Strategic Environmental Assessment (SEA) for Indonesian Master Plan for Accelerated Economic Development (MP3EI)

Evaluation of the MP3EI Policy

Draft Report
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Evaluation of the MP3EI Policy

Draft Report

Prepared for ESP3 / Bappenas
Represented by Mr Peter Oksen / Mr Nizhar Marizi

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APPENDICES

A Appendix A: Approach and Methodology for Economic Analysis

A.1 Approach

A.2 Methodology
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1 Introduction

1.1 MP3EI SEA Project background

In 2011, the Government of Indonesia introduced the first version of the Master Plan for Acceleration and Expansion of Indonesia Economic Development 2011-2025 (MP3EI). The MP3EI encapsulates Indonesia’s long-term development strategy; based on the objectives of realizing the Indonesia 2025 vision of creating a ‘self-sufficient, advanced, just, and prosperous Indonesia and transforming Indonesia into a developed country by 2025’. The MP3EI includes a strategic focus on 22 economic activities (i.e. the Policy) and the implementation of these activities in the defined Economic Corridors (ECs).

While executing the recently released updated version of the MP3EI, however, it was realised that the MP3EI, and the associated National Medium Term Development Plan (RPJMN), needed to align its policies and plans with national commitments to social and environmental sustainability. Thus, along with several other initiatives, this Strategic Environmental Assessment (SEA) process was initiated to realize the required level of integrated policy and planning development. A SEA is also required by Indonesian legislation for all policy, planning and programme (PPP) developments.

To accomplish the required MP3EI ‘Greening’, Bappenas and the Ministry of Economic Coordination, key MP3EI coordinating bodies of the Government of Indonesia (KP3EI), developed an appropriate SEA approach. This approach required the execution of one MP3EI ‘Policy’ SEA to cover the strategic and policy related aspects of the MP3EI; and six Economic Corridor (EC) SEAs to cover the more tangible aspects of Economic Corridor planning. In order to fund these studies, Bappenas approached the Royal Danish Embassy and DANIDA for assistance via the third instalment of the Environmental Support Programme (ESP3).

The project MP3EI SEA was launched in June 2013 and shall last until September 2014.

1.2 Objective of MP3EI SEA

Generally, SEAs aim to address the strategic levels of decision-making to effectively minimise risks to environmental resources and human health likely resulting from policy, plan or programme implementation, whilst providing opportunities for growth and sustainable development options.

The objective of the MP3EI SEA Project was therefore to provide credible strategic environmental analyses of the MP3EI Policy and Economic Corridor Planning and, where necessary, provide recommendations on how to minimize or avoid associated negative effects and the means to strengthen positive effects. Optimally, the SEAs were designed to foster integrated evolution of a truly sustainable MP3EI, along with the associated planning procedures (e.g. RPJMN) and individual projects.

These objectives were further refined through investigations and consultations undertaken during the Project Inception Phase. Here ‘windows of opportunity’ were identified and the analysis framework was strengthened, as further discussion in the subsequent subsections.

---

1.2.1 RPJMN and Associated Recommendations

The aforementioned requirement to disseminate MP3EI SEA results into the Medium Term Development Plan (RPJMN) was seen as a major opportunity for integrating MP3EI SEA results into national economic and other related planning. Combined, MP3EI SEA output would provide policy and planning mitigation recommendations (include bolstering positive policy or planning aspects) for nationally relevant environmental and social issues; and thus be directly relevant for the RPJMN.

The ultimate goal was therefore to provide Bappenas with continual MP3EI SEA input from the onset of the Project. This would then provide input for inclusion in documentation that will become part of the binding RPJMN Presidential Decree.

1.2.2 Future MP3EI Developments

Although it is acknowledged that the draft of the MP3EI had been already revised, further amendments could occur in relation to presidential elections in 2014 or via scheduled future revisions. The opportunity therefore also existed to:

- Produce MP3EI SEA PPP feedback in line with a more preferred integrated SEA process (e.g. ex ante) to ensure that KP3EI and Bappenas are acquainted with the most favourable sustainable policy and planning process
- Provide suggestions which should be considered when undertaking future revisions of MP3EI Policy or EC Plans.

1.2.3 Feedback for ‘Greening’ Related Legal & Institutional Setting

It was clear that developments on the scale of MP3EI cannot be achieved without environmental and social consequences. Thus, where apparent and readily possible, it was deemed important to pursue impact avoidance or minimisation via ‘structural’ adjustments in how they are managed or regulated.

Given the Project’s overarching coverage in this regard, another MP3EI window of opportunity was to identify critical points in legal procedures and institutional schemes associated with the identified strategic issues identified in the MP3EI. Where analyses clearly identified institutional weaknesses, recommendations to further ‘Green’ inter-governmental communication, permitting procedures, environmental monitoring, etc. were considered as necessary and beneficial.

1.2.4 KSN and Provincial Planning

Spatial Plans for KSN (Kawasan Strategis Nasional) and provincial planning (both spatial and development plans) are closely linked to implementation of the MP3EI and Economic Corridor Plans. The MP3EI-related SEAs could therefore provide recommendations that facilitate the streamlining of sustainable planning in the preparation and SEA evaluation of KSN and provincial plans.

The opportunity for achieving this was to provide sustainability ‘guidelines’ or ‘road maps’ for planners in subsequent layers of planning. Among others, examples may include:

- Defining the sensitive areas and sites not to be used for certain type of development
- Recommending more favourable zones for certain MP3EI Projects
- Formulating “thresholds” and “limits” which should not be exceeded for specific territories, etc.
1.2.5 Influencing Significant MP3EI Projects

Based on the assessment of the Economic Corridors, the SEA also aimed at providing certain “guidelines” to be followed for significant or sensitive MP3EI initiatives. For example, where appropriate, it:

- Identified specific issues and problems to be analysed in detail within EIAs
- Identified where further research or strategic environmental analysis is necessary before local authority decision-making for MP3EI projects can be given (e.g. SEA of a proposed industrial area)
- Formulated suggestions on alternatives (both in terms of spatial dimension and possible sequencing of proposed development), and
- Highlighted the key aspects to be considered in monitoring of environmental and social effects during the project implementation.

1.2.6 Considering Climate Change

Climate change has been recognised as one of the key issues for MP3EI, as optimally it should contribute to meeting the goals stipulated by Indonesian National Action Plan Addressing Climate Change (RAN-PI) and the National Action Plan for Mitigation (RAN-GRK). Therefore the SEAs for MP3EI Policy and Economic Corridors aimed at uncovering effective and appropriate responses to climate change by focusing both on reduction of greenhouse gas emissions (mitigation) and actions to be taken to cope with the expected changes in climatic conditions (adaptation).

1.3 Purpose of this Report

This Report presents a strategic-level environmental evaluation of the MP3EI Policy (i.e. the English MP3EI version dated May 2011) which provides a basis for discussions with Bappenas, KP3EI as well as with the other government and non-government stakeholders regarding integration of the recommendations in the MP3EI and/or RPJMN and in related legal and institutional schemes.
2 Overview of the MP3EI

2.1 MP3EI Policy

The MP3EI represents the main Indonesian long-term development master plan, with its prime objective “to realize the Indonesia 2025 vision to create a self-sufficient, advanced, just, and prosperous Indonesia and to transform Indonesia into a developed country by 2025”. The main strategy of MP3EI implementation is to support the integration of the following three elements:

1. Developing regional economic potential in the six (6) ECs
2. Strengthening national connectivity both locally and internationally
3. Strengthening human resource capacity and national science and technology to support the development of main programmes in every EC.

The MP3EI policy document identifies eight (8) primary programmes and twenty-two (22) primary activities as the focus of national development. Among those eight programmes, seven are related to economic sector development and one related to development of strategic zones. The eight programmes cover 22 main activities consisting mostly of sectoral economic development and two activities of regional development in strategic zones. Further details on the structure of the programmes and activities can be seen in Section 5.1 of this Report.

2.2 MP3EI Planning and the linkages to the RPJMN

As a national high level economic policy and planning document, the MP3EI automatically closely relates to the National Long Term Development Plan (RPJP) and the National Medium-Term Development Plan (RPJMN). The MP3EI is formulated by combining two approaches, namely sectoral and regional planning which are integrated into the development of economic corridors. These two approaches are also contained in the RPJMN, which also combine sector and regional planning.

The preparation of the RPJMN for 2015 – 2019 is being coordinated by Bappenas. The tentative schedule indicates that the advanced RPJMN Draft should be ready by November 2014 with the relevant Presidential Regulation on RPJMN issued in February 2015.
3 MP3EI Policy SEA Approach and Evaluation Framework

3.1 General Approach to Assessing MP3EI Policy Sustainability

3.1.1 Interconnectivity between MP3EI Policy and Economic Corridor SEAs

Although SEAs for the MP3EI Policy and Economic Corridors were required to be conducted as separate SEA processes, the fact that the MP3EI integrates both Policy and EC planning in one document where the plans are highly integrated entails that the assessments of the MP3EI Policy and EC Plans are also inherently linked. Given this, the MP3EI Policy SEA has been carried out in three steps, namely:

1. Pre-scoping / Scoping analysis of the existing main social and environmental problems in Indonesia and their relationship to economic activities and other key aspects (e.g. insufficient management).
2. Execution of an initial preliminary and more qualitatively driven draft SEA analysis, resulting in recommendations for modifications of the MP3EI, its implementing scheme and providing environmental and social sustainability suggestions for the RPJMN.
3. Updating the draft MP3EI Policy SEA after execution and finalisation of the EC SEAs to further underpin and refine draft MP3EI Policy SEA conclusions with results of the more quantitative analyses planned for the EC SEAs.

Figure 3.1 Conception representation of the 2-staged MP3EI Policy SEA

This approach to the assessment enabled mutual reinforcing between the SEA for MP3EI Policy and EC’s, i.e.:

- The SEA of the MP3EI Policy provides a general framework (i.e. by further identifying the key issues at the national level to be analysed in detail when assessing the Economic Corridors, formulating guidelines for MP3EI implementing scheme etc.)

- While conclusions from the SEAs for Economic Corridors were used to estimate the overall cumulative impacts of the MP3EI in the SEA of the MP3EI Policy.
The SEA for MP3EI Policy SEA thus can be seen as an initial method to “plant the seed” of policy and planning adjustments, through generating discussion on necessary environmental and socially related policy and planning adjustments.

### 3.1.2 Approach to the MP3EI Policy Analysis

The MP3EI Policy stipulates the main priorities for developing the Indonesian economy through enhanced connectivity. Optimally, proposed economic developments should be in line with national objectives and laws pertaining to social issues and the protection of environmental resources. The MP3EI Policy SEA therefore focussed on evaluating the linkages between the MP3EI and the country-wide strategic issues representing Indonesian social and environmental priorities. This was done to identify potential conflicts, i.e. where the MP3EI might worsen existing problems or create new ones, as well as opportunities, i.e. where implementation of MP3EI might lead to improvements of environmental conditions and/or solving social problems).

The MP3EI Policy SEA has been carried out through the following analytical and consultation steps:

**Stage 1:**
- Pre-scoping / Scoping analysis of the existing main social and environmental problems in Indonesia and their relationship to economic activities and other key aspects (e.g. insufficient management). This provided for
- A proper understanding of baseline trends, which then provided the basis for predicting likely MP3EI effects, which then allowed for…
- The identification of key MP3EIA issues and the analysis scope for the Policy SEA

**Stage 2:**
- Evaluation of MP3EI strategy i.e. its 22 main economic activities and the National Connectivity Framework in relation to the key issues to determine likely risks and opportunities associated with MP3EI implementation, and the overall adherence of MP3EI to National sustainability commitments
- Execution of a legal analysis of the major legal and procedural MP3EI-related aspects to understand if the MP3EI contradicts existing legal requirements
- Execution of an economic analysis of the MP3EI via an approximation - where possible – of the externalised social and environmental costs related to the MP3EI,
- Summarisation of the findings from Stages 1 and 2 in the Initial Evaluation Report and consultations with relevant stakeholders.

**Stage 3:**
- Final evaluation of MP3EI Policy, which will consider results and findings from more detailed assessment at the EC level and highlight the cumulative effects resulting from the MP3EI implementation as well as formulate relevant measures
- Drafting the SEA report to summarize all findings and conclusions as well as provide overview of the consultations with relevant stakeholders. The SEA report will be a subject of stakeholders’ consultations.
3.2 Approach for Legal Review

The Legal Analysis was carried out by the Indonesian Legal Expert Professor Harsanto Nursadi, Faculty of Law, University of Indonesia, supported by two Junior Legal Specialists. The aim of the Legal Analysis was, considering the key sustainability issues identified by the MP3EI SEA, to identify existing problems related to the legal framework, legal procedures or law enforcement associated with the MP3EI and its main economic categories, and to provide suggestions for enhancing the MP3EI-related legal or procedural framework i.e. amendments of existing law or improvements of the institutional scheme.

To deliver expected conclusions, the Legal Analysis for each MP3EI Economic Category provides:

- An overview of the specific legislation related to a given MP3EI Economic Category (in Section 3.7)
- Description of existing legal environmental/social conflicts related to the MP3EI Economic Categories (in relevant Sections in Chapter 5) addressing among others
- The level of enforcement, entailing for example compliance with required horizontal requirements, compliance with sector specific requirements, etc.
- Any existing illegal activities within the MP3EI economic categories
- Procedural challenges (e.g. issuing permits) and problems in cooperation among the Governmental Institutions
- Existing legal gaps and the legal documents under preparation or planned to be drafted

The recommendations regarding the legal framework, which were formulated based on the analyses in Chapter 5, are included in the summary of recommendations provided in Chapter 8.

3.3 Approach for Economic Costing of Social & Environmental Risks

The methodology and approach for valuing the identified environmental and social costs of MP3EI is detailed in Appendix A.

The likely economic impacts of various types of economic activities envisaged under MP3EI were assessed through use of the recent work undertaken by the Economics of Ecosystems and Biodiversity (TEEB)\(^2\). This recognised set of economic data was used to measure the ‘costs’ of natural resource use (i.e. impacts to land, water, air, forests etc.) from MP3EI envisaged economic activities and connectivity developments (e.g. agriculture, light and heavy industry, mining, energy, tourism, fishing, roads, shipping, etc.). This therefore provides an indication of the difference between MP3EI financial revenues (i.e. accruing to private individuals) and the true economic cost to the Indonesian economy through resource-use underpricing.

At the policy level, some national or province-specific aggregate monetary costs imposed on forests, land, water, air, etc. were therefore analysed where TEEB values seem reasonably transifiable to the assessed MP3EI impacts. The TEEB resource values were supplemented by other monetary values transferred (and suitably adjusted) from recognized contemporary secondary sources it was assessed that that natural resources quantity and/or quality would be

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\(^2\) *Natural Capital At Risk: The Top 100 Externalities Of Business* (2013). TEEB. TEEB is a multi-stakeholder Platform for supporting the uptake of natural capital accounting in business decision-making. It is supported by G8 and UNEP; see [www.teeforbusiness.org](http://www.teeforbusiness.org)
affected by proposed developments. It was felt that this approach would give a feel of the relative scale of possible environmental costs vis-à-vis MP3EI planning as a whole. Social and distributional aspects of resource impacts (especially on common property resources) are similarly discussed qualitatively.

Similar to evaluation of the social and environmental risks and impacts, the estimation of the scale and sources of economic costs leads naturally to particular recommendations (for MP3EI itself as well as for other relevant planning schemes) activity-by-activity and for the sustainability of MP3EI as a whole.

### 3.4 National Strategic Issues Related to MP3EI

The initial stage of MP3EI Policy SEA provided an overview of country-wide issues relevant to the MP3EI, which were then further addressed both in assessment of the MP3EI Policy itself as well as for as a “starting point” for pre-scoping in the SEAs for the Economic Corridors.

The National Strategic Issues described below reflect existing trends and problems, which may be affected by implementing the M3PEI and thus represent the evaluation framework for analysing the likely risks and opportunities related to the MP3EI Policy.

Altogether eleven issues have been identified with further specification of existing concerns and problems. The table below provides an overview, while the full description can be found in Chapter 4 below.

**Table 3.1 Overview of the national strategic issues**

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<td><strong>Environmental Quality</strong></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>• Substantial pollutant discharges to freshwater and marine environments, especially in main population centres</td>
</tr>
<tr>
<td></td>
<td>• High vulnerability to floods and droughts aggravated by loss of forest cover and uncontrolled land use conversion</td>
</tr>
<tr>
<td>Air and climate</td>
<td>• Air pollution that threatens public health in urban areas and industrial centres</td>
</tr>
<tr>
<td></td>
<td>• Regular forest- and peat land fires exposing the population to substantial levels of related atmospheric pollutants</td>
</tr>
<tr>
<td></td>
<td>• Indoor air pollution</td>
</tr>
<tr>
<td></td>
<td>• High GHG emissions from deforestation and peatland degradation</td>
</tr>
<tr>
<td></td>
<td>• Increasing GHG emissions from energy, industry, transport and waste sector</td>
</tr>
</tbody>
</table>
### Issues

#### Land and soil
- Increasing rates of agriculture land conversion (especially in Java)
- High rates of land degradation by industry and mining, with limited investment in land rehabilitation
- Unsustainable use of peat lands leading to high GHG emissions and future land losses
- Increasing risk of soil erosion
- High use of "illegal" pesticides in intensive rice- and vegetable production resulting in impacts to soil quality
- Soil contamination from improper waste management (landfilling)
- Land subsidence in Java, coastal metropolitan areas (Jakarta, Medan, Surabaya, Semarang, Makassar) and Kalimantan resulting in regular flooding, deteriorating public health, loss of households assets and urban infrastructure

#### Ecosystems

##### Forests
- High rates of deforestation and forest degradation (e.g. fragmentation) causing forest cover loss and loss of forest-related natural capital (biodiversity and environmental services)
- High rate of peatland degradation
- Illegal logging

##### Biodiversity
- Habitat degradation and fragmentation
- High numbers of threatened species
- High vulnerability of biodiversity to climate change
- Ecosystem overexploitation (incl. poaching, illegal trade of flora and fauna, destructive fishing methods, human-wildlife conflict, pollution, etc.)
- Introduction of alien and invasive species

##### Coastal Areas
- High levels of coastal habitat degradation (incl. mangroves and coral reefs) resulting from coastal development, water pollution (including sedimentation), mining (especially offshore), charcoal production (from mangrove) and fishing (especially illegal)
- High vulnerability of coastal ecosystems to climate change
- High level of coastal erosion due to land subsidence and coastal development

#### Social and Economic Aspects

##### Human health
- Continued high incidence of infectious diseases – TBC, malaria, dengue
- High incidence of emerging diseases (avian influenza) and HIV/AIDS
- Environmental conditions negatively affecting human health – air pollution, noise, water-borne diseases
- Insufficient water supply infrastructure and waste water management systems (sewage/sanitation) both in urban and rural areas
- Poor access to health services in remote areas
- High proportion of population living in disaster-prone areas
- High proportion of population at potential risk as a result of climate change
<table>
<thead>
<tr>
<th>Issues</th>
<th>Specific concerns and problems</th>
</tr>
</thead>
</table>
| Livelihood and Local Communities | • High number of social conflicts over natural resources involving indigenous communities  
• High and possibly increasing number of underage workers  
• Continued high poverty rate especially in marginalised areas  
• Declining number of students in vocational schools  
• Inadequate public transport systems between regions and in large cities  
• Rapid and uncontrolled urbanisation leading to poor urban infrastructure and settlement in high-risk areas |
| Industry and mining            | • Low use of innovative technologies and methods in industry (energy efficiency, low emission / low waste technologies etc.) resulting in low total factor productivity and high reliance on natural capital depletion to generate economic growth  
• Low level of compliance with emission and environmental waste management standards  
• Difficulties in rehabilitation of ex-mining sites  
• Illegal mining |
| Energy and waste               | • Inefficient energy use and growing energy demand  
• Areas with insufficient electricity supply and occurrence of blackouts  
• Low utilization of renewable energy resources  
• Weak green fiscal incentives and disincentives to initiate behavioural change  
• Fuel subsidies fuelling inefficient use of combustion engines  
• Increasing waste production and lack of investment in waste management capacities  
• Insufficient waste management capacities |
| Environmental Management       |                                                                                                                                                                  |
| Environmental management       | • Weak coordination of planning systems  
• Insufficient quality of SEA and EIA  
• Lack of proper coastal management  
• Difficulties in protected area management (e.g. in terms of controlling encroachment)  
• Low level of enforcement of environmental legislation and compliance with environmental standards |

3.5 Benchmarks for Sustainable Economic Policy

The Indonesian Government has made a number of commitments regarding sustainable development, environmental and nature protection and social issues through adopting national policies and strategies as well as by signing international treaties and agreements. The goals and targets stipulated in these documents can be understood as certain benchmarks that should guide sustainable economic development of the country.
The overview below lists the objectives and targets defined by the existing strategic documents relevant to the national strategic issues identified in the first stage of the MP3EI Policy evaluation.

3.5.1 Water

**Water Resources Management Targets (RPJMN; President Regulation No 7/2005)**

- To achieve water resources management pattern in integrated and sustainable manner
- To control groundwater usage
- To improve the water capacity to fulfill the needs for household, settlement, agriculture, and industry with the priority for domestic use and traditional agriculture
- To reduce the impact of flood and drought
- To control water pollution
- To revitalize water sources and water infrastructures conditions
- To ensure the bulk water availability for public needs
- To control flood particularly in urban areas

**National Action Plan on Greenhouse Gases Emissions Reduction (RAN-GRK)**

**Strategies for Forestry and Peat Land sectors**: Optimise land and water resources without deforestation

**Indonesia Action Plan for Climate Change Adaptation (RAN-API): Synthesis-report**

**Target for infrastructure**: The provision of infrastructure on sanitation system and management of wastes that is resilient to climate change.

3.5.2 Air and climate

**National Action Plan on Greenhouse Gases Emissions Reduction (RAN-GRK)**

**Overall objective**:  
- To reduce greenhouse gas emissions by 26% on Indonesian own and by 41% if Indonesia receives international aid, by the year of 2020 from the condition without any action (BAU)

**Strategies for Forestry and Peat Land sectors**:  
- Suppress the rate of forest deforestation and degradation to reduce GHG emissions  
- Increase the efforts to secure forest areas from fire and illegal loggings and apply sustainable forest management
Strategies for Energy and Transportation sectors:

- Conserve the final energy both through the application of cleaner and more efficient technologies and through reduction in the consumption of non-renewable energy (fossil)
- Encourage the use of new and renewable energy in small and medium scales
- Reduce the travel needs, particularly in city areas (trip demand management), through land use management, reduce travel activities and unnecessary distances
- Shift from using private vehicles to low-carbon transportation pattern, such as non-motorized, public, or water transportation facilities
- Improve energy efficiency and carbon release reduction in motorized vehicles in transportation facilities

Strategies for Industrial sector:

- Conduct an energy audit especially on energy-intensive industries
- Provide incentives in energy efficiency programme

3.5.3 Land and soil

**Strategic Action Plan of the Ministry of Environment (RENSTRA)**

**Objectives:**

- To ensure increased empowerment of peatland management, improved rehabilitation outcomes by 500,000 ha per year
- To ensure reduction of environmental pollution load through surveillance in 680 industrial and service activities in 2010 and continues, the number of forest fire hotspots by 20% per year and the overall level of pollution by 50% by 2014
- To ensure cessation of environmental damage in 11 watersheds located in disaster-prone areas.

**Indonesian REDD+ National Strategy**

Strategy for Implementation of an Economy Based on Sustainable Natural Resource Management:

- Increased agricultural and plantation productivity

**Indonesian Climate Change Sectoral Roadmap (2010)**

**Strategy for Agriculture Sector:** Optimization of land and water resources use and development of agricultural activities with environmental knowledge
3.5.4 Forests

*National Action Plan on Greenhouse Gases Emissions Reduction (RAN-GRK)*

**Strategies for Forestry and Peat Land sectors:**

- Suppress the rate of forest deforestation and degradation to reduce GHG emissions
- Increase planting to increase GHG absorptions
- Increase the efforts to secure forest areas from fire and illegal loggings and apply sustainable forest management

*Asia Forest Partnership (AFP)*

- Reducing forest loss and degradation and enhancing forest cover to maintain the provision of forest products and ecosystem services, including mitigation of and adaptation to climate change, watershed and land resource protection, and conserving biological diversity; and
- Combating illegal logging and associated trade

3.5.5 Biodiversity

*Indonesian Biodiversity Strategic and Action Plan 2003 – 2020*

**Objectives:**

- To implement a balanced conservation and sustainable use of biodiversity.
- To strengthen institutions and law enforcement.
- To resolve conflicts over natural resources.

*UN Convention on Biological Diversity* 4

- To integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programmes and policies

3.5.6 Coastal Areas

*Water Resources Management Targets (RPJMN; President Regulation No 7/2005)*

- To protect coastal areas from abrasion especially in remote islands, strategic areas, and international boundary regions

*Indonesia Action Plan for Climate Change Adaptation (RAN-API): Synthesis-report*

**Objectives for coastal areas and small islands:**

- Management of quality of the environment of coastal areas and small islands in a sustainable manner

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3 GOL partnered with AFP in 2002
4 Indonesia is a party of the CBD since 1994.
• Applying structural and non-structural adaptation measures in coastal areas and small islands that are vulnerable to climate change

3.5.7 Human health

*Indonesian Millennium Development Goals*

Target 6A: Have halted by 2015 and begun to reverse the spread of HIV/AIDS.

Target 6C: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.

Target 7C: Half, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation

*Indonesia’s National AIDS Strategy and Action Plan 2010-2014*

Objective: To prevent and reduce the risk of HIV transmission; to improve the quality of life of PLHIV; and to reduce the social and economic impact of HIV and AIDS among individuals, families, and the community at large thus enabling and ensuring their full participation as valuable, productive members of society.

Target: By 2014 eighty percent (80%) of key populations will be reached through effective programmes and 60% of them will engage in safe behavior.

*Ministry of Health Strategic Plan (RENSTRA Kementerian Kesehatan) 2010-2014*

Objective: Improving the access and quality to health services through public health, family planning, health infrastructure, medicine and national health insurance programmes.

*Indonesian Climate Change Sectoral Roadmap (2010)*

Goal: The risks of negative climate change impacts on all sectors of development will be considerably reduced by year 2030 through public awareness-raising, strengthened local capacity, improved knowledge management, and the application of adaptive technology.

Strategy for water sector: Prioritizing water demand for domestic use, especially in regions with water scarcity and in regions of strategic importance.

*National Disaster Management Plan 2010 – 2014*

Strategy 2 Integration of risk reduction programmes into development programmes: Disaster risk reduction programmes will need to be integrated into development plans at the central and local levels, into the Middle-term Development Plan (RPJM), Annual Development Plan (RKP), Strategic Plans and Work Plans of Ministries/Agencies, Local Middle-term Development Plan (RPJMD), Local Annual Development Plan (RKPD) and Work Plan of Local Government Units.

*Indonesia Action Plan for Climate Change Adaptation (RAN-API): Synthesis-report*

Target for settlements: Implementation of development and management of settlements that are integrated to endeavours to overcome the impact of climate change and are in line with sustainable development
3.5.8 Livelihood and Local Communities

Indonesian REDD+ National Strategy

Reform for spatial planning: Researching permit processes, policies and regulations with reference to a creating a legal framework for dealing with climate change and for resolving land use conflicts; and following up on the findings through developing transparent, accountable and integrated systems for issuing land use permits, as well as simplifying regulations and administrative procedures to achieve efficient public service and a climate conducive to investment, especially in the development of small and medium scale enterprises by local communities.

The National Plan of Action for the Elimination of the Worst Forms of Child Labour

Mission 4: Prevent and eliminate the involvement of children in the production or sale of explosives, deep-sea diving, work at offshore platforms/rigs, underground, mining; and eliminate the involvement of children in other work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of the children.

Indonesian Millennium Development Goals

Target 1A: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day.


Objective: Expansion of vocational schools to increase the size of the labor force that is ready-to-work, especially among those who do not continue to tertiary education.

Ministry of Transportation Strategic Plan (RENSTRA) 2010 – 2014

Objectives:

- Support the accessibility and mobilization of passenger and distribution for goods/services to sustain regional connectivity development and increase the competitiveness of national product
- Drive the transportation technology development that is environmentally friendly as the anticipation to climate change impacts

Indonesian National Action Plan for GHG Emission Reduction (Presidential Regulation No 61/2011)

Policies on Energy and Transportation Sectors:

- Development of a low emission, sustainable and environmentally friendly national mass transport

3.5.9 Industry and mining


Objectives for industry sector

- To incorporate the industry sector’s emission reduction efforts into the national economic development
To identify technologies, programmes, and funding required to support activities that can reduce GHG emissions from the industry sector.

Supportive policies for industry sector:

- Inform about Best Available Technology (BAT) and assist BAT installation for new cement plants (2015 – 2020)
- Introduce an Award System for specific savings in GHGe across the (target) industries (2010 – 2014)

**Indonesian REDD+ National Strategy**

Control of damage from mining: Damage to land can be mitigated and reduced through the proper technology for exploration and mining. The development of lower emissions mining can be encouraged through laws, regulations, and the application of extractive industry standards, as well as the designation of mining-free zones, increased effectiveness of reclamation activities, and the improvement of mining permit management.

Strategy for Implementation of an Economy Based on Sustainable Natural Resource Management:

- Control of damage from mining

### 3.5.10 Energy and waste

**Indonesia Action Plan for Climate Change Adaptation (RAN-API): Synthesis-report**

**Objectives for energy security:**

- The developed energy sources from hydropower in regions that have low climate risk with a conducive ecosystem.
- The developed vegetations for bioenergy (biomass and plant fuel) with a high productivity and that are resilient to climate change
- The optimized utilization of organic waste for the production of energy and gas, particularly in densely populated regions for reducing environmental pollution and enhancing the regional tolerance range to extreme rainfall occurrences.
- The increased utilization of renewable energy in more rural areas that encourage preservation of the ecosystem and sustainable energy supply.


**Objectives for energy sector**

- To properly address Indonesian heavy reliance on fossil-based fuels

**Activities for energy sector:**

- Development of biogas for domestic use (2010 – 2014)
- Development of geothermal energy (2015 – 2019)

**Alternative strategies for solid waste management sector**

- Applying environmental-friendly infrastructure development policies in the waste sector, supported by environmental-friendly technology research and development
• Developing environmental policies based on the principle of the 3Rs (reduce, reuse, recycle) and applying these principles in the waste management sector

• Apply infrastructure development policies for conversion of open dumping to sanitary and controlled landfills, supported by the applied technology research and development

National Action Plan on Greenhouse Gases Emissions Reduction (RAN-GRK)

Strategies for Waste Management sector:

• Enhancement of institutional capacity and regional regulations

• Enhancement of waste water management in urban areas

• Reduction of the heaps of wastes through 3R (reduce, reuse, recycle)

• Improvement of the waste management process in the Final Treatment Facility (FTF)

• Improvement/construction/rehabilitation of FTFs

• Utilization of waste/solid waste into environmentally friendly products

3.5.11 Environmental management

Indonesian Millennium Development Goals

Target 7A: Integrating the principles of sustainable development in national policies and programmes as well as reversing the loss of environmental resources


Objectives for coastal areas and small islands:

• Integration of adaption measures to climate change in the plan for managing coastal areas and small islands

UN Convention on Biological Diversity

• To integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programmes and policies

• To introduce appropriate procedures requiring environmental impact assessment of proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participants in such procedures.

3.6 Indonesian Principles for Strategic Environmental Assessment

In accordance with the mandate of Law Number 32 Year 2009 ‘Protection and Environmental Management’, Article 15 paragraph (1) and paragraph (2), KLHS or SEA, must be carried out by the Indonesian national and local governments.

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5 Indonesia is a party of the CBD since 1994.
A SEA is required to follow protocols defined in ‘Environmental Protection and Management No.32 Year 2009, Article 16’, that state, amongst others, that a SEA analysis must include:

• The environment’s carrying capacity and accommodating capacity for the development
• Estimated environmental impact and risk
• Ecosystem service performance
• Efficiency of natural resources utilization
• Level of proneness (vulnerability) and capacity for adaptation to climate change
• Tenacity (resilience) level and potentialities of biodiversity

The principles above can be understood as guidance on the focus of SEA analyses, which should be considered within SEA as appropriate. It means that not all six principles would need to be addressed at the same level of detail and/or scope, but as relevant to the nature of the plan, policy or programme assessed and/or approach to the SEA.

The table below specifies how these principles have been considered within the MP3EI SEA.
Table 3.2  Overview of Indonesian SEA principles and the way of their consideration within MP3EI SEA

<table>
<thead>
<tr>
<th>SEA principle</th>
<th>Considering SEA principle within MP3EI SEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment’s carrying and accommodating capacity for development</td>
<td>While the MP3EI Policy SEA highlights potential threats, which could lead to exceeded capacity of the environment, the EC SEAs provide qualitative and quantitative evaluation of likely impacts and indicate environmental aspects and areas, where the proposed MP3EI development could exceed actual environmental capacities and limits (e.g. industrial air pollution, water pollution etc.).</td>
</tr>
<tr>
<td>Estimated environmental impact and risk</td>
<td>One of the key tasks – while MP3EI Policy SEA is focused more on the risks related to the priorities stipulated by the MP3EI for main Economic Categories, the ECs’ level assessment estimates the likely impacts linked to implementation of the specific MP3EI projects. In accordance with international good practice, both environmental and health/social aspects are addressed within the M3PEI SEA, as well as the estimated economic consequences.</td>
</tr>
<tr>
<td>Ecosystem service performance</td>
<td>The likely effects on the ecosystems (forests and other terrestrial habitats, coastal areas) are analysed both at the MP3EI Policy and EC levels including also economic valuation of loses connected with degraded ecosystems. The SEA analyses consider the services provided by the ecosystems and likely knock-on effects on human populations.</td>
</tr>
<tr>
<td>Efficiency of natural resources utilisation</td>
<td>The MP3EI Policy SEA identifies efficiency of non-renewable natural resource use as one of the key issues and provides a number of recommendations on how to address this issue at the strategic level (e.g. to prioritise energy efficiency of industry and transport in the MP3EI/RPJMN).</td>
</tr>
<tr>
<td>Vulnerability and capacity for adaptation to climate change</td>
<td>Vulnerability to the climate change and importance of proper adaption actions have been identified by the MP3EI Policy SEA as one of the key national strategic issues – it described likely risks related to the MP3EI priorities and provides recommendations towards planning at the national and provincial levels.</td>
</tr>
<tr>
<td>Resilience level and potentialities of biodiversity</td>
<td>Risks and likely impacts regarding biodiversity were analysed within the MP3EI Policy and EC SEA. The analyses consider a wide spectrum of disturbances directly or indirectly related to the MP3EI development (deforestation, water pollution, coastal degradation, introduction of invasive species, etc.).</td>
</tr>
</tbody>
</table>
3.7 Overview of Relevant Legislation and Law

The list below provides an overview of existing legal framework relevant to the main economic activities stipulated by the MP3EI. It presents a basis for further analysis of legal aspects related to the national strategic issues addressed in the MP3EI Policy SEA.

Agriculture and Forestry

- Law No. 41/1999, on Forest Management and Forest Utility
- Law No. 5/1990, on Conservation of Biological Natural Resources
- Law No. 18/2014, on Prevention and Eradication of Forest Degradation
- Law No. 4/2009 on Mineral and Coal Mining
- Law No. 5/1960 on the Basic Agrarian Regulation
- Law No. 18/2009 on Husbandry and Animal Health
- Law No. 18/2004 on Plantation
- Law No. 19/2003 on Protection and Empowerment of Farmers.
- Government Regulation No. 6/2007 in conjunction with Government Regulation No. 3/2008 on Forest Arrangement and Formulation of Forest Management Plan as well as Forest Utilization
- Government Regulation No. 6/2013 on Breeders Empowerment
- Regulation of the Minister of Trade No. 46/M-DAG/PER/8/2013 on the Import and Export of Animals and Animal Products
- Regulation of the Minister of Agriculture No. 98/Permentan/OT.140/9/2013 on Guidelines of Plantation Permits
- Presidential Instruction No. 6/2013 on Adjournment of New License Issuance and Consummation of Primary Natural Forest Management and Peat Land
- Law No. 41/2009 on Protection of Sustainable Agricultural Land
- Law No. 18/2012 on Food
- Law No. 19/2013 on Protection and Empowerment of Farmers.

Light and Heavy Industry

- Law No. 18/2008 on Waste Management
- Government Regulation No. 41/1999 on Air Pollution Control
- Government Regulation No. 85/1999 in conjunction with Government Regulation No. 18/1999 on Management of the Waste of Hazardous and Toxic Materials
- Government Regulation No. 74/2001 on Management of Hazardous and Toxic Materials
- Government Regulation No. 82/2001 on Water Quality Management and Water Pollution Control
- Regulation of the Minister of Environment No. 3/2010 on Quality Standards of Water Waste for Industrial Area

**Mining**

- Law No. 4/2009 on Mineral and Coal Mining
- Law No. 22/2001 on Oil and Gas
- Law No. 30/2007 on Energy
- Presidential Regulation No. 5/2006 on National Energy Policy

**Energy**

- Law No. 30/2007 on Energy
- Law No. 10/1997 on Nuclear Energy
- Law No. 27/2003 on Geothermal Energy
- Law No. 30/2009 on Electricity


- Governmental Regulation No. 14/2012 on Electricity Supply Activities
- Regulation of the Minister of Energy and Mineral Resources No. 4/2009 on Electricity Distribution Regulation

- Regulation of the Minister of Energy and Mineral Resources No. 15/2010, No. 1/2012, and No. 21/2013 providing the List of Accelerated Development Project of Power Plants Using Renewable Energy, Coal, and Gas and Transmission Related

- Regulation of the Minister of Energy and Mineral Resources Regulation No. 10/2012 on Implementation of Physical Activity Utilizing New and Renewable Energy

- Regulation of the Minister of Energy and Mineral Resources No. 2/2006 on Development of Mid-Range Renewable Energy Power Plant

**Fisheries**

- Law No. 31/2004 in conjunction with Law No. 45/2009 on Fishery
- Law No. 5/1983 on Indonesian Economic Exclusive Zone
- Law No. 6/1996 on Law and Water Territory
- Law No. 27/2007 on Management of Coastal Areas and Small Islands
- Law No. 17/1985 on Sea Convention
- Governmental Regulation No. 54/2002 on Fish Farms
- Governmental Regulation No 60/2007 on Conservation of Fish Resources
• Governmental Regulation No 36/2010 on Business Tourism In Wildlife Nature, National Park, Forest Park Botanical, and Amusement Park

Tourism

• Law No. 10/2009 on Tourism
• Government Regulation No. 50/2011 on National Tourism Development Master Plan
• Law No. 1/2014 and Law No. 27/2007 on Management of Coastal Areas and Small Islands
• Presidential Regulation No. 122/2012 on Reclamation of Coastal Areas and Small Islands
• Regulation of the Minister of Marine Affairs and Fisheries No. 17/PERMEN-KP/2013 on Reclamation Permit in Coastal Areas and Small Islands
• Regulation of the Minister of Marine Affairs and Fisheries No. 12/PERMEN-KP/2013 on Monitoring of Coastal Areas and Small Islands Management

Communication

• Law No. 36/1999 on Telecommunication
• Law No. 32/2002 on Broadcasting
• Law No. 11/2008 on Information and Electronic Transaction
• Law No. 14/2008 on Transparency of Public Information
• Government Regulation No. 52/2000 on Implementation of Telecommunication

Development of Strategic Areas

• Law No. 29/2007 on Administration of Special Capital Region of Jakarta as the Capital of Unitary State of the Republic of Indonesia
• Law No. 26/2007 on Spatial Planning
• Law No. 28/2002 on Building
• Law No. 25/2007 on Investments and other related laws
• Presidential Regulation No. 36/2010 On List of Business Fields Closed to Investment and Business Fields Open, With Conditions, to Investment

Connectivity

• Law No. 38/2004 on Roads
• Law No. 23/2007 on Railroad System
• Law No. 1/2009 on Aviation
• Law No. 17/2008 on Shipping
• Government Regulation No. 15/2005 in conjunction with No. 44/2009 in conjunction with No. 43/2013 on Toll Roads
• Government Regulation No. 34/2006 on Roads
• Government Regulation No. 70/2001 on Airports
4 Overview of Country-wide Sustainability Issues

This section describes specific concerns and problems for each of the National Strategic Sustainability Issues. 6

4.1 Environmental Quality

4.1.1 Water

Heavy Freshwater and Marine Pollution

Water pollution levels in rivers, lakes and coastal areas in Indonesia have risen to alarming levels. This poor water quality is not only threatening the health of the community but also affecting the diverse biota living in the freshwater and marine ecosystems. Out of 35 rivers monitored in 2008 by the Ministry of Environment, 25 of them were classified as “polluted” to “heavily polluted”. The Figure 4.1 provides an overview of the areas with low water quality i.e. non-compliant with the National Standards (Class III). Rivers are often used as dumping grounds for household wastes, agricultural wastes and industrial wastes. For example, 84% of pollution in Cisadane River comes from domestic waste (such as households, hotels, restaurants and vehicle workshops) and 14% comes from industrial waste particularly iron and manganese plants.

Figure 4.1 Areas with Water Quality Non-Compliant with the National Standards (Class III)

6 In order to enhance the readability of the report, only selected references are directly provided in the text, while the full list of background documents and literature used can be found in Section 9.
High Vulnerability to Floods and Droughts

In principle, almost all parts of Indonesia are vulnerable to flood and drought hazards (See Figures 4.2 and 4.3). During the rainy season, Indonesia receives abundant rainfall, with average rainfall reaching up to 400mm/month. Overloaded surface water sources and water reservoirs, mostly clogged by garbage accumulations, have increased the severity of flooding in many urban regions. Several cities like Jakarta, Semarang and Banjarmasin suffer periodic flooding; as well as several big rivers such as Bengawan Solo in Java and Benanain River in East Nusa Tenggara.

Conversely, during the dry season, many regions of Indonesia experience prolonged drought with water deficits that last for several months and cause failures of water supply systems and of rain fed irrigated crops.

Figure 4.2  Flood Risk Levels
4.1.2 Air and Climate

Air pollution threatening public health and ecosystems

The most important air quality related concerns in Indonesia are associated with major urban areas and the smoke and haze from forest fires. Emissions from transportation, electricity generation from fossil fuels, industry and residential combustion are the main sources of urban air pollution – Figure 4.4 below provides an overview of the areas with the low air quality (based on the Indonesian National Standards). Furthermore there are various air pollution sources that need to be taken into account at a local level, for example uncontrolled burning of waste, field burning (of crop residues), and flaring of oil & gas production. Indoor air pollution is also a significant specific threat to public health in Indonesia as reported by for example the WHO.

