption and Production (SCP)

Sustainable Consumption is defined as 'the use of services and products which respond to basic needs and bring a better quality of life whilst minimising the use of natural resources and toxic materials as well as the emissions of waste and pollutants

over the life cycle of the service or product so as to not jeopardise the needs of future generations' (UN CSD, 1995. p. 2). Sustainable Consumption and Production (SCP), therefore, promotes resource efficiency by encouraging more sustainable consumption and production patterns, whilst meeting human needs using fewer natural resources. In this context, it is worth noting that Malaysia's approach to Green Growth is centred on the concept of SCP (Adham, Merle, and Weihs, 2013).

The final report of the midterm review of the ASCC Blueprint, published on 25 September 2013, recommended promoting the emerging SCP issue by replacing the existing 'Environmentally Sound Technology (EST) as SCP covers a wider ranges of areas than EST'. But implementing the SCP throughout ASEAN faces several challenges. Public awareness and building up process within the society are key in this regard. An integrated participatory and multi-stakeholder approach to SCP should be designed to demonstrate the benefits of SCP policies and actions (environmental, economic, and social). SCP will create a new consumers' and producers' market with sustainable products. Hence, the challenges, opportunities (in terms of demand-supply, pricing, substitutability, profitability, etc.) of that market needs to be analysed carefully and actions should be taken accordingly.

4.5. New Vision on NRM towards 2025

It is acknowledged in the literature that a country's wealth is a function not only of physical capital and human capital, but also natural capital, the depletion or degradation of which will affect the sustainability of its current level of economy (Asafu-Adjaye, 2004). Unfortunately, significance of the efficient use of natural capital has received very little attention from the policy makers. With the changing perspective, it is now required to develop effective accounting system for natural capital within a strong institutional framework. A unified framework across AMCs would strengthen the design and implementation of NRM policies, which would effectively take into account the transboundary impact of natural resource use. Although Indonesia [2] and the Philippines have been actively involved in the measurement of natural capital, applying the United Nations' System for

[2] The World Resources Institute integrated environmental effects into Indonesia's national accounts in 1990. The report found that estimates of net income and growth of net income were overstated when calculated using the conventional accounts (UNU–IAS, 2000).

Environmental Economic Accounts (SEEA), the widespread development and implementation of natural capital accounting amongst the AMCs is a step towards achieving within AMCs would help to develop one of the best regional models on natural capital accounting in the world by 2025. In this pursuit, AMCs can get assistance from the World Bank's Wealth Accounting and Valuation of Ecosystem Services (WAVES) scheme that was launched in 2010. Indonesia and the Philippines have already been receiving support from WAVES (OECD, 2014).

For strengthening NRM in ASEAN by 2025, further research is needed into the implementation of 'resource rent tax' in AMCs from natural resource extractive industries (OECD, 2014). Such a tax would strengthen the sustainable development of AMCs without excessively denting their public finances.

References

Adham, K.N., K. Merle and G. Weihs (2013), *Sustainable Consumption and Production Policy Support for Malaysia: A Baseline Study on Government Policies, Institutions and Practices*. Putrajaya, Malaysia: Economic Planning Unit, Prime Minister's Department.

Anbumozhi, V. and A. Bauer (2010), 'Impact of Global Recession on Sustainable Development and Poverty Linkages,' *ADBI Working Papers* 227, Tokyo: Asian Development Bank Institute.

Asafu-Adjaye, J. (2004), *Green National Accounting and the Measurement of Genuine (Extended) Saving*. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific.

ASEAN Secretariat (2009), *Socio-Cultural Community (ASCC) Blueprint*. Jakarta: ASEAN Secretariat (June).

ASEAN Secretariat (2012), *ASCC Scorecard: Section-D. Ensuring Environmental Sustainability*. Jakarta: ASCC Department (28 February).

ASEAN Secretariat (2013), *Mid-Term Review of the ASEAN Socio-Cultural Community Blueprint: Final Report*. Jakarta: ASEAN Secretariat (25 September).

AWGWRM (2011), *Presentation on ASEAN IWRM country strategy guidelines: IWRM monitoring status guidelines for ASEAN countries*, July 2011, Singapore, ASEAN Working Group on Water Resource Management.

Commonwealth of Australia (2009), *Natural Resource Management Monitoring, Evaluation, Reporting and Improvement Framework.* Commonwealth of

Australia, Department of the Environment, Water, Heritage and the Arts, Canberra, ACT.

Government of South Australia (2012), *Our Place, Our Future, State Natural Resources Management Plan South Australia 2012–2017*. Department of Environment, Water and Natural Resources, Government of South Australia, Adelaide.

Ingram, J.C. *et al*. (2014), 'Evidence of Payments for Ecosystem Services as a Mechanism for Supporting Biodiversity Conservation and Rural Livelihoods', *Ecosystem Services*, 7, pp.10–21.

OECD (2013), *Economic Outlook for Southeast Asia, China and India 2014: Beyond the Middle Income Trap*. Geneva, Switzerland: OECD Publishing.

OECD (2014), *Towards Green Growth in Southeast Asia*. Geneva, Switzerland: OECD Publishing.

Persoon, G., D.M. van Est and P.E. Sajise (eds.) (2003), 'Co-Management of Natural Resources in Asia: A Comparative Perspective*', Man and Nature in Asia Series* No. 7, Copenhagen: NIAS Press, Nordic Institute of Asian Studies.

Pomeroy, R.S. *et al*. (2007), 'Fish Wars: Conflict and Collaboration in Fisheries Management in Southeast Asia', *Marine Policy*, 31(6), pp.645–56.

Roberts, C.M. *et al*. (2002), 'Marine Biodiversity Hotspots and Conservation Priorities for Tropical Reefs', *Science*, 295(5558), pp.1280–84.

Suuronen, P. *et al*., (2013), 'Management of Trawl Fisheries in Southeast Asia and Coral Triangle Region: The REBYC-II CTI Project', *Fish for the People*, 1(3), pp.21–24.

UNESCAP/ADB and UNDP (2013), 'Asia-Pacific Aspirations: Perspectives for a Post-2015 Development Agenda', *Asia-pacific Regional MDG Report* No. 23012/13.

UNU–IAS (2000), *Green GDP Estimates in China, Indonesia, and Japan: An Application of the UN Environmental and Economic Accounting System*. Tokyo: United Nations University – Institute of Advanced Studies.

UN (2014), "*Open Working Group Proposal for Sustainable Development Goals*" General Assembly document A/68/970 New York: United Nations Headquarters.

Appendix 1

Review of the Performances of ASEAN Member Countries (based on MTR)

Brunei Darussalam

Performance Measures	Performance Evaluation	Remarks from own perspective	Remarks from Regional perspective
Environmental Performance Index (EPI)	Brunei Darussalam's EPI was well above the AMS average and in second position behind Malaysia in 2012, but the negative trend EPI reflects a worsening performance since 2010.		**Excellent**
Multilateral environmental agreements	Brunei ratified or acceded to most of the major multilateral environmental agreements (MEAs), except the Stockholm Convention, which aims to eliminate or restrict the production and use of Persistent Organic Pollutants (POPs).		**Good**
MEA implementation	No data supplied on the illegal transboundary movement of hazardous waste under the Basel Convention.		**Much Improvement Required**
Consumption of POPs	No data supplied on consumption of POPs.		**Much Improvement Required**
Consumption of chlorofluorocarbons (CFCs)	According to commitments under the Montreal Protocol, Brunei has totally phased out the use of ozone-depleting CFC gases.		**Excellent**
Quality of air	Air quality in Brunei Darussalam seems to have gradually improved since 2009.		**Very Good**

Incidence of fires	The incidence of fires in 2012 was the second lowest in this region after Singapore, but increased slightly compared with 2009.		**Excellent**
Environmental education and promotional activities	Though Brunei has incorporated Environmental Education (EE) in its national education system for the 21st century (SPN21), its progress on promoting eco-schools and eco-clubs has been the slowest of the AMCs.		**Very Good**
Implementation of global certification on environmentally sound technology (EST)	Implementation status of EST is not satisfactory as evidence shows that Brunei did not enforce Roundtable on Sustainable Palm Oil (RSPO) Certification, Sustainable Farm Certification (SFC), and Forest Stewardship Council (FSC) Certification.		**Much Improvement Required**
Eco-labelling Scheme	No enforcement is evident in eco-labelling scheme for enhancing business competitiveness of its farms whilst maintaining environmental health and social equity.		**Much Improvement Required**
Municipal (solid) waste production	No evidence of monitoring or reporting municipal (solid) waste production as of 2013.		**Much Improvement Required**
Marine protected areas	Brunei is surrounded by the South China Sea and Brunei Bay. However, it has no marine protected area listed as ASEAN heritage area.		**Much Improvement Required**
Integrated Coastal Management (ICM)	No evidence of implementing the Integrated Coastal Management (ICM).		**Much Improvement Required**

Protected land areas and heritage parks	Of Brunei's total land area 18.2% was considered to be protected area in 2009, but no data is available for MTR. It had one heritage park in the period 2009–2012.		**Very Good**
Enactment and implementation of biosafety laws	No national law/administrative measures on biosafety in Brunei to date. In 2011, it started the Clearing House mechanism (CHM) initiatives with the launching of a website, but no data have been made available so far.		**Fair**
Access to improved freshwater	All of Brunei has access to improved freshwater.		**Excellent**
Access to improved sanitation	95% of the population is using standard sanitation facilities, which is amongst the top three in the region.		**Very Good**

Explanation:

Country's own perspective: Positive change (), Negative change (), Unchanged ( )

Regional Perspective: Excellent: Performance is amongst the top 20% of ASEAN countries

Very Good: Performance ranges in the top 40% but below 20%

Good: Performance ranges in the top 60% but below 40%

Fair: Performance ranges the top 80% but below 60%

Much Improvement Required: Performance in the bottom 20% (This also includes 'data not available' category.)

Cambodia

Performance Measures	Performance Evaluation	Remarks from own perspective	Remarks from Regional perspective
Environmental Performance Index (EPI)	Cambodia had the lowest Environmental Performance Index (EPI) in ASEAN in 2010. However, rapid progress on environmental indicators at a trend EPI of 6.71 placed it above Indonesia, Myanmar, and Viet Nam in the 2012 MTR		**Fair**
Multilateral environmental agreements	Cambodia ratified or acceded to all major MEAs.		**Excellent**
MEA implementation	No data was available for transboundary movement of hazardous waste, implying the lack of incentives in implementing or enforcing those MEAs.		**Much Improvement Required**
Consumption of POPs	No data was available regarding consumption of POPs.		**Much Improvement Required**
Consumption of CFCs	No data was available regarding consumption of CFCs.		**Much Improvement Required**
Quality of air	No measurement of air quality in Cambodia was available for review.		**Much Improvement Required**
Incidence of fires	Incidence of fires increased from 12,911 to 14,992 during 2009–2012.		**Good**
Environmental education and promotional activities	Cambodia has incorporated Environmental Education (EE) at all levels of its national education system, which is encouraging.		**Good**
Implementation of global certification on environmentally sound technology (EST)	Implementation of promoting Environmentally Sound Technology (EST) has been slow as only one mill had received RSPO Certification by 2013. No farm had received either SFC or FSC Certification.		**Fair**
Eco-labelling Scheme	No eco-labelling scheme has been put in place so far.		**Much Improvement Required**