High GHG emissions from deforestation and peatland degradation

Indonesia is one of the three largest emitters of GHG in the world. Since the country is host to vast forested areas, about 24 billion tonnes of carbon stock (BtC) are stored in vegetation and soil, and 80 percent of this is stored in the standing forest. Thus, the most significant release of carbon dioxide is estimated to come from deforestation. Yearly emissions from energy, agriculture and waste altogether are around 451 million tonnes of carbon dioxide equivalents (MtCO$_2$e), while land-use change and forestry (LUCF) alone is estimated to release about 2,653 MtCO$_2$e – mostly from deforestation and peatland degradation.

However, it needs to be noted that there are different estimates regarding the National GHG inventory and main contributing sectors. The Second National Communication (SNC) report estimated the main contributing sectors were Land Use Change and Forestry, followed by energy and peat fire related emissions, while World Bank and DFID study stated LUCF contributed about 85% of the total emissions (twice the SNC estimate above). Between the SNC...
and World Bank estimates, a recent study from NCCC (DNPI) (2009) suggested that the total GHG emissions from LUCF in 2005 reached 1,880 MtCO$_2$e where about 55% was from peat emissions. These large differences in Indonesian emissions estimates thus appear to be mainly due to differences in estimates of LUCF emissions, particularly from peat and peat fires.

![Figure 4.4](image)

**Figure 4.4** Areas with the Air Quality Non-Compliant with the National Standard

*Increasing GHG emissions from energy, industry, transport and waste sector*

Energy-related GHG emissions are dominated by industry, power, and transport sectors and the energy sector is the third largest source of CO$_2$ emissions in Indonesia (in 2005 it was about 275 MtCO$_2$e, which accounted for 9 percent of the country’s total emissions). Although GHG emissions from non-forestry sectors such as energy are small, in absolute and per capita terms, they are growing very rapidly, due to rapid industrialization and economic growth.

The GHG emissions from power generation and transportation are predicted to further rise significantly in the future if the current trends continue. The estimates provide that Indonesia’s power and transportation emissions are expected to rise seven-fold over the 25-year period leading up to 2030 following the strong demand growth and an increasing dependence on coal. As illustrated in Figure 4.5, the CO$_2$ intensity of the Indonesian economy has been growing – although still below the OECD average (2.35 in 2009), the existing trend is opposite to development in OECD countries. Therefore if the current trend continues, Indonesia may exceed the OECD average in 5 – 10 years.
4.1.3 Land and Soil

Increasing rate of agriculture land conversion

The total area of agricultural land has increased in Indonesia in the period 1975 – 2005 including an increase of land utilised by palm oil production. This expansion of agricultural land is evenly split for arable land and permanent crops, while permanent pasture land has remained constant. The increase in arable land was primarily due to increasing rice production (representing more than half of all arable land) and the increase in permanent crops was primarily due to increasing palm oil production. In Indonesia, land occupied by palm oil production has grown significantly faster than all other permanent crops (which, however, also have been increasing).

On the other hand, the rate of land use change from agriculture to non-agriculture use reaches almost 75,000 Ha per year in the period of 1979 — 1999 and increases to 110,000 Ha per year in the period of 2000 — 2011. The increasing rate of agricultural land conversion is caused by many inter-related factors and underlying drivers; such as population growth, agriculture and forestry prices, economic growth and policy and institutional factors. One of the most critical drivers is a very low incentive to work in agriculture compared to industrial and service sectors; which thereby influences farmers to sell their agricultural land as an opportunity to find better and more promising opportunities in other sectors.

High rate of land degradation by industry and mining

The conversion of the agricultural land for industrial and mining activities (e.g. mainly open pit mining and illegal mining) is one of the key drivers of soil degradation – directly at the site as well as in surrounding area. Coal mining in Kalimantan and gold mining in West Java and Kalimantan are notable examples of where mining has led to significant soil contamination.

Increasing risk of soil erosion

Rainwater erosion is an important driver of the land degradation in Indonesia. In western Indonesia, this phenomenon occurs due to the high volumes and intensity of rainfall; while in the eastern part of Indonesia the erosion is caused primarily by high intensity of rain. The slope inclination is another factor related to this problem. Around 77% of the total land area in Indonesia is at a slope of more than 3% and thus prone to erosion – furthermore over the last 10
– 12 years agriculture and settlements have often encroached onto steeper slopes than earlier, thus further increasing the potential risk of erosion. Figure 4.6 below illustrates the risks of landslides across the country.

![Figure 4.6 Landslides Risk Levels](image)

**Soil pollution resulting from improper waste management**

Improper or uncontrolled sanitary landfills are a common waste management issue in Indonesia, one that often leads to the leaching of contaminants to soil and water resources; examples of this are abundant and the landfill at Bantargebang Bekasi (West Java) is a typical one. This 120 ha landfill receives 5.300 tonnes of waste per day from Jakarta Province even though its maximum design capacity has been exceeded. This practice continues as there is a lack of other available replacement sites.

It is evident that toxic materials are most often not separated for dedicated treatment or disposal; i.e. only about 50%. This coupled with uncontrolled and/or over utilised landfills undoubtedly presents significant threat to human health through related soil, groundwater and water pollution.

**Land subsidence**

Land subsidence is occurring in large Indonesian cities such as Jakarta, Bandung, and Semarang. The impact of land subsidence in Jakarta is clearly apparent through the cracking of permanent structures (e.g. in the centre of Jakarta), the expansion in area and occurrences of flooding and increased inland seawater intrusion.

Land subsidence in Jakarta is mainly caused by groundwater extraction. Shallow extraction (<40 m) is mostly carried out by individual property holders. These wells are generally evenly distributed across the basin and their extraction rate per well is relatively low. Deep extraction (>40 m) is usually conducted by industry, is localized and has a high extraction rate.
Bandung in West Java is also facing a land subsidence phenomenon. Increasing rates of urbanization and industrial activity in the Bandung Basin have increased the degree of groundwater withdrawal from the aquifers. The estimated subsidence rates at all observed areas vary highly (from 2-20 cm/year) and the areas with high subsidence rate are frequently affected by flooding.

Land subsidence also presents a problem in Kalimantan and Sumatra, where the drainage of peatland (mainly due to industrial oil palm plantations) causes irreversible lowering of the surface as a consequence of peat shrinkage and biological oxidation. Since continuing peatland degradation is projected (see Section 4.2.1), further exacerbation of the land subsidence issue in Kalimantan and Sumatra can be expected.

4.2 Ecosystems

4.2.1 Forests

*High rate of deforestation and forest degradation*

Indonesia has among the highest global deforestation rates of all countries in the world, with estimates indicating that more than two million hectares are being degraded and cleared each year. The main factors causing deforestation and forests degradation are as follows:

- Timber extraction – both with concession and illegal logging
- Industrial timber plantations
- Palm-oil and other large scale industrial estate crops
- Small-scale farming, encroachment and forest burning
- Infrastructure development

The effects of climate change should also be considered in relation to deforestation. The change in forest fires dynamics due to the El Niño Southern Oscillation events in 1982 – 1983 and 1997–1998 is an example of how prolonged drought and widespread human-induced forest fires resulted in the loss of significant areas of forests.

Figure 4.7 provides a comparison of the land cover in years 2003 and 2011 respectively.

There is also a strong correlation between agriculture land conversion rates and forested land reduction. Figure 4.8 below indicates that since 1996 an average conversion rate of forest area to agricultural land has been approximately 1.066, which means that agriculture development is likely to be the most significant driver of forest land conversion (i.e. only around 6.6 % of forest land in this period has been used for non-agricultural purposes). Should current trends continue, further decrease of the forest land area are estimated at more than 60,000 km² by 2023 (see Figure 4.9).

Road infrastructure development also represents a significant threat to forest wilderness areas; such as those remaining in Kalimantan, Sumatera and Papua. Although the likely impacts of the road itself can be mitigated at the project level, the roads open access to previous ‘untouched’ areas. This is then followed by a broad range of legal (as well as illegal) activities, including hunting, logging, encroachment and forest fires; which ultimately amplify the deforestation and related impacts.

In Kalimantan, the network of logging roads, built by the concessionaires, currently represents one of the major factors facilitating ongoing hunting, illegal logging and encroachment. Similarly, one of the major factors behind forest loss in East Kalimantan is the provincial highway, which cuts across or runs along several protected areas – Kutai National Park, Taman Hutan Raya Bukit Soeharto and Sungai Wain Protection Forest. Also in Sumatera several large roads,
cutting across wilderness areas, have resulted in highly accelerated forest loss e.g. the Ladia Galaska road system.

Figure 4.7  Land Cover in 2003 and 2011
High rate of peatland degradation

The majority of Indonesia’s approximately 21 million hectares of peatland is located in the regions of Kalimantan and Sumatera, which account for over 80% of peatland in Southeast Asia and half of the world’s tropical peatland. A distinctive environmental problem in Indonesia is, however, the conversion of tropical peatland to agriculture land, which leads to a release of carbon from previously stable, long term storage. Draining and/or burning these lands due to land conversion to large-scale agriculture activities, thus releases significant amounts of CO₂ and contribute to the increased level of emission and greater risk of fires.
In Kalimantan, Sumatra, and Malaysia, the total area of industrial oil palm on peatland increased sharply by well over half a million hectares, from 1.6 to 2.15 Mha, at a rate of 190,000 ha/year, between 2007 and 2010. Although some of most recent expansion (200,000 ha) was in Malaysia, the remainder divided more/less evenly between Sumatera and Kalimantan (see Figure 4.10). In Kalimantan alone, agricultural activities such as palm oil plantation increased sharply between 2007 and 2010. This increase is particularly pronounced in West Kalimantan, where 48% of the operating plantations in 2010 had been established in the previous 3 years. It is also projected that the extent of plantations will likely continue to expand (at tentative maximum value) to around 1.3 Mha in 2030 for Kalimantan alone.

![Figure 4.10  Palm Oil Concessions and Plantation Areas on Peatland](image)

**Illegal logging**

The state claims 127 million hectares of land as ‘forest estate land,’ more than two-thirds of Indonesia’s land area – however a large and increasing share -- nearly 30 percent – of this land has no forest cover. More than half of state forest land is allocated to commercial activities, licensed as concessions to firms engaged in forest exploitation or scheduled for conversion to other uses. It is estimated that at least half the timber harvest is illegal. However, it needs to be noted that recent (September 2013) signing of the FLEGT Voluntary Partnership Agreement (i.e. FLEGT-VPA) between Indonesia and the European Union should lead to decreasing trade with the illegal timber and timber products.

### 4.2.2 Biodiversity

**Habitat degradation**

The population of Indonesia is projected to increase to 273.2 million by 2025. This large and growing population has and is expected to further increase pressures to biodiversity through further conversion or degradation of important habitats (forests, coastal areas, etc.).
High number of threatened species

Indonesia possesses rich and unique biodiversity, both in terms of species and ecosystem diversity. Although it covers a mere 1.3 per cent of the earth’s surface, it harbours 10 per cent of all flowering plants, 12 per cent of the world’s mammals, 16 per cent of the world’s reptiles and amphibians, 17 per cent of all birds, and more than a quarter of all marine and freshwater fish. Despite this richness, Indonesia is among a selection of countries where biodiversity is most at threat. In 2013, IUCN listed Indonesia as the country in Southeast Asia with the second highest number of threatened species (1,206 plant and animal species).

High vulnerability of biodiversity to climate change

Recent studies identified Indonesia as one of regions with the highest vulnerability of biodiversity to the climate change. For instance, highly climate change vulnerable corals are concentrated around Sumatra and Java. These islands also present areas for highly climate change vulnerable and threatened amphibians. The death of a 400 km stretch of coral reefs in the Mentawai Islands in West Sumatra has been attributed to unusually cool water temperatures and run off resulting from inland forest fires, which are likely to be linked with changing climate.

Ecosystems overexploitation

Poaching and illegal trade of endangered animal and plant species also pose serious threats to Indonesia’s biodiversity. In Sumatra, at least 40 Sumatran tigers were poached per year between 1998 and 2002 to supply Indonesian and international markets with tiger skins and body parts. Also, the population of the Javan and Sumatran Rhinoceroses have already been significantly decimated and the species are regarded as unlikely to survive. In addition to these “flagship species”, even relatively common and widespread species (e.g. geckoes, flying foxes or langur monkeys) have been affected by trading related to traditional medicines.

Figure 4.11 illustrates habitats of large mammals (tiger, elephant and orang-utan) outside protected or conservation areas and thus potentially endangered.

Human - wildlife conflict is another significant threat to biodiversity. Increased forest conversion related mainly to agricultural (agro-industry) expansion and urbanisation has resulted in habitat loss, decreases in available food sources and an increase in human-wildlife interaction. For example, survey results indicate that orang-utans in Kalimantan are killed primarily for meat or to eliminate destruction of crops.

Indonesian marine biodiversity including coral reefs have been significantly impacted by the cumulative pressures from pollution and overexploitation. In 2009, it was estimated that 40% of Indonesia’s coral reefs were severely damaged, while 29.2% were moderately damaged. In the past 50 years, the proportion of degraded coral reefs in Indonesia has increased from 10% to 50%. Direct human impacts include over-fishing (i.e. which does not destroy corals but reduces abundance and diversity of fish and invertebrates), destructive and illegal fishing (trawling, poison and blast fishing) and sand and coral mining. Indirect impacts result from coastal development and run off, sedimentation from development inland and the impact of sewage and other land-based pollutants stressors.
Introduction of alien species

The spread of invasive alien species is one of the major direct drivers of biodiversity and ecosystems changes, particularly in island ecosystems, leading to decreased food and feed production, worsening living environment, etc. Economic sectors such as agriculture, forestry, and fishery are also susceptible to the impacts associated with alien species. It is estimated that up to 70% of Indonesia’s original species, including plants and animals, have been displaced by the invasive species, which have been able to reproduce in their new habitat and, in some cases, dominate and eliminate the native species. The Ministry of Environment has prepared a list of prohibited plants, animals and organisms, which included 53 species in the agricultural sector, 99 species in the forestry sector and 112 species in the maritime and fisheries sector.

Two highly invasive tree species, *Acacia mangium* and *Acacia auriculiformis*, are among the major target species of pulp timber plantations. Although these two species do not invade healthy primary forests, they become highly invasive in secondary and degraded forests, following logging and forest fires. Acacias change conditions of soil and water, making the environment inhospitable for other species and prone to further forest fires.

Indonesian freshwater ecosystems have been significantly affected by invasive species. Many invasive species have been brought to the country for aquaculture and some of them are still being introduced to Indonesian waters. Carnivorous species (e.g. Channidae) may be particularly detrimental for the ecosystem. Other species, such as *Oreochromis spp.*, may became adapted to brackish water and thus invade not only freshwater but also the coastal ecosystems.

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7 Iskandar, S., 2006. The efforts to against the forest invasive species in Indonesia; A Review Country Paper. Forest and Nature Conservation Research and Development Center Ministry of Forestry, Republic of Indonesia.
4.2.3 Coastal Areas

*High level of coastal habitat degradation*

Indonesia is the world’s largest archipelagic state with highly productive coastal zone, comprising 13,466 islands and 95,181 km of coastline, 18% of the world’s coral reefs and 60% of the world’s coral species. Coastal and inland wetlands include peat marshes and mangrove systems. These areas are essential breeding grounds for fish and other wildlife and they also act as buffers to coastal flooding and storm surges; and thereby mitigate the effects of sea level rise. Coral reefs are also an important asset for the tourism sector. The Government of Indonesia has made certain efforts to address the degradation of coastal ecosystems and, as of late 2011, 96 Marine Protected Areas covering 15.39 million hectares had been declared and established in the country (see Figure 4.12).

Coastal degradation (including mangroves) is linked to expansions of agriculture and forestry activities, fishing, industrialization, mining, tourism development, settlement development and urbanization, as well as water pollution. Also the shrimp and milkfish farming (mariculture) in ponds called *tambak* as well as land reclamation are among the major drivers in mangrove forest degradation. The direct destruction of mangrove forests, in turn, leads to decreased overall productivity of the entire coastal ecosystem.

![Figure 4.12 Marine Protected Areas in Indonesia](image)

Tourism infrastructure development also represents a significant threat to the coastal ecosystems; one that may ultimately end up degrading the very unspoiled natural assets that in fact draw tourists to Indonesia. Derawan Island (East Kalimantan) is a noteworthy example in this regard. Here, tourist infrastructure development has altered the island to such an extent, that it was rendered ‘unattractive’ just two decades after the island was “discovered” by the tourist industry. A similar coastal conversion currently threatens Maratua Island, where tourism activities from Derawan are now gradually migrating to.
Offshore mining presents another important driver of the coastal degradation. For example, tin mining causes significant sedimentation in offshore areas and subsequent impacts on marine life and ecosystems (coral reef, mangroves and seagrass). Other issues associated with mining in marine areas surround offshore dumping of gold mine tailings, as exemplified by a mine in Sulawesi that pumps their tailing offshore. This practice has led to observations by local people of fish kills and the smothering of corals on reefs adjacent to the tailings disposal site. Where coral fish and macrobenthos survive, there is also the associated risk of bioaccumulation of heavy metals (e.g. arsenic and mercury) from tailings into the local food chain.

Figure 4.13 provides an overview of mining concessions in relation to sensitive coastal habitats – mangroves, coral reefs, and seagrass.

Figure 4.13 Mining Concessions and sensitive coastal habitats

Another problem is increasing underwater noise from seismic surveys, offshore mining operations, coastal industry and shipping. The noise causes disturbance either directly e.g. especially to marine mammals who depend on the sense of echolocation to orient and find prey, as well as indirectly, by driving away the fish and disrupting fish shoaling pattern. This can result in a serious problem for local fisheries.

High vulnerability of costal ecosystems to climate change

Indonesia’s coastal ecosystems are vulnerable to the effects of climate change. It is estimated that by 2030 about 2,000 of Indonesia’s islands will be inundated if there is no proper preventive actions in place. An increase of 0.2°C–2.5°C would cause more coral bleaching, as has been documented during El Niño events in 1997–1998. Also, the sea-level rise and storm surges coupled with land subsidence are expected to increase extreme-weather related damage to the coastal areas.
High level of coastal erosion

Coastal erosion in Indonesia has reached an alarming level. At least 40% of Indonesia’s 81,000 km long shoreline is damaged by erosion. The most affected areas are south of Bali Island (Sanur, Nusa Dua, Tanjong Benoa), where almost US$80 million was provided by the Indonesian Government to combat coastal erosion from 1996 to 2004, however with unsatisfactory results. In the northern coast of Java – as another example – the coastal erosion started in the 1970s when most of the mangrove forest had been converted to shrimp ponds and other aquaculture activities, and the area was also subjected to unmanaged coastal development, diversion of upland freshwater and river damming.

4.3 Social and Economic Aspects

4.3.1 Human health

Continued high incidence of infectious diseases (TBC, malaria, dengue)

Infectious diseases continue to be the major cause of morbidity and mortality in Indonesia. Nearly 300 people die of tuberculosis every day, with over half a million new cases estimated to occur every year. Malaria remains a major vector-borne disease in many parts of Indonesia and large-scale outbreaks of dengue and dengue haemorrhagic fever also occur.

High incidence of emerging diseases and HIV/AIDS

Emerging diseases (such as avian influenza), and HIV/AIDS, also add to the changes in disease patterns. Indonesia has the highest number of avian influenza deaths worldwide and has one of the highest fatality rates. Also, Indonesia is one of the countries in Asia with high growth of HIV/AIDS. It is also evident that there is a close connection between the population mobility and the spreads of HIV/AIDS, especially with the migrant groups. Figure 4.14 shows AIDS cases rate (per 100,000 inhabitants) in 2010.

Environmental conditions negatively affecting human health

Considerable air pollution resulting from extensive burning of fossil fuels, use of leaded gasoline in cities and major forest fires throughout Indonesia impact negatively on public health. Indoor air pollution resulting from excessive use of biomass fuel in poorly ventilated households, combined with unreliable or intermittent supply of safe water and inadequate sanitation, have led to dangerous levels of household pollution in some areas. The insufficient water supply infrastructure and a lack of the waste water management systems can be seen as a major driver of the water-borne diseases.

Also noise – especially from transport – can be considered as an issue related to human health in large cities.

Insufficient water supply infrastructure and waste water management systems

Indonesia, as a tropical archipelagial country consisting of thousands of islands surrounded by seas and oceans, still lacks sufficient water management capacity. Although the number of the population with access to water supply and sanitation has significantly increased (i.e. from 33% in 1990 to 52% in 2008), with advances in both urban and rural areas, the development of drinking water infrastructure in urban areas has not kept pace with urban population growth.
The urban population in the country has more than doubled from 60 million to 125 million since 1990, but only about 40 million people are connected to piped water supply from local government water supply utilities. The remaining urban population depends on individual wells or small-scale water vendors. The poor rural areas often do not have access to safe water resources and basic sanitation facilities, with severe consequences to their health and livelihoods. Many of those poor areas have disease profiles associated with poor water supply and sanitation, such as diarrhoea, skin disease, intestinal worms, malaria and dengue. Specifically in Kalimantan, the situation is worsening due to coal mining, which leads to decreasing levels of underground water, drying wells and decreased water quality. Also extensive agriculture, notably palm oil plantations, may cause decreased level of underground water and drying wells. Figure 4.15 illustrates the access to clean water in the country.

Domestic sewage remains largely untreated. According to the recent assessment, only 11 cities have some form of sewerage network. On average, these networks reach about 2% of urban residents in each location. Over 70% of urban households have on-site sanitation, mostly in the form of septic tanks that do not function effectively. Less than 25% of human waste delivered to on-site systems is dealt with properly. About 80% of bathroom, kitchen, and laundry waste are passed directly to surface water drains. In rural areas, less than 30% of households have toilet facilities, and only about 20% have septic tanks. The most common form of communal system is a public facility for bathing, washing, and toilets serving 20–100 families.
Poor access to health services in remote areas

While the primary health care level in Indonesia is generally regarded as having relatively adequate levels of provision, it conceals large variations in geographic accessibility, with people in remote interior locations or small islands having particularly poor access. At the hospital level, Indonesia has low levels of bed provision at 0.7 beds per 1,000 inhabitants in 2011, which is well below the OECD average of 4.8 beds per 1,000 population. Also an estimated 0.2 physicians per 1,000 population, and 0.9 nurses per 1,000 inhabitants respectively in 2011, is much lower compare to the OECD averages. The health services are disproportionately concentrated in urban areas and particularly in the larger cities, where the clientele with the greatest ability to pay resides. Figure 4.16 shows the density of the Community Health Centres in the country.

High number of population living in disaster-prone areas

Indonesia can be considered as one of the most disaster-prone countries in the world – more than 80 percent of its territory is prone to natural disasters, including: floods, landslides, earthquakes, tsunamis, hurricanes, volcanic eruptions, and forest fires. The problem is further exacerbated by the issue of land subsidence – especially in Java and Kalimantan.

More than 5 million people live in tsunami-prone areas. Indonesia also occupies a very active tectonic zone – more than 14,000 earthquakes with magnitude above 5 SR were recorded in the period 1897 – 2009. The risks are further aggravated by uncontrolled urbanization and low quality of building construction due to the low enforcement of building codes, especially in smaller urban centres (e.g. earthquake in 2006 made 1.4 million people homeless in Java).

The frequency of the occurrence and magnitude of devastating floods tend to be consistently increasing. Over a period of 4 rainy seasons (2002 – 2005), an increasing number of people died or went missing, rising from 200 in 2002, 320 in 2003, 482 in 2004, and 274 in 2005 (up to May). More than 930,000 persons were evacuated. The accumulated infrastructure recorded...
inundated or damaged included more than 280,000 ha of business and industrial areas, 805,000 units of houses, 1,199,400 ha rice fields, and 2,830 km of roads. The data for the period 2004 – 2014\(^8\) provides that there were altogether 71 flood events with 2,147 victims and nearly 3 million people directly affected.

![Figure 4.16 Community Health Centres (2012)](image_url)

**High proportion of population at potential risk as a result of climate change**

The impacts of climate change are estimated to have significant effects on Indonesia’s economy, poor, human health, and biodiversity.

Sea-level rise is predicted to result in, and already shows signs of, significant losses of Indonesia’s 81,000 km of coastline, comprising thousands of islands and associated marine resources (e.g. coral reefs, fisheries, mangroves, etc.). This, in turn, is expected to result in significant physical and socio-economic impacts as much of Indonesia’s population, industrial infrastructure and fertile agricultural lands are concentrated in low-lying coastal areas. As may be expected, more than 98% of the Indonesian population also lives within 100 km of the coast. Estimates show that inundation of low-lying coastal areas and small islands, resulting from sea level rise, is predicted to affect more than 40 million Indonesians living within 10 metres above mean sea level. The predicted long-term rise in sea-level will inundate low lying areas, and lead to an increase in the severity and frequency of flooding due to both the increased sea level and expected increase in extreme weather events. All of these predicted impacts of climate change will affect those people who are dependent on economic activities concentrated in coastal areas. It is particularly expected to effect the agricultural sector in Indonesia, and in turn those poor who are dependent on it.

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\(^8\) EM-DAT: The OFDA/CRED International Disaster Database, www.emdat.be - Université catholique de Louvain - Brussels - Belgium
The effects of climate change may also include more widespread and extensive occurrence of vector-borne diseases, such as malaria and dengue, as well as water-borne infectious diseases. In addition, nutritional impacts can be expected due to the disruption in food production.

4.3.2 Livelihood and Local Communities

Rapid urbanisation

Indonesia’s economic development has been accompanied with a rapid and increasing urbanization process. 20 years ago, approximately two-thirds of Indonesia’s population lived in rural areas, while currently more than half of Indonesia’s total population lives in urban environments – a trend that can be expected to extend into future (see Figure 4.17). While poverty occurs in both rural and urban areas, the proportion of poor people in rural areas is significantly higher than the proportion of poor people in urban areas.

![Trends in the rural and urban population](image)

**Figure 4.17** Trends in share of the rural and urban population (based on the World Bank data)

High number of social conflicts over natural resources involving indigenous communities

Considering the richness of environmental resources as well as the economic development in Indonesia over the past several decades, the conflicts between development and environmental protection seem to be inevitable. Indonesia population is estimated at 259.94 million inhabitants. Among those numbers, there are more than 500 ethnic groups speaking over 700 languages and dialects. Obviously, most of the problems relate to the most important economic sectors – mining, palm oil development, forestry, agriculture, fishery, and tourism. Since 2004 many aspects of environmental management and natural resource management have been decentralized to the local level, and thus greater local control has had positive aspects through reputational programmes, greater political will, inter-agency collaboration, community empowerment, and integration of environment in spatial planning. However, at the same time, decentralization has resulted in obstacles to good environmental management, including:
inadequate standards and enforcement; problems with incentives, empowerment and insufficient capacity; and specific issues with forestry, fisheries and environmental impact assessment. Despite the progress in developing laws and regulations for the environment, not only does there continue to be conflicts and overlaps between laws, but by and large there are still few mechanisms to effect enforcement.

Generally, the studies indicate that the conflict scale is getting smaller, but unfortunately the frequency is increasing quite sharply. A survey conducted by Institute of Peace in Jakarta revealed that during 2008, there were 1,136 cases of violent conflicts in Indonesia – 30% was related to the social crimes, 22% was resources-related violent conflicts, 16% was related to political conflict, only 2% was ethnic conflicts related and the rest were small inter-village riots. Figure 4.18 provides an overview of land-use conflicts in 2010 – 2012.

Industrial development and concessions for mining and plantations are often allocated on customary land belonging to indigenous peoples and, as such are a source of social conflicts. In addition, some Governmental forest conservation or protection programmes include areas considered customary forests by indigenous peoples. These programmes sometimes make related forests areas inaccessible to those whose livelihoods have depended on them for generations.

Cases have been recorded where the local governmental authorities authorized forest uses that were inconsistent with national forest laws. Although the Government of Indonesia released Presidential Instruction No. 10/2011 on ‘The postponement of issuance of new licences and improving governance of primary natural forest and peatland’ (a so called “moratorium”), its implementation can be considered as poor (i.e. permits were still being issued during moratorium).
**Likely increasing number of underage workers**

Indonesian Law No. 13/2003 on Labour, defines a child worker as any worker less than 18 years old; and it only permits employers to recruit children under this age (i.e. 13-18) under certain conditions. However, although no formal data is available, instances of underage employment are found in numerous places in industries, such as mining and manufacturing. NGO reports suggest that the number of child labourers is increasing; as some parents prefer that their school-age children work for an assured income, rather than risking education and uncertain future employment.

**High poverty rate**

Data indicates that although the trend of poverty has been declining over the past ten years, the incidence of poverty is still significant in Indonesia compared to similar Asian middle income countries – both in terms percentage and number of poor. (16% or 35 million people respectively in 2005, and 12.5% / 29 million people in 2011). However, it should be noted that in 2011 the Government of Indonesia loosened the ‘poverty line’ definition to IDR 233,740, which approximately equals USD $25.00, a monthly per capita income which slightly obscures trend analyses. If a standard of daily income of USD $2 is used, approximately one half of Indonesian people fall under the category of “poor” or “near poor”. The Figure 4.19 below shows the percentage of poor people in 2012.

![Map showing poverty rate in 2012](image)

**Figure 4.19**  Poverty rate in 2012

**Declining number of students in vocational schools**

In 2006, the Ministry of National Education began expanding vocational schools with policy aimed at increasing the size of the labour force that is ‘ready-to-work’; especially among those who do not continue with tertiary education. The policy’s target is to achieve a 50:50 vocational

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9 Calculation is based on the Indonesian poverty threshold and the data provided by the Statistical Office of Indonesia.
to general student ratio by 2010, and a 70:30 ratio by 2015. In contrast, enrolment in vocational high school has been steadily declining, with the number of vocational students at 1.6 million in 1999 and approximately 1.2 million in 2006. Over the same period, the proportion of high school students in vocational schools declined from 27% to just 20%, as more students chose general education over vocational education.

*Inadequate public transport systems between regions and in large cities*

In urban areas of Indonesia increasing birth rates and urbanization has resulted in significant levels of traffic congestion that hampers large cities like Jakarta, Bandung, Medan, Surabaya, and associated satellite urban areas such as Bogor, Bekasi, and Tangerang. Some public transport (buses, minibuses) is available, however their capacity and adequacy is far from a sufficient level to alleviate traffic congestion problems. This imbalance remains a substantial problem that affects the livelihoods and quality of life of an increasing portion of Indonesian society.

### 4.3.3 Industry and Mining

*Low use of innovative technologies and methods in industry*

Specific concern related to industry is the application of inefficient and disproportionately polluting technology. Industry encompasses a wide range of activities, ranging for example from oil refineries, power stations, metal smelters, chemical industry, mining, cement industries, paper mills to textile, wood, food and beverage factories. Although the environmental pressure differs widely per sector, the application of best available techniques (BAT) as well as use of eco-innovative approaches and methods is largely absent in Indonesia.

*Low level of compliance with emission standards*

Although industrial emissions are regulated, enforcement of the regulations is not always demonstrated. A study on industries in Jakarta found that there was low compliance with the air pollution policies of Indonesia. The study found that rates of non-compliance with emission limits varied between 17% to 76% and that the obligation to report emissions was only met approximately 30% of the time. In addition, the survey determined that installation of air pollution control equipment was 0 out of 10 at sampled sites during 2004. It was concluded that lack of institutional capacity, strategies, political priority, and a poor culture of enforcement were the main reasons for inadequate compliance levels with in Indonesia’s industrial sectors.

*Difficulties in reclamation of ex-mining sites*

Considering the scale of mining industry in Indonesia, the reclamation of abandoned mines presents a specific concern. If not properly managed, mining activities not only lead to significant environmental impacts during mining operations, but they also can affect reclamation and post-mining land-use. There are several regulations that address post-mining management in Indonesia and the governance of mining resources was decentralized since 2008. Current law contains provisions for regulating how mine closure and rehabilitation programmes are financed in order to transform former mining areas into land suitable for other commercial or industrial uses. However, existing mine closure and rehabilitation policies have no public participation mechanisms, environmental protection clauses or multi-stakeholder oversight. Despite the existing regulatory framework, the practice of mines closure and post-mining policy faces major deficiencies, which indicates the problem with the enforcement of the regulations.

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10 “Available” techniques mean those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages.
**Illegal mining**

Since illegal mining is uncontrolled or much less controlled compared to legal mining activities, it poses significant threats on health and ecosystems. Illegal mining in Indonesia if often, but not always, small scale. It can include also larger and somewhat coordinated mining operations that are not associated with legal mining companies. In the mid-1990s there were approximately 77,000 illegal mines in Indonesia with around 465,000 employees. Indonesia's Central Bureau of Statistics recorded average informal sector employment in mining from 1997 to 2002 as 324,000, which is about 10 times higher than the average number of legal mining workers—34,000—in the same period. The estimates provide that around 90% of artisanal mining is regarded as illegal. The law allows members of the local population in possession of a mining authorization to exploit minerals in areas designated by the Government of Indonesia that have no economic significance. However due to difficulties with the licensing procedure, miners are often reluctant to obtain permits and thus such mining is considered as illegal.

4.3.4 Energy and Waste

**Inefficient energy use and growing energy demand**

Specific concerns on energy are related to insufficient electricity/fuel supply and inefficient energy use. Despite significant potential for renewable energy, coal is the main fuel used for electricity generation and it is expected that this will increase fourfold from 2010 to 2030 due to its relative abundance and low cost in Indonesia.

Primary energy consumption has increased steadily and rapidly (3.5 percent / year) since 1990. Industrial energy consumption has soared by 6 percent / year since 1990, i.e., faster than the economic growth rate of 4.5 percent / year. Currently, about 44% of the total energy in Indonesia is used by industries. Long-term, data indicates there was a strong correlation between industrial development and electricity consumption; especially in last 14 years (Pearson Correlation = 0.980773) – see Figure 4.20.
Overview of Country-wide Sustainability Issues

Figure 4.20  Industrial electricity demand in Indonesia (based on the World Bank data)

Generally, fuels and energy are used with low efficiency in Indonesia. Total energy consumption per unit of GDP (as a measure of primary energy intensity), though declining slightly since 1990, measured at purchasing power parity (PPP) remains some 16 percent higher than the world average. In power generation, the reduction in the share from hydropower and the increase in coal power plants mean that overall the sector is slightly less efficient now than it was in 1990; in industry, the share of coal as an energy source reached 45% in 2009 (compared to 4% in 1990) – and the intensity of use of energy in industry in total has been rising by more than unity (i.e. a positive elasticity of energy intensity) since 2000. Although energy efficiency in industrial sectors continues to develop, there are still a lot of potential energy savings that can be explored, since energy intensity trends have not improved much. Between 1990 and 2009 industrial energy intensity increased by 0.7%/year. Since 2000, it has increased at the even faster pace of 1.2%/year. Industries use large amounts of energy both for unit processes such as processing, manufacturing, packaging and supporting utilities for the unit. Unit processes generally use a large number of machines and require large amounts of heat. Industries mostly use fossil energy such as oil, gas and coal. Because the types industry are very diverse, energy efficiency is highly dependent on the kinds of equipment and technology used for the production process. For example in the steel industry, between 1990 and 2009, the energy consumed per tonne of steel produced decreased by more than 4%/year, and since 2000, it has decreased at the even faster pace of 12%/year.

Extensive subsidy schemes can be seen as an obstacle for promoting energy efficiency, cleaner technology or innovation for environmental and health benefits. Since 1967, Indonesia has heavily subsidized the retail prices of diesel, gasoline and kerosene fuel to protect the purchasing power of the poor. The scale of the subsidy has become very expensive – Indonesia
now has the third-highest fuel subsidy in the world, at around $25 billion in 2013, or some 2.2% of GDP. In 2012, the country had the lowest gasoline prices of any net oil-consuming nation in the world; and according to the World Bank, the Indonesian government spends more on fuel subsidies annually than it does on social programmes and capital expenditures combined.

Also the transport sector has have become a less-efficient user of energy due to the growing number of private vehicles and the substantial government subsidies for Premium brand gasoline and Solar brand diesel dampening the price signals that would otherwise incentivize more efficient fuel use.

Considering existing trends, rapidly increasing energy demand can be expected in future, linked mainly to population growth and further economic acceleration.

*Areas with insufficient electricity supply and occurrence of blackouts*

Besides power generation efficiency, there are also concerns with the efficiency of transmission and distribution of electricity. Due to its geographic characteristics, Indonesia faces a problem with the equitable development and supply of energy. Generally, eastern Indonesia lags behind the west of the country; in some of these provinces only about one third of the population has access to a supply of electricity (see Figure 4.21). Especially population in rural areas has limited access to electricity and the remaining population does not have any guarantee of stable and reliable energy supply. This is evident by the national electricity ratio of 75% that is mostly dominated by Java and Bali Islands (>90%).

*Low utilization of renewable energy resources*

Indonesia is one of the countries with the world’s largest potential for developing geothermal power and other renewable energy resources (hydropower, wind, solar, and biomass). However, in 2006, renewable energy sources supplied less than 10% of the energy demand in Indonesia. Indonesia has almost 150 active volcanoes, since it is located in the “ring of fire” volcano belt and estimated to hold approximately 40% of the world’s geothermal reserves, equivalent to some 27 GW of power spread out in 276 locations throughout Indonesia. Most geothermal potential can be found on Sumatra (51%), Java and Bali (34.26%) and Sulawesi (7.4%).
Overview of Country-wide Sustainability Issues

Figure 4.21 Percentage of Households with Electricity Use (2012)

Hydropower has the highest potential energy resources among the other renewable resources, but it has not been effectively utilized. Hydropower potential of Indonesia is estimated at 75.00 GW, but total installed hydropower capacity is only 4.2 GW. The hydropower potential can be found in several islands of Indonesia such as Papua (29.8%), Kalimantan (28.8%), Sumatera (20.8%) and the rest were found in Sulawesi, Java, Bali and Maluku.

There are several types of biomass in Indonesia which can be converted into energy; first generation such as starchy and sugary biomass and second generation such as lignocelluloses biomass. In 2011, Indonesia had 423,000 hectare of sugar cane plantations which could produce 5,000 L/hectare/year; 1.5 million hectare of cassava plantation which can produce 4,500 L/hectare/year; 26 million tonnes of crude palm oil (all quantities are exported) and 800,000-900,000 tonnes/year of coconut oil which both can be converted into biodiesel. While second generation biomass is also abundant, 147 million tonnes of biomass is produced every year in Indonesia such as in Sumatera, Kalimantan, Java and Sulawesi islands. The biomass comes mainly from rice residues (65.6 million tonnes), sugar residues (23.6 million tonnes), rubber wood (41 million tonnes), and palm-oil residues (8.2 million tonnes). Smaller quantities are available from other agricultural waste such as logging residues, sawn-timber residues, coconut residues and other agricultural waste. Market potential for generating electricity and heat from biomass residues is estimated at some 1,160 MW for the whole of Indonesia (Sumatera 50.8%, Kalimantan 19.8%, Java 24.1% and Sulawesi 5.2%).

As Indonesia lies at the equator, the potency of solar energy and wind power is also abundant. Solar power potential ranges from 3.5-4.8 KWh/m²/day in all locations of Indonesia. Meanwhile, wind energy potential is mainly in the central and eastern region of Indonesia.

Increasing waste production and insufficient waste management capacities

Increasing waste generation related to rapid urban growth and industrial expansion coupled with poor waste management is another significant environmental issue. Indonesia has low waste collection rates, landfilling with low rates of recovery of materials or energy, and unmanaged
landfill sites. Factors that influence the situation are a lack of policies/strategies and financial support, low involvement of private sectors, inefficiency of waste management capacities, and low community awareness.

The problem prevails in all steps of solid waste management (i.e. storage, collection, transferring, transporting, and treatment) and often culminates at the landfill end point. Open dumping and controlled landfilling present the major waste management methods in Indonesia. Estimates from 2009 indicate that more than 16% (approximately 1.15 million tonnes) of scheduled industrial waste generated annually remains unmanaged with most of the unreported waste probably illegally dumped or managed by environmentally unsound or informal methods.

4.4 Environmental Management

**Weak coordination of planning systems**

The planning schemes are not well coordinated, since responsibilities belong to different governmental agencies (the Ministry of Home Affairs manages development planning, while the Ministry of Public Works manages the spatial planning scheme), inconsistencies can be seen both vertically (i.e. between national, provincial and local plans) as well as horizontally (e.g. between provincial plans of neighbouring provinces). Furthermore, the Ministries of Forestry, Agriculture, Defence, and Public Works as well as the National Land Agency have their own separate planning procedures for forest areas. Lack of clarity about forest land management is potentially harming investment in the sector and has caused complicated overlapping regulations.

**Insufficient quality of EIA and SEA**

Although the EIA has a relatively long tradition in Indonesia, the practice is widely seen as ineffective due to a range of factors, including the lack of public participation, the formality of the process and the inappropriateness of the techniques employed, which result in poor quality EIA documents and general failure of the EIA system to address the actual issues. Insufficiency of EIA practice also relates to limited consideration of various options and alternatives and limited stakeholder engagement. Similarly SEA, which was introduced in the country 2007, has not yet explored its full potential and SEA “effects” on plans and programmes assessed in terms of avoiding or mitigating potential adverse impacts on environment and public health are very rare – main problems can be seen in a lack of analytical work and substantiation of SEA results, limited stakeholders’ involvement and participation, and a lack of communication with the planners and decision-makers.

**Lack of proper coastal management**

The Integrated Coastal Zone Management System (ICZM) was introduced in Indonesia already in late 1980’s, however Indonesia still faces significant problems in terms of coastal and islands management as well as in the provision of ocean services to the coastal communities. The main problems and conflicts in ICZM in Indonesia can be categorised as follows:

- Policy and financial factors: emphasis on agriculture, lack of policy and inconsistency.
- Environmental factors: overfishing and overexploitation of natural resources, erosion, abrasion, pollution, lost and declining biodiversity and mis-management.
- Socio-economic factors: emphasis on new infrastructure development rather than optimising the existing infrastructure and regardless of the consequences to the environment, poverty and lack of knowledge.
• Ocean and coastal observation: only few ocean and coastal observation equipment (such as oceanographic buoy, tidal gauge, etc.) and lack of maintenance.

**Difficulties in management of protected areas**

The decentralisation influenced also the management of protected areas by triggering local government efforts to exploit the remaining forest resources, regardless of their status, with the object of earning short term revenues either through timber cutting, by converting forest areas into agricultural plantations, or by converting protected forest into production forest in order to increase regional income from logging permits. Also a preponderance of ‘unclassified’ protected areas (i.e. IUCN category VI), that have no real biodiversity protection and yet constitute 64% of the total area reported as protected in Indonesia, presents another problem to biodiversity conservation in the country. Obviously, a number of activities which are formally illegal in protected areas (logging, slash-and-burn agriculture), still continue in reality.

**Low level of environmental compliance enforcement**

There are several weaknesses in the system of environmental compliance monitoring and enforcement in Indonesia: (i) weak coordination between the central and local governments, (ii) weak coordination between agencies with sector responsibilities, (iii) limited financial resources for environmental compliance and enforcement, and (iv) insufficient human resources at all levels. Licensing systems are complex and fragmented with overlapping authority, there is a lack of implementation of compliance monitoring guidelines and a lack of clear regulation and guidance on self-monitoring.
Evaluation of MP3EI Policy

This chapter provides an evaluation of the MP3EI Policy (i.e. implementation of its 22 main Economic Activities and Connectivity projects). Each section herein is introduced by a brief overview of an Economic Category, briefly describing features of overall development at the national level and summarising how this particular Economic Category is addressed in the MP3EI. The next section then identifies potential risks that may be associated with activities in that Economic Category as they relate to the eleven national strategic issues. This analysis considers the development of the Economic Activities within a given Economic Category and relevant “Regulation and Policy” as stipulated by the MP3E. Legal issues and the broad economic implications (including distributional aspects) consequent upon the identified risks are then summarized.

Based on this evaluation, the SEA formulates recommendations on enhancing the performance of the MP3EI – in terms of how to mitigate likely risks and how to further utilize existing opportunities – to promote further development in a sustainable way. The recommendations are provided in Chapter 8.

5.1 Categorisation of 22 Economic Activities

The MP3EI Policy is represented by 22 Economic Activities and Connectivity. For purposes of this initial evaluation these have been grouped into eight Economic Categories - each Economic Category includes Economic Activities with similar types of likely impacts.

<table>
<thead>
<tr>
<th>Economic Categories</th>
<th>MP3EI Economic Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and Forestry</td>
<td>Palm Oil</td>
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<tr>
<td></td>
<td>Rubber</td>
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<tr>
<td></td>
<td>Food agriculture</td>
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<tr>
<td></td>
<td>Animal husbandry</td>
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<td></td>
<td>Cocoa</td>
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<td></td>
<td>Timber</td>
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<tr>
<td>Light and Heavy Industry</td>
<td>Defence equipment</td>
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<td>Transportation equipment</td>
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<td>Food and beverages</td>
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<td>Textile</td>
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<td>Shipping</td>
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<td></td>
<td>Oil and gas, petrochemicals</td>
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</table>

The relevant connectivity projects are evaluated within “Connectivity” section – see 5.10.
## Evaluation of MP3EI Policy

<table>
<thead>
<tr>
<th>Economic Categories</th>
<th>MP3EI Economic Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>Ferrous and Non-Ferrous Metal processing</td>
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<tr>
<td></td>
<td>Nickel</td>
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<td></td>
<td>Copper</td>
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<td></td>
<td>Bauxite</td>
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<td></td>
<td>Coal</td>
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<td></td>
<td>Steel</td>
</tr>
<tr>
<td>Energy (Connectivity)</td>
<td>Power generation and distribution</td>
</tr>
<tr>
<td>Fisheries</td>
<td>Fisheries</td>
</tr>
<tr>
<td>Tourism</td>
<td>Tourism</td>
</tr>
<tr>
<td>Development of strategic areas</td>
<td>Jabodetabek Area and Sunda Straits KSN</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Transport infrastructure (roads, ports, airports, railroads) &amp; Telecommunications (where relevant)</td>
</tr>
</tbody>
</table>
5.2 Agriculture and Forestry

5.2.1 General Overview

Agriculture and forestry in Indonesia are regarded as prominent economic sectors, providing substantial contributions to national economic output - being important sources of export revenues as well as large-scale employment. On the other hand, the country is still heavily reliant on imports for staple goods such as wheat, soybeans and sugar - which have raised the issue of food security on the national agenda as world food prices have continued to climb in recent years. Within the MP3EI strategy, the following main economic agricultural activities are regarded as of key importance for accomplishing the overall development goals:

- Palm Oil
- Rubber
- Food agriculture
- Animal husbandry
- Cocoa
- Timber

In the context of MP3EI policy guidelines, the following principles related to agriculture and forestry development are outlined among other Basic Principles, Prerequisites for Success and Main Strategies of MP3EI:

- Food security covers consumption and production;
- Adequate and equitable food supply is available for all Indonesians to fulfill a healthy and productive life;
- Efforts to diversify food consumption away from current staples shall occur in tandem with the increase in people’s income level and pricing structure that meets the prevailing economic condition;
- Diversification of food production is adjusted based on the local food production capability;
- Development of new food production centers outside of Java;
- Increase productivity through the development of research and development activities, especially for seedlings and post-harvest technology.
- Government has to ensure availability and access to water for all;
- Provision of clean water should include the preservation of water resources in order to maintain its sustainability;
- The reforestation strategies will continue and enhance to sustain water catchment areas;
- Local governments will be required to allocate forest area as a percentage of the total area;\(^\text{12}\)

**Palm Oil**

Indonesia produces approximately 43% of the total production of crude palm oil (CPO) in the world. The annual growth of palm oil production in Indonesia in recent years has been 7.8%.

\(^\text{12}\) MP3EI, p.30
and growth is expected to continue in response to the projected continuing increase of global demand of 5% per year. Palm oil activities are concentrated in Sumatra, where 70% of palm oil area (approx. 5 million hectares in 2009) in Indonesia is located, and in Kalimantan (approx. 2 million hectares). Approximately 42% of land under oil palm is owned by smallholders, who tend to achieve lower productivity rates compared to the large plantation estates.

Indonesia’s current palm oil productivity is 3.8 tonnes/Ha, far below the productivity of Malaysia (4.6 tonnes/Ha), and still much lower than the theoretical potential productivity of 7 tonnes/Ha. However, the estimated profit margin of palm oil plantations is still above USD$350/tonne, while much lower profit margins (e.g. USD$10/tonne) are estimated for refining and production of oleo-chemicals within further phases of the processing chain. In this context, high incentives exist for further expansion of plantation areas, while less attention is paid to the development of the complex value-adding industrial chain. Thus, until 2008 the growth rate of palm oil plantation in Kalimantan was around 13 % per year and in Sumatra approximately 5 % per year. This pace has slowed down recently due to exhaustion of much of the readily available areas; however this might be compensated by introduction of palm oil plantation development in other parts of Indonesia.

In May 2010, Indonesian President Susilo Bambang Yudhoyono declared a policy to develop oil palm plantations on degraded land instead of forest or peatland. However, practical effects are hindered by lack of a single definition of ‘degraded land’ in Indonesian law or policy.

Rubber

Indonesia is the world’s second largest natural rubber exporter (after Thailand), while having the largest national area of rubber plantations. Indonesia’s rubber plantations are mainly dominated by smallholder farmers, who make up for 86% of the 3.5 million hectares of land under cultivation (with the remainder split more or less equally between private companies and state plantations). The main sites of plantations are found in North and South Sumatra as well as Riau, Lampung and Java. Total production in 2010 reached 2,736 million tons with production targeted for around 3 million MET for 2011 and 3.6 million tons by 2015 (according to the Indonesian Rubber Industries Association). The majority of production - approximately 90% - is exported, with the remainder used in the domestic automotive sector and other manufacturing industries.

Plantations in Indonesia produce an average of 880 kg–1,000 kg per hectare, compared with up to 1,500 kg for Malaysia and Thailand. Productivity per hectare is closely related to the youth of the trees as well as the quality of the clone seedlings, of which Indonesia is at a disadvantage in both aspects. With most plantations being family held, smallholder plots lack capacity for investment to replace older trees; consequently, the average age of the trees remains high and therefore less productive. Low quality seedlings are also in use at an estimated 40% of all smallholder rubber plantations - resulting in lower quality rubber that is sold at a lower price. Furthermore, complex intermediation along the value chain increases rubber prices in Indonesia and depresses farmers’ returns – rubber farmers receive only 50-60% of the total sale price compared to Thailand and Malaysia where the farmer’s share reaches about 90%.

Food Agriculture and Animal Husbandry

Activities within food agriculture and animal husbandry are highly fragmented across Indonesia. Staple crops such as corn, sugar and rice are cultivated alongside vegetables for domestic consumption, and mainly carried out by small holding farmers. Improving self-sufficiency in the main foodstuffs is a priority for the sector, as imports of key crops such as sugar and wheat are increasing. Sulawesi, Bali – Nusa Tenggara (beef cattle), and Papua-Maluku Economic corridors are designated for support of development of food agriculture activities under the MP3EI. Notable activity includes a programme (launched in February 2010) by provisioning 1.6

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13 MP3EI, p. 55.
milllion hectares of land in Merauke, Papua for agricultural production of food and bio energy. The Merauke Integrated Food and Energy Estate (MIFEE), is a Special Economic Zone that aims to attract USD$8.6 billion in investment for commercial plantations for staple food items including soybean production, rice, and cattle rearing.

Relevant MP3EI policy and regulations include, among others:

- Accelerate the process of releasing designated forest land into food estates areas
- Socialization to the local community about the implementation and benefits of the MIFEE
- Expanding planting area by optimizing the utilization of land, the creation of new paddy fields, rehabilitation and conservation of agricultural land
- Securing the availability and sustainability of food production through the development of food reserves and storage, empowerment and institutional capacity building of farmers
- Reducing the potential loss of quantity and value of post-harvest through improved quality storage and development of effective purchasing mechanisms

**Cocoa**

Indonesia is the world’s second largest cocoa producer, contributing around 18% annually to the global market. Domestically, cocoa commodity exports produce the third largest foreign exchange - after palm oil and rubber. In 2009, foreign exchange from cocoa reached USD$1.38 Billion (derived from beans and processed cocoa). Indonesia’s cocoa productivity per hectare has long lagged behind that of other producing countries - at 700 kg/hectare compared to a potential yield of 1,000-15,000 kg/hectare (BKPM). Production is concentrated in Sulawesi where 63% of the country’s raw cocoa is produced (total land area for cocoa production in Sulawesi reaches 838,037 Ha, or 58% of total cocoa area in Indonesia). Despite land under cultivation increasing over the recent years, productivity has been declining, particularly in South Sulawesi. Rejuvenation of current trees has been taking place under the government programme Gernas Pro Kakao - which replaced 200,000 hectares of trees and will take several years before effects can be measured. The International Cocoa Organisation’s data shows that only 28% of cocoa was processed domestically, with the remaining 72% exported in raw bean form. Processed cocoa such as in butter and powder forms hold a value of up to USD$5,000/MET compared to USD$2,900/MET for raw beans. The quality of Indonesian cocoa has also been a factor holding back the potential gains from exports.

**Timber**

Indonesia’s forest areas comprise 60% of the country’s land area, which makes it the third largest area of tropical rainforest in the world. Indonesia’s forest is therefore important not only for the national economy and local livelihoods, but also for the global environment. In general, the forestry sector also contains non-timber resources such as fruits, mushrooms, medicinal plants, rattan, bamboo, beehives, silk, eaglewood and the like. An important asset is the ability of forests to absorb carbon emissions and the involvement of the sector in the international scheme Reducing Emission from Deforestation and Degradation (REDD+/+). Forestry contributed between 8-9% of national GDP between 2005 and 2009. According to data from the Ministry of Forestry (2009), Kalimantan has the largest production forest area - with a total of 29.8 million Ha. Only 52.7% (or 15.7 million Ha) of this area has been utilized for timber production forest with Timber Cutting and Wood Production (IUPHHK) licensing both for commercial scale Industrial Plantation Forest (HTI), and for Natural Forest (HA). This indicates a strong potential for the further development of timber industry in the region. On 20 May 2011, the government of Indonesia released Presidential Instruction (Inpres) No. 10/2011 on 'The postponement of issuance of new licences and improving governance of primary natural forest and peatland',
which effectively imposes a 2-year moratorium on new forest concession licences. The moratorium was extended in May 2013.

Indonesia’s moratorium on new concessions in primary natural forest and peatland areas is an important step towards meeting its voluntary commitment to reduce emissions. However, several issues are unresolved concerning the area and status of land covered by the moratorium, and hence the amount of carbon stored in the affected forests and peatlands. The CIFOR analysis points out the following:

- The additional area given protection under the moratorium is at most 22.5 million hectares (Mha), which consists of 7.2 Mha of primary forests, 11.2 Mha of peatlands, and 4.1 Mha that fall into neither of these categories.
- The failure to include secondary forests and logged-over forests in the moratorium represents a lost opportunity to protect, at least temporarily, a fraction of 46.7 Mha of forests rich in carbon and biodiversity.
- The moratorium’s application to peatlands is likely to generate the most significant environmental benefits because of their large carbon storage capacity. However, as governance is relatively weak, concerted efforts will be necessary to capture those benefits.
- The moratorium’s exceptions for activities related to food and energy security create loopholes that could undermine the suspension of new concession licences. The potential for environmentally sound and economically viable land swaps should be explored before such exceptions are approved.
- A continually updated Indicative Moratorium Map (IMM) will be an important tool for public scrutiny and a mechanism to further secure and possibly increase the area covered by the moratorium. As part of this process, existing licences should be reviewed for compliance with current laws and regulations.

### 5.2.2 Potential Risks

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
</table>
| Water                             | • Large-scale removal of forest cover (logging, land conversion to plantations) can alter water regimes and affect water resources. The level of underground water may decrease, and water retention capacity of the soil (especially ultisols) can be minimized or lost, which also may lead to heavier and more frequent floods during the rainy season and a serious lack of water resources during the dry season.  
  • Intensive agriculture will increase demand for irrigation water and put pressure on existing water resources (natural and artificial).  
  • Pollution from agro-chemicals’ application, together with increased erosion affect water quality in rivers and lakes, as well as degradation of underground water resources. Heavy use of urea and other fertilisers, herbicides (including highly controversial paraquat) and pesticides leads to pollution of rivers, floodplains and coastal waters through run-offs.  
  • Pollution from animal husbandry (nutrients) can impact water quality |

### Relevant national strategic issues

<table>
<thead>
<tr>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air and climate</strong></td>
</tr>
<tr>
<td>• Forest and peat-land fires (accidental and intentional) are major source of air pollution; there is therefore a risk of increased frequency/scope of peat fires related to opening up new areas.</td>
</tr>
<tr>
<td>• Forest conversion and degradation has a desiccative effect on the mesoclimate, increasing the severity of droughts and the risk of fires in surrounding areas.</td>
</tr>
<tr>
<td>• Land conversion and forest clearing is a major source of GHG emissions, therefore planned MP3EI activities within agriculture and forestry sectors will lead to further increase of GHG emissions.</td>
</tr>
<tr>
<td><strong>Land and soil</strong></td>
</tr>
<tr>
<td>• Large-scale removal of forest cover (logging, land conversion to plantations) can trigger soil degradation and soil loss. Especially, intensive palm-oil production on poor soils such as tropical ultisols (found e.g. in lowlands of Kalimantan) leads to very fast exhaustion of soil nutrients, in addition to the loss of underground water. As a result, the soils are degrading and it is very likely that many areas will not be replanted after the palm-oil production cycle (approximately 25 years). This may cause substantial increase of the unproductive critical land extent (especially in Kalimantan) within several decades.</td>
</tr>
<tr>
<td>• Peat-lands are particularly vulnerable (drying, fire accidents) in this regard</td>
</tr>
<tr>
<td>• Pollution and contamination of soil can occur from application of agro-chemistry</td>
</tr>
<tr>
<td>• Animal husbandry – beef cattle can cause overgrazing and trigger erosion.</td>
</tr>
<tr>
<td><strong>Forests</strong></td>
</tr>
<tr>
<td>• Timber harvesting and plantation expansion are both directly reducing forest territory. Conversion of primary forest in timber producing forest is associated with a loss of ecosystem complexity and therefore reduction of its ecosystem functions (including reduction of ecosystem services such as water conservation and carbon sink).</td>
</tr>
<tr>
<td>• Over 50% of harvested timber is estimated to have been logged illegally, and therefore no systematic application of sustainable forestry principles is ensured.</td>
</tr>
<tr>
<td><strong>Biodiversity</strong></td>
</tr>
<tr>
<td>• Conversion of primary forest in timber producing forest is associated with loss of ecosystem complexity and therefore reduction of its ecosystem functions (including reduction of ecosystem services such as water conservation and carbon sink).</td>
</tr>
<tr>
<td>• Converting primary and secondary lowland rainforest into palm oil plantations (and other intensive agriculture development) is the most important cause of declining biodiversity in Indonesia.</td>
</tr>
<tr>
<td>• The impacts on biodiversity from rubber plantations depends on the scale and intensity of cultivation: while less-intensively managed rubber plantations owned by smallholders are relatively rich in biodiversity (including endangered species such as proboscis monkeys) and may provide some of the forests’ environmental services, the more intensively-managed rubber plantations can lead to significant adverse impacts on local biodiversity.</td>
</tr>
<tr>
<td>• Invasive tree species, notably <em>Acacia</em> spp., used in industrial timber plantations, can spread into surrounding forests, thereby making the environment less hospitable for native species (due to changed soil condition, etc.).</td>
</tr>
<tr>
<td>• Development of agriculture and forestry-related transport infrastructure (e.g. logging roads) can greatly increase rates of poaching and encroachment.</td>
</tr>
</tbody>
</table>
### Evaluation of MP3EI Policy

#### Relevant national strategic issues

<table>
<thead>
<tr>
<th>Description of potential risks affecting national strategic issues</th>
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</thead>
<tbody>
<tr>
<td><strong>Human health</strong></td>
</tr>
<tr>
<td>• Intensive use of agrochemistry in plantation agriculture can have negative impact on occupational health of plantation personnel, and secondary impact on adjacent population through contamination of water and soil</td>
</tr>
<tr>
<td><strong>Livelihood and Local Communities</strong></td>
</tr>
<tr>
<td>• Large-scale territorial expansion of plantations can conflict with local subsistence farming (competing for scarce land and water resources). Together with an often only limited number of well-paid jobs being provided by the large-scale plantations, it can further accelerate social inequity.</td>
</tr>
<tr>
<td>• Large areas of smallholder-managed farms are currently being converted into palm oil plantations. Furthermore, the farmers are often provided palm oil seedlings and encouraged to produce palm oil, too. This makes the farmers vulnerable to fluctuations of the demand for palm oil, while increasing the dependence of local communities on imported food and/or increasing the pressure on the remaining forests, which are being converted into farms to compensate for the loss of agricultural land.</td>
</tr>
<tr>
<td>• Removal of forests (uptake of forest land for plantations and timber harvesting) might reduce livelihood opportunities of rural populations traditionally depending on forest resources (timber for building and fuel-wood, and NTFPs).</td>
</tr>
<tr>
<td>• Removal of forests and thus altering the water regime in the area can lead to increased incidence and severity of floods and droughts.</td>
</tr>
<tr>
<td>• Intensive plantation agriculture might be less labour-intensive than traditional farming and thus can reduce employment opportunities especially for unskilled and disadvantaged groups. (At the same time, further investments and expansion of the sector will generate new employment opportunities – so the risks here may be more evenly balanced).</td>
</tr>
<tr>
<td>• Expansion of the plantations, as well as logging, can directly trigger disputes over land and forest rights among different stakeholder groups. Indigenous communities traditionally dependent on forest resources are particularly vulnerable. Protection of customary rights of communities to forest territories is not well established under Indonesian law. Inconsistencies in licensing and land-use regulations enforcement for timber logging and plantation establishments create legal conflicts and social disturbance (especially where there are overlapping concessions).</td>
</tr>
<tr>
<td><strong>Environmental management</strong></td>
</tr>
<tr>
<td>• Plantations or timber concessions can conflict with the delineation of natural protected areas and important biodiversity hotspots (lacking legal protection) and thus significantly decrease their connectivity for the wildlife</td>
</tr>
<tr>
<td>• Territorial planning does not involve comparison of alternatives for large scale plantation developments and the complex evaluation of cumulative environmental impacts.</td>
</tr>
<tr>
<td>• Policies to support agriculture development lack cross-checking with environmental policies (especially biodiversity protection).</td>
</tr>
<tr>
<td>• Lack of integrated watershed management results in increased risk of degradation of water resources</td>
</tr>
</tbody>
</table>

#### 5.2.3 Legal Issues

There are several issues related to the legal framework and/or procedures

*Moratorium on new concessions in primary natural forest and peatland areas*
The above mentioned moratorium was extended in May 2013. However, the Presidential Instruction on extending the moratorium repeats the loopholes from the previous moratorium. In addition to the fact that the moratorium only applies to primary forest and not to secondary forests, it specifically does not apply to:

- Existing concessions or concessions that already “received approval in principle” from the Minister of Forestry.
- “National development” projects including: geothermal, oil and gas, electricity, land for rice and sugar cane.
- The extension of existing concessions.

**Planning and permitting of plantations and agriculture production**

Both planning of plantations as well as related permitting procedures are relatively complicated. The planning consists of (as stipulated by Art. 6 Law No. 18/2004, on Plantation):

- National planning coordinated by the Government of Indonesia,
- Provincial planning coordinated by the Governors, and
- District/Municipal planning coordinated by Regents and Mayors, respectively.

In accordance with the Article 10.1 Law No. 18/2004, on Plantation, the maximum and minimum area of land-use within plantation area is to be determined by the Ministry of Agriculture.

The authority responsible for issuing the plantation permit is determined by the location (Art. 20 Regulation No. 98/Permentan/OT.140/9/2013 on Guidelines of Plantation Permits, the Ministry of Agriculture) i.e.

- Plantation Permit shall be granted by the Regent/Mayor, where the location of the land is within one district/municipality.
- Plantation Permit shall be granted by the Governor, where the location of the land overlaps the boundaries of districts/municipalities within one Province.

Before getting the Plantation Permits, there are also “land rights” which need to be issued by the Land Institution (BadanPertanahanNasional).

However, despite the system described above, there are cases of the overlap between permitted plantations. The problem relates to the weak supervision of the local governments i.e. the new permit is issued without withdrawing the existing one covering the same area. Optimally, a regulation should be adopted stipulating the period after which the permit for plantation should be revoked, if the permit holder does manage the permit area in a proper manner.

Similarly to the plantations, using the land for agriculture production often leads to conflicts with indigenous communities as a result of the Location Permit covering the lands of the indigenous community, which are used for customary agriculture production.

There are also cases where the regulation on the conversion of farming land to non-farming land for housing, mining or plantation issued by the Central Government contradicts the local government’s regulation. This situation can be seen as a result of decentralization and low “vertical” coordination between central, provincial and local governmental agencies.

Also, a certain lack of coordination between the Ministry of Forestry and the Ministry of Agriculture can be seen regarding utilization of productive forest area to be allocated as the agricultural land.
Conflicts with Local Communities

As already mentioned above, the conflicts with local communities present one of the key issues regarding plantation development, especially when the land to be used for plantation is owned by the local community. In such a case, the company has to make a procurement of the land for plantation. Nevertheless, the problem is the amount of compensation, which often does not meet the local community’s demand. Besides that, it also often happens that the company gives back to the community land which already had been given as compensation.

The regulation for land compensation has already been set (Law No. 2/2012 on Acquisition of Land for Development in the Public Interest), however the problem appears to be in the enforcement of appropriate procedure i.e. control to ensure companies provide compensation as agreed with the local communities. Plantation land occupation by the community can also occur when the “right to cultivate” (HGU) expires and its extension is not yet being issued.

Limiting the plantation size

Officially, the government limits the ownership of plantation area for companies or a group of companies which have the same management or ownership. This policy applies for eleven commodities: crude palm, sugar cane, tea, coconut, rubber, cotton, coffee, cocoa, cashew nuts, pepper and clove. The policy is stipulated by the Minister of Agriculture Regulation No. 98/2013 on Directive of Plantation Business License, which overrides previous policy stipulated by the Minister of Agriculture Regulation No. 26 of 2007. The limitation of plantation size is needed for managing and control of the licenses to be issued by the local government and to avoid the issuance of licences for areas of uncontrolled size. However, it can be concluded that enforcement of the above described policy is rather problematic.

Conflicts between plantations and mining

Cases have been recorded where plantation and mining land overlap. The problem lies in misinterpretation of the provisions regarding the land rights. The plantation business is considered as only utilization of earth surface, while the mining operations are activities beneath the earth surface and are not suppose to include the earth surface right (Article 134 Law No. 4/2009 on Mineral and Coal Mining stipulates the rights regarding Mining Business License Area, People Mining Business License Area or Specific Mining Business License Area, but does not address the earth surface right).

In order to carry out plantation activities, after getting Plantation Permits, the companies are obliged to complete the process of acquiring land rights. Based on Indonesian Agrarian Law, the land rights only cover the earth surface. Article 4(2) Law No. 5/1960 states that anything lying beneath and above the earth surface can be used for the benefit associated with the land use. On the other hand, Mining Permits are granted within the Mining Permit Areas. Title to the Mining Permit Area itself does not include surface land title. Therefore, Mining Permit holders may carry out their activities only upon approval of land title holders. They must settle land titles with title holders under provisions of laws and regulations (in accordance with the articles 134 – 136 Law No. 4/2009 on Mineral and Coal Mining).

Indonesian Sustainable Palm Oil Certification

Indonesia has initiated implementation of Indonesian Sustainable Palm Oil (ISPO) Certification scheme. In accordance with the Regulation of the Minister of Agriculture No. 19/2011 on Continuining of ISPO, each palm-oil company has to execute its operational business in line with ISPO as well as to obtain the ISPO certificate by December 31st, 2014. However, by January 2014 only 40 companies from altogether 2.500 companies obtained the ISPO certificate, with another 153 companies in the process of acquiring the certificate. Currently (April 2014), in

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Based on information from the Head of ISPO Commission, Ms. Rosediana Suharto.
order to motivate the businesses to apply for ISPO certification, the Ministry of Agriculture proposed to the Ministry of Trade to provide an incentive in the form of export tax cuts for companies that have obtained the ISPO certificate.

**Unclear Legal Provisions regarding Livestock**

The period of expiration of the livestock business license is not clearly stipulated in the Minister of Agriculture Decision No. 404/kpts/OT.210/6/2002 on Licensing and Livestock Business Registration. Therefore it is unclear whether the livestock business license is granted without limit of time or whether the determination of this period should be submitted to the Regent / Mayor as the authorized governmental body to issue permits on livestock business.

### 5.2.4 Potential Economic Implications

Clearly, agriculture and forestry activities in Indonesia generally – and as to be promoted by MP3EI – are large in scale and extremely diverse, and the risks associated with them are likewise highly varied. As a result, the potential economic implications of agriculture and forestry activities are likely to be extremely significant in terms of their effect on national strategic objectives in aggregate, be distributed across several regions of the country, and will also arise from a wide variety of sources. Moreover, the economic implications of the kinds of identified risks will derive, firstly, from the scale and distribution of individual agriculture activities and (secondly) from the intensity of their effect on the national strategic issues (i.e., it will vary according to the value of a specific resource or situation being impacted).

In order to put some economic dimensions to this analysis, the following points are relevant in the current context:

- In general terms at global and regional levels, agriculture activities such as rice farming, cattle ranching, soybean and other oilseed processing, poultry and non-poultry animal processing, vegetable farming, tree-crop farming etc., are among the activities with the greatest impact on natural capital at a global level - as estimated by *The Economics of Ecosystems And Biodiversity* (TEEB)\(^{16}\) programme. As the TEEB work summarises the situation for these types of activities - ‘the extent to which agriculture sectors (globally) do not generate enough revenue to cover their environmental damage is particularly striking from a risk perspective’. Agriculture activities also tend to be ones which are characterized by externalities being passed along supply chains and significantly multiplied in the sequences of further processing and manufacturing.

- As a measure of relative scale, the TEEB estimates that consumer demand for food and goods produced by primary sectors contributed to environmental damage worth 13% of global economic output (in 2009). As a component of this, for example, water pollution driven by the eutrophication from nitrate and phosphate fertilizers alone is estimated to cause resource costs in eastern Asia of about 80% of sector revenue, for example.

- More specifically in Indonesia, with over 40 million Ha under crops nationally, of which some 13 million Ha is rice, nearly 11 million Ha of land is under the tree crops of oil palm and rubber, and the remainder under vegetables, other perennials etc., and with agriculture representing about 15% of Indonesian GDP, the economic impact of agriculture activities on water, land and soil, air and climate, forests, biodiversity resources etc. will therefore be enormous, and initiatives under MP3EI to increase such activities inevitably degrade national

\(^{16}\) *Natural Capital At Risk: The Top 100 Externalities Of Business* (2013). TEEB. TEEB is a multi-stakeholder Platform for supporting the uptake of natural capital accounting in business decision-making. It is supported by G8 and UNEP; see www.teeforbusiness.org
natural capital stocks still further. Based on the broad composition of agriculture activities envisaged within individual economic corridors (as well as the existing geographical distribution of plantations and other agriculture throughout Indonesia as a whole), the areas most likely to be exposed to the kinds of risks to national strategic issues implied by MP3EI are: (i) Sumatra (as a ‘Center For Production and Processing of Natural Resources….’ and as a location for current palm oil and rubber production (ii) Sulawesi (as a Center For Production And Processing Of National Agricultural Plantation’ and food production…..), and (iii) Papua-Kepulauan-Maluku (as a ‘Center For Development of Food…..’.

- As a very relevant example of potential economic implication for Indonesia, the TEEB estimate is that palm oil has a land use cost equal to 20% of sector revenue. This implies that economic prices received by the oil palm industry as a whole should be some 20% higher than they presently are in order to compensate for land resources degradation. To give an idea of monetary scale, for Indonesia’s palm oil exports alone this implies a financial cost of about $4 billion annually (based on 20% of export earnings of around $20 billion). Split between Sumatra and Kalimantan this would be about $2.8 billion and $1.2 billion respectively. This type of thinking is of course applicable – to a lesser extent – to rubber and cocoa, and is especially true regarding the scale of impacts from logging and timber production; while the TEEB analysis suggests the natural resource effects of logging are lighter than might have been expected (with a likely land use cost of 22% of sector revenue as estimated for eastern Asia for example), this is in part because much logging – including in Indonesia – is illegal and unreported.

- The most obvious impact of expansion of proposed agriculture activities under MP3EI would likely be on forest resources. Indonesia’s tropical forests are still extensive, but impacts on their scale and/or quality (e.g., from the removal of cover, from forest fires, from changes to meso- and micro-climates, from loss of species range and diversity, from soil degradation, to restriction of community access to timber and NTFPs) as a result of expanded agriculture activities under MP3EI will likely be substantial. A recent, widely-cited and very comprehensive (320 research papers from 300 locations) resource valuation meta exercise estimated Total Economic Value (TEV) for a range of resource types, The estimated value of a hectare of tropical forest (adjusted to 2013 Indonesian prices from 2007 US$ figures) is some $5,790. This value is comprised of a wide range of provisioning (food, water, timber, plants), regulating (air quality, climate regulation, nutrient recycling, water treatment etc.), habitat services (nurseries, genetic diversity) and cultural services (e.g., recreation, spiritual experience). While any one agriculture activity may not impact all of these services, any partial effects will still compromise TEV overall. Old forest areas probably absorb 15% of all human induced GHG emissions at present, and (conversely) deforestation contributes about 19-25% to global emissions at present; so any loss of forest land to agriculture in Indonesia (which is relatively important as a forest source in world terms) thus likely has major economic effects at the global level.

17 Details on the rates of conversion of forest lands to agriculture and projections thereof are provided in Chapter 4.
18 Global estimates of the value of ecosystems and their services in monetary units; de Groot et al. Ecosystem Services 1 (2012)
19 Other work by TEEB shows that forests can have significant values in a range of regulating services – carbon storage, erosion prevention, pollution control, water purification - when their economic importance is often currently only perceived in terms of timber and non-timber products. As a rough proxy, it is not atypical to find that two thirds of the value of tropical forests derives from regulating services whereas only one third comes from provisioning food, raw material and genetic material for pharmaceuticals. A range of studies and values are cited in The Economics of Ecosystems and Biodiversity for National and International Policy Makers (2009).
• As an example of the potential scale of such impacts in economic terms to Indonesia itself, if the area of production forest in Kalimantan were to expand by 5% from its current level (i.e., 785,000 ha) into tropical forest areas and the TEV of that area were to be affected to the degree of only 10% of its value (i.e., to about $580), the implied economic cost would be in excess of $45 million per annum. If landuse conversion to agriculture takes place on peatlands, the economic costs can be about 5 times this amount — on the basis that such lands provide very similar ecosystem services as do wetlands.

• The capacity for agriculture activities to affect rural livelihood and wider social issues is also major. A recent study\textsuperscript{21} of the social and environmental implications of oil palm plantations in Indonesia found (\textit{inter alia}): (i) the incidence of land disputes between local communities and palm oil plantations was very high – in 2010 alone there were over 630 disputes recorded; (ii) while plantations do offer some local community members employment opportunities, and housing and transport facilities may be improved, these benefits tend to be offset (for up to half or more) of the local population in terms of increased time to collect firewood or other forest resources, reduced access to such resources, increased water and air pollution etc., and (iii) poor community-customary landowner relations, general unevenness in benefits distribution within the communities (e.g., between investing households or salary earners and non-plasma/estate participants) contributed to community differentiation and (typically) further entrenchment of elites.

• More generally, the failure to properly account for and value the full range of ecosystem impacts in planning means that distributional aspects of developments are overlooked – typically to the disadvantage of customary/traditional (and usually relatively poor) resource users. For example, a study by Van Beukering et al. (2003) of the ecosystem services of the Leuser Ecosystem in Indonesia under different land use scenarios (including agriculture, partial and full conservation options) clearly identified that in the long-run conservation and selective use of the forest ecosystem allowed using and maintaining a broad range of ecosystem services creating greater benefits for the local population than would otherwise have been the case - and a greater total level of economic benefits for the country overall (although of course not all would have been captured in money prices). This situation is of course part of a wider problem, in that the poor are disproportionately dependent upon common property resources (forests, wetlands, fisheries etc.), and thus their degradation or depletion as a result of poor policy compromises (in this case) Indonesia’s national poverty reduction objectives.\textsuperscript{22}

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\textsuperscript{21} Environmental and Social Impacts of Oil Palm Plantations and their Implications for Biofuel Production in Indonesia; Krystof Obidzinski Ecology and Society 17(1): 25.

\textsuperscript{22} There are numerous examples from Asia and elsewhere of how biodiversity protection and planning can be positively linked to poverty alleviation objectives; see Tallis et al (2008), cited in The Economics of Ecosystems and Biodiversity for National and International Policy Makers (2009). This is also the basis for emerging work on adjusting measures of accounting to allow for resource degradation (i.e., so-called ‘green accounting’) and also measures to estimate ‘the GDP of the poor’. For an attempt to apply this kind of approach in Indonesia, see Ahmad, Mubariq (2009) - Mimeo based on experts discussion in reference to various segmented forest valuation studies known in the circle of Forestry Department, Bogor Agriculture University (Box 3.A3 in The Economics of Ecosystems and Biodiversity for National and International Policy Makers
5.3 **Light Industry / Heavy Industry**

5.3.1 **General overview**

The industrial sector has become a major source of economic growth in Indonesia. All non-oil/gas industrial sectors recorded positive growth in 2011, with base metal, iron and steel industry taking the lead with 13.1%, followed by food, beverages and tobacco industry at 9.2%, and textile, leather products and the footwear industry at 7.5%. Compared to these industries, wood products and the forestry industry have shown lower growth (0.3%). The industrial sector in the country encompasses a wide variety of activities both in nature and in size. Although the specific environmental impacts of most of the industrial projects can be properly assessed only at a project level, the strategic assessment can take into account potential interaction of a number of the projects, and thus address likely cumulative effects. Therefore, looking at large industrial areas at a higher strategic level may reveal:

- The cumulative environmental pressures arising from direct emissions to the air and water, the amount of hazardous waste and indirect associated pressures from related utilities (e.g. power stations) and transportation.
- The required associated infrastructure for road/rail/water/air transportation, wastewater management, waste management.
- The impact on adjacent nearby residential areas.
- The fresh water demand and the potential pollution of the watershed, which can have negative effects on freshwater availability for households, agriculture, fishery etc. as well potential adverse effects on ecosystems and biodiversity.

The tables in Section 5.3.2 address the industrial economic activities stipulated by the MP3EI. The following four are considered as light industries i.e. with limited strategic impacts which would be related to the MP3EI, and thus the likely impacts can be mainly analysed at the a local level:

- Defence equipment
- Transportation equipment
- Food and beverages
- Textile

The following four are considered as heavy industries. These activities can lead to large-scale impacts and are typically grouped with similar types of activities and associated development and located close to harbours and/or metropolitan areas. This means that the cumulative impacts related to the MP3EI need to be considered as strategic and assessed at the policy level:

- Shipping
- Oil and gas
- Ferrous and Non-Ferrous Metal processing
## 5.3.2 Potential Risks

### Industry (General)

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
</table>
| **Water**                         | • Water quality is negatively affected by industrial wastewater discharges, either directly discharged, or indirectly via a sewage treatment system or by diffuse emissions caused by discharges of contaminated run-off water / firewater or by leakage of hazardous waste sites. Industrial discharges can affect toxicity, change in temperature, pH, salinity, nutrients, etc.  
  • The industrial growth projected by the MP3EI will lead to additional stress on the watersheds.  
  • The industrial development will lead to further water demand, which may exceed existing sources |
| **Air and climate**                | • Industrial activities contribute significantly to outdoor air pollution, although road transportation is often the most important source in urban areas.  
  • The industrial growth projected by the MP3EI will lead to additional stress on the air quality  
  • The fossil fuel consumption to satisfy the energy demand of the industry is also an important source of greenhouse gases emissions and it can be expected that the industrial development stipulated by the M3PEI will lead to further increase of GHG emissions (see Section 6 for further details regarding the likely MP3EI impacts on GHG emissions). |
| **Land and soil**                  | • Further industrial development will lead to increased extraction of ground water resources, which – specifically in Java coastal metropolitan areas – will exacerbate the issue of land subsidence  
  • Uncontrolled industrial landfills may lead to wide-scale soil contamination |
| **Human health**                   | • The MP3EI aims at further expansion of sea ports, where also the expansion of the heavy industry is expected, which will probably lead to an increase in the population living in coastal areas. These lowlands are vulnerable to increased flooding associated with sea level rise and extreme weather events caused by climate change.  
  • Generally, further industrial development may lead to increased pressures to the human health from environmental determinants related to air pollution (both outdoor and indoor) and poor water quality. Non-existing or low abatement of atmospheric emissions present a significant threat to human health and ecosystems. Air pollution is associated with a broad spectrum of acute and chronic illness, such as lung cancer and cardiopulmonary disease. For example, WHO estimate that particulate matter in air pollution causes about 9% of lung cancer deaths, 5% of cardiopulmonary deaths, and about 1% of respiratory infection deaths. |
| **Livelihood and Local Communities** | • There might be a risk of a lack of appropriately qualified labour force required for certain types of industrial production  
  • Depletion of the groundwater resources from increased water demand may lead to land subsidence and thus – especially in Java coastal metropolitan centres – result in loss of real estate.  
  • The water pollution due to industrial development (in areas where the industry will be developed near major rivers or in coastal areas) can lead to a decline of livelihood of the local communities (fishermen etc.) |
<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
</table>
| **Energy and waste**              | • Existing industrial technologies contribute greatly to depletion of non-sustainable resources and augment environmental pressures (e.g. the textile industry has high water consumption, while production of metals is highly energy demanding), and these pressures will simply be expanded if the technologies associated with MP3EI are not improved by the application of best available techniques (BAT). Innovation parts of the MP3EI thereby offer an opportunity to ameliorate risks by replacing existing inefficient and disproportionate polluting technologies.  
• Specific concerns on waste are related to increasing industrial waste generation, low waste collection rates, landfilling with low rates of recovery of materials or energy, and unmanaged landfill sites. For example, recent examples reported in the press (Saroso, 2011) highlight heavy metal pollution in Lampung Bay caused by the dumping of industrial and domestic waste, which purportedly led to the contamination of drinking water in the area. |
| **Environmental Management**      | • Although industrial emissions are regulated in Indonesia, enforcement of the regulations is not always demonstrated. For example, illegal mining can pose a local threat to health and ecosystems. Also, the reclamation of abandoned mines is a specific concern. The Indonesian Center for Environmental Law (ICEL) and the Program Study of Environmental Science, University of Indonesia, commissioned a study to investigate the effectiveness of the Industrial Air Pollution Control Policy in Indonesia in 2006 (Aminudin, 2006). This study concluded there was a low compliance of industries in the Jakarta area with the national air pollution policies. The rates of non-compliance with emission standards varied between 17 – 76%, where non-compliance on reporting obligations was found to be at around 30%. In addition, surveys determined that installation of air pollution control equipment was 0 out of 10 at sampled sites during 2004. It was concluded that a lack of institutional capacity, strategy, political priority, and enforcement culture in Indonesia were the main reasons for such poor compliance levels in industry. |
| **Textile Industry**              | • The textile industry encompasses activities with both low and potentially high environmental impact - for example, the garment assembly versus dyeing of fabrics. Most of the textile industry activities can be considered as a light industrial production with only local level impacts. However, the treatment and dyeing of textiles has the potential to threaten watersheds by extracting fresh water and by discharging pollutants - although it should be possible to manage these negative environmental impacts to an acceptable level by applying best available techniques (BAT).  
• Further development of the textile industry as envisaged by the MP3EI will therefore potentially have a negative impact on watersheds. Dyeing, rinsing, and treatment of textiles require a large amount of fresh water, while wastewater discharges typically contains toxic compounds. The World Bank estimates that almost 20% of global industrial water pollution comes from the treatment and dyeing of textiles. A multitude of toxic chemicals can reach water supply shed from textile dyeing. |
### Food and beverages

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>• The food and beverages industry is generally considered as a light industrial activity; however the water demand and the high biological load of the wastewater can pose a severe pressure on local water systems.</td>
</tr>
</tbody>
</table>

### Shipping

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
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</thead>
<tbody>
<tr>
<td>Water</td>
<td>• Discharge of hazardous contaminants to waterways, marine ecosystems and food chains can be attributed to many activities in the shipbuilding and ship repair industry, with risks of environmental damage generally being elevated by the industry's open air working environments and water front locations (as these provide direct pathways for pollutants to reach air, soil and water). The potential impact of emissions from shipbuilding operations on their immediate environment can be very significant, especially given that shipyards are inevitably near and on water, which increases the likelihood of propagation of some of those emissions.</td>
</tr>
<tr>
<td>Energy and waste</td>
<td>• More positively, increased ship production also presents an opportunity for highly energy-efficient transportation of passengers and goods if BAT is applied.</td>
</tr>
</tbody>
</table>

### Oil and Gas

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
</table>
| Water                             | • The fresh water demand and the cooling water demand of the oil and gas industry generally tend to be high.  
• Oil-contaminated wastewater also originates from the various processes and from so-called ‘produced’ water stemming from the wells. In addition, it can be expected that spills will occur for reasons such as operational failure, accidents or corrosion. |
| Air and climate                   | • Mineral oil refineries and petrochemical complexes are energy intensive industries with significant atmospheric emissions of major air pollutants. As these complexes are typically located in large industrial areas near harbours, the cumulative impacts to the air can be of a strategic importance. |
| Land and soil                     | • Although not large in volume, oil/chemicals/waste of the oil and gas industry may threaten watersheds as the bore holes interconnect different geological layers. |
### Steel

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air</strong></td>
<td>• Steel smelters and mills are highly energy intensive industries with significant atmospheric emissions of major air pollutants. As these complexes are typically located in large industrial areas near harbours, the cumulative impact can be of strategic importance.</td>
</tr>
<tr>
<td><strong>Energy and waste</strong></td>
<td>• Steel smelters and mill are highly energy intensive industries; therefore further increase of steel production will lead to increased energy demands and thus depletion of non-renewable energy resources. There is thus a significant opportunity to promote energy efficient technologies within the MP3EI.</td>
</tr>
<tr>
<td></td>
<td>• The smelting and associated processes will generate large volumes of waste/by-product (slag, scales and dust). Most of the waste residues from the integrated iron and steel sector can be recycled to obtain added value if an effective system of associated industries and market is in place. However, considerable amounts of hazardous waste will still remain and will require adequate treatment and waste management.</td>
</tr>
</tbody>
</table>

### Non-ferrous Metals

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air</strong></td>
<td>• The MP3EI promotes the development of alumina conversion and aluminium smelting in addition to new copper smelting capacity</td>
</tr>
<tr>
<td></td>
<td>• Aluminium smelting is an electricity intensive industry with significant direct (fluoride) emissions and indirect atmospheric emissions of the associated power plants. As these complexes are typically located in large industrial areas near harbours, the cumulative impact can be of strategic importance.</td>
</tr>
<tr>
<td></td>
<td>• Also copper/nickel smelting/refining requires large amounts of electricity. The most important direct emissions are related to the sulphur content of the ore, which will be emitted as SO₂ (if not abated). These acid emissions can have a severe negative impact on public health and nature in a wide geographical area.</td>
</tr>
<tr>
<td><strong>Energy and waste</strong></td>
<td>• The smelting and associated processes will generate considerable amounts of hazardous waste, which require adequate treatment and waste management.</td>
</tr>
<tr>
<td></td>
<td>• Since both aluminium and copper/nickel smelting are highly energy demanding industries, promoting the use of BAT presents a significant opportunity for reducing the energy consumption and related adverse impacts to the environment and health.</td>
</tr>
</tbody>
</table>

### 5.3.3 Legal Issues

#### Environmental Compliance

Based on the Governmental Regulation No. 41/1999 on Air Pollution Control, which sets the thresholds for the air quality standards, industries emitting pollutants to the air as a result of their activities shall:

- Fulfil the air quality standards, emission standards, and nuisance rate standards,
• Ensure prevention and/or settlement over air pollution as a result of their activities

• Provide correct and accurate information to the people as an effort to control air pollution within the location of industries.