Municipal (solid) Waste production	No evidence of monitoring or reporting municipal (solid) waste production as of 2013.		**Much Improvement Required**
Marine protected areas	Cambodia has two marine protected areas listed as ASEAN heritage parks.		**Very Good**
Implementation of the Integrated Coastal Management (ICM)	No evidence of implementing the Integrated Coastal Management (ICM) so far.		**Much Improvement Required**
Protected land areas and heritage parks	In 2009, 23.5% of Cambodia's total land area (which is the highest share amongst AMCs) was considered to be protected area for forest and ecologically significant habitats. However, no data is available for MTR. Cambodia also has one transboundary protected area with Lao PDR and Viet Nam, and two with Thailand.		**Very Good**
Enactment and implementation of biosafety laws	Recently, Cambodia has put regulations and operational systems on biosafety into place, but they have yet to be enforced. As of 2012, no Clearing House mechanism (CHM) initiative had been undertaken.		**Much Improvement Required**
Access to improved freshwater	Access to improved freshwater increased from 65% to 69% over the 2009–2012 period, but still remains amongst the lowest of AMCs.		**Fair**
Access to improved sanitation	Situation regarding sanitation facilities is the worst in the ASEAN region. Only 28% of the population had access to improved sanitation facilities in 2009, which increased to 42% in 2012.		**Much Improvement Required**

Indonesia

Performance Measures	Performance Evaluation	Remarks from own perspective	Remarks from Regional perspective
Environmental Performance Index (EPI)	Indonesia had the second lowest EPI amongst ASEAN countries in 2010. Its position remained unchanged despite a moderate trend EPI of 5.07 in the next two years.		**Much Improvement Required**
Multilateral environmental agreements	Indonesia ratified or acceded to all the major MEAs.		**Excellent**
MEA implementation	It supplied no data concerning its transboundary movement of hazardous waste.		**Much Improvement Required**
Consumption of POPs	No consumption of POPs in 2009and 2012.		**Excellent**
Consumption of CFCs	No consumption of CFCs in 2009, and at the time of the MTR in 2012.		**Excellent**
Quality of air	No measurement of air quality in Indonesia available for review.		**Much Improvement Required**
Incidence of fires	Incidence of fires increased from 25,792 to 27,667 during 2009–2012.		**Much Improvement Required**
Environmental education and promotional activities	Indonesia is one of the pioneers in eco-school programmes in the ASEAN region. The Adiwiyata Programme, launched in 2006, has been encouraging the education on and public participation in promoting sustainable development in Indonesia. Awareness and campaign programmes were accelerated in 33 provinces. Population and environmental issues were incorporated into the formal curriculum in 1984. More recently, capacity building activities such as a		**Excellent**

	Training for Trainers programme have been put in place.		
Implementation of global certification on environmentally sound technology (EST)	Indonesia seems to be the most active amongst AMCs in implementing EST. The number of mills with RSPO Certification increased from eight to 88 during 2009–2013. The SFC and FSC Certification schemes have been successfully promoted during this time.		**Excellent**
Eco-labelling Scheme	Eco-labelling scheme named Ekolabel was introduced.		**Very Good**
Municipal (solid) waste production	No evidence of monitoring or reporting of municipal (solid) waste production as of 2013.		**Much Improvement Required**
Marine protected areas	Indonesia has no marine protected area listed as ASEAN heritage parks.		**Much Improvement Required**
Implementation of the Integrated Coastal Management (ICM)	No evidence of implementing the Integrated Coastal Management (ICM) so far.		**Much Improvement Required**
Protected land areas and heritage parks	Indonesia has the largest natural resource based protected area amongst ASEAN countries –it was 13.1% of the total land area in 2009, but decreased to 11.2% in 2012. It had three ASEAN heritage parks. It also has one transboundary protected area with Brunei and three with Malaysia.		**Good**
Enactment and implementation of biosafety laws	Indonesia has a well-functioning national Biodiversity Clearing House (nBCH) mechanism with highly informative web-site.		**Excellent**

Access to improved freshwater	The situation regarding access to improved freshwater in Indonesia is the worst in ASEAN– 57% of total population had access in 2009, but this fell to 44% in 2012.		**Much Improvement Required**
Access to improved sanitation	Access to improved sanitation fell from 69% to 51% in this period, a big disappointment in terms of implementing the roadmap for an ASEAN community 2009–2015.		**Fair**

Lao PDR

Performance Measures	**Performance Evaluation**	**Remarks from own perspective**	**Remarks from Regional perspective**
Environmental Performance Index (EPI)	Lao PDR had an EPI rating of 59.6 in 2010, which was above the average for ASEAN countries. But due to the complex new methodology of ratings, no data on EPI could be calculated for 2012.		**N/A***
Multilateral environmental agreements	Lao PDR has not yet ratified or acceded to the Basel Convention on transboundary movement of hazardous waste.		**Good**
MEA implementation	No data available in terms of transboundary movement of hazardous waste.		**Much Improvement Required**
Consumption of POPs	Non-availability of data implies a lack of incentives in implementing or enforcing MEAs.		**Much Improvement Required**
Consumption of CFCs	No data available for review.		**Much Improvement Required**
Quality of air	No measurement of air quality in Lao PDR available for review.		**Much Improvement**

			Required
Incidence of fires	Incidence of fires increased from 15,327 to 17,697 during 2009–2012.		**Fair**
Environmental education (EE) and promotional activities	Lao PDR is one of the fastest growing countries to promote eco-school programmes in the ASEAN region. It also has been conducting various nationwide environmental awareness activities involving government, the private sector, universities, NGOs, and civil society. Environmental education is an integral part of the formal and informal curriculum in Lao PDR. Recently, EE has also been incorporated in teaching manuals, and subjects such as environmental management, water management, and land management can be studied at university level.		**Excellent**
Implementation of global certification on environmentally sound technology (EST)	Implementation of EST has been slow in Lao PDR as no mill had received RSPO or SFC Certification as of 2013. Only two FSC certificates were issued during 2009–2013.		**Fair**
Eco-labelling scheme	No eco-labelling scheme has been set up so far.		**Much Improvement Required**
Municipal (solid) waste production	No evidence of monitoring or reporting municipal (solid) waste production as of 2012.		**Much Improvement Required**
Marine protected areas	Lao PDR, being a landlocked country, has no marine protected area listed as ASEAN heritage park.	**N/A***	
Implementation of the Integrated Coastal	ICM is not applicable to Lao PDR, being a landlocked country.		