In accordance with the Governmental Regulation No. 82/2001 on Water Quality Management and Water Pollution Control, industries that release waste water have to fulfil water quality and quantity standards which are determined by the local government for the territory where the industry is located.

However, there are cases of industries that do not meet standards stipulated by the relevant regulations. This situation is partially caused by a lack of control from the relevant authorities.

**Vehicle Emissions**

Regulation of the Minister of Environment No. 4/2009 on Threshold of Exhaust Emissions of New Type Motor Vehicle determines emission standards for motor vehicles. The standards are based on emissions produced by motor vehicles and related to the fuel used.

### 5.3.4 Potential Economic Implications

The economic implications of light and heavy industry tend to be more localized than for agriculture activities (because industrial activities are more clustered) and also more focused on particular national strategic issues (particularly water, air, human health, energy and waste). Like agriculture activities, however, the potential economic implications of light and heavy industry are a function of specific industrial process, the quality of technologies employed, scale of operations, and the local resource base within which any operations are located.

The following points may be relevant to a consideration of the possible economic implications of light/heavy industrial developments proposed under MP3EI at a policy level:

• Steel and cement manufacturing, fugitive methane emissions, flaring at oil and gas wells, and the energy associated with the supply and treatment of water are all major contributors to GHG emissions (as identified by TEEB and others). Sulphur dioxide, nitrogen oxides, and particulate emissions from fossil fuel combustion dominate the costs of air pollution. As examples of the kinds of economic impact levels these industries can have, TEEB estimates that iron and steel mills and cement manufacturing in eastern Asia can easily have (unaccounted) natural resources costs of 40-80% of their respective sector revenues (again, this implies commensurate levels of price increases necessary if such industries were to truly reflect their use of natural capital).

• While aggregate land and water costs of light and heavy industry are not as great as agriculture activities at a global level, iron and steel mills, petroleum and natural gas extraction have massive GHG costs associated with them. TEEB's measures of 'Environment Key Performance Indicators' (EKPI) have (for example) iron and steel production and cement manufacturing in east Asia among the top 6 of the most environmentally-impactful region-sectors measured in monetary terms – and over 90% of the total impacts estimated value is accounted for by GHG emissions.23

• Diverse light industrial activities, as being promoted within several Economic Corridors – including food and beverages – associated with downstream processing of primary products can have major economic costs. Flour and malt

23 The TEEB methodology for social cost of carbon follows the UK Government/Stern approach and applies a value in 2009 CPI-inflation adjusted prices of $106 per tonne of CO2 equivalent based on a central or business-as-usual scenario.
production, beet processing, fats and oils refining and blending, fibre, yarn and thread industries, pulp mills, frozen food and dairy manufacturing, leather tanning and finishing etc. can all have total direct and indirect resource impacts ranging from 50-130% per monetary unit of output. Again, the actual impacts arising from individual industrial development under MP3EI will be activity-, location-, and technology-specific, but the essential point is that such economic costs will be borne through the environmental externalities of investments unless mitigation actions are taken. Within the MP3EI economic corridors, significant economic impacts arising from light and heavy industry activity could be expected to be especially felt in Java (food and beverages, textiles, transportation and defence equipment), and Kalimantan (steel, oil and gas).

- Increased air pollution (particulates, noxious gases etc.) is a typical consequence of light and heavy industry especially when highly geographically concentrated and / or clustered, and worldwide studies suggest 90% of the costs associated with air pollution are borne through effects on human health (and thereby wider livelihood dimensions). Standard techniques for valuing the economic impacts of increased morbidity and mortality (using estimates based on years of life adjusted for extent of disability – the DALY models) arising from air pollution tend to yield high impact values; for example, estimated monetized benefits from the US Clean Air Act exceed $100 billion (in 1990 dollars), and the annual cost of air pollution in the Greater Metropolitan Region of Sydney was some $4.7 billion (midpoint estimate, 2003 Australian dollars) –or an average of just under $900 per capita and representing 2% of GDP. Likewise, the World Bank estimated that health costs (in 2001 dollars) of exposure to particulate matter in four major urban centers (including Metro Manila, Baguio City, Cebu City and Davao City), were estimated to be over USD$430 million – or equivalent to 0.6% of the country’s national gross domestic product. Other work by Nowak and Powe (2002) in the US and UK respectively identified the extent to which trees planted in urban areas could absorb pollutants and the extent of mortality and morbidity avoided thereby provides the basis for an economic valuation of the trees.

- Clearly the economic value of estimates of damage costs due to air pollution for Indonesia and for specific developments under MP3EI would tend to be reduced due to lower average levels of income prevailing than in developed economies, but given both that pollution could potentially be more severe in the absence of regulatory enforcement and that local populations are vulnerable without access to comprehensive health care, the relative order of magnitude in overall GDP terms could easily be the same. Within Indonesia, the cost burden will fall disproportionately on the poor, given that these communities are less likely to be able to access health care (for location / travel cost reasons and simply because of the costs of health care services themselves being prohibitive).

- Across nearly all types of light and heavy industrial activity, potential impacts on water resources can be significant. The scale of economic impacts arising from MP3EI developments on water is not so easy to conceptualize as the impact of more specifically land-based (e.g., agriculture) activities, but it may be worth noting that the meta study of the value of ecosystem services by de Groot et al, suggested that water resources biomes economic values were generally high – freshwater, rivers and lakes had an estimated value of just under $5,000 per ha

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24 *Introduction to the Economics of Pollution Control: Health Issues*; John A Dixon/World Bank (2005)


27 Cited in *The Economics of Ecosystems and Biodiversity for National and International Policy Makers* (2009).
(2013 prices). Furthermore, the impact at any areas of inland wetlands (of which Indonesia has many) are valued at nearly five times this amount – mainly because of the wide range of environmental regulating services (water flows, waste treatment, erosion prevention). Any such impacts in many areas of Indonesia are likely to be further exacerbated by the current high levels of freshwater pollution and propensity for floods and droughts (which are likely to be further exacerbated by climate change). As is the case for other common property resources, damage to natural water sources will disproportionately affect the poorest communities, as they are less likely to be able to acquire substitute supplies (e.g., bottled drinking water) and/or will have higher travel and other costs in accessing alternative natural sources.

- There are however positive examples which MP3EI can draw on to value water resources properly; for example, the Segah watershed (Berau District) contains some of the largest tracts of undisturbed lowland forest in East Kalimantan (150,000 hectares) which provide the last substantial orang-utan habitat. A 2002 valuation study concluded that water from the Segah river and the nearby Kelay river had an estimated value of more than USD$5.5 million/year (e.g. regulation of water flow rates and sediment loads to protect infrastructure and irrigation systems). In response to these findings, the Segah Watershed Management Committee was established to protect the watershed.28

- The economic impacts of waste from primary refining and smelting of nonferrous metals, alumina refining and aluminium production can be substantial – all of these appear among the list of top 20 sources of costs associated with waste in the TEEB work. In Indonesia’s case, economic costs from waste often take the form of soil and water pollution.

- Lastly, any industrial developments under MP3EI (e.g., shipping, oil and gas) which are located at coastal ecosystems also particularly threaten very high levels of resource costs, given that coastal ecosystems are valued broadly as highly as inland wetlands (their regulating services especially for waste treatment are valued particularly highly). At areas of coastal wetlands – again of which Indonesia has notable examples - these figures go up fivefold again (to an estimate of around $250,000 per ha in 2013 dollars).

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28 The Nature Conservancy (2007)
5.4 Mining

5.4.1 General overview

Mining constitutes one of the eight autonomous development programmes outlined by the MP3EI (along with agriculture, energy, industrial, marine, tourism, telecommunication, and the development of strategic areas) and the MP3EI identifies mining of metals - Bauxite, Nickel, Copper, and energy raw materials - Coal, Oil & Gas - among 22 main economic activities to be promoted.

Indonesia is endowed with a wide range of key minerals. It is the world’s second largest producer of tin and nickel and the fourth largest copper producer. The country also produces significant quantities of coal, gold, bauxite, phosphates and iron sand, and has the potential for alluvial diamond production. The mining industry has consistently contributed between 8% and 13% of GDP since the late 1980s. It accounted for 10.8% of Indonesia’s GDP in 2009, with minerals and related products contributing 20% of the country’s total exports. In 2014 the mining sector contribution to GDP is estimated to be as high as 12%.

The mining sector in the country generally suffers from a lack of infrastructure – namely processing capacities, the prevalence of extensive illegal mining and perpetual allegations of corruption. Furthermore, some projects have been delayed due to inconsistent interpretations of regulations at the local level. In the beginning of 2014, the implementation of restrictions (i.e., legislation adopted as early as 2009) on unprocessed minerals export has generated further uncertainty in the market and investment climate; however, the long-term effects are yet to be evaluated.

Nickel

In 2011, Indonesia exported more nickel ore than any other country in the world, with the Sulawesi region dominating national output. Major producers include government-controlled PT Antam and PT Vale Indonesia. While some of the ore is processed into nickel matte and ferronickel before export, the bulk is shipped in raw form, mostly to China, where it is used primarily in the production of stainless steel. However, Ibris Group reportedly plans to build a $1.8 billion nickel smelter in Indonesia, and Australia’s Direct Nickel in July 2013 signed a preliminary agreement with Antam to develop the country’s first nickel laterite processing plant.

Bauxite

As with nickel, Indonesia is also China’s largest supplier of bauxite, the main raw source of aluminium (and China is Indonesia’s largest customer). Antam is the dominant player in the sector and – in cooperation with Japan’s Showa Denko – leads the way in investment in bauxite processing. The world’s largest aluminium producer, Rusal from Russia, meanwhile, reportedly wants to build a $2 billion refinery in Kalimantan, while Chinese firms have announced similar plans. The processing of bauxite into alumina is the missing link in the aluminium production chain, as Indonesia’s only aluminium smelter relies on alumina imports from abroad.

Copper

Copper deposits exist across the archipelago, but mine output and exports declined sharply after 2009. Nevertheless, the country remains a top-ten producer in global terms. The Grasberg mine in Papua, operated by PT Freeport Indonesia, is believed to hold the world’s largest recoverable reserves, while the Batu Hijau mine on Sumbawa Island, run by PT Newmont Nusa Tenggara, is another major asset. Both mines are undergoing expansion programmes to access deeper-lying deposits. Indonesia only has one copper smelter, owned by a consortium of Japanese companies and Freeport Indonesia’s US-based parent company.
**Coal**

Indonesia produced about 257 million tonnes of coal in 2010 and is the second largest coal producer globally and the largest exporter of thermal coal. The distribution of coal resources in Indonesia is concentrated in the provinces of Kalimantan and Sumatera. As reported by the Ministry of Energy and Mineral Resources – MEMR (Geology Agency) in November 2011, the total coal resources and coal reserves in Indonesia are approximately 105,187 million tonnes and 21,131 million tonnes, respectively. Coal production levels are expected to continue to increase in 2014 and beyond - as domestic demand for coal will add to the demand from major importers such as China and India. It has been estimated that the expansion of Indonesia’s coal-fired power plants will add a total 12.6 gigawatts of electrical capacity and this will require an additional 44 million tonnes of coal supply to the domestic market.

**Oil & Gas**

MP3EI anticipates further development of the Oil & Gas sector with particular focus on EC Kalimantan, Sulawesi, and Papua. Proven Oil Reserves of Indonesia account for 4.2 billion barrels (2011) and Proven Gas Reserves approximately 109 trillion cubic feet (2011). However, since 2002, increasing demand in domestic consumption of oil and gas has made Indonesia dependant on imports. The acceleration strategy for oil and gas development is to increase national oil and gas production to 1 million barrels per day (BPD) by 2025. In the near future, oil and gas exploration will be directed to areas with more difficult conditions, such as deep sea exploration, which would require higher investment than previously. In addition to conventional methods for oil and gas exploration, increasing the production capacity of Coal-Bed Methane (CBM) is one potential way to boost national gas production.

### Potential Risks

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>• Contamination of surface water bodies by toxic compounds (primarily metals) from mine water discharge and leaching of mining waste rock dumps</td>
</tr>
<tr>
<td></td>
<td>• Dam break floods, and contamination risk from tailings facilities (dams)</td>
</tr>
<tr>
<td></td>
<td>• Contamination of groundwater resources, due to leaching of waste from unlined tailing facilities.</td>
</tr>
<tr>
<td></td>
<td>• Long term legacy mine contamination risks that develop many decades after mine closures. For example, pit lakes take many decades to fill and can then begin spilling into the water environment during wet periods.</td>
</tr>
<tr>
<td></td>
<td>• Contamination of groundwater resources from fracking fluids used in Coal Bed Methane extraction process</td>
</tr>
<tr>
<td></td>
<td>• Deep sea mining and deep sea tailings disposal are beginning to be looked at by mining companies – there is a risk of failures and thus there is a possibility of water contamination.</td>
</tr>
<tr>
<td></td>
<td>• Offshore mining can also lead to significantly increased sedimentation in coastal waters (e.g. tin mining).</td>
</tr>
<tr>
<td></td>
<td>• Competition for fresh water resources between mining and agricultural, stock and domestic users, as well as miscellaneous riparian users.</td>
</tr>
<tr>
<td></td>
<td>• Alteration of surface water regimes by mining operations (including water course diversions and increased flood risk).</td>
</tr>
</tbody>
</table>
|                                   | • Sedimentation of waterways from increased upland erosion on mining disturbed land. This is particularly important for tropical soils which have significantly
### Evaluation of MP3EI Policy

#### Relevant national strategic issues

<table>
<thead>
<tr>
<th>Description of potential risks affecting national strategic issues</th>
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</thead>
<tbody>
<tr>
<td>Elevated risk of erosion.</td>
</tr>
<tr>
<td>• Depletion of ground water resources from mine dewatering operations. Depending on the water quality there can be reuse opportunities for the groundwater resources in dry seasons.</td>
</tr>
</tbody>
</table>

#### Air and climate

| • Dust mobilisation is a major air quality issue during dry periods and requires significant amounts of water to be used for dust suppression. |
| • Direct emissions to the air from mining operations. |
| • Indirect impact of increased demand for energetic coal will significantly increase emission of pollutants such as SO$_2$, NO$_x$, Particulate Matter, and others. |
| • Increase of toxic emissions from mineral processing. |

#### Land and soil

| • Contamination from failure of tailings storage facilities. |
| • Mining operations can exacerbate risk of natural disasters (erosion induced landslides, flooding). |
| • Land uptake by large scale mining operations (namely forest land). |
| • Erosion triggered by mine disturbed land. |

#### Forests

| • Forest land loss due to expansion of mining activities. |

#### Biodiversity

| • Construction and operation of mining infrastructure has significant negative impacts on biodiversity, namely through disturbance, destruction and fragmentation of ecosystems. |
| • Water pollution and increased sedimentation in freshwater bodies and coastal waters can negatively affect both freshwater and marine ecosystems and thus the biodiversity. |
| • Emissions from metal processing constitute significant pressure on many aspects of natural environment supporting biodiversity. |

#### Human health

| • Waste and emissions from mining operations can pose significant risk of contamination with impacts on human health (e.g. toxic heavy metals). |
| • Emissions and waste from mineral downstream processing and power generation can negatively affect environmental quality (air, water, etc.) which are important determinants of public health. |
| • The bioaccumulation of metals (mainly arsenic and mercury) from tailings in local food chains can present a significant threat to human health for local communities (fishermen, small farmers). |
| • Mining communities belong to sensitive groups for HIV/AIDS and other contagious diseases. |

#### Livelihood and Local Communities

| • Development of a mining sector will tend to provide significant employment and economic opportunities. The distribution of these may be uneven, but can also lead to social and economic benefits that outweigh the environmental risks if they are managed properly. |
| • The mining sector is a particularly important trigger of certain types of social conflicts, including conflicts with indigenous communities over land-use, water and riparian rights. |
| • Mining projects and associated employment opportunities attract migration and increase in population in the local territory typically without adequate infrastructure (sanitation, water supply, education and health services, etc.). |
### Relevant national strategic issues

<table>
<thead>
<tr>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>being supplied in time.</td>
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</table>

<table>
<thead>
<tr>
<th>Environmental management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mine closure and mine reclamation policies are not well developed and have led to a major global problem (including Indonesia) of legacy mine sites that need to be managed. The costs of this are generally born by the communities near the mining sites many decades after mining has ceased.</td>
</tr>
<tr>
<td>• The environmental management plans for mines are often not consistently implemented or enforced.</td>
</tr>
<tr>
<td>• Mining activities and infrastructure development (e.g. road networks, gas and oil pipelines) can conflict with the delineation of natural protected areas and important biodiversity hotspots (lacking legal protection).</td>
</tr>
<tr>
<td>• The mining project development planning process does not involve comparison of alternatives and complex evaluation of cumulative environmental impacts.</td>
</tr>
</tbody>
</table>

### 5.4.3 Legal Issues

The legal basis for mining activities is stipulated by the Law No. 4/2009 on Mineral and Coal Mining, which has changed the license regime to the system of Mining Business License (Izin Usaha Pertambangan/IUP). Issuing IUP provides the governmental authority the mandate to amend the agreement if the implementation of the mining business violates the national interest. Therefore the new licensing regime is different compare to the previous “Contract of Work” regime in which the positions of the government and mining company were at the same level.

The above mentioned law gives the authority to the provincial and regency/city governments to issue mining license in their jurisdiction. The law also acknowledges local people’s mining activities i.e. the license can be issued as well as the location permit. Thus the new law has legitimized the local people’s mining activities, which have been taking place a long time before certain areas were determined as local mining areas, and which had therefore previously been considered as illegal. However, the local people’s mining business has to be operated only by the local communities that are the holders of the mining license.

The Governmental Regulation No. 23/2010 on Implementation of Mineral and Coal Mining Business Activities, introduces the “Clean and Clear” concept in license scheme. “Clean and Clear” means that the Mining Permits:

- Are issued in accordance with the provisions of the Law No. 4/2009 on Mineral and Coal Mining, and
- Do not overlap with another permit.

Until March 2013 there were altogether 10,809 mining licenses with 5,503 IUPs classified as “Clean and Clear”, which indicates that almost half of IUPs did not meet the above criteria.

### Contradicting Legal Provisions

Originally, the article 9(2) Law No. 4/2009 stipulated that the mining area shall be determined by the local government after consulting with the House of Representatives. However, based on Constitutional Court Decision No. 10/PUU-X/2012 on the judicial review of Law No. 4/2009, the wording of the article 9(2) has been changed, therefore currently determining the mining area shall be done by the Central Government after the area has been set by the local government in consultation with the House of Representatives.
The Law No. 4/2009 also stipulates that the approval for mining activities is being given in the form of license (IUP). By issuing IUP, the governmental authority is entitled to amend the agreement if the implementation of mining activities violates the national interest. There are current efforts from the Government to renegotiate mining concessions which had been issued before Law No. 4/2009 came in force (KK/P2KB) in order to adjust those in accordance with the new legislation.

Furthermore, Article 91 of Law No. 4/2009 provides the possibility for License (IUP) and Special Mining Permit (IUPK) holder to use any public facility including the public road. However, there are examples when the regulation issued by the Local Government contradicts the above mentioned provision and prohibits the use of the public roads for transport of the mining production (e.g. Local Government Regulation of South Kalimantan No. 3/2012). The reason is that the Local Government intends to decrease road damages and/or traffic congestions caused by trucks transporting mining production. However, the Local Government then has to provide alternative roads for the purposes of mining activities.

The draft bill of the Bangka Belitung Province prohibits mining activities in the open pits, rivers and sea. However, law No. 4/2009 stipulates that one of criteria to authorize a People’s Mining Area is to have secondary mineral reserves which exist in a river and/or on the edge of a river. Therefore, the draft bill is considered as contradicting Law No. 4/2009.

The Qanun (i.e. Islamic Local Government Regulation) of Aceh Province on Mineral and Coal Mining Management is also considered as contradicting Law No. 4/2009, since it stipulates compensation to the local government for any exploited natural resources of between 2.5% and 6.6%, and 2% to be provided by the mining company for community development.

Conflicts between mining and other land-use

Numerous conflicts or overlaps have been recorded regarding mining areas e.g. overlap between mining area concession and production forest area, mining area and conservation area (Ketapang Regency, East Kalimantan), or mining concession area with palm oil plantation (East Luwu, Sulawesi). Cases can be found where the forest area was opened for mining without the approval by the Ministry of Forestry.

Post-mining Policy and Mine Reclamation

Reclamation liability is regulated by articles 96, 99, and 100 of Law No. 4/2009 on Mineral and Coal Mining. Article 96 (c) states that in the application of good mining technique principles, Mining Permit and Special Mining Permit holders must conduct management and monitoring of the mining environment, including reclamation and post-mining activities. Article 99 (1) states that any Mining Permit / Special Mining Permit holder must provide reclamation plans and post-mining plans when submitting an application for a Production Operation Mining Permit or Production Operation Special Mining Permit. Article 100 (1) states that Mining Permit / Special Mining Permits holders must set up reclamation deposit funds and post-mining deposit funds. Governmental Regulation No. 78/2010 on Reclamation and Post-Mining obliges the IUP/IUPK holder to carry out the mine reclamation. However, in reality there are only a few companies (mainly large companies) which are committing themselves to implement this obligation. Obviously, there is a lack of enforcement and control as well as rather weak willingness of governmental authorities at all levels to support post-mining reclamation.

Issues regarding Oil and Gas Industry

There are cases of overlaps between concessions for oil and gas activities and forest areas. Although the Regulation of the Ministry of Forestry No. 14/2013 and 18/2011 on Guidelines of Forest Area Use prohibits exploration and exploitation activities within protected forests and nature protected areas, there are Oil and Gas activities being implemented in these areas and thus clearly contradicting the legal provisions.
Due to a lack of coordination between central and local governments, there have been also cases where mining conflicted with oil and gas activities. For instance, an oil and gas pipeline was broken as a result of mining activities in East Kalimantan. Most of the Mining Business Licenses (IUP’s) overlapping with the oil and gas working areas were issued by the regency government with no coordination with the Central Government, which is responsible for coordination of oil and gas management.

There are also cases recorded when mining/ oil & gas companies did not pay proper compensation to the local community for their land (e.g. Wajo Regency, South Sulawesi).

5.4.4 Potential Economic Implications

The economic implications of mining activities tend to be yet more localized and individualized than the implications for industry generally; mining activities are necessarily highly concentrated around individual resource deposits. Nevertheless, as a distinct class of economic activity they can typically require large amounts of water (less so land) resources for processing and cleaning, and can impose significant clean-up/legacy costs. They also impose burdens in the form of air pollution and GHG emissions.

Some points to put the economic implications of MP3EI mining activities in context may include the following:

- The TEEB framework suggests that in aggregate terms globally (and as would likely be the case within Indonesia but at respectively smaller scales) the environmental costs associated with mining are dwarfed by both land-based agriculture and industries generally. Only petroleum and natural gas extraction (in Eastern Europe) make it into the top 20 of global resource impacts in absolute terms, for example, and no other mining activities at all figure in the list of the top 100 global externalities.

- Petroleum and gas extraction (and petroleum refining) from a range of regions of the world including southern and western Asia do figure in the top 20 GHG emitters however, and are also among the worst air polluters generally. Petroleum refining is also characterized by having a high proportion of its costs located within its own supply chain, although this is not the case for raw minerals extraction and processing.

- While there have long been sources of materials to categorize environmental impacts associated with different types of mining, there are few studies which attempt to capture the social and environmental costs of mining as a distinct activity, rather than the individual resources and biomes which are impacted. One of the few studies to do so – which investigated the social and environmental costs associated with underground mining in Australia - reported that the unaccounted for costs likely represented about 10% of the value of the social benefits of mine operations (over a 20 year period). Again, this kind of analysis is not directly transferable to Indonesian coal or other mining activity, but it may suggest a likely lower bound for the unaccounted economic impact of some mining in Indonesia, given that both project design and regulatory enforcement are likely to be weaker than in Australia and that local human populations proximate to mines in Indonesia will be greater.

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29 See, for example, Environmental Assessment of Mining Projects World Bank Environmental Source Book (1998);
• Mining can typically locally abstract large volumes of water from rivers and lakes as well as from groundwater aquifers which are not directly paid for, and which are returned to water bodies in a degraded state. Looking just at the valuation of water provisioning services as a component of the total economic value of fresh water in the de Groot et al work suggests that a value of over $2,000 per ha (2013 dollars) is reasonable. In areas where recreational activities are compromised by mining activities this value would more than double. If areas of tropical forests or inland wetlands were affected by mining activities, the kinds of values cited earlier for the agricultural and industrial activities would similarly apply – i.e., about $6,000 or $25,000 per ha respectively.

• Given the distribution of mining activities across the ECs, the main economic implications of environmental and social impact would likely fall on Kalimantan (bauxite), Sulawesi (nickel), and Papua-Kep Maluku (nickel and copper). As is the case for other types of activity, impacts falling on the common property resources of mainly (in this case) air and water will tend to hit the poorest hardest. These impacts are of course further concentrated on those communities closest to individual mine sites.
5.5 Energy

5.5.1 Energy within MP3EI

The MP3EI addresses issues related to the energy production and distribution infrastructure development within its Connectivity component in order to emphasize its cross-sectoral character. Among the main goals of the MP3EI Strategy is to ensure energy security that is based on risk management of the needs and availability of energy in Indonesia. This includes the following principles:

- Manage risks through the continuous adjustment to the energy mix, which support sustainable economic development in Indonesia;
- Revision of current legislation related to energy mix and power production so as to support increased investments in the sector by improving consistency between laws and regulations;
- Restriction of the export of energy commodities followed by further processing activities within the country in order to increase value added exports;
- Implementation of good mining practices to minimize environmental damage.

Since the environmental aspects of coal and oil & gas extraction industries are addressed within the analysis of the mining sector (see Section 5.4), this section's focus is limited to energy generation and transmission infrastructure.

The following typical activities are proposed within the MP3EI:

- Development of power generating capacities (namely coal).
- Constructing new power plants that use renewable and clean fuel (namely hydro, geothermal, and biomass).
- Development of electricity networks, and energy supply infrastructure for the public.
- Utilization of green technology equipment to support electricity provision in non-commercial areas.
- Development of non-diesel power plants and the construction of off-grid clean energy facilities for remote/scattered areas.
- MIFEE (Merauke Integrated Food and Energy Estate) development programme including biomass energy generation.

5.5.2 General Overview

According to the Asian Development Bank’s Energy Outlook for Asia and the Pacific (2013), Indonesia is expected to continue to experience an increasing demand for energy that is projected to reach 445.4 million tonnes of oil equivalent (Mtoe) in 2035, up from 207.8 Mtoe in 2010 in business as usual scenario (BAU). Even in the scenario with the deployment of advanced technologies are applied by the final energy users and the transformation sector, and new and renewable energy and nuclear power plants are introduced as government plans, holding other conditions same as in the BAU case. ABD (2013), p. 304 and further.

31 The alternative case assumes that advanced technologies are applied by the final energy users and the transformation sector, and new and renewable energy and nuclear power plants are introduced as government plans, holding other conditions same as in the BAU case. ABD (2013), p. 304 and further.
advanced technologies, primary energy demand will only be 62.5 Mtoe (or 14%) lower than BAU in 2035, reaching 382.9 Mtoe.

To meet the country’s increasing energy needs, the Government of Indonesia initiated a two-phase “fast-track” generating programme. In the first phase, the Perusahaan Listrik Negara (PLN), a state-owned general electricity company mandated to provide electricity to the Indonesian public, was authorized to build a total of 9,551 MW of new coal-fired generation capacity to become operational in 2010 and 2012. In the second phase of the programme, 11,144 MW of new capacity will be built, with coal-fired power plants taking the biggest share (68%), followed by geothermal power plants (19%), combined-cycle gas-powered plants (10%), and hydropower plants (3%).

Thus, the energy mix (primary energy demand), as predicted for 2035, will be dominated by oil, accounting for 30.1 %, followed by coal (28.8 %); natural gas (20.7 %); others including biomass, geothermal, and new energy sources (19.5 %); and hydro (0.8 %).

Unlike many other countries, Indonesia’s government encourages increased use of coal in the power sector, due to the relatively abundant domestic supply and as a way to reduce the use of expensive diesel and fuel oil. Although coal consumption has grown significantly in the last decade, the majority of production has gone toward exports. In order to guarantee sufficient domestic supply, the Indonesian government set a 24% domestic market obligation for producers, which it revised down to 20% in October 2012 due to lower than expected energy consumption levels.

In an alternative scenario, the energy savings are achieved predominantly through electricity demand savings, and thermal efficiency improvement of fossil fuel generation. In addition, compared with the BAU case, electricity generation in the alternative case has higher shares from low-carbon-emitting sources. The alternative case assumes the deployment of 5.2 GW of nuclear power plant capacity in 2035, with nuclear energy accounting for 9% of total electricity generation in 2035. The BAU case and the alternative case assume the same capacity of geothermal at 8.2 GW in 2035, while a great expansion of new and renewable energy sources is assumed. In the alternative case, the capacity of wind is expected to reach 210 MW, solar 807 MW, and biomass 2GW in 2035 (ADB, 2013).

Renewable energy potential in Indonesia is substantial; however the level of utilization remains low, as indicated in following table:

<table>
<thead>
<tr>
<th>Type</th>
<th>Potential</th>
<th>Installed Capacity</th>
<th>% Utilized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>75,000 MW</td>
<td>6,848.46 MW</td>
<td>9.13</td>
</tr>
<tr>
<td>Geothermal</td>
<td>29,164 MW</td>
<td>1,341 MW</td>
<td>4.6</td>
</tr>
<tr>
<td>Biomass</td>
<td>49,810 MW</td>
<td>1,644.1 MW</td>
<td>3.3</td>
</tr>
<tr>
<td>Solar</td>
<td>n.a.</td>
<td>27.23 MW</td>
<td>n.a.</td>
</tr>
<tr>
<td>Wind</td>
<td>n.a.</td>
<td>1.4 MW</td>
<td>n.a.</td>
</tr>
<tr>
<td>Ocean</td>
<td>49 GW</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Nuclear</td>
<td>3,000 MW</td>
<td>-</td>
<td>0</td>
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Source: Ministry of Energy and Mineral resources Indonesia 2013

In terms of energy distribution infrastructure, namely the electricity network, Indonesia’s level of electrification (i.e., the ratio of population with access to electricity) is over 75% (end of 2012), although some regions still remain without adequate coverage. The effectiveness of the distribution network also suffers from frequent blackouts caused by low supply capacity and the existence of technical bottlenecks on the transmission grid.
### 5.5.3 Potential Risks

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
</table>
| Water                             | • Increased conventional fossil fuel power plant capacity will increase technological water consumption significantly.  
• Hydro energy development (dams) has impact on water regimes, including risk of impacts on drinking water sources (alteration of underground water levels, contamination etc.), and increased methane production from anaerobic fermentation in dam reservoirs.  
• Energy biomass production can increase need for irrigation and water consumption.  
• Geothermal energy utilization can entail risks of negative impact on underground water sources (loss of water due to disruption of aquifer or contamination). |
| Air and climate                   | • Coal fired power plants development will significantly increase emission of pollutants such as SO\(_2\), NO\(_x\), Particulate matter, and others.  
• Fossil fuels utilization will result in increase of GHG emissions.  
• Biomass combustion can have negative effects both in terms of local air pollution (e.g. volatile organic compounds, dust particles) and GHG.  
• However, potentially positive impacts are associated with solar, geothermal, wind and other renewables with close-to-zero emissions. |
| Land and soil                     | • Coal-based electricity generation development will trigger massive impacts in mining sector (land uptake, contamination).  
• Geothermal energy utilization can, in certain contexts, contribute to the increased risk of land subsidence, local earthquakes and land slides.  
• Energy biomass production on agriculture land displays similar negative impacts characteristic to other intensive agriculture – namely soil degradation (erosion, pollution), and uptake of productive land at the expense of food production for local population.  
• Solar energy installations can take up substantial territory (considered the relatively low energy production intensity per territory unit) that is lost for other land use.  
• Inundation associated with hydro-plant developments can affect fertile low-lands or other types of land-use. |
| Forests                           | • Indirect negative effects on forests can be associated with acidification (atmospheric acid deposition) resulting from fossil fuel burning emissions.  
• Emphasis on energy crops cultivation can increase pressure on forests (conversion of forest land) |
## Evaluation of MP3EI Policy

### Relevant national strategic issues

<table>
<thead>
<tr>
<th>Biodiversity</th>
<th>Description of potential risks affecting national strategic issues</th>
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<tbody>
<tr>
<td>• Construction and operation of energy infrastructure, namely expansion of energy transport network, has significant negative impacts on biodiversity, namely through disturbance, destruction and fragmentation of ecosystems.</td>
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<tr>
<td>• Hydro energy utilization carries a significant risk of negative impact on aquatic ecosystems. (e.g. alteration of river water regime and physical characteristics of water important for life of certain aquatic species, fragmentation of river continuum destroying migration patterns, increasing risk of spread of invasive species, etc.).</td>
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<tr>
<td>• Energy crop cultivation creates pressure on land conversion, often at the expense of natural ecosystems.</td>
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<tr>
<td>• Emissions from fossil fuels combustion constitute significant pressure on many aspects of natural environment supporting biodiversity.</td>
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<thead>
<tr>
<th>Human health</th>
<th>Description of potential risks affecting national strategic issues</th>
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<tbody>
<tr>
<td>• Improvement in accessibility and reliability of energy supply for population increases living standards and comfort with positive influence on human health.</td>
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<tr>
<td>• Emissions and waste from power generation (and indirectly from mining of fossil fuels) can negatively affect environmental quality (air, water, etc.), which is an important factor for public health.</td>
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<table>
<thead>
<tr>
<th>Livelihood and Local Communities</th>
<th>Description of potential risks affecting national strategic issues</th>
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<tbody>
<tr>
<td>• Meeting the energy demands of the economy will enable continuation of economic growth and thus will improve livelihood opportunities for the population.</td>
<td></td>
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<tr>
<td>• Development of the energy sector will provide employment opportunities, both on an industrial scale (large power-plants and electricity distribution, petrol supply for transport sector) and locally in development and operation of small-scale and decentralized energy generating installations (especially in the sector of renewables).</td>
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<tr>
<th>Environmental management</th>
<th>Description of potential risks affecting national strategic issues</th>
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<tbody>
<tr>
<td>• Energy transport infrastructure development (electricity networks, oil &amp; gas pipelines) can conflict with the delineation of natural protected areas and important biodiversity hotspots (lacking legal protection).</td>
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<tr>
<td>• Infrastructure development planning does not involve comparison of alternatives and complex evaluation of cumulative environmental impacts.</td>
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<tr>
<td>• Policies to support renewable energy source utilization lack cross-checking with other environmental policies (especially biodiversity protection).</td>
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<tr>
<td>• The EIA results and environmental management plans are often not consistently implemented or enforced.</td>
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### 5.5.4 Legal Issues

The main legal basis for energy policy is Law No. 30/2007 on Energy stipulating that the vision of the national energy policy is to reach national energy self-sufficiency and national energy security.

**Use of Renewable Energy Source**

As already described above, energy production in Indonesia is still based mainly on fossil fuels. Although use of renewable energy resources has been growing (and Presidential Decree No. 13/2011 stipulates that the government and local authorities should develop innovations in energy and water supplies), there are several obstacles limiting its further expansion. The fact
that fuel is heavily subsidised is one of the major reasons why the energy from renewable resources (which is not subsidized) cannot effectively compete in the market. Also, there is a lack of investments and governmental support for investments in the renewable energy sector compared to investments related to fossil fuels (e.g. geothermal energy development requires relatively high costs for exploration).

Land compensation

Similar to other economic developments, there are problems with too low compensation being provided for the land to be used for constructing the energy infrastructure – there is no consistent standard for the land price valuation and therefore the views of the governmental agencies differ as well as the view of the private developers and indigenous people having customary rights.

Electricity subsidy

The electricity subsidy is provided to the poor people with electric power between 450 – 1,300 VA. The total subsidy was Rp 71,364,809,000,000 in 2013, and Rp 99,900,000,000,000 in 2012, which represents a significant burden for the national budget, especially considering likely future increase of electricity consumption.

Fuel subsidy

Besides electricity, also fuel consumption of which has been increasing in the country – is highly subsidised. To reduce fuel consumption, particularly subsidized fuel, the Government released Regulation of the Ministry Energy and Mineral Resources No. 1/13 on the Control of Use of Fuel Oil. This regulation stipulates the type of vehicles limited for the use of subsidised fuel. Control over subsidized fuel use is mandated by Law 22/11 on the State Budget for Fiscal Year of 2012, which provides that the allocation of subsidized fuel has to be carried out more precisely through control. The control of subsidized fuel use is expected to reduce governmental spending.

Electricity distribution

Electricity distribution is regulated by the Regulation of the Ministry of Energy and Mineral Resources No. 4/2009 on Electricity Distribution Regulation. Since some areas within the country face blackouts and a lack of fuel supplies, besides problems related to infrastructure (lack of infrastructure, need for high investments for the infrastructure etc.), there is a need for a more detailed regulatory framework stipulating rules regarding electricity distribution.

Fuel standards

Indonesia is still using EURO 2 standard for cars including Low Cost Green Cars (LCGC). There is no specific emission standard for LCGC, therefore it has to follow the requirements stipulated in the Regulation of the Minister of Environment No. 4/2009 on the Threshold of Exhaust Emissions for New Type Motor Vehicle (i.e. EURO 2). Up until now, fuel standards only apply to new motor vehicles based on the above mentioned regulation. The regulation on the use of fuel with emission standards higher than EURO 2 has not been introduced yet. It is still merely a verbal statement issued by the Minister of Industry (from October 2013). For older motor vehicles, for which fuel standards do not apply, periodic testing of emissions is voluntary as stipulated by the Law on Environment and other relevant regulations (Governmental Regulation No. 41/1999 on Air Pollution Control, Regulation of the Ministry of Environment No. 4/2009 on Threshold of Exhaust Emissions of New Type Motor Vehicle).
5.5.5 Potential Economic Implications

What stands out immediately from the energy activities contained within the MP3EI in terms of the economic implications related to the potential risks affecting the national strategic issues is of course the environmental costs associated with coal-based power generation. Indonesia’s energy plans within MP3EI seem generally somewhat anomalous in strict environmental and social terms, although the relatively abundant domestic reserves compared to the high costs of imported diesel etc. obviously explain the current rationale.

A few points regarding energy in MP3EI may be as follows:

- Although the impacts of energy generation on local land and water resources can be obvious, concentrated and locally significant, they pale when compared to the impacts (potential and actual) on air and climate (through pollution and GHG emissions). For example, in none of the global top 20 sector-region rankings compiled by TEEB do energy activities figure regarding economic impacts on land and water (these remain dominated by agriculture activities).

- Conversely, within the TEEB global analysis framework, coal-based power generation in eastern Asia has the single largest impact on the world’s natural capital stock bar none – with virtually all the impacts coming from GHGs and air pollutants. Coal is of course much more carbon-intensive than either oil or gas. Coal power generation in all other regions of the world also figures in the top 100 identifiable resource impacts – with 6 separate global impacts ranked within the top region-sectors 25 alone. The fact that coal-based power generation has different levels of economic costs in different regions of course reflects the fact that considerably different levels of technology and environmental efficiency are being applied and obtained – indicating the scope for improved practices within Indonesia under MP3EI. Coal power generation practices in North America are more efficient than Eastern Europe, for example, and more than offset the higher human health costs in that region.