Management (ICM)			
Protected land areas and heritage parks	15.6% of Lao PDR's total land area was considered to be natural resource–based protected area in 2009. No updated data was available for review in 2012. The number of ASEAN heritage parks remains at one during this period. However, as it has borders with five countries- China, Cambodia, Vietnam, Thailand and Myanmar. , Lao PDR has the highest number of transboundary protected areas amongst ASEAN countries. It has three such areas with Viet Nam, one jointly with Cambodia and Viet Nam, and two with Thailand.		**Very Good**
Enactment and implementation of biosafety laws	Lao PDR has yet to initiate drafting of biodiversity regulations and operational systems. Hence, no CHM initiative had been in place by 2012.		**Much Improvement Required**
Access to improved freshwater	Access to improved freshwater increased from 60% to 67% over the 2009–2012 period, but still remains amongst the lowest amongst AMCs.		**Fair**
Access to improved sanitation	The situation regarding sanitation facilities is not encouraging. Only 48% of the population had access to improved sanitation facilities in 2009, and this increased to 49% in 2012.		**Much Improvement Required**

*As Lao PDR is a landlocked country, EPI cannot be calculated for 2012. Hence, some other indicators are not applicable to Lao PDR.

Malaysia

Performance Measures	Performance Evaluation	Remarks from own perspective	Remarks from Regional perspective
Environmental Performance Index (EPI)	Malaysia has maintained a high EPI amongst AMCs since 2009. With a remarkable trend EPI of 8.27, it was the highest rated country in ASEAN in 2012.		**Excellent**
Multilateral environmental agreements	Malaysia has ratified or acceded to the Basel Convention and the Montreal Protocol. It has just signed in Stockholm Convention, but not yet ratified it or acceded to it.		**Good**
MEA implementation	The number of cases of transboundary movement of hazardous waste declined from 49 to 45 during 2009–2012 and illegal movements decreased from 11 to five.		**Good**
Consumption of POPs	No consumption of POPs during this period.		**Excellent**
Consumption of CFCs	CFC consumption fell to zero in 2012, from 105.2 MT in 2009.		**Excellent**
Quality of air	Air quality has been a big problem for Malaysia. Only 55.6% of the days in 2009 had 'good' air in 2009, which increased slightly, to 57.4%, in 2012.		**Good**
Incidence of fires	Incidence of fires increased from 3,161 to 3,446 during 2009–2012.		**Very Good**
Environmental education and promotional activities	Eco-school programmes and environmental awareness programmes have become increasingly important in Malaysia. EE was incorporated in the school curriculum in 1992, and was implemented at all school levels and in extra-curricular activities.		**Very Good**

Implementation of global certification on Environmentally Sound Technology (EST)	Malaysia provided RSPO Certification to the highest number of mills in ASEAN, with the number increasing from 20 to 99 during the 2009–2013 period. Surprisingly, no farm had received SFC as of 2013 despite the fact that FSC Certification schemes had been successfully promoted during2009–2013.		**Excellent**
Eco-labelling Scheme	An eco-labelling scheme named SIRIM is undertaken.		**Very Good**
Municipal (solid) waste production	Municipal (solid) waste production increased from 9.34 to 10.43 million tonnes during 2009–2012.		**Very Good**
Marine protected areas	Malaysia has no marine protected area listed as ASEAN heritage park.		**Much Improvement Required**
Implementation of the Integrated Coastal Management (ICM)	It incorporated an Integrated Shoreline Management Plan in 2009, and this was intensified with the enactment of the National Physical Plan-2, 2010 and the National Coastal Zone Physical Plan, 2012.		**Excellent**
Protected land areas and heritage parks	Malaysia had only 6.7% protected area in 2009, which went up to 10.46% in 2012. The number of ASEAN heritage parks remained three during this period. Although it has one transboundary protected area jointly with Brunei and Indonesia, no specific management plan for this transboundary protected area had been developed at the time of review.		**Good**
Enactment and implementation of biosafety laws	Malaysia enacted the Biosafety Act in 2007. It subsequently established a national Biodiversity Clearing House (nBCH) in 2008, which is functioning well and has an informative website.		**Very Good**

Access to improved freshwater	Access to improved freshwater in Malaysia is amongst the top-3 countries in ASEAN. In 2009, 93% of the total population had access and this increased slightly, to 94.4%, in 2012.		**Very Good**
Access to improved sanitation	Access to improved sanitation increased from 93.3% to 94.5% during this period.		**Very Good**

Myanmar

Performance Measures	**Performance Evaluation**	**Remarks from own perspective**	**Remarks from Regional perspective**
Environmental Performance Index (EPI)	The EPI of Myanmar is below the average of ASEAN countries. It was 51.3 in 2010 and slightly increased, to 52.72, in 2012, with a moderate trend EPI of 6.56.		**Fair**
Multilateral environmental agreements	Myanmar has not yet ratified or acceded to the Basel Convention on transboundary movement of hazardous waste.		**Good**
MEA implementation	No data was available in terms of transboundary movement of hazardous waste.		**Much Improvement Required**
Consumption of POPs	Non-availability of data implies a lack of incentives in implementing or enforcing MEAs.		**Much Improvement Required**
Consumption of CFCs	No data was available for review.		**Much Improvement Required**
Quality of air	No measurement of air quality in Myanmar was available for review.		**Much Improvement Required**

Incidence of fires	The incidence of fires was the highest in the ASEAN region. It increased from 34,871 to 52,033 during 2009–2012.		**Much Improvement Required**
Environmental education and promotional activities	Eco-school programmes and environmental awareness programmes have become increasingly important in Myanmar. EE was incorporated in the academic curricula along with few extra-curricular activities like debate programs, tree plantation etc.		**Good**
Implementation of global certification on environmentally sound technology (EST)	Implementation of Environmentally Sound Technology (EST) is not satisfactory, as evidence shows that Myanmar did not enforce the Roundtable on Sustainable Palm Oil (RSPO) Certification, the Sustainable Farm Certification (SFC), and the Forest Stewardship Council (FSC) Certification		**Much Improvement Required**
Eco-labelling Scheme	No eco-labelling scheme has been adopted for enhancing business competitiveness of its farms.		**Much Improvement Required**
Municipal (solid) waste production	No evidence of monitoring or reporting municipal (solid) waste production as of 2012.		**Much Improvement Required**
Marine protected areas	Myanmar has one marine protected area listed as ASEAN heritage park.		**Good**
Implementation of the Integrated Coastal Management (ICM)	No evidence of implementing the Integrated Coastal Management (ICM) so far.		**Much Improvement Required**

Protected land areas and heritage parks	Only 5.6% of Myanmar's total land is protected area for forest and ecologically significant habitats, which remained unchanged during 2009–2012. The number of ASEAN heritage parks was five in 2009, and by 2012 there were six. Myanmar also has one transboundary protected area with Thailand.		**Good**
Enactment and implementation of biosafety laws	Several biosafety acts had been enacted prior to 2011. An overall biodiversity framework and a National CHM were being drafted at the time of review.		**Good**
Access to improved freshwater	In 2009, 82.3% of Myanmar's population had access to improved freshwater. No data was available during the MTR.		**Fair**
Access to improved sanitation	Access to improved sanitation was 83% in 2009 and no data was presented for 2012.		**Fair**

Philippines

Performance Measures	**Performance Evaluation**	**Remarks from own perspective**	**Remarks from Regional perspective**
Environmental Performance Index (EPI)	The Philippines maintained a high EPI of 65.7 in 2009. With a moderate trend EPI of 6.8, its rating under the new EPI system was 57.4 in 2012.		**Very Good**
Multilateral environmental agreements	The Philippines has ratified or acceded to all major MEAs.		**Excellent**

MEA implementation	The number of cases of transboundary movement of hazardous waste increased from 53 to 118 during 2009–2012, but no illegal movement was recorded.		**Much Improvement Required**
Consumption of POPs	No consumption of POPs during this period.		**Excellent**
Consumption of CFCs	CFC consumption fell to zero in 2012, from 208.68 MT in 2009.		**Excellent**
Quality of air	Air quality measures show a slight improvement from 2009 to 2012, as the average national TSP fell from 107 microgram/NCM to 99 microgram/NCM during this period.		**Very Good**
Incidence of fires	The incidence of fires decreased from 1,357 to 1,157 during 2009–2013.		**Very Good**
Environmental education and promotional activities	Participation in Eco-school programmes and environmental awareness programmes has been increased in the Philippines. EE has been incorporated with enhanced curricula in the elementary, technical, and vocational education systems in the Philippines since 2009.		**Very Good**
Implementation of global certification on environmentally sound technology (EST)	The Philippines provided no RSPO of FSC Certification to any mill, but the number of farms that received SFC Certification increased from six to 16 during 2009–2013.		**Good**
Eco-labelling scheme	The Philippines has two eco-labelling schemes.		**Excellent**

Municipal (solid) waste production	Municipal (solid) waste production increased from 12.78 to 13.51 million tonnes during 2009–2012.		**Excellent**
Marine protected areas	The Philippines has no marine protected area listed as ASEAN heritage park.		**Much Improvement Required**
Implementation of the Integrated Coastal Management (ICM)	It has been incorporating ICM activities since 2009, with22.78% of the country's coastline covered.		**Excellent**
Protected land areas and heritage parks	The Philippines had 13.41% protected area in 2009, and 13.53% in 2012. The number of ASEAN heritage parks increased from three to four during this period. It has one transboundary protected area with Malaysia. Few administrative orders are enforced regarding biosafety management.		**Good**
Enactment and implementation of biosafety laws	Philippines enacted both CHM and nBCH in 2009; they are functioning well and have informative websites.		**Excellent**
Access to improved freshwater	The situation regarding access to improved freshwater in the Philippines deteriorated during 2009–2012, as the share of the population with access declined from 92% to 86%.		**Good**
Access to improved sanitation	Access to improved sanitation increased from 74% to 90%during 2009–2012.		**Good**

Singapore

Performance Measures	Performance Evaluation	Remarks from own perspective	Remarks from Regional perspective
Environmental Performance Index (EPI)	Singapore had the highest EPI of 69.6 amongst ASEAN countries in 2010, but the rating fell below the regional average in 2012.		**Good**
Multilateral environmental agreements	Singapore has ratified or acceded to all major MEAs.		**Excellent**
MEA implementation	The number of cases of transboundary movement of hazardous waste increased from 75 to 103 during 2009–2012, but only one illegal movement was recorded during this period.		**Fair**
Consumption of POPs	No consumption of POPs during this period.		**Excellent**
Consumption of CFCs	No consumption of CFCs during this period.		**Excellent**
Quality of air	Singapore's air quality improved during 2009–2012 – 91% of days had 'good' air in 2009, and this increased to 93% in 2012.		**Excellent**
Incidence of fires	No fires were reported during this period.		**Excellent**
Environmental education and promotional activities	Eco-school programmes and environmental awareness programmes are becoming increasingly important and getting importance and more participation in Singapore with time. EE is also incorporated in both primary and secondary schools' curricula. Some		**Excellent**

	schools are adopting extended environmental modules.		
Implementation of global certification on environmentally sound technology (EST)	Implementation of EST is not satisfactory as no mill/farm in Singapore received RSPO, SFC, or FSC Certification.		**Much Improvement Required**
Eco-labelling scheme	Three eco-labelling schemes have been initiated since 2009 for enhancing business competitiveness of farms whilst maintaining environmental health and social equity.		**Excellent**
Municipal (solid) waste production	Municipal (solid) waste production increased from 6.11 million tonnes in 2009 to 7.27 million tonnes in 2012.		**Good**
Marine protected areas	Singapore has no marine protected area listed as ASEAN heritage parks.		**Much Improvement Required**
Implementation of the Integrated Coastal Management (ICM)	Singapore had adopted ICM for the sustainable development of its coastal and marine resources before 2009.		**Very Good**
Protected land areas and heritage parks	Singapore has only 5% protected area, amounting to 34.18 square kilometres, which is the lowest amongst all ASEAN countries. It had one ASEAN heritage park in 2009 and a second one was added in 2012. It does not have any transboundary protected areas with neighbouring countries.		**Fair**