- GHG emissions in general are dominated by thermal power production, with coal power alone accounting for about 30% of all emissions. This finding is also consistent with that of the International Energy Agency, which found\(^\text{32}\) that coal combustion drove about 43% of all power generation GHG emissions.

- Climate regulation is widely ranked (e.g., by TEEB, by the Biodiversity Information System For Europe etc.) as the single most valuable ecosystem service overall; obviously, maintaining a stable climate at global and local scales has important implications for all human activities, including food production and basic survival. However, the fact that damage from GHG emissions is almost entirely externalised (especially in a country like Indonesia with underdeveloped tax regimes) means that the problem is especially hard to tackle. Currently the estimated social costs of carbon\(^\text{33}\) (using the TEEB methodology updated to 2013 prices based on the MUV index implies a value of $118.98 per CO\(_2\) equivalent in 2014 prices) – and this could be applied to analyses of major coal and other projects with emissions implications considered under MP3EI. Given that CO\(_2\) intensity is already known to be increasing in Indonesia (although there is some debate about relative causes of this), and power and transport emissions are expected to rise 7-fold over the next 25 years in the BAU scenario, it is hard to

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\(^{33}\) The social cost of carbon is not the same as the price paid in financial markets (e.g., where REDD+ and other schemes may operate), nor is it the abatement cost – but rather reflects the expected damage done to the environment through climate effects under various assumptions about GHG levels overall and the relationship between GHGs and temperature changes.
overstate the obvious economic implications of increases in GHG emissions from power generation activities in general, and coal in particular.

- Fossil fuel combustion results in the pollutants such as sulphur dioxide, nitrogen oxides and particulates being released; globally nearly half of all air pollution costs (mostly through impacts on human health) arise from coal power generation in East Asia, North America and Western Europe. In the absence of country-specific data to the contrary, it is likely that similar orders of magnitudes for the relative sources of economic costs arising from air pollution would apply in Indonesia. Again, the costs of air pollution (and even GHG emissions) are likely to fall on the poorest.

- Coal power generation in particular is also an important source of waste – solid and hazardous wastes generated can be used in other industries (e.g., construction). Although the economic costs of waste from coal/energy activities are overshadowed in global terms by the costs associated with dealing with nuclear power waste storage and disposal, for Indonesia this will likely be a significant issue.

- Lastly, a feature of the economic impacts of energy investments in MP3EI is that the (relatively) minor economic cost impacts on land and water will be felt locally – notably under MP3EI in those ECs where investments in power and energy predominate (e.g., Sulawesi, Kalimantan), but the major economic cost implications on climate will be felt globally. The intermediate scale cost impacts resulting from air pollution will mainly be felt locally in the short term, but will spread wider over time.

**Fuel subsidy**

Typically, subsidies are only justified in economic terms where there are positive externalities (i.e., where social returns exceed private returns), decreasing cost sectors (to attain optimal scale of output), or to offset distortions resulting from other policy choices. The Indonesian situation is one where the initial (redistributive) intentions to protect the poorest groups would have been far better achieved by more targeted interventions exhibiting far less leakage to non-poor groups, as fuel subsidies are provided per litre and do not vary depending on incomes, those who consume the most fuel – notably the wealthiest households and those in urban areas - receive the largest share of the subsidy. The simple fact it that, in Indonesia, the top half of households by wealth consumed 84% of the subsidised gasoline; the richest decile alone account for almost 40% of subsidised gasoline use, while the poorest decile accounted for less than 1% of it. About two-thirds of the poor and near-poor households (defined as the bottom five deciles) do not consume any gasoline whatsoever.

The prevailing price level of fuels is now one to which all Indonesians have become used over a very long period, and – consequently – the situation is politically almost impossible to address (there were major protests in 2005, 2008, 2009 and 2013 at attempts to reduce fuel subsidies). This is despite the fact that the poorest themselves would actually be better off if the money saved by reducing the fuels subsidies was spent on basic health and education services.

While it is the case that rises in the prices of fuels due to a reduction in subsidies would push up transportation costs and this would knock-on to food, clothing, manufacturing costs etc., and whose impacts would undoubtedly be regressive, the effects on the poorest groups in society

34 See ADB: Bank Criteria For Subsidies (undated) for a brief discussion of the cases for subsidies.
35 Fuel Subsidy Reform in Indonesia, Rae Kwon Chung, Director, Environment & Development Division, UN ESCAP; World Bank Institute (2013)
36 About 29 million Indonesians live below the country’s national poverty line — 250,000 rupiah per person per month or 1,250,000 rupiah per family per month, and in urban areas, 350,000 rupiah per person per month or 1,500,000 rupiah per family per month. A further 70 million, categorized as near poor, live just above that line. (2013)
could be ameliorated by cash transfers or other targeted support policies. These kinds of programmes (e.g., direct cash payments, rice and food supplies, subsidized loans, health insurance, rural infrastructure investments) were introduced following fuel subsidy reductions in 2005 and 2008 and were successful in reducing the poverty impact of the price impacts. However, subsidies have been re-introduced in all years since (except 2012) essentially due to political pressures. In general, the willingness to persist with fuel subsidy reduction has varied according to the popularity of the government at the time, and the main source of pressure to address the issue at all has been adverse (often external) economic events (e.g., the Asian financial crisis, a negative current account as Indonesia became a net oil importer, historically high oil prices etc.).

**Electricity subsidy**

Within an overall framework set by Presidential Decree (No. 5/2006) an increase in renewable energy production to a level of 17% by 2025 is mandated. Accordingly, Indonesia already has a wide range of incentives that – theoretically at least - encourage renewables’ production, including financial incentives (e.g., the Geothermal Fund, Development Credits for Biofuels and Plantation Revitalization), fiscal incentives (e.g., income tax and VAT reductions), and the provision of goods and services at below-market values (e.g., mandatory usage of biofuels by fuel distributors). However, reviews of these existing schemes suggest that while they may each be partially successful in broad implementation / administrative terms, collectively they have failed to seriously underpin the promotion of renewables in the country overall because:

- In general, and most importantly of all, the continuing subsidies for petroleum products, and the under-pricing of electricity generation (at prices essentially determined by PLN on the basis of its monopsonistic power), fundamentally reduce incentives to develop alternative sources of energy. To put the situation at its simplest – ‘there is no point in subsidising biofuel (for instance) while subsidies on gasoline remain intact’ and ‘Unfortunately, without changes to policy and regulation, it is unlikely that Phase II (of the government’s 2004 ‘Crash Programme’ to produce 20,000 megawatts (MW) of additional energy will garner a significant influx of foreign investment.’

- At the national level, Indonesia competes with other countries for sources of capital and expertise to develop large-scale projects (e.g. geothermal), and regulatory uncertainty and confusion (e.g. with conflicts between central and provincial governments over rates for feed-in-tariffs (FIT) for mini-hydropower schemes will tend to drive investors to other countries.

- More specifically in relation to micro- and mini-hydropower projects, such projects are in many cases simply not bankable (according to BAPPENAS sources). This is due to a lack of capacity both on the part of project developers and on the part of lending institutions: the former often do not know how to prepare project proposals that will be acceptable to institutional lenders, while the latter may also lack the knowledge and experience needed to assess the acceptability of projects.

- In biomass schemes, as well as the generic pricing issues affecting any power producers in Indonesia, technical issues surround the sourcing of sufficient quantities of agriculture, forest and urban wastes.

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37 Investment Incentives for Renewable Energy: Case study of Indonesia Yose Rizal Damuri Raymond Atje. IISD (2012)
38 Ibid.
40 There are particular technical issues related to turbine availability, and also issues surrounding the rate of FIT according to whether connection is to a low- or high-voltage grid.
5.6 Fisheries

5.6.1 General Overview

Indonesian fisheries are very complex and diverse, reflecting the country’s extraordinarily diverse bio-geographic characteristics. The waters of the western part of the archipelago are relatively rich (the shallow Sunda Shelf area, the Makassar and Bali Straits, and coastal waters of the large islands of Sumatra, Java and Kalimantan); they produce about two-thirds of the total fish catch and attract very large amounts of fishing effort, particularly inshore. The Arafura Sea shelf area between Papua and Australia is shallow and hosts trawling for penaeid shrimps, but most of the rest of eastern Indonesia is deep water where large-scale purse seines and artisanal pole-and-line, trolling gear and mini-seines catch small pelagics, tuna and skipjack, often using fishing aggregating devices. Many small-scale inshore fishers operate on coral reefs, reef flats and inshore waters using lines, traps, beach seine or lift nets, and even gleaning without any gear. Economically important species include shrimp, tuna, skipjack, giant perch, king mackerel, squid, coral fishes such as grouper and spiny lobster, ornamental fishes, shellfish and seaweed. Indonesia also has a vast area of brackish water, lakes, reservoirs, rivers, and freshwater ponds, which are very suitable for aquaculture development.

Marine and fisheries industries represent an important part of the Indonesian economy. Although small-scale operations produce about 95% of the total catch, industrial fisheries produce considerably more in value.

There are several issues fisheries face: overfishing in both marine and inland fisheries; low income for fishers and fish farmers; low standard of living of fishers; weak practical fisheries management, particularly concerning monitoring, surveillance and enforcement; and degradation of coral reefs and other marine habitats affecting fisheries. Furthermore, illegal fishing practices by both foreign and Indonesian fishing fleets are considered the most detrimental to the countries fisheries.

The MP3EI stipulates the development of fisheries in three Economic Corridors – Sulawesi, Bali – Nusa Tenggara, and Papua – Maluku.

5.6.2 Potential Risks

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<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
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<tbody>
<tr>
<td>Water</td>
<td>• Deteriorating environmental quality: aquaculture production has negative impacts on the water quality through the release of waste waters containing nutrients, chemicals, and pharmaceuticals. One of the worst cases of the impact of eutrophication to the fisheries occurred in Jakarta in 2004, where a massive kill of fish in Jakarta Bay occurred. More recent examples include mariculture damage due to eutrophication from mariculture itself, which led to exceeded carrying capacity in Lampung Bay.</td>
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<tr>
<td>Air and climate</td>
<td>• Since mangroves constitute a high carbon landscape, losses of mangrove ecosystems due to aquaculture development will reduce GHG storage capacities</td>
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## Relevant national strategic issues

<table>
<thead>
<tr>
<th>Description of potential risks affecting national strategic issues</th>
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<tbody>
<tr>
<td><strong>Biodiversity</strong></td>
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<tr>
<td>• Destruction of habitats: Over-exploitation and destructive fishing methods constitute the main threats to biodiversity in Indonesia due to destruction of the coastal habitats, thus leading in biodiversity decline. This also includes marine mammals (dugong, whales, dolphins) that are significantly impacted by fisheries. Also, both terrestrial and aquatic wildlife can lose their habitats through the building and operating of aquaculture facilities and its accompanying infrastructure.</td>
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<tr>
<td>• Invasive alien species: Inland aquaculture in Indonesia is now dominated by alien species, and the country has the most introduced species for mariculture in Western Pacific.</td>
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<tr>
<td><strong>Coastal ecosystems</strong></td>
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<tr>
<td>• Coral reefs: Over-fishing, which does not destroy corals but reduces abundance and diversity of fish and invertebrates, and destructive and illegal fishing (poison and blast fishing) are major drivers of coral reef degradation in Indonesia.</td>
</tr>
<tr>
<td>• Mangroves: Loss of mangrove ecosystems caused by aquaculture development.</td>
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<tr>
<td><strong>Livelihood and Local Communities</strong></td>
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<tr>
<td>• Loss of Fisheries: Although the trends in capture fisheries production are only slightly rising, there are concerns that the maximum sustainable yield (MSY) of Indonesian fisheries is rapidly being approached and in many areas is already being exceeded (with resultant declines in catches). The potential of Indonesia’s marine fish resources is estimated as 6.4 million tonnes of MSY, 80% of which (i.e. 5.12 million tonnes) have been stipulated as the total allowable catch (TAC). Fish production in 2011 at over 5.41 million tonnes was beyond the TAC, which indicates over-exploitation of the fish resources, however, this varies from species to species and between fishing areas (e.g. shrimps are showing a declining trend). This may lead to negative effects on the livelihood of the coastal communities, which are heavily reliant on wild capture and aquaculture fisheries production / resources to sustain their livelihoods. Fish catches have decreased especially in some Fisheries Management Area (WPP); for example over exploitation of demersal fish species has been experienced for WPP 718.</td>
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<tr>
<td>• Effects of Climate Change: Indonesian fisheries are vulnerable to the likely consequences of climate change i.e. sea-level rise, changes in water temperature etc. Estimates have been made in Karawang and Subang Districts providing that sea-level rise will most likely affect the production of both fish and prawn, with an estimated loss of over 7,000 tonnes, worth over USD$0.5 million.</td>
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<tr>
<td>Relevant national strategic issues</td>
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<tr>
<td><strong>Environmental management</strong></td>
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### 5.6.3 Legal Issues

#### Fishing Licences

The system of licensing has been introduced to manage the fishery activities consisting of:

- **SIUP** (Surat Izin Usaha Perikanan) is a written permission (as an integral part of SIUP), which must be owned by the fishing companies to conduct fisheries using production facilities specified in the license.
- **SIPI** (Surat Izin Penangkapan Ikan) is a written permission, which must be owned by any fishing ship engaged in fishing activities.
- **SIKPI** (Surat Izin Kapal Pengangkut Ikan) is a written permission, which must be owned by any fishing ship transporting fish.

The licences above are issued by (i) the Director General of Capture Fisheries at the Ministry of Marine Affairs and Fisheries (for ships over 30 GT), (ii) the Governor through the department head or officer appointed (for ships size 10-30 GT) in its jurisdiction and operating in fishing areas under its responsibility and not using foreign labour or capital, and (iii) Regent/Mayor through the department head or designated officer (for ships size 5 – 10 GT) in its jurisdiction and operating in fishing areas under his/her responsibility and not using foreign labour or capital. SIPI can also be issued by Governor for ships size 30 – 60 GT – this authority should be regulated in the new regulation of the Minister of Marine Affairs and Fisheries.

There is, however, no legal ground for controlling the number of vessels which are allowed to access certain fishing area, since the total number of permits is not monitored. Thus, it can lead

\textsuperscript{41} The calculation was based on expected 25% of the loss due to IUU (around 1.6 million ton) with assumed price of fish USD 2/kg.
to overfishing of certain areas. In addition, regulations issued by local governments often contradict the regulations by the Ministry of Marine Affairs and Fisheries.

**Increasing fish export**

Despite the scale of the fishery sector in Indonesia, due to the fact that the export of fish is increasing, the domestic demand has to be satisfied by import. This situation has been further reinforced by the Regulation of the Ministry of Marine Affairs and Fisheries No. 26/2013, providing that tuna can be exported directly without being processed in Indonesian ports. This can further harm the fisheries sector since an important part of production with high added value is carried out abroad.

**Lack of monitoring and zoning**

There is a lack of monitoring of fisheries – there is no regulation providing details on the fishery reports, appropriateness of data and submission to the relevant authority. The Indonesian fisheries can be characterised as an “open access” system. There is no clear zoning of sea waters, therefore large companies – operating with large and well equipped fishing boats – can present high pressure on fish resources and lead to overfishing.

**Conflicting regulations and a lack of coordination regarding the coastal areas**

There is contradiction between the legal regulations regarding management of the coastal zones and reclamation of the coastline. The Law on Fishery provides that the local government determines the coastal zones (to be regulated by the local government regulation), while coastal reclamation is regulated by the Presidential Regulation No. 122/2012. This means that coastal reclamation coordinated by the Central Government may affect the coastal zone, which is regulated by the local government. According to the law, Presidential Regulation No. 122/2012 is prevailing and thus the local regulation should be adjusted accordingly even if the assigned reclamation does not comply with the existing conditions in the coastal area.

**5.6.4 Potential Economic Implications**

Fishing activities are much smaller in scale (GDP composition, employment, planned investment under MP3EI etc.) than agriculture, light and heavy industry etc., and the economic implications arising from the risks to national strategic issues are correspondingly smaller.

Some points to contextualise the nature and scale of potential economic implications of fisheries activities include the following:

- Notwithstanding the relatively small scale of fishing, its importance in terms of its damage to ecosystems on land resources (i.e., marine and freshwater areas in this case) in global terms follows cattle ranching and rice farming.

- Faced with compelling long-term and worldwide evidence of the deteriorating state of marine resources, a joint World Bank/FAO report estimated fisheries resource costs in terms of lost economic rent to fisheries due to both depletion of stocks (making it more expensive, on average, to catch fish than otherwise if marine productivity and benefit flows were greater) and overcapacity of ships (again, raising the average cost of capture exercises) to be some $50 billion a year in 2004 (TEEB estimated this was worth $80 billion year in 2009 prices — now it would likely be around $100 billion annually). As Indonesia is already

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42 The Sunken Billions: The Economic Justification for Fisheries Reform; World Bank/FAO (2009)

43 This estimate is consistent with other studies, but is still conservative in that it does not include illegal and unregulated fishing, ghost fishing (where abandoned gear continues to catch fish which are not landed), nor impacts on soft seabe
usually the fourth largest producer of capture fish, a significant proportion of this value (perhaps several $ billion) is already being lost to the country.

- The fundamental problems which the World Bank/FAO study reflected all most certainly affect Indonesia’s marine fisheries; the question is to what extent the fisheries investments under MP3EI in these circumstances may further degrade the national stock and/or add to existing overcapacity? In Sulawesi EC the emphasis seems (appropriately from the point of view of economic resource costs) on aquaculture; in Bali-Nusa Tenggara the diversification into seaweed and salt production is welcome – although the continued development of capture fisheries may be more questionable, and; in Papua-Kepulauan Maluku the drive for greater value addition in processing and expansion of aquaculture may be welcome, but increasing fishing infrastructure capacity in general may not be.

- Marine resources themselves – in terms of hectares of ocean – tend obviously to have low average economic value because they are so vast; the de Groot et all estimate is of the order of just over $500/ha/year. The picture changes dramatically, however (and as noted previously), if fisheries (or other activities) impact on coastal systems (i.e., estuaries, continental shelves etc.) – as these are typically valued in tens of thousands of dollars per ha/per year, and coastal wetlands in hundreds of thousands of dollars per ha/per year. Coral reefs are the most valuable of all resources in economic terms, with high recreation and erosion prevention services provision alongside maintenance of genetic diversity, nursery services, raw materials/food production etc. In some tourist destinations the value of coral reefs can be up to US$ 1 million per hectare and year, as it is the case for Hawaii. Overfishing is likely to cause reductions in these kinds of marine resource values for Indonesia to the extent that MP3EI developments promote or allow illegal or unregulated practices (blast fishing, unseasonal fishing etc.).

- More generally, the costs of fisheries and marine resources degradation will fall on those fishing communities most dependant upon capture resources; falling stocks, reduction in average fish sizes, lack of species diversity and macroscopic damage to species composition will all affect household incomes, and responses to the situation (typically travelling further from shore to access other resources, or investing in modern gear) involve expense.

\[\text{(including microhabitats and benthic fauna). There are seemingly no estimates of the economic value of these impacts, but they are comprehensively identified in 'Impacts Of Fishery Activities' produced by FAO Fisheries And Aquaculture Department (http://www.fao.org/fishery/topic/12273/en)}\]

\[\text{44 Cesar et al 2002; Ruitenbeek and Cartier 1999, cited in The Economics of Ecosystems and Biodiversity for National and International Policy Makers (2009)}\]
5.7 Tourism

5.7.1 General Overview

Tourism development in Indonesia has been highly concentrated in several areas i.e. Bali, Jakarta, Yogyakarta, and several places in North Sumatra, North Sulawesi and South Sulawesi. Bali especially (and later also in Lombok) has developed as one of the world’s premier tourist destinations, with over one million foreign visitors flying directly to Bali each year since 1994.

Indonesia has large potential for eco-tourism development – heritage sites, traditional small town, down-town and the coastal cities and water front cities, natural landscapes and wildlife flora and fauna are scattered throughout the country and thus present an opportunity to diversify the tourism sector.

Within the MP3EI, the tourism is planned mainly for the Bali – Nusa Tenggara Economic Corridor with Bali Islands as a main area. However the Regulation and Policy for tourism sector also mentions a need for improving tourism destinations beyond Bali (i.e., Lombok, East Java, Komodo Islands).

5.7.2 Potential Risks

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
</table>
| Water                             | • Water pollution: Extensive development of tourism facilities significantly increases the amount of waste waters, which may exceed capacities for waste water management, and thus result in pollution of both freshwater as well as coastal waters. Water pollution may also be caused by improper management of solid waste produced by tourism facilities.  
  • Water resources: Growing number of visitors may lead to depletion of ground water and surface water resources. |
| Biodiversity                      | • Threatened species: Tourism can lead to pressures on already threatened fauna and flora species – tourism induces poaching and trade with plants and animals (as souvenirs for tourists etc.).  
  • Protected areas: The presence of large number of visitors can be disturbing for animal species and thus influence their breeding or feeding patterns; as well it can harm vegetation and habitats. |
| Coastal ecosystems                | • Coastal erosion: Development of tourism facilities too close to the shoreline exacerbates coastal erosion. Bali Island (especially its southern part – Sanur, Nusa Dua, Benoa) has been significantly affected, and Bali was a main recipient of the governmental support to combat coastal erosion in 1996 – 2004, which however has not been very effective.  
  • Coral reefs: There are both direct impacts resulting from tourism activities (diving, fishing, boat trips) as well as indirect effects caused by increased pollution in coastal water in the areas with a high concentration of tourism facilities. |
| Human health                      | • AIDS/HIV: Tourist destinations tend to belong to areas with high rise of the AIDS/HIV cases in Indonesia.  
  • Threats to population: Tourism development may increase the proportion of the population living in disaster-prone areas (tsunami, floods) as well as in those coastal areas likely to be most affected by sea-level rise resulting from climate change. |
### Relevant national strategic issues

<table>
<thead>
<tr>
<th>Description of potential risks affecting national strategic issues</th>
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</thead>
<tbody>
<tr>
<td><strong>Livelihood and Local Communities</strong></td>
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<tr>
<td>• Indigenous communities: Tourism development can negatively affect local indigenous communities by damaging their traditional lifestyle as well as the natural environment. Although its scale is much lower than in the case of e.g. palm-oil development or mining, tourism may also initiate social conflicts and negatively affect the natural resources the local communities have been using for centuries (e.g. the case in Maluku, where tourism affected around 80% of villagers practising a traditional marine resource management system, Sasi).</td>
</tr>
<tr>
<td>• Excessive development of coastal tourism infrastructure can cause the loss of the aesthetic value of the area (coastline, landscape etc.), which is one of the major assets attracting tourists to Indonesia. Subsequently, it can lead to decline of a number of tourists, which will negatively affect the local economy.</td>
</tr>
<tr>
<td>• Local economy: Since tourism may be affected by global factors (economic crisis, massive outbreak of infectious disease, wars etc.), tourism sector tends to be fragile, and if the local economy depends too much on tourism, it can be significantly affected by decline of incomes from tourism activities e.g. as the case of Bali after the terrorist attack in 2002 shows. There is also the issue of the distribution of the economic benefits from tourism among the society – research indicates that there might be a significant “leaking out” of the tourist expenditures through import of goods and services.</td>
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<tr>
<td>• Waste management: Tourism leads to increased solid waste production which may cause further overload of existing local waste management capacities.</td>
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<tr>
<td>• Climate change: Tourism is also considered to be a highly climate-sensitive economic sector, which is especially relevant to Indonesia taking in account the fact that the most of the tourism activities are concentrated in coastal areas.</td>
</tr>
<tr>
<td><strong>Environmental management</strong></td>
</tr>
<tr>
<td>• Coastal management planning: The lack of proper application of the Integrated Coastal Zone Management System (ICZM) in Indonesia has resulted in significant problems in terms of coastal and island management linked – among others – also to tourism development and the risks described above.</td>
</tr>
</tbody>
</table>

### Legal Issues

The Government of Indonesia prepared the National Tourism Development Master Plan (RIPPARNAS) for the period 2010 – 2025, which was published by the Governmental Regulation No. 50/2011. The national tourism development scheme includes: Tourism Destinations, Tourism Marketing, Tourism Industry, and the Institutionalization of Tourism. RIPPARNAS is targeting 50 national tourist destinations, 88 national tourist strategic areas, and 222 national tourist development areas. RIPPARNAS commitments are also reflected in the MP3EI, primarily related to development of infrastructure, safety/comfort, and connectivity.

The changes in the regulatory framework for tourism development were made in 2009. According to Law No. 10/2009 on Tourism, conducting tourism business no longer requires permissions; it only needs to be registered.

Also, the Indonesian Tourism Promotion Board and Tourism Industry Association Indonesia have been re-established. Relevant governmental agencies at the central and provincial levels are obliged to develop and protect the micro, small, medium, and cooperative businesses in the field of tourism. There is also a scheme for the standard business certification for products, services, and management of tourism business activities.
Changes of the regulatory framework for tourism activities (i.e. from permitting to only registering) have led both to positive and negative results. It obviously simplified the administrative procedures, but on the other hand it has made it more difficult for governmental agencies to monitor and control compliance with legal requirements, since there is simply no permit which can provide a basis for sanctions.

Application of the Integrated Coastal Zone Management scheme

So far, there has been very limited use of the Integrated Coastal Zone Management scheme. One example is the tourism development in Kepulauan Seribu (Thousand Island), Java, where zone classification was introduced – e.g. “Main Zone” including the islands which provide nature activities, or “Supporting Zone” where accommodation is placed.

In addition, there are several local regulations regarding coastal areas and small island management and zoning:

- Local Regulation of Special Region of Yogyakarta No. 16/2011 on Zoning Plan of Coastal Areas and Small Islands in Special Region of Yogyakarta for 2011-2030
- Local Regulation of West Java Province No. 9/2012 on Coastal Areas and Small Islands Management
- Local Regulation of East Java Province No. 6/2012 on Management and Zoning Plan of Coastal Areas and Small Islands
- Governor Regulation of Special Capital Region of Jakarta No. 15/2014 on Strategic Plan of Coastal Areas and Small Islands

Tourism-related Legal Conflicts

The Governor of Bali issued in 2012 Decree No. 1051/03-L/HK/2012 on a cultivation permit for nature tourism in mangrove areas of Ngurah Rai Forest Park to PT Tirta Rahmat Bahari (for total area of 102 acres). The decree contradicts the moratorium that the Governor had issued earlier in December 2010 (Decree No. 570/1665/BPM), which stipulated suspension of the registration for the investments in tourism sector (accommodation) in Gianyar, Denpasar and Badung. Subsequently, the administrative court considered the Decree No. 1051/03-L/HK/2012 as legally flawed and decided to repeal it. It should be also noted that the map of the Ngurah Rai Forest Park originally (in 2007) determined only about 400 acres of the total area to be used for tourism development. However, the changes of the map in 2012 increased the areas for tourism development up to 700 acres, which indicates the intention of the Provincial Government to expand the tourism development (which contradicts the moratorium introduced in 2010).

5.7.4 Potential Economic Implications

The impacts of tourism are well-identified, and broadly similar in their scope and nature vis-à-vis land and water resources to those arising from a mixture of agriculture and light industrial activities (including construction). Solid waste and litter, cultural and social issues (though not major land use conflicts) are also apparent.

Tourism’s economic impacts tend to be in quite specific locations (and as are envisaged in MP3EI focussed on specific types of activities), and problems typically arise either from localized intensity or the scale of a particular activity increasing over time (especially as once-pristine areas become ‘discovered’). As a result, conceptually and methodologically, impacts of tourism being promoted under MP3EI (especially in Bali-Nusa Tenggara) could be valued the same as for agriculture, industry, mining etc. activities in terms of the per hectare/per year impact on a biome/resource basis.
The net economic impact of unsustainable tourism in Indonesia has not been measured directly. However, modelling work undertaken by UNEP on ‘greening’ tourism suggests that a 0.2% of GDP investment in energy and water efficiency, emissions mitigation and solid waste management would result in economic growth of the sector in excess of 7% over the BAU scenario. The green investment scenario is projected to undercut the corresponding BAU scenario by 18% for water consumption, 44% for both energy supply and demand, and 52% for CO$_2$ emissions. These projected reductions thus provide a measure of the scale of resource damage that could be avoided under the present/BAU regimes with appropriate investment and regulatory policies in place.

More generally, increased nature-based tourism, eco-tourism, agri-tourism activities etc. can help stakeholders and beneficiaries recognise and begin to measure the value of ecosystem services to their economic activities, and remove the tourism sector’s tendency to relative invisibility as regards its impacts. The case of sustainable tourism based on marine resources is perhaps most relevant to Indonesia’s circumstances; establishment of marine protected areas with activities such as recreational fishing (worth some $40 billion annually worldwide), diving, whale-watching (worth over $2 billion a year) and shark-watching can conserve natural resources, provide an income for groups (e.g., local fisher communities) who would likely otherwise be disadvantaged by less sustainable developments (e.g., simply hotels or resorts).

Lastly, in the context of considering the economic implications of risks associated with tourism developments under MP3EI, it may be worth noting that, while the economic scale of benefits from tourism (including to Indonesia) are usually taken to be very large – based on ever-growing increases in numbers of tourist arrivals, hotel rooms, average per capita expenditures, jobs created etc., such estimates typically overstate national-level positive impacts because they fail to adequately account for the leakage to the host economy which occurs when the imported component of goods and services consumed by tourists (themselves an export industry) is allowed for. Work by UNEP has suggested that leakage rates for Thailand might be 70%, and for the Caribbean around 80%.

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46 UNEP: *Negative Impacts Of Tourism* (http://www.unep.org/resourceefficiency/Business/SectoralActivities/Tourism - accessed 27/05/2014))
5.8 Development of Strategic Areas

In addition to a “sectoral” view applied within the MP3EI planning across all Economic Corridors, the development of two “strategic areas” is elaborated at the same strategic level, while simultaneously adopting a more complex and cross-cutting approach. The Sunda Straits National Strategic Area located in EC Sumatra and Greater Jakarta Area/Jabodetabek Area (within EC Java) both constitute concentrations of investment and undertakings of strategic importance that go beyond individual ECs. Therefore, within the MP3EI structure they are included in the set of twenty-two main economic activities along with standard key sectors (e.g. Palm Oil, Coal, Food Agriculture, Steel, etc.).

5.8.1 General overview

Sunda Straits National Strategic Area

The core activity triggering the inclusion of the autonomously-addressed Sunda Straits National Strategic Area in the MP3EI is the proposed construction of the Sunda Straits Bridge (JSS) providing connection between Sumatra and Java. The expected benefits include:

- Efficient transportation between the islands of Sumatra and Java. (JSS will reduce the travel time to only 30 minutes compared to ferry services that take on average of 2-3 hours. Moreover, JSS will enable both car and railway transportation.)

- The Sunda Straits Bridge can also be used as infrastructure for the installation of liquid and gas pipes, cables and fiber optic networks, and a component of a tidal-based electricity generation system.

In addition, the scale of the investment and the improvement of connectivity in the region is expected to facilitate a shift in the distribution of economic activities (e.g., industrial development so far concentrated in Java will spread to Sumatra, while Sumatra’s agricultural sector can further benefit from the improved access to Java markets). In addition to the JSS construction, investment in the infrastructure associated with operationalization of the Sunda Straits bridge, such as: Panimbang - Serang Toll Roads, South Banten Airport, Bojonegora Container Port, and Cilegon - Bojonegora Toll Road (14 km) are envisaged by the MP3EI. Vast multiplication effects are also expected in direct connection with the construction such as the development of a tourism resort of Tanjung Lesung (1,500 Ha), the area around Bojonegora Container Terminal (500 Ha) and industrial estate in Cilegon, as well as industrial and warehousing areas in Lampung.

Greater Jakarta Area/Jabodetabek Area

The Jabodetabek Area represents the Jakarta metropolitan areas, covering the territory of three provinces (namely DKI Jakarta, Banten and West Java) and 12 regencies/cities which collectively represent 28 million inhabitants (2010), or more than 12% of the national population, and comprise one of the largest urbanized areas in Southeast Asia. Such a concentration of inhabitants as well economic activities (including the majority of the country’s foreign trade and financial institution operations) pose major challenges to sustainable development of the region. Among key issues to be addressed by the MP3EI framework are following:

- Inadequate transportation infrastructure with the existing transport system permanently overloaded and generating severe negative environmental impacts.

- Underdeveloped water supply and waste infrastructure.
• Occurrence of flooding exacerbated by accumulation of municipal solid waste in the water reservoirs and drainage channels.

Strategies undertaken to address these challenges include:

• Incentives to spread business activity outside of DKI Jakarta to reduce the time of travel between business centres in the internal Greater Jakarta.

• Development of a mass transportation system reducing the need for individual motor vehicles use.

• Development of an efficient logistic network among production centres in the region and beyond to improve efficiency of freight transport.

• Development of effective sewerage and drainage system.

To assist implementation of the strategy the MP3EI envisaged a number of infrastructure investments including the following:

• Expansion of the Soekarno Hatta Airport.

• Expansion of the Port of Tanjung Priok and establishment of a new Port at Cilamaya.

• Construction of metro commuter rail lines North-South and East-West.

• Construction of a monorail and a circular railway line from Manggarai to Soekarno-Hatta International Airport.

• Improvement of road network in the Greater Jakarta area, including the construction of flyovers and underpasses.

• Development of a logistic network connecting industrial centers on the outskirts of Greater Jakarta area with the Port of Tanjung Priok, Port Cilamaya, and Soekarno-Hatta Airport.

• Reform the flood control system.

• Reform the system of solid and liquid waste disposal from residential areas and industrial areas, including the development of processing and final disposal of solid waste in West Java.

• Develop new sources of clean water supply.
## 5.8.2 Potential Risks

### Sunda Straits National Strategic Area

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
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</table>
| **Water**                          | • Water quality is an existing concern within the Sunda Strait area. Developments related to the MP3EI may impact water quality through a number of cumulative pathways, including increased sewage and waste, increased industrial discharge, and storm water run-off.  
• Expected development further amplifies the already existing safe water shortage.  
• Potential for impacts to global thermal oceanic processes from the Sunda Strait Bridge needs to be further investigated. |
| **Air and Climate**                | • Increased traffic emissions, land clearing, waste burning, and industrial emissions are likely to occur as a result of projected development. |
| **Biodiversity**                  | • Areas of high biodiversity value exist in the area potentially affected by the development, especially along the east and west coast of Lampung. Developments related to the MP3EI activities will impact biodiversity through land use changes and direct loss, as well as habitat and environment degradation.  
• Higher inter-regional connectivity increases likelihood for introduction and spreading of alien species  
• Key species present in the areas adjacent to the JSS include a number of highly endangered species such as Sumatran tigers, rhinoceros, elephant, sea turtles and whale sharks. Development over the last 30 years has severely affected a number of these species, particularly Sumatran tiger and elephant populations. Both infrastructure development and land use change are well-documented causes of impacts through direct removal of habitat, deterioration of environmental quality, and disturbance (noise, visual, etc.). |
| **Coastal ecosystems**            | • Development of port infrastructure and intensification of marine transport will generate pressure on coastal ecosystems, including physical destruction of the natural coast, alteration of tidal dynamics and siltation regime, dredging of seabed, pollution of coastal ecosystems and the like. |
| **Human health**                  | • Improved connectivity can increase spreading of communicable diseases.  
• Large-scale economic development will create opportunities for increased access to health facilities, improvements of community infrastructure and increased ability to pay for health treatment. However, significant negative social impacts on local communities are also a concern, such as reduced food availability and nutrition, increases in the price of foodstuffs and increases in road accidents.  
• The Sunda Strait area is at risk of major tectonic activity. Increased development will increase both population and economic investment. As such, consequences of a natural disaster could be severe, including direct impact on public health or secondary impact resulting from potential industrial accidents triggered by geological activity. |
### Relevant national strategic issues

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<td><strong>Livelihood and Local Communities</strong></td>
</tr>
<tr>
<td>• Increased connectivity stimulates economic growth and thus will improve livelihood opportunities for the population. However, it can also trigger structural changes (i.e. intensification of exploitation of natural resources, increasing production for national and international markets at the expense of local needs, etc.). This can have negative impacts on certain groups, e.g. rural communities, and in general people benefiting from involvement in the traditional local economy.</td>
</tr>
<tr>
<td>• Improved connectivity also opens up better opportunities for migration, thus enabling more flexibility for the workforce, but brings risks in the form of increased diseases, social and ethnic conflicts etc.</td>
</tr>
<tr>
<td>• Negative impacts in the form of insufficient compensation for losses of agricultural and forest land, and lack of opportunities for smallholders to benefit may also occur. It is noted that the 9 ferry companies are likely to close their businesses as a result of the Sunda Strait Bridge development.</td>
</tr>
<tr>
<td><strong>Environmental management</strong></td>
</tr>
<tr>
<td>• Transport infrastructure development, especially expansion of inland transport networks associated with the JSS can conflict with delineation of natural protected areas and important biodiversity hotspots (lacking legal protection).</td>
</tr>
<tr>
<td>• Current waste management facilities in the area are unable to cope with existing levels of waste production. The amount of additional waste expected as a result of the development of the Strategic Area is significant. New waste management facilities planned will mitigate the additional waste production to some degree; however, additional waste production will be extensive. There are no waste management studies currently available to confirm the suitability of the proposed waste management facilities.</td>
</tr>
<tr>
<td>• Environmental Feasibility of Sunda Strait Bridge is still to be attested</td>
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### Greater Jakarta Area/Jabodetabek Area

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<thead>
<tr>
<th>Relevant national strategic issues</th>
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<tr>
<td><strong>Water</strong></td>
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<tr>
<td>• The already existing water quality degradation in Jakarta is likely to further deteriorate due to additional development from MP3EI projects further increasing the scale of industrial land use that leads to increase discharges to both marine and fresh water.</td>
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<tr>
<td>• Increased urbanisation and regional population has the potential for uncontrolled domestic waste discharges into rivers and other water bodies.</td>
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<tr>
<td><strong>Land and Soil</strong></td>
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<tr>
<td>• There is a risk of continuing land subsidence related to extraction of ground water resources.</td>
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<tr>
<td>• Potential threat to many proposed MP3EI projects that are located in the coastal area, which may be endangered due to sea level rise and the increased risk of extreme weather events.</td>
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### Relevant national strategic issues

<table>
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<tbody>
<tr>
<td><strong>Air and Climate</strong></td>
</tr>
<tr>
<td>• Improved efficiency of the transport networks can be a factor reducing air emissions intensity (when addressing existing bottlenecks causing congestions and extra transportation needs).</td>
</tr>
<tr>
<td>• Increasing transport intensity, if not accompanied with policies for modernization of the vehicle fleet, can result in increase in the total volume of air pollution and GHG emissions.</td>
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<tr>
<td>• Transport and industrial development are likely to increase air polluting emissions.</td>
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<tr>
<td><strong>Coastal ecosystems</strong></td>
</tr>
<tr>
<td>• Development of port infrastructure and intensification of marine transport generates pressure on coastal ecosystems, including physical destruction of natural coast, alteration of tidal dynamics and siltation regime, dredging of seabed, pollution of coastal ecosystems and the like.</td>
</tr>
<tr>
<td>• Coastal water degradation, including sedimentation from dredging and reclamation (Giant seawall project in Jakarta, Reclamation of Tanjung Priok).</td>
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<tr>
<td><strong>Human health</strong></td>
</tr>
<tr>
<td>• Modernization of transport infrastructure may actually reduce the human health impact of transportation (e.g. reduction of congestions and related air and noise emissions) and improve safety (e.g. reduction of accidents).</td>
</tr>
<tr>
<td>• Secondary impacts from air quality from the emissions associated with road and utility corridors will increase potential health complications in localised populations (increased respiratory stress, cardiac stress, mental stress etc.)</td>
</tr>
<tr>
<td>• Potential for spread of disease and pathogens through increased populations and improved connectivity (e.g. transmissible disease, AIDS).</td>
</tr>
<tr>
<td>• Improvement of the waste management system and infrastructure may be regarded as a key opportunity for reduction of risks to public health.</td>
</tr>
<tr>
<td><strong>Livelihood and Local Communities</strong></td>
</tr>
<tr>
<td>• Increased connectivity stimulates economy growth and thus will improve livelihood opportunities for the population. However, it can also trigger structural changes (i.e. intensification of exploitation of natural resources, increasing production for national and international markets at the expense of local needs, etc.). This can have negative impacts on certain groups, e.g. low-income communities, and in general people benefiting from their involvement in the traditional local economy.</td>
</tr>
<tr>
<td>• Possible economic impact and conflicts between migrants and existing communities in relation to the increased development in Jakarta and job opportunities in the area.</td>
</tr>
<tr>
<td>• The proposed development will increase the proportion of the population in natural disaster-prone areas. Increasing risk of flooding as a result of land subsidence and sea level rise (North Jakarta).</td>
</tr>
<tr>
<td>• The proposed development will require resettlement of the slum areas (e.g. coastal settlement areas of Jakarta Bay).</td>
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<tr>
<td>• Further shrinking of publicly-accessible area (e.g. public parks).</td>
</tr>
<tr>
<td>• Reduction of opportunities for fishery in Jakarta Bay (pollution, land reclamation).</td>
</tr>
<tr>
<td><strong>Environmental management</strong></td>
</tr>
<tr>
<td>• Poor existing waste management, contributing e.g. to clogging of drainage channels.</td>
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<tr>
<td>• Inadequate flood protection.</td>
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<tr>
<td>• Transport system planning lacks alternatives and scenarios evaluation.</td>
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## 5.8.3 Legal Issues

Presidential Regulation No. 54/2008 on the Planning for the Area of Jakarta, Bogor, Depok, Tangerang, Bekasi, Puncak, and Cianjur, intends to create an integrated organization of provincial spatial planning in order to facilitate a balance between economic development and environmental protection – however, main objectives are focused on the economic expansion and development of infrastructure.

The transportation system in Jakarta is governed by the DKI Jakarta Governor Regulation No. 103/2007, on Macro Transportation System. There are several policies in the transport sector addressing, for example, development of the TransJakarta bus lines, introduction of double-decker buses, upgrading the bus fleet etc. Jakarta’s government also formed a greening movement with the motto "Jakarta HijauRoyo – RoyodanBerkicau" (i.e. “Green, verdant and chirping Jakarta”).

### Conflicts of authority between the Central Government and the Local Government in Jakarta

Law 29/07 on Administration of Special Capital Region of Jakarta as the Capital of Unitary State of the Republic of Indonesia, does not clearly divide between the central and regional authorities, therefore there is a certain overlap of mandates and responsibilities for the same administrative domain. The situation is even more complicated for Jakarta, considering its position as the national capital. It is, for instance, not fully clear if Jakarta’s reclamation programme is the responsibility of the Central Government or the Jakarta Governor. There are a similar situations regarding the flood mitigation programme, tourism development, management of transport infrastructure and other public facilities – again, it is unclear if it is the local or central government’s responsibility.