Enactment and implementation of biosafety laws	Singapore enacted Biosafety Guidelines in 2006, and they were subsequently modified several times. It established National Biodiversity Centre (NBC) in the same year, which is functioning well and has an informative website.		**Excellent**
Access to improved freshwater	Singapore provided 100% access to improved freshwater throughout 2009–2012.		**Excellent**
Access to improved sanitation	Singapore is the only country in the region that successfully provided access to improved sanitation for all of its population throughout 2009–2012.		**Excellent**

Thailand

Performance Measures	**Performance Evaluation**	**Remarks from own perspective**	**Remarks from Regional perspective**
Environmental Performance Index (EPI)	Thailand‘s EPI was 62.2 in 2010. With the fastest growing trend EPI of 12.06, its score under the new system was 59.98 in 2012 Most importantly, Thailand is ranked as one of the top-10 trend index performers amongst 132 countries.		**Very Good**
Multilateral environmental agreements	Thailand has ratified or acceded to all major MEAs.		**Excellent**
MEA implementation	No data was supplied on the transboundary movement of hazardous waste.		**Much Improvement Required**

Consumption of POPs	No consumption of POPs in 2009, nor at the time of the MTR.		**Excellent**
Consumption of CFCs	No consumption of CFC in 2009 and 2012.		**Excellent**
Quality of air	Thailand's air quality improved during 2009–2012. More than 80% of days in a year had 'good' air in 2009, and this increased to 85% in 2012.		**Very Good**
Incidence of fires	The incidence of fires increased dramatically, from 14,314 to 27,033 during 2009–2012.		**Fair**
Environmental education and promotional activities	The importance of and participation in eco-school programmes and environmental awareness programmes have been growing in Thailand. EE has been incorporated in schools' core basic curriculum since 2008. Some high schools are adopting extended environmental modules on forestry and forest resources conservation issues.		**Good**
Implementation of global certification on environmentally sound technology (EST)	Implementation of EST is not satisfactory as only two mills received the RSPO certificate. No farms received the SFC Certification. The number of farms with the FSC certificate increased from four to six during 2009–2013.		**Very Good**
Eco-labelling scheme	An eco-labelling scheme called Thai Green label has been in place since 2009.		**Very Good**
Municipal (solid) waste production	In 2009, 15.11 million tonnes of municipal (solid) waste was produced. Data for 2012 was not available.		**Fair**
Marine protected areas	Thailand has had four marine protected areas listed as ASEAN		**Excellent**

	heritage parks since 2009.		
Implementation of the Integrated Coastal Management (ICM)	Two ICM strategies had been adopted for the sustainable development of the country's coastal and marine resources before 2009. One further project, along Thailand's southern coast, was started in 2009–2013.		**Very Good**
Protected land areas and heritage parks	Thailand had the second biggest share (22.35%) of protected areas amongst ASEAN countries in 2009. No data on this was available in 2012. It had four ASEAN heritage parks in 2009–2013 and it has one transboundary protected area jointly with Cambodia and Lao PDR.		**Very Good**
Enactment and implementation of biosafety laws	Thailand has yet to initiate drafting biodiversity regulations and operational systems, but has adopted other relevant sectoral regulations. Hence, no CHM initiative had been in place by 2012.		**Much Improvement Required**
Access to improved freshwater	Thailand has been providing 100% improved freshwater access.		**Excellent**
Access to improved sanitation	Access to improved sanitation was close to 100% in 2009–2013.		**Excellent**

Viet Nam

Performance Measures	Performance Evaluation	Remarks from own perspective	Remarks from Regional perspective
Environmental Performance Index (EPI)	Viet Nam's EPI was 59.0 in 2009. With a trend EPI of 4.2, under the new system its rating fell below the average EPI for ASEAN countries in 2010.		**Much Improvement Required**
Multilateral environmental agreements	Viet Nam has ratified or acceded to all major MEAs.		**Excellent**
MEA implementation	No data was available for transboundary movement of hazardous waste.		**Much Improvement Required**
Consumption of POPs	The non-availability of data implies a lack of incentives for implementing or enforcing MEAs.		**Much Improvement Required**
Consumption of CFCs	No data available.		**Much Improvement Required**
Quality of air	No measurement of air quality in Viet Nam was available for review.		**Much Improvement Required**
Incidence of fires	The incidence of fires increased from 9,897 to 13,981 in 2009–2012.		**Good**
Environmental education and promotional activities	Viet Nam has adopted eco-school programmes and various environmental awareness programmes. It has also incorporated EE at all levels of its national education system, which is encouraging.		**Good**
Implementation of Global certification on environmentally sound	Viet Nam has not provided any mill with RSPO Certification. In terms of SFC Certification schemes, the situation looks a little more encouraging, as the number of farms		**Very Good**

technology (EST)	that received this certification increased from two in 2009 to eight in 2013 and FSC certification increased from one to seven during this period.		
Eco-labelling scheme	Viet Nam's Green Label scheme has been in place since 2009.		**Very Good**
Municipal (solid) waste production	No data available for municipal (solid) waste production.		**Much Improvement Required**
Marine protected areas	Viet Nam has no marine protected area listed as ASEAN heritage park.		**Much Improvement Required**
Implementation of the Integrated Coastal Management (ICM)	No evidence of implementing the Integrated Coastal Management (ICM) so far.		**Much Improvement Required**
Protected land areas and heritage parks	No data on protected land area of Viet Nam. There were four ASEAN heritage parks in 2009, and one more had been added by 2012. Viet Nam also has three transboundary protected area with Lao PDR and one jointly with Lao PDR and Cambodia.		**Good**
Enactment and implementation of biosafety laws	Viet Nam's biosafety regulations are still under development. Hence, there had been no CHM initiatives as of 2012.		**Much Improvement Required**
Access to improved freshwater	The situation regarding access to improved freshwater in Viet Nam deteriorated during 2009–2012, with the access level declining from 92% of the population to 83% during this period.		**Good**

Access to improved sanitation	Access to improved sanitation fell from 65% to 55% in 2009–2012, a setback in terms of Viet Nam's part in implementing the roadmap for an ASEAN community 2009–2015.		**Fair**

Sources of Appendix 1

ASEAN Secretariat (2009), ASEAN Socio-Cultural Community (ASCC) Blueprint, Jakarta: ASEAN Secretariat, June.

ASEAN Secretariat (2012), ASCC Scorecard: Section-D. Ensuring Environmental Sustainability, Jakarta: ASEAN Secretariat, 28 February 2012.

ASEAN Secretariat (2013), Mid-Term Review of the ASEAN Socio-Cultural Community Blueprint: Final Report, Jakarta: ASEAN Secretariat, 25 September.

Appendix2

Proposed Lists of Indicators for NRM

Resource-based elements (at national level)

a. Usage of land

Sl.	Indicator	Explanation	Remarks/Sources
1	Land use changes	Percentages of a) Arable & crop land b) Pastures c) Forest land (including deforestation and reforestation) d) Others	OECD
2	Inhabitants per ha and municipality	The population density is a major driving force for urban expansion and is thus highly relevant for land-use management	OECD
3	Built-up area per municipality	The built-up area measured in hectare per municipality is used to describe the building density	OECD
4	Size of protected areas in km^2 (percentage of total land area)	Protected areas are declared as *Heritage Park* or other forms to conserve nature	ASCC Blueprint

Ref: OECD (2014), *Green Growth Indicators 2014, OECD Green Growth Studies*, OECD Publishing, *http://dx.doi.org/10.1787/9789264202030-en*

b. Inland water resources management

Sl.	Indicator	Explanation	Remarks/Sources
1	Renewable freshwater resources per capita	Total freshwater resources refer to internal flow plus actual external inflow. The internal flow is equal to precipitation less actual evapotranspiration. It represents the total volume of river run-off and groundwater generated, in natural conditions, exclusively by precipitation into a territory. The	OECD

		external inflow is the total volume of the flow of rivers and groundwater coming from neighbouring territories.	
2	Freshwater abstraction	The freshwater abstraction indicators relate to the intensity of use of freshwater resources, expressed as gross abstractions per capita, as a share of total available renewable freshwater resources	OECD
3	Water stress (% of renewable resources)	Water stress is defined as the intensity of use of freshwater resources, expressed as gross abstraction in percentage of total available renewable freshwater resources (including inflows from neighbouring countries)	OECD
4	Water stress (% of internal resources)	Gross abstraction in percentage of internal resources (i.e., precipitation minus evapotranspiration).	OECD

c. Ensuring the quality of soil

Sl.	Indicator	Explanation	Remarks/Sources
1	Visual indicators	Exposure of subsoil, change in soil colour, ephemeral gullies, ponding, run-off, plant response, weed species, blowing soil, and deposition are only a few examples of potential locally determined indicators. Visual evidence can be a clear indication that soil quality is threatened or changing.	USDA NRCS
2	Physical indicators	Examples include topsoil depth, bulk density, porosity, aggregate stability, texture, crusting, and compaction. Physical indicators primarily reflect limitations to root growth, seedling emergence, infiltration, or movement of water within the soil profile.	USDA NRCS
3	Chemical	Measurements of pH, salinity, organic matter, phosphorus	USDA NRCS

	indicators	concentrations, nutrient cycling, and concentrations of elements that may be potential contaminants (heavy metals, radioactive compounds, etc.)	
4	Biological indicators	Measurements of micro and macro-organisms, their activity, or by-products	USDA NRCS

Ref: USDA Natural Resources Conservation Service
http://urbanext.illinois.edu/soil/sq_info/sq_eval.pdf

d. Ensuring the quality of air

Sl.	Indicator	Explanation	Remarks/Sources
1	Production-based CO_2 productivity	GDP generated per unit of CO_2 emitted in production. Production-based emissions refer to gross direct CO_2 emissions from fossil fuel combustion, emitted within the national territory and excluding bunkers, sinks, and indirect effects.	OECD
2	Demand-based CO_2 productivity	Real national income per unit of CO_2 emitted. Demand-based emissions are production-based emissions plus emissions embodied in imports minus missions embodied in exports.	OECD
3	Exposure to PM2.5	The share of the population exposed to various PM2.5 levels, derived from satellite-based measurements. Population exposure to air pollution is calculated by taking the weighted average value of PM2.5 for the grid cells present in each region with the weight given by the estimated population count in each cell.	OECD
4	Exposure to PM10	The indicator shows urban population weighted PM10 levels in residential areas of cities with more	OECD

		than 100,000 residents. The estimates represent the average annual exposure level of the average urban resident to outdoor particulate matter. Current WHO air quality guidelines are annual mean concentrations of 20 micrograms per cubic meter for particulate matter less than 10 microns in diameter.	
5	Exposure to pollution by ozone	The indicator shows the population weighted concentration of ozone to which the urban population in Europe is potentially exposed. It refers to the annual sum of daily maximum 8-hour mean concentrations above a threshold (70 microgram ozone per m3 or 35 parts per billion) at urban background stations in agglomerations and calculated for all days in a year. Current WHO air quality guidelines for ozone are 8-hour mean concentrations of 100 micrograms per cubic meter.	OECD