### Lack of planning coordination

There are conflicts stemming from the lack of coordination of planning e.g. bus lines, rails, waste management etc. RPJM and RPPLH, which are considered as Jakarta City planning documents, are not referred to in the strategic documents (RPPLH/RPJM) of the District and the City of Bogor, Bekasi Regency and Depok City when preparing their strategic documents. Instead, these documents refer to the RPJM and RPPLH of the West Java Province, although geographically these regions border with the DKI Jakarta. Similarly, RPJM and RPPLH of the DKI Jakarta are not linked to the planning documents of the District and City of Tangerang, and the South Tangerang and Tangerang Districts, which refer only to the RPJM and RPPLH of West Java province.

## 5.8.4 Potential Economic Implications

The development of strategic areas as envisaged by MP3EI in Sunda Straits and Greater Jakarta provide examples of essentially two somewhat different types of economic geographic phenomena. The Sunda Straits development – anchored on the JSS itself - is more in the nature of a typical ‘economic growth area’ (where part of the development logic is that geographic areas with differing factor and technology endowment are allowed to combine and that overall market access is improved and its size expanded), with the rationale being that natural resources development in Sumatra will benefit from access to technology and capital in Java – as well as from larger final product markets. The case of the Greater Jakarta/Jabodetabek strategic area is more one of promotion of generalized urban agglomeration – such that various transport and logistics links are improved, and specific aspects of urban environmental management (waste, flood protection, water supply etc.) are simultaneously expanded or upgraded. In both cases, the economic effects of the development of these strategic areas may to some extent be reflected through approaches provided by the ‘New Economic Geography’

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47 For a review of New Economic Geography literature in this context, see *New Economic Geography and Economic Integration: A Review*. Andrea Ascani, Riccardo Crescenzi, Simona Iammarino, Department of Geography and Environment London School of Economics and Political Science. (2012)
and various theories of economic corridor development in which the two strategic areas are essentially ‘growth poles’ within larger economic spaces. Sunda Straits and Greater Jakarta are essentially ‘cores’ that can be linked to more ‘peripheral’ areas through improved connectivity (see below). As such, each of the strategic areas can be expected to experience a wide range of economic effects, as population density and dynamics change, as urban infrastructure intensity and efficiency increases, as vertical integration and value chains deepen etc.

The multiplicity and diversity of expected projects within MP3EI will necessarily lead to a wide range of environmental risks and impacts (as detailed in the tables) being experienced. While economic impacts on particular resource types and human situations will be detectable from individual project investments (as in the cases of individual sector interventions already outlined), at the policy level the aggregate net environmental and economic impacts will depend upon various factors:

- Firstly, the extent to which positive environmental impacts in some projects (e.g., shifts towards public transportation systems and away from car use which reduce emissions and air pollution; more collection and recycling of solid waste) are offset by negative impacts in others (e.g., damage to sensitive coastal areas through bridge or port developments; land-take concomitant on airport expansion). These effects – in economic terms - within the two strategic areas are therefore simply the sum of the value of all projects’ environmental impacts (both positive and negative).

- Secondly, the economic value of environmental impacts will depend upon how the collective set of project investments changes human population behaviour and work productivity in economic terms through network, spill-over, and other agglomerative effects (e.g., improved mobility resulting in more or less travel time to work, more or fewer meetings being held, economies of scale in transport, production and marketing etc.) over and above the sum of individual projects. Net economic effects here may be offset over time to the extent to which any deagglomeration or dispersion (and shift in employment away from the urban areas) occurs as a result of negative externalities resulting from overcrowding, conflicts between original residents and migrants etc. Overall, these economic effects may be regarded as incremental in nature to those of the set of individual projects.

- Thirdly, the nature and economic value of environmental impacts arising from these types of strategic area developments will also depend upon the extent of cumulative impacts on the total natural capital stock that may arise as a result of both historical / extant investments plus the new interventions (under MP3EI in this case). Cumulative environmental impacts on resources result when the effects of an action are added to or interact with other effects in a particular place and within a particular time. A good example of cumulative impacts in the current context may be changes to urban microclimates of Jakarta and around Sunda – where conditions are mostly determined by anthropogenic impacts and first of all by pollution; environmental impacts include the level of illumination, quantity of solar ultraviolet radiation, humidity, and frequency of fog/smog.

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48 See for example, ADB Economics Working Paper Series No. 258: Regional Corridors Development in Regional Cooperation Pradeep Srivastava May 2011

49 Consideration Of Cumulative Impacts In EPA Review of NEPA Documents. U.S. Environmental Protection Agency, Office of Federal Activities (2252A) EPA 315-R-99-002/May 1999. The cumulative impacts of an action can be viewed as the total effects on a resource, ecosystem, or human community of that action and all the other activities affecting that resource no matter what entity (government or private) is taking the actions

50 One of the important components of the microclimate, with a significant influence on human organisms, is the temperature of the air. Average annual air temperature in a city is typically several degrees higher than in rural areas; overall, heat energy released by a large conurbation (like Jakarta) is significant and reaches up to 5% of solar energy
Clearly, the economic implications of all the above effects (i.e., from individual projects’ environmental impacts, from incremental impacts and from cumulative impacts) for the two strategic areas are extremely complex. Overall, it is essentially impossible to anticipate or summarize a priori the aggregate value of environmental impacts of the development of the Sunda Straits and Jakarta/Jabodetabek strategic areas in much depth at this stage - the point is that awareness of them should inform implementation of MP3EI at the policy level in the first instance.

One final point, however, concerns the distributional aspects of environmental impacts arising from the development of the strategic areas. As is the case with other transport projects in MP3EI, major investments in bridges, highways, airports, etc. as envisaged in the two strategic areas tend to produce economic benefits that accrue to users of those facilities while many of the costs are imposed on local communities. It is relatively easy to anticipate that the poorest sections of urban society generally would experience positive environmental impacts from metro systems, monorails, solid and liquid waste systems’ upgrades, tidal electricity generation etc., but much less so from airport and port expansion, underpasses and flyovers (which impose local noise and air pollution costs and can create barriers within communities). For this reason, the final composition of projects which expand port and airport infrastructure, major roads etc. should – from an equity and poverty-impacting point of view - be balanced by a sufficient number and size of projects improving water supply and sanitation, solid and liquid waste management etc.

The level of ultraviolet radiation decreases in cities (this has a negative impact on people – heightened tiredness, irritability, metabolic diseases and so on). Bacterial air pollution rises, the relative humidity goes down, there are more windless days, atmospheric pressure and wind velocity is lower in cities – leading to aerial stagnation, severe contamination of the urban-industrial environment and increased morbidity of population with respiratory diseases. In the current context, it is the cumulative impact arising from a number of major infrastructure projects (bridges, airports, rail/urban transit etc.) across a range of sectors which may produce this kind of effect.
5.9 Connectivity

5.9.1 Connectivity within M3PEI

The MP3EI defines Connectivity as a broad concept covering not only the transportation sector but also a range of other aspects, such as Information and Communication Technology (ICT) or Energy. Furthermore, the Connectivity is not understood only in terms of physical infrastructure development, but, especially in its international dimension, including also Institutional Connectivity (with components such as Facilitation and liberalization of trade, Investment and services, Cross-border procedures), and Social and Cultural Connectivity (Education and culture, Tourism).

In terms of specific activities to be implemented within the MP3EI, the Connectivity-related projects typically involve investment in physical transportation, ICT, and energy infrastructure.

Types of projects indicated\(^\text{51}\) include:

- Improvement of the quality of road network (including construction of new roads).
- Increase of the capacity and quality of railway systems (including construction of new railroads).
- Increase of the capacity and quality of ports and related services (including new terminals and port access infrastructure).
- Development of power generating capacities, including Electricity networks, and supply infrastructure for the public.
- Waste management infrastructure.
- Oil & Gas related infrastructure, including pipelines.
- ICT infrastructure development, including fibre-optic cables, backbone and last mile connection with required broadband capacity.
- Development of government communication and information systems that are safe (secure) and integrated.
- Development of clean water treatment, and wastewater treatment facilities.
- Develop a network of mass transportation trains from the suburbs into the centre of metropolitan areas and metropolitan centres in the region.
- Airports development.
- Implementation of Flood control system measures.
- Inland waterways.
- Irrigation facilities.
- Warehouse and Storage capacities.
- Fishery infrastructure including breeding centres, Catch depots, Fishing equipment (including related ICT);

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\(^{51}\) The types of projects included in the list represent developments proposed within the ‘Connectivity sections put forth for the individual Main Economic Activities in each Economic Corridor as described within the MP3EI draft document.
• Fertilizer production facilities.

As illustrated by the list above, the Connectivity has a cross-cutting character, with infrastructure projects planned to serve different economic sectors. From the point of view of evaluation of potential environmental impacts resulting from the implementation of the Connectivity component of MP3EI, it is useful to focus on key activities related to transport, while other types of projects can be better addressed within evaluation focused on other sectors (e.g. Energy, Fishery, Tourism, Mining, etc. – see description in respective sections of the report). Thus, within this section, the transport infrastructure development component of the MP3EI planning as well as sanitation, water supply and waste management are the main subjects of the policy evaluation.

5.9.2 General State of Transportation

The state of the transportation sector is generally recognized as one of the key bottlenecks hampering Indonesia’s development. To establish an effective connection system within a country consisting of 5 major islands and more than 6,000 other smaller inhabited islands is a major challenge. Hence, the market is not perfectly integrated and the mobility of goods and people are relatively inefficient, with problems such as significant price differences across regions, high costs of inland as well as inter-island transportation, and massive congestions in big cities. This situation creates a ‘high cost economy’ and deteriorates Indonesia’s trade competitiveness. In some export sectors, such as cocoa, rubber, and coffee, around 40% of total logistics and transport cost come from pre-shipment and inland transportation expenses (Joko Tirto Raharjo).

Indonesia’s transport infrastructure has been chronically underinvested and lagging behind the standards observable in the neighbouring countries (Malaysia, Singapore, and Thailand). Key issues are as follows:

• Low capacity and productivity of existing ports.
• Limited network of quality motorways.
• Fragmented and limited railway network, with significant part not being operated due to economic reasons.
• Limited number of airports with long runways (above 1,000 m), and with the three biggest airports in Indonesia (Jakarta, Medan, and Denpasar) experiencing over-capacity.
• Poor public transport services.
• High environmental impact of transport, especially in cities.

The MP3EI includes a great number of projects addressing the above-mentioned issues. Among the key projects are, for example, the modernization of Tanjung Priok Port, 640 km Trans Java Toll Road, Jakarta – Surabaya High Speed Train Project, dry port in Cikarang Industrial Estates in West Java along with its connecting railway to Tanjung Priok Port, railway network from Jakarta’s Airport to the city centre, and many other large projects.

52 Analysis by Joko Tirto Raharjo of PT Indonesia Research Institute Japan illustrates the situation with following examples: Supermarkets in Jakarta sell oranges from China, not from Medan (North Sumatera), because the cost to deliver goods from Belawan Port in Medan to Jakarta is more expensive than from Shanghai to Jakarta. It is cheaper to ship goods from Jakarta to Rotterdam than from Jakarta to Papua, hence cement is 20 times more expensive in Papua than in Jakarta. Average inland transportation cost in Indonesia is 1.5 times higher than the average in Asia: Indonesia is USD 0.34/km, while the average for Asia is USD 0.22/km. Cost of moving goods from Warsaw to Hamburg (750 km) is half of Makasar-Enrekang in South Sulawesi (240 km).
### Potential Risks

<table>
<thead>
<tr>
<th>Relevant national strategic issues</th>
<th>Description of potential risks affecting national strategic issues</th>
</tr>
</thead>
</table>
| **Air and climate**               | • Improvement in the efficiency of the transport networks can be a factor in reducing air emissions intensity (when addressing existing bottlenecks causing congestions and extra transportation needs).  
• Increasing transport intensity, if not accompanied with policies for modernization of the vehicle fleet, can result in an increase in the total volume of air pollution and GHG emissions.  
• Since mangroves represent a very high-carbon landscape, losses of mangrove ecosystems due to infrastructure development in coastal areas will lead to the loss of GHG storage capacities. |
| **Forests**                       | • Inland road (and railroad) network expansion is likely to contribute to fragmentation of forests. Improved accessibility will also stimulate intensification of logging and forest land conversion. |
| **Biodiversity**                  | • Construction and operation of transport infrastructure, namely expansion of the road network, has significant negative impacts on biodiversity, namely through disturbance, destruction and fragmentation of ecosystems.  
• Improved accessibility of territories along the new roads triggers further disturbance from increases of investments and exploitation of newly opened opportunities.  
• Higher inter-regional connectivity increases likelihood for introduction and spreading of alien species. |
| **Coastal ecosystems**            | • Development of port infrastructure and intensification of marine transport generates pressure on coastal ecosystems, including physical destruction of the natural coast, alteration of tidal dynamics and siltation regime, dredging of the seabed, pollution of coastal ecosystems and the like.  
• Increased capacity of fishing ports (and improved accessibility of distant markets) can stimulate further pressures on fish stocks and unsustainable fishing practices. |
| **Human health**                  | • Modernization of transport infrastructure may reduce the human health impact of transportation (e.g. reduction of congestion and related air and noise emissions) and improve safety (reduction of accidents).  
• Improved connectivity can increase spreading of communicable diseases, however can also enhance the access to the health care.  
• Increased mobility may lead to further urbanization resulting in a higher proportion of the population (and infrastructure) in disaster-prone areas (tsunami, floods) as well as possibly being endangered by sea-level rise and extreme weather events due to climate change. |
### Relevant national strategic issues

#### Description of potential risks affecting national strategic issues

<table>
<thead>
<tr>
<th>Livelihood and Local Communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased connectivity stimulates economic growth and thus will improve livelihood opportunities for the population. However, it can also trigger structural changes (i.e. intensification of exploitation of natural resources, increasing production for national and international markets at the expense of local needs, etc.). This can have negative impacts on certain groups (e.g. indigenous communities) benefiting from involvement in the traditional local economy – and thus stimulate social conflicts.</td>
</tr>
<tr>
<td>• Improved connectivity also opens up better opportunities for migration, thus enabling more flexibility in the workforce.</td>
</tr>
<tr>
<td>• Expanding the road network without improving public transport systems can provide further incentive for people to prefer individual cars to public transportation or to a reduction of transport needs. Thus, the effectiveness of the developments on transport performance both in terms of economic and environmental aspects will be sub-optimal.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Transport infrastructure development, especially expansion of inland transport networks can conflict with the delineation of natural protected areas and important biodiversity hotspots (lacking legal protection).</td>
</tr>
<tr>
<td>• The infrastructure development planning does not involve comparison of alternatives and complex evaluation of cumulative environmental impacts.</td>
</tr>
</tbody>
</table>

### 5.9.4 Legal Issues

#### Lack of coordination in transport infrastructure planning

Permits for development of transport infrastructure are issued by different ministries – while permits for toll roads are issued by the Ministry of Public Works, issuing permits for airports, ports and railways is the responsibility of the Ministry of Transportation. Vertically, the local government has to convey the recommendations about infrastructure development planning to the Central Government, and the Central Government should include it in the relevant planning. However, there is also a lack of “horizontal” coordination at the local level – the coordination between two local governments is usually limited to the process of land procurement by forming the Land Procurement Committee (PanitiaPengadaan Tanah/P2T).

#### Conflicts regarding transport infrastructure

Conflicts over the planning and development of the transport infrastructure can be found all over Indonesia. Quite often, agreement cannot be reached concerning compensation in the context of land acquisition.

Often, transport infrastructure is planned through territories where indigenous communities live. In such a case, if the communal rights (hak ulayat) cover the area, the land procurement can be preceded in accordance with the Law No. 2/2012 on Acquisition of Land for Development in the Public Interest, after the customary rights have been converted into right of ownership. In accordance with the Regulation No. 5/1999 on Guidelines on Problem Settlement of Communal Rights of Indigenous People, the communal rights should be regulated by local government regulation (e.g. the Local Government Regulation of Lebak Regency No. 65/2001 on Protection of Communal Rights of Baduy Society; Special Local Government Regulation of Papua Province No. 23/2008 on Communal Rights of Indigenous People and Right of Ownership of Indigenous People; Local Government Regulation of South East Maluku Regency No. 3/2009 on Ratshap and Ohoi53; and Local Government Regulation of City of Ternate No. 13/2009 on Protection of Ratshap and Ohoi.

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53 Ratshap and Ohoi are the terms for the local communities in South East Maluku Regency.
Communal Rights and Communal Culture of Ternate Sultanate). Thus, following these local regulations, customary rights can be converted into ownership rights with the chief of the indigenous people’s approval.

Another type of conflict relates to road management, since often one road belongs to more than one authority – especially if the road goes through two districts or provinces. In these cases, the provision on district/provincial cooperation should be adopted, in accordance with the Governmental Regulation No. 50/2007 on Implementation Guidelines of Municipalities Cooperation. However, this approach is only rarely being taken, since local governments are often concerned about the interests of their region only, therefore they rarely coordinate with the other local governments.

5.9.5 Potential Economic Implications

The set of proposed investments promoting Connectivity are part of the wider economic corridor logic (and not dissimilar to that underpinning the development of the Strategic Areas) that aims at promoting national and global linkages through increased trade based on improved logistics (making use of more complete transport systems), a more diversified production base, better human resource use (through labour pooling and other network effects), and more sophisticated services provision. As was the case for the development of Strategic Areas, the aggregate economic implications – including those from environmental impacts - of improved Connectivity are impossible to anticipate in quantitative terms a priori, but it is possible to say something about the economic dimensions of likely environmental impacts in qualitative terms.

The relationship between transport projects and the environment within which they are situated is notoriously complex, and in the case of the Connectivity investments proposed under MP3EI the situation (in aggregate) is especially difficult because of the various scale, multi-modal and multi-location characteristics of the numerous individual proposals. The actual economic implications of connectivity/transport investments under MP3EI arising from the environmental risks described above will be very site-specific and unique to particular projects, including regarding their distributional implications. However, a few key points which will be of relevance at a policy level in terms of economic consequences to MP3EI arising from environmental impacts are the following:

- In general, the largest environmental impact of transport projects worldwide (and thus of initial importance as regards expected impacts under MP3EI) is on air quality (GHGs and particulate matter emissions, lead, dust etc.). Conceptually these impacts can be valued as has already been described (e.g., for light and heavy industry and/or energy investments). Indonesia’s role as a major GHG emitter has already been described – a clear policy implication in environmental economics terms for transport in terms of emissions costs alone must be to balance investments in road networks with (for example) investment in mass transit systems.

- Transport investments (especially roads) tend to create major noise impacts during operation. The effects have traditionally been measured through some kinds of property valuation changes, although other more sophisticated methods are now being developed including impacts on health, ecosystems etc. The impacts of noise from major roads can be very large indeed – typically because any one investment will affect very large numbers of people. The cost of urban road traffic noise in the UK has been estimated at between £7-10 billion ($12-16 billion) annually; this is greater than the estimated impact on climate change and

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54 For a discussion of these kinds of effects, see, for example What is Economic Corridor Development and What Can It Achieve in Asia’s Subregions?; ADB Working Paper Series on Regional Economic Integration, No. 117, Hans-Peter Brunner, August 2013

roughly approximate to the total costs of road accidents.\textsuperscript{56} For the proposed MP3EI investments, valuation of noise impacts would be characterized by lower economic values per person (i.e., the value of DALYs would be lower than in UK because of lower incomes and shorter life expectancy) but greater number of persons affected – with the latter effect almost certainly offsetting the former. Given the scale of Connectivity investments identified under MP3EI, the economic cost from increased noise pollution would likely be in the tens of millions of dollars at least.

- Transport project designs often imply a potential choice of mode – i.e., between road, rail, shipping etc., and the MP3EI Connectivity investment programme contains a wide range of identified modal possibilities. What is important here is that different types of transport project will have very different environmental and social impact implications. In addition to high levels of GHG emissions and noise (as mentioned earlier), road projects tend to consume relatively large areas of land in their construction, and can often have the effect of causing fragmentation of terrestrial ecosystems in sensitive areas (although the construction of tunnels and/or bridges for wildlife movement and migration is now more common). Rail projects may cause similar ecosystem fragmentation, but their impacts on GHG, air, water and noise pollution are much less. Large-scale marine transportation environmental impacts tend to be characterized by emissions plus waste, ballast, oil and fuel spills – and of course the costs associated with construction and operation of ports (which can be very high in fragile and/or congested areas – like many places in Indonesia of course). The important point here for MP3EI, however, is that by making as much effort as possible to investigate (through their identification quantification, and valuation) the environmental impacts of different types of transport projects where there is scope for choice of mode and/or scale, a more efficient investment decision can be made; again, the broad policy implication is one of balance across Connectivity investment types.

- Transport can also typically impact water quality (e.g., through fuel, chemical, particulate discharges, spills), soil quality (e.g., through contamination, removal etc.), land-take (affecting amenity values, creating barriers within communities etc.) and biodiversity – all again are environmental impacts that can be valued similarly to those from the other types of sector-specific investments described earlier.

- Major transport (and especially motorway) projects are also often characterized by significant distributional issues surrounding their environmental and social impacts; this issue is particularly germane in the current context. Because noise pollution is relatively localised, the major burden of its environmental impact tends to fall on densely populated urban areas – these will typically be inhabited by poorer sections of society in Indonesia – but the benefits tend to accrue to large numbers of relatively dispersed populations. For this reason, some attempt is often made to consider (as a supplement to the efficiency measures of traditional cost benefit analysis) ‘distributive equity’ which measures the fairness of the allocation of costs, benefits, and other consequences.\textsuperscript{57} Again, the clear policy implication here for MP3EI arising from the possible distribution of environmental costs and benefits is that a balance of investments in Connectivity across different types of projects is required if equity and poverty-reduction objectives are to be pursued.

\textsuperscript{56} Noise Pollution: Economic Analysis (https://www.gov.uk/noise-pollution-economic-analysis) - accessed 28/05/2014

\textsuperscript{57} In this regard, ‘environmental justice’ is a related legal term sometimes used here, referring to a body of law and regulation that prohibits projects from focusing their negative impacts on low income, minority and vulnerable population groups. Of greatest relevance to benefit-cost analysis is concern over the possibility of a ‘mismatch’ between the incidence of costs and benefits. See, for example, NCHRP Guide to Social and Economic Effects (Forkenbrock and Weisbrod, 2001) provides discussion of various ways to measure equity.
Sanitation, water supply and waste management – costs and policies

A recent study of the sanitation situation in Indonesia estimated that 45% of the national population (about 100 million people) were without improved sanitation, that is, without an easily accessible, private and safe place to urinate and defecate. There are major geographical variations in coverage, and forecasts (at current rate of progress) suggest that Indonesia will fall short of the MDG target of 73% by 10 percentage points, equivalent to 25 million people.

Unimproved sanitation and hygiene have a wide array of economic impacts, which can be categorized into impacts on: health (morbidity and mortality), water-related activities (time taken to defecate, including travel), the external environment (land and water resources), life choices, population preferences, and tourism. The economic cost of these impacts is considerable; in 2006, a World Bank study estimated that Indonesia lost around USD$6.3 billion annually due to poor sanitation and hygiene - equivalent to approximately 2.3% of GDP. Of the impacts evaluated in the MP3EI Policy SEA, health and water resources contributed most to the overall economic losses - disease outbreaks and premature deaths accounted for about half the total costs of poor sanitation, water resources pollution about a third of total costs. Tourism losses were estimated at $166 million annually. Such impacts cause financial losses to populations, who have to pay for health services or who pay more to access clean water supplies, or who may lose income due to poor health. (There are also non-monetized costs of water resources pollution in terms of aesthetics, amenity and recreational values, and regarding the effects on populations’ choice of location, plus values attributable to comfort, privacy and security etc.).

In the case of domestic water supply (urban and rural), it is estimated that in 2011 about 55% of the population in Indonesia had access to safe drinking water supplies – again with major inter-provincial disparities. The economic costs of unsafe water supplies are felt in terms of households having to buy water (including bottled water) from vendors, in fuel resources purchased or collected for boiling water, in time required to have to collect water from more distant wells or natural sources, and in illness resulting from drinking unsafe water. It is likely that the economic costs associated with an absence of safe drinking water supplies are of the same order of magnitude as for the absence of sanitation. A recent global review of the benefits of at-home water supply was that it had significant, measurable benefits when compared with shared water supply outside the home - provided that the service provided is reliable enough to ensure access to adequate quantities of water when required. Reliable at-home water supply results in higher volumes of water consumption, greater practice of key hygiene behaviours, a reduction in musculo-skeletal impacts associated with carrying water from outside the home, and improved water quality.

Regarding waste management, Indonesia presently has a low level of service of solid and liquid waste management. Environmental externalities connected with waste production are the primary market failure in Indonesia – i.e., where economic decisions to produce and consume do not take full account of the environmental consequences of waste generated as a result of these activities. Failing to price in the environmental cost/benefit of generating waste leads to economically inefficient production and consumption patterns, and excess waste in aggregate being produced. Peculiar to waste generation is also the fact that the illegal dumping of waste can be viewed as a (negative) local public good– non-rival and non-excludable in its

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58 Economic Impacts of Sanitation in Indonesia - A five-country study conducted in Cambodia, Indonesia, Lao PDR, the Philippines, and Vietnam under the Economics of Sanitation Initiative (ESI) World Bank Water and Sanitation Program (2008)


60 Public Health and Social Benefits of at-house Water Supplies, Barbara Evans, Jamie Bartram, Paul Hunter, Ashley Rhoderick Williams, Jo-Anne Geere, Batsi Majuru, Laura Bates, Michael Fisher, Alycia Overbo, Wolf-Peter Schmidt by University of Leeds, University of North Carolina at Chapel Hill, University of East Anglia, and London School of Hygiene and Tropical Medicine (2013)
characteristics. The economic costs of this in Indonesia are felt in impacts such as private health costs, public/government health programmes, land and water pollution, methane and other emissions (from non-composting/non-biodegradation), losses in forgone recycling earnings, tourism losses etc.

The economic costs of this are likely to be significant to Indonesia. Regional research in Tonga and Palau for example suggested that the combined economic costs from a range of sources came to about 1.5-2% of GDP. These estimates did not include the impacts of increased GHG emissions, and are thus likely to be an under-estimate of true economic costs. In these cases, health losses were about half of all estimated losses, and tourism-related losses were especially substantial in Palau (as they will be in certain areas of Indonesia – e.g., Bali, Lombok).

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61 For a summary of the economics of waste, see The Economics Of Waste And Waste Policy, Environment and Growth Economics, DEFRA, UK (2011)


6 MP3EI and Climate Change

This section provides outcomes on analysis of possible impacts of the MP3EI projects on greenhouse gases emissions trends. The categorisation of the MP3EI projects (see further) assumed the best-case scenario – i.e. it is built on a hypothesis that the proposed interventions will use modern technologies and management approaches that minimise energy demands and direct greenhouse gas (GHG) emissions and also do not lead to excessive land conversions or degradation of ecosystems that would trigger releases of GHGs.

It may not be realistic that all of these highly optimistic assumptions will materialise. Yet, even such a best-case scenario portrays highly significant adverse impacts of the MP3EI on Indonesia’s GHG emissions.

In addition, the GHG emissions linked to the relevant MP3EI projects were calculated – the results are summarized in Section 6.4.

6.1 Assessment approach

Categorizing of proposed MP3EI projects with regard to their possible impacts on greenhouse gas emissions trends was conducted in two steps which follow the analytical approach laid down in the OECD/DAC approach to marking climate related-expenditures (OECD, 2011). This approach was modified to fit the nature of the MP3EI which is not a plan that aims to address climate-change but rather a development plan that contains multiple proposals that may have both positive as well as adverse impacts on current GHG emissions trends.

The first analysis addressed the percentage of the proposed MP3EI developments and their respective financial pledges that could fit into seven key sectors that were selected by Bappenas (2011) to achieve GHG emission reduction by 26% in 2020 from the business-as-usual scenario. These sectors are:

- Sustainable Peat Land Management.
- Reduction in the Rate of Deforestation and Land Degradation.
- Development of Carbon Sequestration Projects in Forestry and Agriculture.
- Promotion of Energy Efficiency.
- Development of Alternative and Renewable Energy Sources.
- Reduction in Solid and Liquid Waste.
- Shifting to Low-Emission Transportation Mode.

The second analysis considered GHG impacts of MP3EI developments on already ongoing GHG emission trends under business-as-usual scenario. It divided the proposed interventions and their respective financial pledges into the following GHG emission categories:

- Developments with the likely significantly positive impacts on GHG emission trends.
- Developments with the likely positive impacts on GHG emission trends.
- Developments with totally uncertain impacts on GHG emission trends.
• Developments with the likely negative impacts on GHG emission trends.
• Developments with the likely significantly negative impacts on GHG emission trends.

This clustering of projects was done with a view to establish a best-case scenario which is based on a number of highly optimistic assumptions. The hypotheses deployed are summarized in the following text. The assessment was obviously constrained by numerous uncertainties with regard to the actual land-use changes, technologies used and management and implementation modalities. The overall broad-based picture is, however, rather clear.

6.2 Relationship between MP3EI and Indonesia´s pledges

The analysis of all developments proposed in the MP3EI reveals that only 0.19% of the MP3EI financial pledges fall within the broad scope of activities listed among Indonesia´s Nationally Appropriate Mitigation Actions (Bappenas 2011). It appears that this proposal that Indonesia submitted to UNFCCC in 2010 is not reflected at all in the actual development planning made through the MP3EI framework.

Table 6.1 below lists the only three proposed development within the MP3EI framework that have a clear relationship to Indonesia´s NAMA plans:

<table>
<thead>
<tr>
<th>Proposed projects that fall within Indonesia´s Nationally Appropriate Mitigation Actions</th>
<th>Investment Value (IDR Billion)</th>
<th>Developers</th>
<th>Starting Period</th>
<th>End Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiesel Plant 4 in KPI DUMAI, RIAU</td>
<td>154</td>
<td>Private</td>
<td>2011</td>
<td>2013</td>
</tr>
<tr>
<td>Tambling Wildlife Nature Conservation (Forest Conservation, Wildlife, and Marine Nature Reserve; Ecotourism) in KPI TANGGAMUS, LAMPUNG</td>
<td>2,000</td>
<td>Private</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of the electric car industry (Low Cost Green car) in Gresik</td>
<td>107</td>
<td>Private</td>
<td>2012</td>
<td>-</td>
</tr>
<tr>
<td>Total Investment Value (IDR Billion)</td>
<td>2,261</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion in the overall MP3EI Investment Value</td>
<td>0.00186</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6.3 Assessment of Proposed MP3EI GHG Emission interventions

Clustering of all MP3EI interventions into different GHG emission categories reveals that 66% of MP3EI funding is earmarked to interventions are likely to have either significant negative or negative impacts on Indonesia’s GHG emission trends (Table 6.2). On the other hand, only 23% of the MP3EI development proposals may have significant positive or positive impacts on GHG emission trends.
Table 6.2  Overview of GHG emission-related MP3EI investments

<table>
<thead>
<tr>
<th>GHG emission category</th>
<th>Investment Value (IDR Billion)</th>
<th>Percent of total MP3EI financing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely significantly positive impacts on GHG emission trends</td>
<td>48,765</td>
<td>4%</td>
</tr>
<tr>
<td>Likely positive impacts on GHG emission trends</td>
<td>233,628</td>
<td>19%</td>
</tr>
<tr>
<td>Totally uncertain impacts on GHG emission trends</td>
<td>127,079</td>
<td>11%</td>
</tr>
<tr>
<td>Likely negative impacts on GHG emission trends</td>
<td>97,430</td>
<td>8%</td>
</tr>
<tr>
<td>Likely significantly negative impacts on GHG emission trends</td>
<td>702,562</td>
<td>58%</td>
</tr>
</tbody>
</table>

Figure 6.1 graphically presents the structure of MP3EI investment volumes that fall into the different GHG emission categories.

The above clustering of the MP3EI interventions can be explained as follows:

MP3EI proposals with likely significantly positive impacts on GHG emission trends (4% of total MP3EI financing, Investment value: 48,765 IDR Billion)

This GHG category includes projects with significantly positive GHG impacts - e.g. Development of the electric car industry, Biodiesel Plant 4 at KPI Dumai, Riau, and Tambling Wildlife Nature Conservation. It also includes development of technological parks (Pelalawan, Bandung) and an animation research centre at Cimahi, which will offer economic activities and job opportunities that have low GHG emission rates and may lead to further innovations, better utilization of natural resources and dematerialization of the economy. They are therefore included in this GHG category.
MP3EI proposals with likely positive impacts on GHG emission trends (19% of total MP3EI financing, Investment value: 233,628 IDR Billion)

This GHG category includes alternative economic activities and job opportunities that may theoretically reduce the need for short-term exploitation of natural resources. It also includes activities for increased economic returns on palm oil. Possible positive impacts could theoretically occur if they lead to stabilization or reductions in efforts to expand palm oil plantations. However, this is a highly speculative assumption. It is more likely that negative GHG impacts will occur if the proposed development triggers expansions of palm oil plantations. However, within the best-case optimistic scenario, they are allocated to the GHG positive category.

MP3EI proposals with totally uncertain impacts on GHG emission trends (11% of total MP3EI financing, Investment value: 127,079 IDR Billion)

This GHG category includes a number of forestry projects or plantations that may easily fall into significantly negative GHG category if the proposed development leads to conversions of forest or peat lands. GHG impacts in this category also depend on the resulting natural forest conversions and/or forest management practices.

MP3EI proposals with likely negative impacts on GHG emission trends (8% of total MP3EI financing, Investment value: 97,430 IDR Billion)

This GHG emission category includes a variety of economic activities with relatively less important GHG effects - e.g. pipelines, terminals, small-scale production of fertilizers, small-scale smelters and processing and refining of gold, zinc, copper, etc.). GHG effects of these proposed developments depend entirely on the technologies used. It can be easily significantly negative.

MP3EI proposals with likely significantly negative impacts on GHG emission trends (58% of total MP3EI financing, Investment value: 702,562 IDR Billion)

This GHG category includes oil and gas explorations, large-scale mining and large-scale smelters.

6.4 Calculation of MP3EI-related GHG emissions

6.4.1 GHG Related Activities

Indonesia’s Second National Communication to the UN FCCC\textsuperscript{64} gives a summary of national GHG-emissions in 2000 per source and sink category. The ten most important contributors and related substances, provided in this summary, were chosen for the inventory of MP3EI-related GHG emissions. The following table provides an overview of the considered sources/sinks and GHGs.

\textsuperscript{64} United Nations Framework Convention on Climate Change
Table 6.3  GHG sources and sink categories and relevant MP3EI activities

<table>
<thead>
<tr>
<th>Source and sink categories as reported in 2NC</th>
<th>GHG</th>
<th>Activities MP3EI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A1 Energy production (electricity, heat, oil &amp; gas refining)</td>
<td>CO₂</td>
<td>Coal and natural gas power plants</td>
</tr>
<tr>
<td>1A2 Manufacturing Industries and Construction</td>
<td>CO₂</td>
<td>Copper and Iron and Steel industries</td>
</tr>
<tr>
<td>1A3 Transportation</td>
<td>CO₂</td>
<td>Road and water transport</td>
</tr>
<tr>
<td>4C Rice cultivation</td>
<td>CH₄</td>
<td>No significant impact from MP3EI expected</td>
</tr>
<tr>
<td>5A Changes in forest and other woody biomass</td>
<td>CO₂</td>
<td>Natural forest peatland lost to palm oil plantations and timber estate</td>
</tr>
<tr>
<td>5B Forest and grassland conversion</td>
<td>CO₂</td>
<td>Natural forest peatland lost to mining activities (above-ground biomass)</td>
</tr>
<tr>
<td>5C Abandonment of croplands, pastures, plantation forests, or other managed lands</td>
<td>CO₂</td>
<td>No significant impact from MP3EI expected</td>
</tr>
<tr>
<td>5D CO₂ emissions and removals from soils</td>
<td>CO₂</td>
<td>Peatland lost to plantations and mining and natural forest lost to mining activities (biomass in soil)</td>
</tr>
<tr>
<td>6B1 Industrial wastewater (under 6D2 in 2NC)</td>
<td>CH₄</td>
<td>Food and textile industries</td>
</tr>
<tr>
<td>7 Other (stock change)</td>
<td>CO₂</td>
<td>Significant impact from MP3EI not expected</td>
</tr>
</tbody>
</table>

6.4.2  Approach

The pollution load is commonly estimated by multiplying an indicator of the magnitude of the activity with an ‘emission factor’, for example:

\[ \text{fuel consumption (GJ/year)} \times \text{CO}_2 \text{ emission factor specific for this fuel (kg/GJ)} = \text{CO}_2 \text{ emission (kg/year)}. \]

The relevant MP3EI projects have been reviewed for indicators of the magnitude of the activity. Two indicators have been derived from the MP3EI Appendix, namely electrical output power of the power stations (MW) and the investment (IDR). Both indicator units have been converted to ‘activity’ units that are associated with the emission factors. The (MW) number of a power station has been converted to GJ/year based on assumptions of production time and load of the power station. The (IDR) number has been converted to (tonne of product/year) based on literature examples.

Emission Factors

In essence an emission inventory is always an approximation as the details on technology and operational modes of the activities are not known. The selected approach consists of using typical emission factors that are geared to available activity data levels. Local emission factors have been used when available. For the other activities, internationally accepted emission factors have been used. An emission factor is associated with a technique and the region as such is not important. For example a car without a catalytic convertor has similar emissions in
Indonesia and Europe. The difference is that most cars in Europe nowadays have a catalytic converter and are maintained and inspected regularly.

The main sources for emission factors as used for the inventory were:

- Indonesia Second National Communication Under The United Nations Framework Convention on Climate Change (UNFCCC), November 2010
- UN IPCC Guidelines for National Greenhouse Gas Inventories
- Decision Support System for Industrial Pollution Control (DSS/IPC), December 1999
- EMEP/EEA air pollutant emission inventory guidebook – 2009, available from the European Environment Agency (EEA) website

There are a number of publications that present a methodology for estimating emissions to air and water and waste generation but most are restricted in scope, addressing just a few sources. Considering the need to cover all sources and the need to link to activity rates, the following two have been selected as the main references:

- The database of the Decision Support System for Industrial Pollution Control (DSS/IPC)
- EMEP/EEA Air Pollutant Emission Inventory Guidebook

The factors are a compilation of European and other international references (including US EPA) and represent different levels of technology as the situation between the various regions in EMEP countries varies. In principle, these factors are also suitable for activities in Indonesia as it concerns the same processes albeit that the abatement level may differ. The abatement level is reflected in the emission factor range. For the purpose of the MP3EI SEA, upper (95% confidence interval) values were selected when using default emission factors of the EMEP/EEA guidebook. SO₂ emission factors are based on the sulphur content of the fuel.

### 6.4.3 Comparison of MP3EI-related GHG emissions with the 2nd National Communication

The calculated GHG emissions related to the MP3EI projects are compared with the GHG inventory of the 2nd National Communication to UNFCCC (2NC) in following table.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.A.1 Combustion from energy industries</td>
<td>CO₂</td>
<td>241</td>
<td>262</td>
</tr>
<tr>
<td>1.A.2 Combustion from manufacturing</td>
<td>CO₂</td>
<td>63</td>
<td>60</td>
</tr>
</tbody>
</table>


66 The calculations are based on the data provided by the SEAs for Economic Corridors – since this work is still ongoing, the figures may be a subject of further slight modifications, especially regarding the category of Forest and grassland conversion.
### 6.5 Conclusions

Although the MP3EI aspires to “transform the Indonesian economy into a developed nation, which recognized by the world community, through high, inclusive, and sustainable economic growth” it appears to do little to accelerate the shift of the Indonesian economy away from currently highly unsustainable development patterns.

More analyses will be conducted within the SEA M3PEI to investigate impacts on the specific environmental priority concerns. From the specific perspective of the climate change mitigation efforts (reduction of greenhouse gases), the MP3EI appears rather problematic because it on one hand largely supports developments that will significantly increase greenhouse gas emissions and does not (with exception of three minor projects) include any nationally appropriate mitigation measures.

Should Indonesia wish to reduce the gap between MP3EI and its GHG reduction commitments, it may wish to consider making the following adjustments to the MP3EI:

1. Adopt strict rules for MP3EI implementation that prevent or minimize forest and peat land conversions to other uses (especially palm oil, rubber and food crop plantations and mining).

2. Promote of energy efficiency and development and use of renewable energy sources within MP3EI industrial developments.

3. Design MP3EI interventions for transport systems in such a manner that they promote shift to low-emission transportation modes (e.g. promote rail and use of public transport, enhance inter-modality).

4. Reduce MP3EI-related public funding for extractive resource use and shift it to dedicated projects for sustainable peat land management, development of carbon sequestration...
projects in forestry and agriculture, efforts to reduce deforestation and land degradation and reduction in solid and liquid waste.

All of the above recommendations are fully consistent with Bappenas own Guidelines for Implementing Green House Gas Emission Reduction Action Plan (2011).
Conclusions

The analysis of the MP3EI Strategic Economic Categories has uncovered both risks and opportunities in relation to key Indonesian sustainability policy goals. From a pure economic growth perspective, the overarching MP3EI strategic policy of bolstering 22 existing areas of economic growth through improving ‘connectivity’ certainly has merit. Many of the described strategic economic activities also include an explanation of existing or new sustainability measures, thereby reflecting the MP3EI policy-makers’ recognition of the need to counteract what are some very obvious associated threats to sustainability.

However, taken as a whole, it is evident that the general MP3EI strategy lacks the sufficient level of commitment, vision or operationalization, i.e. in terms of the planning, institutional support, and regulatory vigour, to counteract the clearly evident environmental and social impacts which will be associated with MP3EI-styped economic growth.

The following summary section supports this key finding by providing an explanation of key sustainability weakness, or gaps, in the MP3EI policy and, thereafter, by providing a synopsis of the related environmental and social trends that will result.

The ‘Recommendations and Mitigation Measures’ section (Chapter 8) that follows offers potential remedies to address the sustainability policy weaknesses and gaps, along with areas where opportunities can be better exploited, in the MP3EI Policy and the RPJMN and related legal, regulatory and planning context.