e. Sustainable forest management

Sl.	Indicator	Explanation	Remarks/Sources
1	Area of forest land	i) in % of total land ii) in square kilometres per capita, and iii) related changes	OECD
2	Volume of forest resource stocks (in cubic metres, and related changes)	Volume over bark of living trees more than X cm in diameter at breast height (or above buttress if these are higher). Includes stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm. The diameters used may vary by country; generally the data refer to diameters of more than 10 cm at breast height.	OECD

f. Sustainable management of biodiversity

Sl.	Indicator	Explanation	Remarks/Sources
1	The number of threatened species	The number of threatened species compared to the number of known or assessed species. Data cover i) mammals, ii) birds, and iii) vascular plants. It should be kept in mind that these indicators only provide a partial picture of the status of biodiversity and that they also reflect efforts made to monitor species. They should be read in connection with information on the density of population and of human activities, habitat alteration, and the use of biodiversity as a resource (e.g., forest, fish).	OECD
2	Number of heritage parks	As declared by the legislative body	ASCC Blueprint

g. Promoting the sustainable use of coastal and marine resources

Sl.	Indicator	Explanation	Remarks/Sources
1	Number and size of urban centres near the coast	Area of the centre; Population size living near the coastal area	Respective division
2	Number of marine protected areas	As declared by the legislative body	ASCC Blueprint
3	Fish stock and supply	The indicators presented here refer to fish production from capture fisheries and aquaculture	OECD
4	Frequency of extreme weather events near coastal area	At different degree of extreme disaster	Respective division

h. Ensure environmental quality of life

Sl.	Indicator	Explanation	Remarks/Sources
1	Human exposure to pollution and environmental risks	a) Environmentally induced health problems and related costs b) Exposure to natural or industrial risks and related economic losses	Environmental burden of disease at EPI
2	Public access to environmental services and amenities	a) Population connected to sewage treatment b) Public access to basic sanitation c) Population with sustainable access to safe drinking water	ASCC Blueprint

i. Future sustainability of agricultural industry

Sl.	Indicator	Explanation	Remarks/Sources
1	Nitrogen and phosphorus surplus intensities	Expressed as the gross N and P balance per hectare of agricultural land	OECD
2	Agricultural nutrient intensity related to changes in agricultural output	Expressed as changes in the gross N and P balance per hectare of agricultural land versus changes in agricultural production.	OECD

j. Sustainable extraction and use of energies and minerals

Sl.	Indicator	Explanation	Remarks/Sources
1	Energy productivity of the economy	Expressed as GDP in constant prices per unit of total primary energy supply (TPES) – coal, natural gas, oil. Energy productivity measures how much national revenue is generated for each unit of primary energy supplied. Data availability permitting energy productivity can also be calculated for sectors.	OECD
2	Share of renewable in TPES and in electricity generation	The main renewable forms are hydro, geothermal, wind, biomass, waste, and solar energy.	OECD
3	Domestic material consumption (DMC) mix	DMC comprises: a) Biotic (biomass for food and feed, wood) – biomass and fossil energy may be separated b) Other abiotic (metals, industrial minerals) c) Construction minerals d) Municipal waste	OECD
4	Resource Productivity-materials	The amount of economic output generated (in terms of GDP) per unit of materials consumed (in terms of domestic material consumption, DMC). The focus is on non-energy materials.	OECD

k. Promoting green and sustainable tourism

Sl.	Indicator	Explanation	Remarks/Sources
1	Number of tourists per year	Both domestic as well as foreign tourists	WTO
2	Recognised tourist spots (with area of over 5 km^2)	Those spots recognised by the respective Division/Ministry of Tourism	Idea by author
3	Household expenditure for tourism and recreation	Expenditure per capita	WTO
4	Tourism eco-labelling	Is the tourist industry adopting eco-labels?	WTO

Source: World Tourism Organization (WTO) Indicators, http://www.macaulay.ac.uk/ruralsustainability/ExampleSetsofIndicators.pdf

Resource-based elements (at transboundary or regional level)

a. Transboundary haze pollution management

Sl.	Indicator	Explanation	Remarks/Sources
1	Number of hotspot counts	Incidence of fires	ASCC Blueprint

b. Transboundary movement of hazardous waste

Sl.	Indicator	Explanation	Remarks/Sources
1	Number of cases of Transboundary movement of hazardous waste	According to the Basel Convention	ASCC Blueprint
2	Number of illegal cases	According to the Basel Convention	ASCC Blueprint

c. Joint management of transboundary protected areas

Sl.	Indicator	Explanation	Remarks/Sources
1	Number of Joint management of transboundary protected areas	Number with area in km^2	ASCC Blueprint

Programme-related Indicators

Sl.	Indicator	Explanation	Remarks/Sources
1	Evaluation of a Programme's performance	Box-1 in this paper	Basis for any programmes or action plan
2	Community Participation	Number of awareness programmes and Number of participants/beneficiaries	Respective division
3	R&D expenditure	Government appropriations or outlays for R&D	Either for specific programme or for total NRM
4	Official Development Assistance	Total ODA (as a percentage of GNI), the share of ODA to environment and renewable energy	For total NRM
5	Environmentally related tax revenue	Expressed as a percentage of GDP and compared to labour tax revenue, also as a percentage of GDP	For total NRM
6	Road fuel taxes and prices	Expressed in US dollars per litre of diesel or unleaded petrol.	For total NRM
7	Government support in the agriculture and energy sectors	Support as defined in the OECD framework for producer and consumer support estimates, and expressed as percentages of total support estimates and in US dollars.	OECD

8	Water pricing	Expenditure for water (domestic, industrial, and irrigation)	Respective division

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