7 Summary of the main conclusions

7.1 Water

MP3EI Policy Weaknesses & Gaps

To its credit, MP3EI policy goals include further development of the water supply and wastewater systems; suggesting that it does aim to contribute to relevant objectives for Water Resources Management stipulated in the existing RPJMN. The MP3EI is, however, unclear in the specifics of how water demand and wastewater from, for example, industrial, mining, agriculture, and residential expansion, will be addressed. To be effective as a strategy, the MP3EI should provide a minimum level of detail or commitment, such as associated investment, studies and/or intergovernmental cooperation required to ensure that MP3EI-related development will meet water resource management objectives.

Other observed MP3EI gaps related to water include:

- Due to likely continuation of deforestation and forest/peat land degradation, MP3EI will not contribute to the goal “Optimise land and water resources without deforestation” as provided by the RAN-GRK.

- The conflict with the goal of “reducing impacts of floods and droughts” as MP3EI only elaborates on this issue for Greater Jakarta Area, while there are many other areas within the country which face risks from floods and droughts.

- The MP3EI also does not fully address a need to ensure sanitation infrastructure and waste management system that are resilient to the climate change (as stipulated by the RAN-API).
Consequences for Water

MP3EI encouragement of the continuation of intensive agriculture, projected industrial growth (e.g. food and beverage, textile industry, oil and gas), planned expansion of conventional fossil fuel power plant capacity and tourism development will increase the demand for water and thus lead to further pressures on existing water resources. This may exceed available capacities in certain areas – e.g. Greater Jakarta, Bali, and numerous small islands such as Maratua or Derawan.

This MP3EI accelerated growth will also increase the risk of water pollution due to, among other sources, the application of agro-chemicals, nutrient loading from animal husbandry – aquaculture production, and industrial / mining wastewater discharges. There are also significant risks for contamination of the surface waters by toxic compounds from wastewater emission from mines, e.g. leaching of mining waste rock dumps and from tailings facilities. Together with potentially increased sediment loading from increased erosion, M3PEI implementation is predicted to cause deterioration of water quality (e.g. changes in temperature, pH, salinity, nutrient loads etc.) in watersheds and coastal areas throughout Indonesia. Offshore mining and deep sea tailing disposal can also lead to seawater quality impacts and increased sedimentation in coastal waters.

The large-scale removal of forest cover associated with agroforestry activities as well as hydro-energy development can alter water regimes and affect water resources. The level of underground water may decrease and water retention capacity of the soil can be minimized or lost, which also may lead to heavier and more frequent floods during the rainy season and serious lack of water resources during the dry season.

On the positive side, the planned MP3EI goal to enhance sewage and wastewater management systems can lead – if actually correctly executed – to reduced negative impacts on water quality.

7.1.2 Air and Climate

MP3EI Policy Weaknesses & Gaps

As elaborated in Chapter 6 of this report, the majority (~66%) of related MP3EI projects fall into a category of ‘negative’ or ‘significantly negative’ GHG contributors. This indicates a clear conflict with the main objective of the RAN-GRK, i.e. “…to reduce greenhouse gas emissions by 26% on Indonesian own and by 41% if Indonesia receives international aid, by the year of 2020 from the condition without any action (BAU)” The obvious policy conflict exposes a serious sustainability goal gap in the MP3EI.

Also, despite a limited framework for utilization of the renewable energy resources (i.e. those very small scale at the economic corridor level), the MP3EI does not properly integrate RAN-GKR sectoral strategies, as it lacks any specific and clearly defined support for clean and energy efficient technologies. This is also clear in relation to the development of cleaner transport, as road infrastructure and public transport in the MP3EI elaborated only for Greater Jakarta Area. Other more extensive support to alternative and more sustainable means of public transportation in other areas of Indonesia is missing.

Consequences for Air Quality and Climate

MP3EI implementation of industrial developments will lead to additional pressures on air quality – especially in congested urban areas with existing and planned intensive energy industries with significant atmospheric emissions such as steel, aluminium and copper/nickel smelters and mills, oil refineries, petrochemical complexes and new connectivity projects such as power-plants and ports. Since the M3PEI strategy mainly stipulates the development of fossil fuel-based energy the combined expansions (industrial, mining, power and urban growth etc.) it will
likely negatively affect and/or worsen already poor air quality in certain areas throughout Indonesia.

Expected knock-on transport intensity will also result in an increase in total volume of the air pollution. This may be further worsened by suboptimal location of certain infrastructure developments, such as Pulau Balang Bridge in remote part of Balikpapan Bay, which will actually increase rather than decrease the transportation distance. Additional pressures to the air quality can also be caused by the forest and peat-land fires (accidental and intentional), which are likely to be more frequent and/or of the larger scope in newly opened up areas.

The MP3EI strategy will also accelerate unsustainable levels of GHG. Main areas include:

- Deforestation and peat degradation are the major sources of GHG emissions related to the agriculture and forestry sectors
- Fossil fuel consumption to satisfy the growing energy demand of the in industry and urban expansion
- Industrial development itself
- Expected intensification of transportation (terrestrial, water and air)

Additional increase of GHG emissions related to the M3PEI activities will likely be associated with the degradation of mangrove ecosystem (due to aquaculture development, land reclamation for the coastal industry and housing development, as well as the construction of transport infrastructure and ports).

### 7.1.3 Land and Soil

**MP3EI Policy Weaknesses & Gaps**

As evident in the related analyses in Chapter 5 of this report, there is a risk that MP3EI implementation will lead to peat land degradation and further exacerbate the risk of land and soil degradation (incl. groundwater) due to improperly managed contamination pathways. Further there is a risk that simple poor land management can render areas of land unproductive. The MP3EI neither recognises these problems nor proposes measures to counteract them. It can therefore be concluded that the M3PEI will neither contribute to meeting the relevant goals stipulated by the Strategic Action Plan of the Ministry of Environment (RENSTRA), nor those provided by the Indonesia Climate Change Sectoral Roadmap (which stipulates ‘Optimization of land and water resources use and development of agricultural activities with environmental knowledge’ among its priorities).

The MP3EI may, however, contribute to increased agriculture and plantation productivity as promoted by the Indonesian REDD+ Strategy.

**Consequences for Land & Soil**

Large-scale removal of forest cover resulting from planned agro-forestry activities will continue to trigger soil degradation and soil loss. Here, intensive palm-oil production in poor soils such as tropical ultisols (e.g. found in lowlands of Kalimantan), are likely to exhaust soil nutrients, which can cause substantially increase the extent of unproductive land (e.g. especially in Kalimantan) for several decades. Further negative effects are linked to planned increase of coal-based electricity generation development will trigger land uptake and the risk of soil and groundwater contamination from the mining sector, as well as with inundation associated with hydro-plant developments which can affect fertile low-lands.
The contamination of soil can be also caused by agriculture activities via application of agro-chemistry (pesticides etc.) and by industrial sector, where uncontrolled or inappropriately managed hazardous material and industrial landfills can lead to wide-scale soil contamination.

Land subsidence is substantial risk that will continue with MP3EI strategies; driven by two major factors. First, further industrial development will lead to increased extraction of ground water resources, which – specifically in Java coastal metropolitan areas – will exacerbate the issue of the land subsidence. The second driver is peatland degradation (especially in Kalimantan), which causes irreversible lowering of the surface as a consequence of peat shrinkage and biological oxidation.

7.1.4 Forests

MP3EI Policy Weaknesses & Gaps

Many of the stated MP3EI strategies for the 22 economic activities that lead to deforestation are careful to not overtly indicate expansions into forested areas. The strategy for palm oil, for example, stresses the goal to improve productivity (e.g. downstream during processing) and ‘verify’ productive areas. Existing reforestation schemes are also referenced as a counter-balance to any increases in deforestation.

Substantial planned ‘connectivity’ projects, e.g. roads, port, processing plants, aimed at supporting agroforestry and other MP3EI Economic Policy activities, suggest, however, that increases in agroforestry efficiencies may not be enough to justify the scale of investment. Suggesting further that agroforestry concessions will simply be expanded due to easier access and increasing market demand.

This apparent misalignment or express vagueness in sub-strategies of MP3EI is a clear weakness in the MP3EI as it conflicts with Indonesia law and commitments in Forestry and Peat Land Sectors of RAN-GRK and in the Asia Forest Partnership. A strong, transparent and comprehensive measure would be needed to correct this gap in the MP3EI strategy. This strategy would also need to address potential increases in illegal logging induced by ‘connectivity related’ increases in access to previously remote forested areas.

Consequences for Forests

MP3EI Agro-Forestry activities, especially timber harvesting and plantation expansion, will be the largest source of further unacceptable reduction of forested areas in Indonesia. This deforestation will also have unacceptable secondary impacts to biodiversity and traditional or small-scale forest-based livelihoods.

Although likely lesser pressures, deforestation will also continue due to;

- Mining sector expansion (i.e. due in part by coal-based electricity generation development and other mining developments)
- Inundation associated with hydro-plant developments.
- Urban encroachment associated with expansion of the economic activities

Also inland road (railroad) network expansion is likely to contribute to deforestation and forest degradation – both directly fragmenting forest areas as well as through improved accessibility of new areas likely stimulating intensification of logging and forest land conversion.
7.1.5 Coastal Areas

MP3EI Policy Weaknesses & Gaps

Although there are several MP3EI goals that are dependent on maintaining health of Indonesian coasts, e.g. fisheries, the M3PEI does not elaborate on any regulation or measure aimed at coastal protection or the need for sustainable integrated coastal management. Instead, it focuses on the ‘connectivity’ need for significant harbour and port developments; and implies the associated industrial and urban development that is associated with it.

Given this and the obvious risk to coastal systems emphasised in section 5, the MP3EI is significantly weak as it relates to obligations to protect coastal areas; i.e. as stipulated by the Water Resources Management Targets (current RPJMN) and Indonesian Action Plan for Climate Change Adaptation (RAN-API).

Consequences for Coastal Areas

The likely MP3EI-associated risks to coastal systems are mainly linked to ‘Connectivity’, Fishery, Tourism, and Mining. Left un-managed, MP3EI accelerated - business as usual- fishing methods and tourism activities will most probably lead to direct destruction of coastal habitats including coral reefs. Similarly, the loss of mangroves can be expected due to further expansion of aquaculture production and development of tourism facilities in coastal areas.

Development of port infrastructure and intensification of marine transport will also generate further pressure on coastal ecosystems (noise, spills/leaks), including physical destruction of natural coast, alteration of tidal dynamics and siltation regime (e.g. from dredging of seabed). Offshore mining in coastal waters will also increase sedimentation and thus lead to pressures of the coastal ecosystems – coral reefs, mangrove, seagrass, etc. Increasing water pollution in rivers and directly to coastal waters from, for example, agriculture/agroforestry, aquaculture production, port development and increased marine transport presents additional threat to water quality in coastal areas.

Seen from a cumulative perspective, the many accelerated existing and new stressors to coastal area will result in an increase in the level of coastal degradation.

7.1.6 Biodiversity

MP3EI Policy Weaknesses & Gaps

M3PEI does not specifically stipulate any need for biodiversity protection to address the many related risks and impacts. Considering this, and that many existing conservation related legislation and initiatives have not been effective in curbing overall unacceptable levels of biodiversity loss at present day levels of growth, it is evident that accelerated MP3EI growth must include equally fast-tracked biodiversity protection measures. As it does not, it is more than probable that the M3PEI will actually be in conflict with objectives stipulated by the Indonesian Biodiversity Strategic and Action Plan 2003 – 2020 and UN Convention on Biological Diversity.

Consequences for Biodiversity

Given this policy conflict, it is evident that the MP3EI will continue to contribute, and likely hasten, biodiversity loss. The continued conversion of primary and secondary lowland rainforest into palm oil plantations for MP3EI Agro-Forestry Activities and other intensive agriculture development, i.e. the most important cause of declining biodiversity in Indonesia; can be expected to lead to unacceptable loses of biodiversity.

Furthermore, development of transport infrastructure (e.g. including agriculture and forestry-related transport infrastructure e.g. logging roads) will also have significant negative impacts on biodiversity through disturbance, destruction and fragmentation of ecosystems as well as it can
highly increase the rate of poaching and encroachment in newly accessible areas. Similarly, Energy development will negatively affect biodiversity caused by hydro energy utilization on aquatic ecosystems (e.g., alteration of river water regimes and physical characteristics of water important for life of certain aquatic species, fragmentation of river continuum destroying migration patterns, increasing risk of spread of invasive species, etc), and by construction and operation of energy infrastructure - namely expansion of the energy transport network, leading to disturbance, destruction and fragmentation of ecosystems.

Further, fishery, tourism and ports development proposed by the M3PEI will negatively affect marine biodiversity both through direct destruction of habitats (e.g. project footprints, over-exploitation, destructive fishing methods, and tourism activities) as well as indirectly by deteriorating water quality in coastal waters. Also increase of capacity of fishing ports, and improved accessibility of distant markets, can stimulate further pressures on fish stocks and unsustainable fishing practices and thus lead to adverse effects to marine biodiversity.

The MP3EI will also present a higher threat to biodiversity due to the increased risk of introduction of alien invasive species. This will be evident via:

- Increased aquaculture production
- Industrial Timber Plantations (e.g. Acacia spp., are used in industrial timber plantations, and can spread into surrounding forests and negatively effect local ecosystems
- Increases in international sea traffic at newly established ports.

7.1.7 Human Health

MP3EI Policy Weaknesses & Gaps

In relation to human health, the MP3EI Policy has both strengths and weaknesses. An aspect that shows signs of strength, but is not yet sufficiently operationalised, is that the MP3EI objective to further develop water supply and waste water systems. This suggests the aim to contribute to respective Indonesian Millennium Development Goals to reduce proportion of population without access to safe drinking water and basic sanitation.

However, the increased mobilisation of disease vectors associated with MP3EI related economic migration, is not addressed. The risk that MP3EI implementation may further increase spread of HIV/AIDS in newly developed areas, is therefore in conflict with goals stipulated by the Indonesian Millennium Development Goals regarding AIDS/HIV and the National AIDS Strategy and Action Plan 2010 – 2014.

The M3PEI also does not elaborate on policy measures to combat the health risks related to the climate change; i.e. MP3EI induced migration to residential development endangered by consequences of the climate change. Therefore it can be concluded that the M3PEI implementation has a gap as it related to objectives stipulated by the Indonesian Climate Change Sectoral Roadmap, Indonesia Action Plan for Climate Change Adaptation (RAN-API) and National Disaster Management Plan 2010 – 2014 respectively.

Consequences for Human Health

MP3EI generated economic growth will present both benefits to health conditions in Indonesia, as well significant drawbacks. The likely positive effects may result from, among others, overall economic enhancement, further development of water supply and waste water management systems, better transport connectivity and more stable energy supply.

However, the evident risk of MP3EI induced worsening environmental quality will threaten human health in areas that become more congested with urban development and industrial
production. This MP3EI development will cause worsening air quality – together with growing energy production from fossil fuels, planned expansion of seaports and expected increase of traffic intensity. Also, water pollution due to agriculture and aquaculture development, mining activities, new industrial and tourism facilities will likely adversely affect human health.

Planned expansion of industry and tourism, together with increased mobility, will very probably result in a higher number of population inhabiting coastal areas, which are often disaster-prone (tsunami, floods) as well as are likely to be endangered by the consequences of climate change (especially by sea-level rise).

Further tourism development, labour force migration (e.g. due to new mining activities) as well as improved connectivity may lead to increase spreading of communicable diseases and higher number of AIDS/HIV cases.

Taken as a whole, existing health care capacities will likely also become overstretched.

7.1.8 Livelihood and Local Communities

MP3EI Policy Weaknesses & Gaps

There are several livelihood and local community policy gaps or weaknesses in the MP3EI as discussed in the sections that follow.

It can be expected that implementation of the MP3EI will enhance the economic performance of entire country; and therefore contribute to decrease a number of low-income people as required by the Indonesian Millennium Development Goals.

The MP3EI provides for, i.e. within the section on Implementation & Governance of MP3EI (pp. 182 – 183), further actions to improve regulations and permits at the regional level (i.e. “finalization of Provincial Spatial Planning (RTRW Propinsi)) as a basis to overcome potential land use conflict related to plantation, and mining area in forests”. It also specifically mentions, i.e. among the policies and regulations for Kalimantan EC, the need to ‘Improve regulations concerning land administration and spatial conflicts between coal mining and forestry or plantations’. Although positive, policy weakness is still apparent because MP3EI does not specifically elaborate on how to achieve the planning and regulatory improvements, and also because it does not integrate climate change in permitting procedures as suggested by the Indonesian REDD+ National Strategy.

The MP3EI does not specifically address the issue of child labour, and thus it will not contribute to achieving relevant goals stipulated by the National Plan of Action for the Elimination of the Worst Forms of Child Labour.

The MP3EI emphasises several times a need for educated and skilled labour force – both within its general policies (e.g. Basic Principles, Prerequisites for Success and Main Strategies of MP3EI – Innovation Stakeholders Strengthening stress out necessity of “Creating human resources that have the competence, high level of integrity through a combined curriculum of science & technology, social value, and humanities education”) as well as for specific Economic Activities (e.g. “Implementation of education and training to improve skilled labor in the steel industry” for Sumatra EC or “The provision and improvement of vocational education, specifically in the field of textile product design” for Java EC). Therefore, the MP3EI does aim to contribute to the objectives regarding increasing the skilled labour force as stipulated by the Strategic Plan of the Ministry of National Education.

In terms of transport development, the M3PEI will enhance the accessibility and mobility of the population (however, mainly in the Greater Jakarta Area) and thus it will support relevant objectives contained in the Strategic Plan of the Ministry of Transport. Although it mentions “…building the industry for alternative-fuelled vehicles” (Java EC), the MP3EI would require
more extensive elaboration of this issue to fully contribute to the goals regarding low-emission and environmental-friendly transport (as proposed by the by the Strategic Plan of the Ministry of Transport and the National Action Plan for GHG Emission Reduction) especially in the other areas than Greater Jakarta.

Consequences for Livelihoods and Local Communities

Similar to human health, the MP3EI presents both opportunities as well as certain risks in relation to ‘Livelihood and Local Communities. The likely positive effects may result from overall improvement of economic enhancement, higher job availability and flexibility of labor force as well as better living conditions as a result of further development of water supply and waste water management systems, better transport connectivity and more stable energy supply.

On the other hand, further development in key Economic Activities (Agro-Forestry, Industry, Fishery etc.) can lead to loss of economic and livelihood opportunities of the local communities – smallholder farmers, traditional fishermen, indigenous communities depending on forest resources etc. Large scale development of agro-forestry, industry, mining or tourism can lead to conflicts with local small scale production and together with only limited number of well-paid working positions provided by large enterprises (since intensive plantation agriculture might be less labour-intensive than traditional farming) it can further accelerate social inequity. Therefore there is a risk of growing number of conflicts over natural resources mainly related to agro-forestry, fishery, energy, mining and tourism.

Further risks to livelihoods include likely increased incidences and severity of floods and droughts due to altering the water regimes as a result of the deforestation or hydropower development, lack of water resources caused by increased demand from industry, agriculture or tourism, land subsidence and thus – especially in Java coastal metropolitan centres – loss of real estate.

Too extensive development of certain economic activities can also negatively affect their economic performance and thus have adverse effects on the local economy and livelihoods. For instance, excessive development of coastal tourism infrastructure can cause the loss of the aesthetic value of the area (coastline, landscape etc.), which is one of the major assets attracting tourists to Indonesia. Subsequently, it can lead to decline of a number of tourists – considering also sensitivity of tourism to global factors (economic crisis, massive outbreak of infectious diseases, military conflicts etc.) the local economy too dependant on tourism also tends to be very fragile. Similarly, there is a risk of loss of fishery due to overexploitation of fish resources likely resulting in decline of entire sector, especially with likely consequences of climate change regarding the fishery in Indonesia (sea-level rise, change of temperature).

Implementation of the MP3EI especially in industrial activities may face the lack of appropriately qualified labor force required for certain types of industrial production.

Further detailed description of externalised costs and general economic implications related to the MP3EI is provided in Section 7.2 below.

7.1.9 Environmental Management & Horizontal Key Activities

Considering the existing situation and challenges related to environmental management in Indonesia, there are a number of potential problems associated with the M3PEI implementation.

- The lack of integrated watershed management can result in further degradation of water resources due to implementation of the M3PEI projects
- Since enforcement of environmental regulations (emission standards) for industries is not always demonstrated in Indonesia, the number of non-compliant industrial operations would likely increase
• Mine closure and mine reclamation policies are not well developed or implemented and have led to a major global problem (including Indonesia) of legacy mine sites that needs to be better managed. The costs of this are generally born by the communities nearby the mining sites many decades after mining has ceased. Also, the environmental management plans for mine operations are often not consistently implemented and enforced. Therefore – if not properly managed and controlled – the MP3EI mining activities may further worsen the situation.

• Fishery development can further intensify illegal, unregulated and unreported fishing practices; therefore it will require enhancing of the Fishery Management system including also proper involvement of local communities in fishery planning and management

• The lack of proper application of the Integrated Coastal Zone Management System (ICZM) in Indonesia can result in further significant problems in coastal areas associated with tourism, industry, aquaculture etc.

• Similarly, a lack of systematic planning of industrial development (i.e. industrial sites) can likely lead to further degradation of environmental quality (especially air and water) and exacerbation of environmental management (waste and water management) and related human health problems.

Generally, the development of specific projects in many MP3EI Economic Categories – agro-forestry, mining, transport infrastructure – can lead to significant adverse environmental and health impacts including conflict with delineated protected areas and/or important biodiversity hotspots (which however lack legal protection). Therefore it is important to ensure currently missing proper comparison of alternatives (i.e. incl. considering likely environmental and health consequences of planned options) in spatial planning (SEA), project permitting and related environmental assessment (EIA).

Energy and Waste
Higher energy demand is expected, which is however planned by the M3PEI to be mainly satisfied by production from fossil fuels, giving only very limited space to renewable energy resources.

The specific concerns on waste are related to very likely increasing industrial waste generation (including hazardous waste), low waste collection rates, landfilling with low rates of recovery of materials or energy, and unmanaged landfill sites. There will a growing volume of waste residues (e.g. from iron and steel sector), which can be recycled to obtain added value if an effective system of associated industries and market is in place. However, considerable amounts of hazardous waste will still remain and require adequate treatment and waste management.

Industry and Mining
The MP3EI offers an opportunity to replace existing inefficient and disproportionate polluting technologies, however this chance it not properly utilized since the MP3EI does not emphasise possible replacement of the existing industrial technologies, which highly contribute to depletion of non-sustainable resources and lead to environmental and health pressures, by low-emission / high efficient Best Available Technologies (BAT).

7.2 Summary of Economic Implications of MP3EI
To the extent possible, consideration of the economic implications of proposed MP3EI activities (insofar as they relate to their potential environmental and social impacts) should inform the recommendations made for MP3EI implementation, for its on-going design, and for other
aspects of related Indonesian planning. From the analysis of the economic implications arising from the identified risks to national strategic objectives outlined in Chapter 5, some of the following key messages for MP3EI as a whole are the following:

• The impacts on natural capital (mainly land and forests, but also water) from Indonesian agriculture are already very large and likely to be increased under current MP3EI plans. Oil palm cultivation alone has an estimated economic land use cost of at least 20% of its total sector revenues, and this is greater when water and air pollution, GHG and social/livelihood impacts (e.g., through land and resource access or degradation conflicts) are included. If ‘green accounting’-type practices to properly reflect such environmental impacts were used for plantation investment feasibility studies, many would be inherently unviable.

• Losses of forest, and especially wetlands and peatlands, to large-scale agriculture has massive (so far uncounted) economic consequences; expanding oil palm by 5% of existing area in Kalimantan could destroy natural resources worth hundreds of millions of dollars, for example. The same conclusion is true for coastal systems, and especially any areas of coastal wetlands or coral (the former typically having economic values per hectare per annum in the hundreds of thousands of dollars because of the ecosystem services it provides (water supplies, prevention of erosion etc), the latter potentially in the hundreds of millions (because of tourism potential). Any large-scale developments under MP3EI threatening coastal systems should be especially closely scrutinized.

• Light industries – typically such as those in agri-processing, electronics, assembly etc – can have major environmental impacts easily equal to or more than the financial revenues they produce through air and water pollution (and to a lesser extent waste and land impacts), while heavier industries’ (e.g., steel, cement) impacts tend to be dominated by GHG emissions costs (and of a similar, if not greater, scale of impact). Land-based mining impacts are usually relatively localized – but may be quite intense as regards impacts on water resources and as regards the production of waste.

• Across all industrial activity types, the impacts of particulates and noxious gasses on human health are also major; a feature of the Indonesian situation is that although the economic costs per individual may be lower than in developed countries, the density of population in areas like Java means that large numbers are affected and aggregate costs to the economy are potentially very high.

• An obvious feature of the environmental and social economic analysis of MP3EI is the importance of impacts arising from GHG emissions as a result of energy and power generation (and especially the importance of coal within this). Although climate regulation is the most valuable global ecosystem service of all, the fact that emissions costs remain largely externalised means the problem is hard to address on a simply national basis, and Indonesia’s CO₂ intensity is increasing significantly.

• Economic losses to Indonesia from marine fishing are already considerable (estimated in the billions of dollars) due to over-fishing and overcapacity, and will be increased if capacity (relative to resources) is further increased if little or no attention is paid in planning to MSY/MEY concepts.

• Although there are identifiable environmental costs to tourism (in terms of waste, pollution, cultural degradation), the sector does offer scope to realise positive environmental impacts (i.e., benefits) through orientation towards sustainable eco-tourism, agri-tourism etc.

67 A fuller discussion of these potential impacts follows in the next section.
Conclusions

- Cumulative (and possibly irreversible) environmental impacts will likely be felt in the (further) development of strategic urban areas, although individual infrastructure projects may have positive environmental economic impacts (e.g., reduced emissions, noise, air pollution etc), and

- Most proposed investment activity types under MP3EI imply major distributional impacts. Firstly, many of those individuals affected by industrial, mining (and also large transport project) pollution (air, noise, amenity etc) are the poorest in society and cannot easily obtain relief through market mechanisms – e.g., they cannot afford health treatment even if it is available. Secondly, those most disadvantaged by land-based investments (especially plantation agriculture) tend to be the poorest communities most dependent upon common property resources for their livelihoods – they may be excluded from forests they have hitherto used for timber, food and other NTFPs and/or they see such resources degraded. These same groups in society are also of course those who are most threatened by the commercial developments of marine fisheries.

7.2.1 MP3EI Impacts on the Economic Value of Natural Resources

To get some feel for the scale of such national impacts in relation to MP3EI as a whole, an estimate of the potential impact of MP3EI on the economic value of Indonesia’s natural resources has been made, and is summarized below.

This estimate is grounded on estimated identified physical areas – habitats - of different types from the SEA GIS layering, which might be affected by the planned infrastructure, economic, and mining activities. These areas have had annual per hectare monetary values in current US$ attributed to them, based on the various components of their Total Economic Value (TEV) and as estimated by a recent comprehensive meta-study of natural resources. The following table provides some typical examples of the various components of Total Economic Value that are expressed in monetary terms for each of the habitats.

<table>
<thead>
<tr>
<th>Habitats</th>
<th>Provisioning services (examples)</th>
<th>Provisioning services (examples)</th>
<th>Provisioning services (examples)</th>
<th>Provisioning services (examples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined Conservation Area (CCA)</td>
<td>Wildlife, plants, medicinal supplies</td>
<td>Disturbance moderation, climate regulation</td>
<td>Genetic diversity (fauna and flora)</td>
<td>Recreation (wildlife tourism), spiritual experience, aesthetic values</td>
</tr>
<tr>
<td>Coastal wetlands</td>
<td>Fish, plants, reeds</td>
<td>Nutrient recycling</td>
<td>Nursery / breeding</td>
<td>Recreation, tourism</td>
</tr>
<tr>
<td>Coral reefs</td>
<td>Ornamental resources, fish</td>
<td>Erosion prevention, biological control</td>
<td>Nursery / breeding</td>
<td>Recreation, tourism</td>
</tr>
<tr>
<td>Inland wetlands</td>
<td>Fish, frogs, small mammals</td>
<td>Regulation of water flows</td>
<td>Nursery / breeding</td>
<td>Recreation, wildlife tourism</td>
</tr>
<tr>
<td>Marine</td>
<td>Fish, prawns, seaweeds</td>
<td>Waste treatment</td>
<td>Nursery / breeding</td>
<td>Recreation/sporting</td>
</tr>
<tr>
<td>Tropical forest</td>
<td>Wood, bamboo, rattan, NTFPs,</td>
<td>Air quality, carbon sequestration,</td>
<td>Nursery breeding (terrestrial)</td>
<td>Spiritual experience, collective cognitive</td>
</tr>
</tbody>
</table>

68 TEV comprises both use values (including direct use such as resource use, recreation, and indirect use from regulating services) and non-use values, e.g. the value people place on protecting nature for future use (option values) or for ethical reasons (i.e., bequest and existence values).

69 Full details of the valuation bases for each habitat type (numbers of studies, TEV components covered, monetary values, data sources etc) are all contained in Global estimates of the value of ecosystems and their services in monetary units; de Groot et al. Ecosystem Services 1 (2012).
Based on estimates of habitats of various types potentially impacted by MP3EI across the six ECs, the value of Indonesia’s national ‘natural capital at risk’ from MP3EI is summarized in the following table.

<table>
<thead>
<tr>
<th>BY ECONOMIC CORRIDOR</th>
<th>Value of natural capital at risk ($m)</th>
<th>EC as % of MP3EI Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BALI-NT</td>
<td>10,149</td>
<td>2.16%</td>
</tr>
<tr>
<td>JAVA</td>
<td>10,757</td>
<td>2.29%</td>
</tr>
<tr>
<td>KALIMANTAN</td>
<td>185,503</td>
<td>39.46%</td>
</tr>
<tr>
<td>PAPUA-MALUKU</td>
<td>82,581</td>
<td>17.57%</td>
</tr>
<tr>
<td>SULAWESI</td>
<td>28,160</td>
<td>5.99%</td>
</tr>
<tr>
<td>SUMATRA</td>
<td>152,970</td>
<td>32.54%</td>
</tr>
<tr>
<td>INDONESIA/All MP3EI</td>
<td><strong>470,121</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BY TYPE OF HABITAT</th>
<th>Value of natural capital at risk ($m)</th>
<th>Habitat as % of MP3EI Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined Conservation Area (CCA)</td>
<td>34,824</td>
<td>7.41%</td>
</tr>
<tr>
<td>Coastal wetlands</td>
<td>220,190</td>
<td>46.84%</td>
</tr>
<tr>
<td>Coral reefs</td>
<td>41,381</td>
<td>8.80%</td>
</tr>
<tr>
<td>Inland wetlands</td>
<td>115,501</td>
<td>24.57%</td>
</tr>
<tr>
<td>Marine</td>
<td>390</td>
<td>0.08%</td>
</tr>
<tr>
<td>Tropical forest</td>
<td>57,835</td>
<td>12.30%</td>
</tr>
<tr>
<td>ALL BIOMES/CCA</td>
<td><strong>470,121</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

On this basis, the estimated value of Indonesia’s ‘natural capital at risk’ is likely to be around $470 billion annually. The analysis suggests that the largest impacts on natural resources may be in the ECs of Kalimantan, Sumatra, and Papua-Maluku (collectively just under 90% of all impacts in monetary terms – and explained by very large areas of tropical forest), and that impacts on coastal and inland wetlands account for some 60% of all impacts (again, in monetary terms).

The interpretation of these results in economic terms is essentially as follows:

- The figure of about $470 billion annually reflects the estimated economic value of natural resources which may be considered to be ‘at risk’ from the set of MP3EI investments over the whole 15-year plan period

- The actual level of impact will be likely be less than this (unless planned investments are increased in scale), because not all MP3EI infrastructure, economic and mining projects will actually result in the loss of all components of TEV. In other words, while some land-based investments may cause damage to (for example) timber, NTFP or food supplies, disturb some animals etc, and while coastal investments may cause erosion, pollution etc, actual economic losses in terms of natural resources value will not be total/catastrophic in all cases. It is also the case that not all projects will start immediately, so – at least in early years – the scale of impact will be less than that envisaged at full MP3EI implementation

- Expressing the value of Indonesia’s ecosystem services in monetary terms does not suggest that such values should be used for setting prices for assets, or that...
they could be directly used in detailed/site-specific project appraisals. Most ecosystem services are public goods\(^\text{70}\) that cannot (or should not) be privatized. Losses of such natural resources can literally be ‘beyond price’, if the consequences of investments’ implementation results in catastrophic or irreversible loss (e.g., species’ extinction). Expressing the value of such resources in monetary terms is primarily an estimate of their benefits to society as a whole beyond the scope of typical investment design —benefits that would be lost if they were destroyed.

- Given that it is typically the poorest in Indonesian society who depend most on common property natural resources, such groups are most at risk from the loss of these services. Recent work in Indonesia by TEEB\(^\text{71}\) suggests (for example) that adjusting GDP sectoral composition to allow for the value of non-marketed ecosystem services increases agriculture’s share of GDP by about 25%, and – even more significantly – raises the per capita income of the poor by about $110. This is likely to be a greater source of economic benefit than any other type of government policy presently under consideration for the poorest among the Indonesia population.

- In the present case, it may be useful to consider the annual value of ‘natural capital at risk’ of some $470 billion in relation to the estimated MP3EI total investment value of about $340 billion\(^\text{72}\) (i.e., in scale it is about a third bigger in every year alone) and also in relation to Indonesia’s annual GDP of about $880 billion (in 2012, and obviously it represents about half on national wealth generation). Further, if the $470 billion annual natural resource cost was actually incurred, it may be instructive to note that over a period of 20 years - and discounted at 12% - its NPV is about $3,510 billion (or some 10 times the total planned MP3EI investment cost).\(^\text{73}\)

In summary, the relevance of this exercise for the MP3EI SEA exercise is to demonstrate that monetary valuations of the importance of ecosystem services to society can serve as a powerful (and arguably essential) communication tool to inform better, more balanced decisions regarding trade-offs involved in land use options and resource use.\(^\text{74}\) Ecosystem service valuations of the type presented here are best seen as complementary to conventional non-quantitative - and essentially non-economic - decision-making frameworks (such as EIA and SEA), in which the positive and negative externalities of the use or loss of many environmental goods and services are still not, or are only insufficiently, acknowledged and captured. Awareness of more dimensions of the real costs of investment decisions can only lead to better long-term resource use.\(^\text{75}\)

\(^{70}\) Public goods are characterised by non-excludability and non-subtractability, i.e., they are potentially open and available to all members of society and one person’s consumption/enjoyment does not diminish that of other members.

\(^{71}\) The Economics Of Ecosystems and Biodiversity: TEEB for National and International Policy Makers (2010) – see Chapter 3, calculation of a ‘GDP of the poor’

\(^{72}\) As provided by the MP3EI, p. 49

\(^{73}\) This is a relatively high rate, as used by international development agencies, and which arguably may not be appropriate for Indonesia’s social and economic capital conditions. Were the estimated natural resource costs to be discounted at a lower rate (which may be more appropriate given the long-term costs associated with climate change and uncertainties surrounding possibly irreversible natural resource impacts), the NPV would be correspondingly greater. There are numerous views about what are appropriate discount rates to apply in different circumstances ; see ‘Cost Benefit Analysis For Development: A Practical Guide’, ADB (2013)

\(^{74}\) Again, see TEEB For National and International Policymakers’, Chapter 4

\(^{75}\) Again, as the TEEB For National and International Policymakers’ work clearly demonstrates, many investment decisions might not be viable if full accounting was made of the natural resource costs – see Chapters 3 and 4.
Caveats to the usefulness of natural resources impacts valuation in this case include not only the general methodological issues associated with ecosystem benefits estimation and benefits transfer, but also the fact that the figures really represent a likely upper bound of the value of possible external costs, with actual costs being dependent upon detailed design, scaling and timing and projects, and especially in relation to any mitigating measures which can (still) be put in place before implementation. Further, these external costs only relate to natural resource losses, and not to other impacts - such as on urban areas (e.g., water supplies, air quality, congestion etc) and greenhouse gas emissions. Lastly, because the costs are expressed on a per hectare basis, at this stage they do not reflect the numbers - and proportion – of the national population impacted.

7.3 Overall Findings in Relation to Sustainability

The preceding sections provide an overview on whether MP3EI Policy strategies are in line with the national target and goals summarized in Section 3 of this report; by highlighting weaknesses, gaps, contradictions and potential synergies between MP3EI and existing national commitments. Where there are weaknesses, gaps or contradictions; a synopsis of the results impacts to Indonesia’s ecosystems and society are offered.

In general, the MP3EI stipulates a number of commitments, both within its general policy as well as for specific Economic Activities, which are highly relevant to environmental, social and health issues addressed within MP3EI Policy SEA. It mentions among other prerequisites for successful implementation of MP3EI that “Business enterprises must undertake innovative measures to develop technology and production methods in order to triumph in today’s global competitiveness”. Also, within State Financial Policy Reform the MP3EI provides that “The revenues and royalties from non-renewable natural resources extraction should not be treated and expanded as current revenue but rather some portion to be kept for the benefit of future generations” and that “The return from processing renewable natural resources will be invested to enhance the quality of human capital and technology”.

A specific example related to climate change provides that it (the MP3EI)... “is formulated in consideration of the National Action Plan for Greenhouse Gas (Rencana Aksi Nasional Gas Rumah Kaca – RAN GRK) as a national commitment which recognizes the global climate change”.

Although there are some promising MP3EI commitments, the analysis undertaken for this SEA shows that as a policy, i.e. for Climate Change and the other indicated sustainability issues, the MP3EI misses the inclusion of critical sustainability issues and is generally unclear regarding the implementation of positive MP3EI initiatives.

Given this, a significant portion of the existing sustainability goals and targets stipulated by national polices and strategic documents, as well as the international commitments, will not be met or in conflict with MP3EI implementation.

Furthermore, the economic analysis revealed a significant potential costs related to natural habitats which may be adversely affected by the MP3EI implementation. Thus, unmanaged environmental risks will cause not only degradation of environment and worsening the human health but impose also problems regarding the economic efficiency of the M3PEI.
8 Recommendations and Mitigation Measures

The analyses above have resulted in a number of recommendations and mitigation measures aiming at avoiding and/or minimizing likely environmental and social risks linked to the MP3EI implementation. There are both general suggestions for adjusting the MP3EI overall policy and/or the RPJMN to properly address several key issues (Section 8.2), and regarding enhancement of institutional context to improve environmental management (Section 8.3), as well as specific recommendations for main Economic Sectors (Section 8.4). Section 8.5 provides an example of the "Roadmap," which is recommended to be developed to define specific actions on implementing proposed mitigation measures by the Government of Indonesia.

8.1 Categories of Recommendations and Mitigation Measures

The recommendations and mitigation measures are grouped in altogether six categories:

Adjustments of MP3EI / RPJMN

Modification of policy directions for certain sectors is highly needed to ensure that further development as envisaged by the MP3EI/RPJMN is in-line with sustainable development objectives and consistent with the Indonesian commitments. The MP3EI Policy SEA has proposed a number of specific modifications of the MP3EI draft as well as formulated issues to be addressed during the RPJMN preparation. Optimally, the discussion on how to integrate proposed modifications in the existing version MP3EI and/or in the draft RPJMN should be soon initiated at the KP3EI platform.

Amendments of Legal and Regulatory framework

Achieving satisfactory level of environmental protection requires adjustments of the relevant legislation (e.g. introducing stricter standards for air and water quality). Similar to the point above, based on the recommendations to be provided by the MP3EI SEA the discussion between Bappenas and KLH should be launched to determine details on further actions.

Improvements of National and Provincial Planning

In order to properly manage the environmental and social issues, it is important to transpose appropriate policy direction and spatial guidelines in relevant planning schemes – the sectoral planning at the national level (which further elaborates priorities stipulated by the RPJMN) and provincial planning (i.e. both development and spatial plans). It is recommended to open discussion during preparation of the RPJMN (inviting relevant ministries) to address linkages between the RPJMN and sectoral plans regarding integration of measures proposed by the MP3EI SEA as well as Bappenas should coordinate focused communication with the MOPW and MOHA on integration of the recommendations at the provincial level.

Guidelines for Project Execution

Obviously, significance and scope of likely MP3EI impacts to a large extent depend on a way of the specific MP3EI projects’ implementation. Therefore the MP3EI Policy SEA will propose guidelines to be elaborated in detail through SEA for individual ECs, which should be followed when designing and implementing specific projects. Optimally, these guidelines should be applied not only for the MP3EI projects, but for all development activities in given economic

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76 The Roadmap is currently (June 2014) a subject of discussions with the relevant Governmental agencies. The conclusions will be included in the final vision of the MP3EI Policy SEA report.
sectors. The discussion on practical application of the guidelines should optimally involve
governmental authorities at the provincial level, which are responsible for permitting procedures.

Improving Institutional Environmental Management & Coordination

In recognition that better management is a function of prioritising the institutional management
and ensuring sufficient coordination among relevant stakeholders, the MP3EI SEA has provided
recommendations on enhancing ‘institutional space’ for better coordination among MP3EI
governmental stakeholders, as well as non-governmental organizations, to ensure proper
implementation of the relevant MP3EI social and environmental measures. Since
intergovernmental negotiations on necessary arrangements may take longer time, it is
recommended to initiate the process by “bilateral” discussion between Bappenas and KLH to
design further steps.

MP3EI Greening Audits

In order to manage likely environmental and social risks, there is a need to enhance monitoring
schemes as well as to strengthen enforcement of the legal provision.

The scheme below explains the linkages between these categories and their position in the
overall planning and decision-making system, while Table 7.1 provides rationale behind
categories and types of recommended generic method of implementation (the colours of cells in
the table correspond with relevant boxes in the scheme).

![Diagram of Linkages between categories of mitigation measures]

**Figure 8.1** Linkages between categories of mitigation measures
### Table 8.1 Categories of MP3EI SEA Measures

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Rationale</th>
<th>Method of Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy and Planning</strong></td>
<td>Adjustments of MP3EI / RPJMN</td>
<td>Modification of policy directions for certain sectors is highly needed to ensure that further development as envisaged by the MP3EI/RPJMN is in-line with sustainable development objectives and consistent with the Indonesian commitments. The MP3EI Policy SEA has proposed a number of specific modifications of the MP3EI draft as well as formulated issues to be addressed during the RPJMN preparation.</td>
<td>Initiating discussion at the KP3EI platform on how to integrate proposed modifications in the existing version MP3EI and/or in the draft RPJMN. MP3EI SEA experts would optimally join the negotiations to provide detailed recommendations.</td>
</tr>
<tr>
<td></td>
<td>Amendments of Legal and Regulatory Framework</td>
<td>Achieving satisfactory level of environmental protection requires adjustments of the relevant legislation (e.g. introducing stricter standards for air and water quality). Therefore MP3EI SEA recommended certain changes in the legal acts stipulating to improve legal framework regarding the key environmental and social issues.</td>
<td>Launching discussion between Bappenas and KLH to determine details on further actions.</td>
</tr>
<tr>
<td></td>
<td>Enhancing sustainability of national sectoral planning</td>
<td>In order to properly manage the environmental and social issues in various economic sectors, it is important to transpose relevant policy direction proposed by the MP3EI SEA in sectoral planning at the national level to further elaborate specific actions towards better environmental protection and allocate appropriate funding.</td>
<td>Opening discussion during preparation of the RPJMN (to be coordinated by Bappenas and inviting relevant ministries) to address linkages between the RPJMN and sectoral plans regarding integration of measures proposed by the MP3EI SEA.</td>
</tr>
<tr>
<td></td>
<td>Integrating national sustainability issues in provincial planning</td>
<td>Environmental and social issues elaborated by the MP3EI SEA need to be properly integrated in the planning at the provincial level to ensure that both development and spatial planning schemes support national objectives and commitments regarding sustainable development.</td>
<td>Bappenas should coordinate focused communication with the MOPW and MOHA on integration of the recommendations given by the MP3EI SEA at the provincial level.</td>
</tr>
<tr>
<td><strong>Project Execution</strong></td>
<td>Guidelines for Project Execution (MP3EI &amp; others)</td>
<td>Obviously, significance and scope of likely impacts will to a large extent depend on a way of the specific projects’ implementation. Therefore the MP3EI Policy SEA will indicate the guidelines (to be elaborated in detail through SEA for individual ECs), which should be followed when designing and implementing specific projects (e.g. ToR</td>
<td>The discussion on practical application of the guidelines should optimally involve governmental authorities at the provincial level, which are responsible for permitting procedures.</td>
</tr>
<tr>
<td>Decision-making levels</td>
<td>Category of MP3EI SEA Measures</td>
<td>Rationale</td>
<td>Method of Implementation</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------</td>
<td>-----------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Vertical measures</td>
<td>Improving Institutional Environmental Management &amp; Coordination</td>
<td>One of the main problems in Indonesia regarding environmental protection is the law enforcement, monitoring and control. Therefore the MP3EI SEA has provided recommendations on enhancing ‘institutional space’ for better coordination among MP3EI governmental stakeholders as well as non-governmental organizations to ensure proper implementation of the relevant MP3EI social and environmental measures.</td>
<td>Since intergovernmental negotiations on necessary arrangements may take rather longer time, it is recommended to initiate the process by “bilateral” discussion between Bappenas and KLH to design further steps</td>
</tr>
<tr>
<td></td>
<td>MP3EI Greening Audits</td>
<td>Similar to the category above, the enhancement of monitoring schemes and law enforcement is required to enable better management of environmental issues at all planning and project development measures.</td>
<td>Since intergovernmental negotiations on necessary arrangements may take rather longer time, it is recommended to initiate the process by “bilateral” discussion between Bappenas and KLH to design further steps</td>
</tr>
</tbody>
</table>

### 8.2 General Recommendations for Adjusting the MP3EI Policy / RPJMN

Besides recommendations related to the specific economic sectors there are several issues which would need to be properly accommodated in and emphasised by the MP3EI overall policy and/or properly addressed in the RPJMN:

**Preventing or minimizing forest and peat land conversions**

- Considering the importance of forests as well as existing trends in deforestation and forest / peat land degradation, the MP3EI/RPJMN should – among its main principles – emphasise importance of protecting the forest (especially primary forests) and peat land with the aim to prevent (or minimize) its conversion.

- Also, the MP3EI/RPJMN should promote the sustainable forest management principles (PHPL) for primary, secondary, and production forests.\(^77\)

- Besides MP3EI/RPJMN, the policies and regulations in relevant sectors should be adjusted accordingly, and operations and activities in forests should follow provisions of the President Instructions No. 6/2013 the Delay of New Permit Issuance and Improving the Management of Primary Forest and Peat Land, and related Indicative Map of the New Permit Delay (PIPIB) revision IV.

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\(^77\) In accordance with Regulation No.43/ Menhut-II / 2014 on Assessment of Sustainable Forest Management Principle (PHPL) and Verification of Wood Legality (VLK).
Reducing reliance on non-renewable natural resources

- The M3PEI should strongly emphasise necessity of increasing the energy efficiency of the entire country’s economy (especially in industry and transport sector) and higher utilization of renewable energy resources as the only ways how to in long-term perspective minimize reliance on the non-renewable natural resources.

- The major benefits of increasing energy efficiency to Indonesia can be formulated as follows:
  - Aggregate reduction in energy use per unit of GDP implies a reduction in exposure to external sources of supply (especially and most obviously as the country as is now a net importer of oil) and improves the national balance of trade position
  - Improved energy efficiency improves competitiveness across a range of businesses, and is especially important for exports or import-substituting activities
  - Greater energy efficiency also reduces the volume of CO₂ and other emissions, and reduces the overall scale of global and national pollution
  - More efficient energy uses are associated with greater long-term sustainability (e.g., in the use of water- or rail-based transport and moves away from road transport)
  - Reductions in energy costs are an element in poverty reduction (especially for electricity supply in urban areas) programmes
  - More energy-efficient assets (factories, commercial or domestic building) have a higher asset value, longer lives, and provide better living and working conditions (and can have positive health impacts)

Considering the Climate Change and its likely consequences

- Although the MP3EI provides that its formulation takes “…in consideration of the National Action Plan for Greenhouse Gases”, yet there is not further reference on how the MP3EI integrates the goals for reduction of the GHG emissions in its policies and regulations. Also the analysis of the MP3EI projects clearly indicates the majority of projects will increase GHG emissions. The MP3EI should clearly claim that it intends to contribute to fulfilling the country’s commitments regarding the GHG emissions – and subsequently also adjust planning for the most relevant sectors (industry, energy, transport). In result, the list of the MP3EI projects should include larger number of the projects having relationship with Indonesia’s Nationally Appropriate Mitigation Actions (so far there are only three such projects within M3PEI).

- Since Indonesia may be significantly affected by the consequences of the changing climate, the MP3EI Policy should clearly stipulate a necessity for proper consideration of the risks likely related to the changing climate in the MP3EI sectoral planning and – similarly to the GHG emissions – make further adjustments in policies and regulations for relevant sectors (tourism, agriculture, connectivity etc.).
General principles of environmental management

Implementation of the MP3EI projects as well as further on implementation of the RPJMN should follow key principles to ensure it properly considers relevant environmental, social and health concerns:

- Protected or ecologically sensitive areas and biodiversity hotspots should be primarily considered as “no-go-areas”, their status maintained or enhanced and these areas should be prioritized to be protected (if it is not the case yet)
- Suitable brownfield areas or already degraded land should be reclaimed and primarily used for relevant MP3EI projects
- Existing tools and approaches for a good planning should be utilized i.e. applied for planning and implementation the MP3EI projects and the development stipulated by the RPJMN – namely Integrated Coastal Zone Management, River Basin Management Planning etc.
- Sensitivity of area to and likely impacts of natural disasters and likely consequences of the climate change (sea-level rise etc.) should be considered planning location for specific economic development
- The appropriate capacity of health and educational services, water supply and waste/waste water management systems have to be ensured before or in parallel with the MP3EI/RPJMN-related development

8.3 Enhancing the Institutional Context

The MP3EI itself provides that there is need for “Building a commitment to the implementation of good governance” and “Creating an effective bureaucracy, which is able to better manage and enhance the people’s livelihood as well as supporting the needs of the business sector” as prerequisites for successful implementation of MP3EI. Although the document does not elaborate further details, it can be assumed that promoted bureaucracy reform should also focus on managing the environmental, social and health concerns.

However, considering existing problems with environmental management in Indonesia, it seems to be probable that the implementation of the projects under the MP3EI (and/or RPJMN) would face similar difficulties. Therefore, in recognition that better management is a function of prioritising the institutional management of an issue and ensuring sufficient coordination among relevant stakeholders, the MP3EI SEA aims to provide related recommendations to enhance the structures coordinating the MP3EI implementation.

Among others, these may entail establishing ‘institutional space’ for better coordination among MP3EI governmental stakeholders, as well as non-governmental organizations, to ensure proper implementation of the relevant MP3EI social and environmental measures. Considering its position in the governmental scheme, it is obvious that the Ministry of Environment (KLH) should play a pivotal role and be involved (as a part of the KP3EI) in recommended activities, such as the:

- Development, adoption and application of downstream MP3EI “planning guidelines” (see tables for specific economic categories below)
- Monitoring the SEA and EIA processes related to the MP3EI projects in order to ensure its appropriate quality including extensive involvement of relevant stakeholders and transparent disclosure of reports and results
• Ensuring transfer of MP3EI SEA recommendations to provincial plans and related SEAs
• Ensuring the environmental compliance of the MP3EI projects
• Establishing web-based EIA/SEA Information System (optimally within the KP3EI website), where information and documents related to SEAs/EIAs for MP3EI projects would be publicly available and which could later on be used for all SEAs/EIAs conducted in the country
• Developing and applying mandatory guidelines for Keystone MP3EI projects on social aspects to be applied in associated planning, project design and related environmental assessments
• Strengthening implementation of “moratorium” on primary natural forest and peatland (Presidential Instruction No. 10/2011) for the MP3EI projects
• Allocating appropriate funds and human resources to protected areas management to strengthen the control of illegal logging and poaching likely to be linked to the MP3EI projects.

8.4 Recommendations for specific Economic Categories

Tables below provide a summary of the recommendations developed through the MP3EI Policy SEA for main economic categories and structured along the categories described in Section 8.1.
### Table 8.2 Recommendations for Agriculture and Forestry

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Agriculture and Forestry</th>
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<tr>
<td></td>
<td>Adjustments of MP3EI / RPJMN</td>
<td>The M3PEI/RPJMN should – among its main principles – emphasise importance of protecting the forest (especially primary forests) and peat land with the aim to prevent or minimize its conversion. MP3EI/RPJMN policies and regulations for Agriculture and Forestry Economic Activities should clearly promote (i) application of the guidelines for agriculture and forestry development for all relevant MP3EI projects (integrating principles and criteria developed by the Indonesian Sustainable Palm (ISPO) of the Ministry of Agriculture, as well as policies of the Sustainable Forest Management (PHPL) of the Ministry of Forestry), and (ii) application of good management practice. The relative importance given to the industrial timber plantations (HTI) as opposed to managing the natural production forests for sustainable selective logging is however progressively imbalanced towards the industrial timber plantations. Therefore, the MP3EI within policies and regulations for Timber Economic Activity should stipulate a focus on improving standards of sustainable management of the natural forests in order to decrease converting forests into industrial timber plantations. Make a clear decision on size of ‘productive plantation areas’ in RPJMN and introduce intergovernmental cooperation to maximize efficiencies while reducing the area of existing plantation concessions. RPJMN should make a clear commitment to addressing environmental dimension of the agriculture and forestry sectors (e.g. sustainability criteria, Best Available Techniques – BAT) as described above for the MP3EI.</td>
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<td></td>
<td>Amendments of Legal and Regulatory Framework</td>
<td>Guidelines integrating Principles and Criteria developed by the Indonesian Sustainable Palm Oil (ISPO) should be legislated. A dedicated study should be prepared to analyse implementation of the forest permits, their overlap with other permits as well as to determine major inconsistencies between legislation and forest policies (as indicated by the MP3EI Policy SEA). The scheme of integrated licensing system should be enhanced i.e. the current licensing mechanism for plantations should be revised to make the plantation business permit the administrative process. The procedure of issuing the Cultivation Right Title (HGU) by BPN should be integrated into the process of land release. Revise regulation regarding releasing the land for plantation in order to tighten up the procedure. The Government should prepare and issue the new implementing regulation (Governmental Regulation) on the farm business following the Law No. 18/2009 on Husbandry and Animal Health (the Article 97 stipulates that the governmental regulation regarding the implementation of Law No. 18/2009 should be adopted no later than two years after the Law enters into force). The main issue to be addressed in new regulation should be the farm business permit, especially regarding the period of expiration of the farm business permit. There is a need for further regulation regarding indigenous people and their rights, including customary land; although protection of agriculture land and its conversion into non-agriculture land is regulated by the Law No. Law No. 41/2009 on Protection of Sustainable Food</td>
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<td>Decision-making levels</td>
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<td></td>
<td><strong>Agricultural Land</strong></td>
<td>The enforcement of the law needs to be strengthened, especially properly integrate the protection of agriculture land in spatial planning at the provincial and local levels.</td>
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<td><strong>Enhancing sustainability of national sectoral planning</strong></td>
<td>Definition of “degraded land” needs to be precisely described in the relevant sectoral plan, since the lack of clear definition of “degraded land” presents a burden for efficient application of the Forest Moratorium.</td>
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<td>Review of existing concessions: Before allocating public funds for further Palm-Oil (or other plantation) development, the review of existing land use conversion concessions shall be performed in order to avoid conflicts and inefficiencies in territorial development and infrastructure investments. The relevant sectoral plan should elaborate necessary procedure to ensure the above mentioned.</td>
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<td>Relevant sectoral plan should provide instructions for implementing environmental assessment steps into agriculture and forestry development planning, including evaluation of alternatives.</td>
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<td>Since it is recognized that inconsistencies in permitting and palm oil, timber and other land concession awarding mechanisms are key structural problem of territorial governance system in Indonesia, responsible for sub-optimal utilization of resources and social conflicts (disputes over land, conflicts with indigenous communities, corruption, etc.), the relevant sectoral plan should elaborate the practical steps addressing this issue.</td>
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<td><strong>Integrating national sustainability issues in provincial planning</strong></td>
<td>Forests on poor soils, especially tropical ultisols (which are not suitable for development of agricultural activities/plantations), should not be converted into plantations. Also the areas that produce diverse food crops for local use should not be converted into monoculture plantations. Therefore the provincial spatial plans should determine these areas to provide territorial guidance for further agriculture and forestry development.</td>
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<td><strong>Guidelines for Project Execution (MP3EI &amp; others)</strong></td>
<td>Strictly consider protected or ecologically sensitive areas and biodiversity hotspots as “no-go-areas” for plantations development at all levels of planning.</td>
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<td>Strictly follow criteria determined by the Ministry of Forestry (Regulation P.3/Menhut-II/2008) prohibiting timber activities in certain types of areas.</td>
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<td>Considering further plantation development anticipated within the MP3EI, comprehensive guidance on site selection and implementation of environmental management needs to be strictly implemented and monitored, in order to minimize the likely significant negative environmental impacts. The guidelines should specially address following issues:</td>
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<td>• Watershed protection: Since watershed conservation belongs to high priorities, the guidelines need to elaborate principles of the forest conservation along the rivers, constructing water retention dams wherever rivers leave the plantation areas, to prevent the floods downstream and reduce the sediment load washed by the rivers from the plantations.</td>
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<td>• Good management practice: The guidelines should elaborate principles of good management practice to protect soil, water, biodiversity, and socio-economic aspects including human health (e.g. to enhance preservation of soil nutrients, underground waters</td>
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<td>Decision-making levels</td>
<td>Category of MP3EI SEA Measures</td>
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<td>and water retention capacity of the soil, reducing the use of industrial fertilizers, herbicides and pesticides (and resulting pollution) and maximizing the options of organic farming and recycling the waste biomass).</td>
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<td>• Protected Areas in Unit Management: The protected areas within plantations should be redesigned to really meet the conservation needs and protected forests regulation. Instead of small patches of forests scattered across plantations; the continuous forest blocks should be designed, preferably located marginally to the plantation and connected with other forests.</td>
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<td></td>
<td>Improving Institutional Environmental Management &amp; Coordination</td>
<td>The approach should be developed and enforced to address existing inconsistencies in permitting and palm oil, timber and other land concession awarding mechanisms, which present the key structural problem of territorial governance system in Indonesia, responsible for sub-optimal utilization of resources and social conflicts (disputes over land, conflicts with indigenous communities, corruption, etc.).</td>
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<td>Enhanced coordination between local governments, the Ministry of Energy and Mineral Resources, the Ministry of Agriculture, and the Land Institution would be needed to avoid conflicts between plantations and mining. The Memorandum of Understanding between those parties could be signed addressing a need for better registration and compliance audits for mining and plantation concessions, which could results in establishing the information system.</td>
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<td>It can be recommended to develop scheme (by the Ministry of Industry) which would encourage processing industries buying raw cocoa directly from the farmers. In addition, the Ministry of Agriculture in collaboration with the Ministry of Industry and the Ministry of Finance could also support cocoa farmers in introducing new and more efficient technologies.</td>
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<td></td>
<td>MP3EI Greening Audits</td>
<td>The procedure of issuing the Cultivation Right Title (HGU) by the National Land Agency (BPN) has to be monitored to ensure it proceeded through the legal process of the land release coordinated by the Ministry of Forestry.</td>
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</table>
## Recommendations and Mitigation Measures

### Table 8.3 Recommendations for Industry (Light & Heavy)

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Industry (Light &amp; Heavy)</th>
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<td></td>
<td>Adjustments of MP3EI / RPJMN</td>
<td>Reduce MP3EI-related public funding for extractive resource use and shift it to dedicated projects for sustainable peat land management, development of carbon sequestration projects in forestry and agriculture, efforts to reduce deforestation and land degradation and reduction in solid and liquid waste. MP3EI policies and regulations for Industrial Economic Activities should promote a need for innovative industrial development and thus provide a framework for investments in e.g. renewable energy equipment, low emission / low waste industrial technologies etc. MP3EI – among its regulations and policies for Industrial Economic Activities – should clearly stipulate use of the best available techniques (BAT) for the relevant MP3EI projects as well as to promote the BAT application in all sectors to ensure an adequate level of environmental protection including adequate social and environmental management and self-monitoring. The MP3EI – among its regulations and policies for Industrial Economic Activities – should clearly stipulate the strict enforcement of the environmental regulations (e.g. compliance with air emission standards) for industrial sectors. For transportation equipment, the MP3EI should promote production of the fuel-efficient vehicles which would contribute to the efforts to decrease air emissions from transport. The MP3EI should also promote use of innovative technologies in transport equipment production e.g. higher use of recyclable materials, using lubricants with longer lifetime etc. For the shipping industry, the MP3EI should promote &quot;life-cycle thinking&quot; within the various maritime sectors (shipbuilding, ship operators and vessel recyclers), which would enable a more effective way of minimising the impacts of this industry including the impacts resulting from ships during their operation. Similarly to the transportation equipment, the MP3EI should also support use of innovative technologies in shipping industry i.e. fuel-efficient ships, higher use of recyclable materials, using less toxic anti-scaling products/methods, using lubricants with longer lifetime etc. Oil and Gas Industry the M3PEI should promote the production and distribution of low sulphur fuels as well as use of the zero flaring technologies. RPJMN should assign • preparation of the scheme for annual emission inventory (using amongst others the facility reports of self-monitoring) to be developed and used for the M3PEI industrial projects as well as for other industrial initiatives (out of the MP3EI scheme) • the survey on use of the BAT in industrial sectors – based on the results, the strategy for BAT application in Indonesia should be prepared • regular surveys on (non)compliance with the environmental emissions standards and based on it adopt the actions to strengthen compliance of industrial production with the environmental standards.</td>
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<td>Decision-making levels</td>
<td>Category of MP3EI SEA Measures</td>
<td>Industry (Light &amp; Heavy)</td>
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<td></td>
<td>Amendments of Legal and Regulatory Framework</td>
<td>Introduce stricter air and water quality standards, make application of BAT a requirement in all new EIA (permitting procedures), and permit renewals. It can also be suggested to strengthen monitoring and control scheme to ensure that majority of industrial production in the country complies with the legal standards regarding emissions to the air as well as waste and waste water disposal. The scheme should also include penalties for businesses not meeting the legal requirements.</td>
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<td></td>
<td>Enhancing sustainability of national sectoral planning</td>
<td>Following adjusted MP3EI/RPJMN planning for the most relevant sectors (industry, energy, transport) developed new projects to be considered as Indonesia’s Nationally Appropriate Mitigation Actions. Since the industrial development will lead to increase water and energy demand, as well as to the higher waste / waste water production, the studies needs to be conducted to analyse existing capacities (energy and water supply, waste / waste water management capacities) and ensure there will be sufficient capacities to satisfy expected growing demands. Relevant sectoral plan should assign such study to be used as a basis for further industrial development planning at the provincial level.</td>
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<td></td>
<td>Integrating national sustainability issues in provincial planning</td>
<td>Since a number of the MP3EI industrial projects will be located in the coastal and lowland areas, which are prone to floods, the provincial spatial plans need to identify the most sensitive areas and to recommend to most suitable locations for industrial development.</td>
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<td></td>
<td>Guidelines for Project Execution (MP3EI &amp; others)</td>
<td>Use primarily suitable brownfield areas or already degraded land for implementation of the MP3EI industrial projects. The areas where topography and hydrology does not enable safe industrial waste management, prevention of soil erosion and sedimentation and protection of water ecosystems (including coral reefs and sea grass beds) should not be used for industrial development. Generally, it includes steep slopes, sheltered bays with limited water exchange (e.g. Balikpapan Bay), lakes, floodplains and hotspots of marine and freshwater biodiversity. The provincial spatial plans should consider above mentioned types of territories when determining the sites for industrial development. Specifically for oil and gas industry projects it is important to ensure preparedness for incidental spills.</td>
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<td></td>
<td>Improving Institutional Environmental Management &amp; Coordination</td>
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Recommendations and Mitigation Measures

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<td>MP3EI Greening Audits</td>
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### Table 8.4 Recommendations for Mining

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<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Mining</th>
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<tr>
<td>Policy and Planning</td>
<td>Adjustments of MP3EI / RPJMN</td>
<td>In MP3EI/RPJMN elaborate requirements to implement BAT approach for existing and future mining operations to achieve cleaner production and energy efficiency. M3PEI/RPJMN should elaborate controlling scheme and provide financial framework to ensure that mine closure plans and reclamation plans are implemented. It is recognized that MP3EI reflects the need for a better governance in mining sector, however, outlined provisions and policy regulations are rather general and do not indicate practical steps towards solution of conflicts related to mine closure and reclamation, overlapping concessions, inconsistency between central and regional/local planning and permitting and other shortcomings plaguing the mining sector’s regulatory environment. Thus, the MP3EI should stipulate clear provisions providing the framework for improved for better mine closure and reclamation management and control for the relevant MP3EI projects. Reduce MP3EI-related public funding for extractive resource use and shift it to dedicated projects for sustainable peat land management, development of carbon sequestration projects in forestry and agriculture, efforts to reduce deforestation and land degradation and reduction in solid and liquid waste. RPJMN should make a clear commitment to addressing environmental dimension of the mining development, namely guidelines for technology selection (e.g. environmental criteria, BAT). Integrated solutions for energy production facilities (addressing transport of fuel, waste management, emission and pollution control measures) shall be preferred by the RPJMN.</td>
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<td></td>
<td>Amendments of Legal and Regulatory Framework</td>
<td>Introduce stricter air and water quality standards, make application of BAT a requirement in all new EIA (permitting procedures), and permit renewals. The licensing mechanism for mining should be revised to make the procedure of issuing the mining license as an administrative process as well as to clarify the permitting procedure for mining areas within forest areas. In such cases, the mining permit holder have to obtain permit from the Ministry of Forestry (IPPKH – forest use permit), besides getting permit from the local government. However, this process is regulated by different legal documents. In the Law No. 4/2009 on Mineral and Coal Mining, there is no provision that would stipulate the obligation of the mining permit holder to also obtain the permit from the Ministry of Forestry. If the mining area overlaps with the forestry area. That obligation is stipulated by the Law No. 41/1999 on Forestry. Optimally, the procedure should integrate obtaining both types of permits – therefore the amendments of relevant legal documents would be needed which would also enhance coordination between the local governments, the Ministry of Energy and Mineral Resources, and Ministry of Forestry. There is obviously a need for developing the legal basis clearly stipulating provisions on the public-private partnership for oil processing facilities, since according to the Presidential Regulation No. 67/2005, the type of infrastructure which can be built by the partnership scheme includes processing, storage, transportation, transmission, as well as oil and gas distribution, while the Presidential Regulation No. 13/2010 and Presidential Regulation No. 66/2013 provide that the oil and gas infrastructure covers only the transmission and/or oil and gas distribution.</td>
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<td>Decision-making levels</td>
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<td>Enhancing sustainability of national sectoral planning</td>
<td>The relevant sectoral plan should elaborate in detail issues to be addressed in the MP3EI/RPJMN – see above. Considering the heavy coal-based energy production capacity development within the MP3EI, as well as continuing focus on metal ores mining, a comprehensive guidance on environmental management including post-mining land reclamation is necessary to ensure minimization of potentially heavy negative environmental impacts. Mines should provide a financial security to ensure that mine closure plans and reclamation plans are implemented. Mine closure plans should be updated on two-year basis during the mine life to ensure that they are relevant at the time of mine closure due to changes in economic conditions or ownership.</td>
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<td>Integrating national sustainability issues in provincial planning</td>
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<td>Project Execution</td>
<td>Guidelines for Project Execution (MP3EI &amp; others)</td>
<td>The systematic application of environmental assessment for the mining sector developments is of critical importance. Following types of environmental impact need to be addressed consistently during both policy and project design preparation: • Land-use concerns (including solution of land rights disputes and conflicting concessions) • Land uptake minimization (including proper phasing of mining activities, when permit for opening a new sector can only be awarded after previously affected land is re-cultivated in line with environmental management plan. • Local air pollution • Impact on water resources • Impacts on biodiversity (especially habitat fragmentation) • Risk of soil erosion and natural disaster mitigation</td>
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<td>Vertical measures</td>
<td>Improving Institutional Environmental Management &amp; Coordination</td>
<td>Develop and enforce controlling scheme ensure that mine closure plans and reclamation plans are implemented In order to reduce conflicts between mining and forests, the permitting procedure should be based on unified map as a reference for issuing the permits The local government should also regularly report to the Central Government on the mining permits issues. It is also needed to improve coordination among all relevant institutions involved i.e. the Ministry of Energy and Mineral Resources, the Ministry of Forestry as well as the Local Governments to address the issues above.</td>
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<td>MP3EI Greening Audits</td>
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### Table 8.5 Recommendations for Energy

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<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Energy</th>
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<tr>
<td><strong>Policy and Planning</strong></td>
<td>Adjustments of MP3EI / RPJMN</td>
<td>The M3PEI should strongly emphasise necessity of increasing the energy efficiency of the entire country’s economy (especially in industry and transport sector) and higher utilization of renewable energy resources as the only ways how to in long-term perspective minimize reliance on the non-renewable natural resources. The RPJMN should elaborate and promote strategies to increase energy efficiency in all relevant economic activities (industry, transport etc.), since only this direction can in long-term perspective ensure sustainable use of the natural resources. This strategy should also elaborate options for developing the pricing mechanisms for energy and gradual phase out of fuel subsidies. Revise energy strategies in MP3EI and RPJMN to include a minimum of 30% of feasible non-fossil fuel energy – the MP3EI Energy section should provide a framework for higher utilization of the renewable energy resources, which may also lead to increased investments into new technologies development and thus contribute to further evolution of “green” industries in the country. Considering its potential in Indonesia, the geothermal energy development should be a high priority for the M3PEI, as well as coal gasification and co-generation technologies. The MP3EI Energy sections would benefit from presenting alternative options for the proposed energy-related developments that would provide comprehensive evaluation of expected impacts on energy supply situation on both national and EC levels (i.e. contribution of MP3EI investments to meeting the energy policy targets) and resulting in suggestions for shifting the MP3EI from current high focus on the coal-based power plants investment towards more diversified energy production. RPJMN should make a clear commitment to addressing environmental dimension of the energy infrastructure development, namely guidelines for technology selection (e.g. environmental criteria, BAT) and stipulate a financial framework enabling investments in renewable energy technologies RPJMN shall elaborate integrated solutions for energy production facilities (addressing transport of fuel, waste management, and emission and pollution control measures). RPJMN should assign the study to identify available renewable energy resources and potential of its exploitation at the provincial level as an basis for the national energy planning as well as development of the provincial plans (both development and spatial plans). The study should also elaborate an incentive scheme for micro- and mini-hydropower and for biomass energy projects to support its development.</td>
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<td><strong>Amendments of Legal and Regulatory Framework</strong></td>
<td>Equalize subsidy to non-renewable and renewable energy sources to allow renewable resources to be market competitive. The strategy for increasing energy efficiency in relevant economic sectors should also elaborate options for developing the pricing mechanisms for energy and gradual phase out of fuel subsidies, which – once developed – should be legislated. Further legal amendments would also be needed to regulate price of the energy from geothermal resources, and to stipulate providing the governmental guarantees for developing geothermal energy projects as well as simplifying the process of obtaining the long-term debts in the field. Also, excluding geothermal energy from mining and categorize it as an environmental service could be considered. Also, there should be a clear provision in the Law of Oil and Natural Gas and/or the Law on Geothermal, and Law on Mineral and Coal Mining addressing Borrow-to-Use Permit (as it is e.g. regulated in the Law on Forestry).</td>
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<td>Decision-making levels</td>
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|                        | The Law 30/2009 on Electricity should be amended in order to: | • Better regulate the use of forest areas for electricity infrastructure development – i.e. to stipulate necessary conditions, procedural coordination between the Ministry of Energy and Natural Resources and the Ministry of Forestry,  
• Stipulate comprehensive regulation regarding the electricity subsidy, taxation, incentives etc. to equalize the price of energy from different sources |
|                        | Enhancing sustainability of national sectoral planning | Elaborate above mentioned goals and issues in the relevant sectoral plans – e.g. the national energy plan should indicate a shift from current high focus on the coal-based power plants investment towards more diversified energy production and make a commitment for higher utilization of clean energy and renewable energy resources.  
Relevant sectoral plan should provide instructions for implementing environmental assessment steps into energy infrastructure planning, including evaluation of alternatives.  
The strategy for increasing energy efficiency in relevant economic sectors should also elaborate options for developing the pricing mechanisms for energy and gradual phase out of fuel subsidies. High fuel subsidies are one of the reasons for inefficient energy use in the country. To go beyond a partial and ad hoc approach to this issue likely requires:  
• The de-politicization of fuel subsidies as an election issue, perhaps by the establishment of an independent commission to review all aspects of the matter and to make recommendations on economic and social grounds alone (i.e., to remove political implications from the analysis). This work should include an analysis of the deleterious implications for the economy as a whole of encouraging petroleum products to the neglect of renewables’ sources. This should include the GHG emissions implications of the present level of subsidies – it has been estimated that removing Indonesia’s fuel subsidies would reduce CO₂ emissions by 6% by 2020, and a further 1% reduction could be achieved by the removal of electricity subsidies)\(^7\)  
• Wide dissemination of an economic analysis that demonstrates that the non-poor (a minority) presently benefit most from fuel subsidies, and a commitment that moneys saved through reducing fuel subsidies will be ring-fenced for health and education spending, mainly for the poorest  
• Introduction of a range of targeted compensatory measures to protect the poor, complemented by larger, long-term poverty-reduction strategies.  
Regarding the strategy for enhancing energy efficiency, price signals alone are typically not enough to achieve a greater rationalisation of energy use, and policy measures tend to be necessary in market economies to reinforce the role of energy prices, first to create the  |

\(^7\) Ibid.
Recommendations and Mitigation Measures

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Appropriate market conditions for energy-efficient equipment and services, and second to drive consumer choice towards the most cost-effective solutions. International best practice sources suggest that a number of instruments can be employed to promote energy efficiency, which should be optimally elaborated and implemented in Indonesian context, including:</td>
</tr>
<tr>
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<td>• Information and communication, well-channelled to final consumers to increase their awareness and demonstrate the range of possible options for technical decisions</td>
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<td></td>
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<td>• Support for the purchase of primary energy-efficient equipment and devices through financial incentives (e.g., direct subsidies, subsidised loans) with complementary or stand-alone subsidised interest rates or fiscal measures (tax credit, tax reduction, taxation of inefficient equipment)</td>
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<tr>
<td></td>
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<td>• Deployment of specific financing mechanisms to enable consumers to invest in cost-effective solutions with high investment outlays (e.g., solar panels, windmills – linked to FITs)</td>
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<td></td>
<td></td>
<td>• Regulations covering appliances, equipment and buildings to mandate the display of their energy efficiency performance (e.g., through efficiency labels) and to impose minimum efficiency standards to remove the least efficient from the market</td>
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<td>• Regulations imposing obligations on consumers (e.g. audits, reporting, plans, energy savings)</td>
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<td>• Research and development (R&amp;D) and demonstration programmes for energy-efficient technologies to speed up their penetration in the market.</td>
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<td>• In a context of budget constraints and to reach multiple consumers more directly, public policies now tend to rely more and more on the private sector - especially energy utilities, and the energy services companies. The involvement of utilities can be through negotiated or voluntary agreement or through regulations that mandate these utilities to make energy savings with their customers – energy savings obligations. The involvement of such private or parastatal bodies can help to introduce the inclusion of technical and financial solutions that can help consumers invest in energy efficiency.</td>
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Integrating national sustainability issues in provincial planning

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79 The following market failures are often used to justify the implementation of policy measures: (i) information is either missing or incomplete, (ii) the availability of efficient appliances and production devices in the domestic market is limited, (iii) there is a lack of technical, commercial and financial services, (iv) decision makers for energy-efficiency investments are not always the final users who have to pay the heating or cooling bills; (v) consumers’ financial constraints are often more severe than what is actually revealed by national discount rates or long-term interest rates, resulting in a preference for short-term profitability. This often leads consumers to over-emphasise the immediate cost of equipment and devices, which usually means they do not select the most efficient equipment or devices. Implicit discount rates in the industry are over 20% compared to less than 10% for public discount rates, and 4–6% for long-term interest rates. Energy-efficiency policies are therefore necessary to address these multiple barriers.

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Energy</th>
</tr>
</thead>
</table>
| Project Execution      | Guidelines for Project Execution (MP3EI & others) | The systematic application of environmental assessment for the energy sector developments is of critical importance. Following types of environmental impact need to be addressed consistently during both policy and project design preparation:  
  - Global and regional impacts (emission of air pollutants, natural resource depletion, climate change),  
  - Local project impacts (local air pollution, land uptake, impact on water resources, impacts on biodiversity – especially habitat fragmentation) |
| Vertical measures      | Improving Institutional Environmental Management & Coordination |  |
|                        | MP3EI Greening Audits |  |
Table 8.6  Recommendations for Fishery

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Fishery</th>
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</table>
|                        | Adjustments of MP3EI / RPJMN    | The M3PEI should clearly stipulate that any further development in Fishery Sector needs to be based on the revised Maximum Sustainable Yield (MSY) combined with the concept of bio-economic approach using Maximum Economic Yield (MEY). RPJMN should allocate the appropriate funds enabling to upgrade already largely outdated fishing technologies to ensure that these allow high selective catch, are biologically safe and economically feasible. The “Policy and Regulations” for all three ECs, where the fishery sector is promoted by the MP3EI (i.e. Sulawesi, Bali – Nusa Tenggara, and Papua – Maluku) should  
  • Stipulate that any further development needs to be based on the revised MSY (see above).  
  • Include support to the production of organic fish products, as well as schemes for introducing of certified wild-capture fish and processed fish products as well as certified aquaculture and processed aquaculture products, which would meet the global demand (e.g. from Japan, EU etc.) for the high quality food.  
  MP3EI policies and regulations for Fishery Economic Activity should promote support to the projects using co-management models involving local communities in the management of the areas (as e.g. the case of the Karimunjawa National Park shows, this approach can provide economic incentives to the local communities to reduce fishing pressures). The “Policy and Regulations” for the Sulawesi EC shall stipulated development of shrimp ponds “out of the mangrove” rather than suggesting “Performing conversion of mangrove areas into shrimp ponds according to the applicable requirements.”  
RPJMN should promote a highly needed shift in fishery management practices, focusing on sustaining fish stocks as a contributor to economic growth, rather than follow-up present approach prioritizing growth in production with only limited consideration to sustainability of fish stocks. RPJMN should allocate the appropriate funds to research of the fish stock dynamics and spatial structure, which would allow making more accurate estimate of the MSY (see above) combined with the concept of bio-economic approach using Maximum Economic Yield (MEY). RPJMN should allocate the appropriate funds enabling to upgrade already largely outdated fishing technologies to ensure that these allow high selective catch, are biologically safe and economically feasible. RPJMN should promote production of organic fish products, as well as schemes for introducing of certified wild-capture fish and processed fish products as well as certified aquaculture and processed aquaculture products, which would meet the global demand (e.g. from Japan, EU etc.) for the high quality food. | |
<p>|                        | Amendments of Legal and Regulatory Framework | Amendments of the Fisheries Act can be recommended to further integrate the Precautionary Principle and EAFM Approach (Ecosystem Approach to Fisheries Management). There is a need to draft and adopt legal provisions (and related policies), which would reduce an “open access” system of fisheries captures |</p>
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<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Fishery</th>
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<td></td>
<td>in Indonesia. The new “permit system” should determine e.g. a number of ships which can operate in certain areas, gears to be used, fish species to be caught etc.</td>
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<td></td>
<td>Zoning scheme for Indonesian marine territories, especially coastal waters, should be developed and legislated to avoid conflicts over fishing grounds</td>
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<td></td>
<td>Also, existing provisions on the reclamation of the coastal areas need to be coordinated. While the spatial planning system i.e. the Law No. 26/2007 on Spatial Planning and the Presidential Regulation No. 122/2012 on Reclamation of Coastal Areas gives responsibility to the Central Government to administrate the coastal areas, the Law No. 27/2007 in conjunction with the Law No. 1/2014 on the Management of Coastal Areas and Small Islands, stipulates that the local government has the authority to issue regulations contradicting the regulations issued by the Central Government. This provision can however be applied only in specific cases, where the local government considers conditions given by the Central Government are not in accordance with the local circumstances.</td>
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<tr>
<td>Enhancing sustainability of national sectoral planning</td>
<td>Relevant sectoral plan(s) or programme(s) should promote a shift in fishery management practices, focusing on sustaining fish stocks as a contributor to economic growth. Following adjusted M/P3EI/RPJMN, the concept of bio-economic approach should be introduced using Maximum Economic Yield (MEY) – and based on this the existing MSY (i.e. 6.4 million tons) shall be revised at the national level and for all 11 Fishery Management Areas, in order to strengthen fisheries management. Only policy targets based on a thorough evaluation of the fish resources potential will avoid further over-exploitation of the target species and thus lead to the sustainable development of the fishery sector.</td>
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<td></td>
<td>Also, pilot cases should be assigned to selected areas to apply EAFM Approach (Ecosystem Approach to Fisheries Management).</td>
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<td></td>
<td>Since further planning of the fishery sector development shall properly consider the likely consequences of the climate change, the relevant sectoral plan should elaborate likely future scenarios of fishery development in different climatic conditions as a basis for the planning at the provincial level.</td>
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<tr>
<td>Integrating national sustainability issues in provincial planning</td>
<td>Before further developing aquaculture, provincial spatial plans should identify optimal zones for aquaculture considering the potential of the areas as well as likely impacts on the environment and human health (through application of SEA).</td>
<td></td>
</tr>
<tr>
<td>Project Execution Guidelines for Project Execution (MP3EI &amp; others)</td>
<td>Develop and apply Guidelines for the provincial and local authorities providing the management tools and relevant actions in the fishery sector.</td>
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</table>
### Recommendations and Mitigation Measures

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Fishery</th>
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</thead>
<tbody>
<tr>
<td>Vertical measures</td>
<td>Improving Institutional Environmental Management &amp; Coordination</td>
<td>Introduce the scheme to monitor the compliance of the provincial and local planning in the fisheries sector with the national policies and targets. There is a need for further improving the cooperation between the national and provincial and local authorities in the fishery sector to make sure that the sub-national agencies are aware of priorities of the National Fisheries Law and the national commitments in the sector.</td>
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<td>MP3EI Greening Audits</td>
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<tr>
<td>Decision-making levels</td>
<td>Category of MP3EI SEA Measures</td>
<td>Tourism</td>
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<tr>
<td></td>
<td>Adjustments of MP3EI / RPJMN</td>
<td>MP3EI regulations and policies for Tourism Economic Activity should make a clear commitment to application of the Integrated Coastal Zone Management Planning as a basis for development of the tourism facilities and related infrastructure (for MP3EI project as well as for entire economic sector) to avoid current rather haphazard location of tourism facilities. RPJMN should allocate appropriate financial allocation for (i) further development the Integrated Coastal Zone Management Planning and its application in coastal areas (especially in Bali and Nusa Tenggara, (ii) awareness raising activities on environmental issues related to tourism. Besides supporting further expansion of the mass tourism in Bali and Nusa Tenggara the MP3EI should also address (within proposed strategy “Bali and Beyond”) the potential of eco-tourism in Indonesia as a way to diversity the tourism sector and attract visitors to other areas within the country. The general strategies to increase tourist arrivals and length of stay in Bali and Nusa Tenggara (within Bali and Nusa Tenggara EC) should stipulate also necessity of protecting the natural environment and improving its status as a major attractiveness for foreign visitors (although it provides that “…any new developments in Bali will be guided by high environmental management standards;”) MP3EI strategy for Tourism Economic Activity should also address the awareness raising among the providers of tourist activities as well as visitor on the environmental issues, namely water and energy savings and biodiversity protection. Proposed Regulation and Policy on “the acceleration of permits and the provision of Integrated One-Stop Service for all permits to develop tourism area” should clearly mention that the newly established procedure will integrate application of EIA for relevant projects and the final permit will consider the results and recommendations given by the EIA. RPJMN should elaborate the further development of the eco-tourism in Indonesia. RPJMN should stipulate clear instructions for (i) considering the likely effects of the climate change in tourism development planning, (ii) enforcing the water and energy efficiency in the tourism facilities desing. RPJMN should allocate appropriate financial allocation for (i) further development the Integrated Coastal Zone Management Planning and its application in coastal areas (especially in Bali and Nusa Tenggara, (ii) awareness raising activities on environmental issues related to tourism.</td>
</tr>
</tbody>
</table>
|                        | Amendments of Legal and Regulatory Framework | }
## Recommendations and Mitigation Measures

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Tourism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enhancing sustainability of national sectoral planning</td>
<td>Relevant sectoral plan should stipulate clear instructions for (i) considering the likely effects of the climate change in tourism development planning, (ii) enforcing the water and energy efficiency in the tourism facilities design</td>
</tr>
<tr>
<td></td>
<td>Integrating national sustainability issues in provincial planning</td>
<td>Provincial spatial plans, when planning development of tourism facilities in coastal areas, shall take into account likely effects of the climate change – especially sea-level rise and risks of increased number and/or scale of natural disasters. As a result, provincial spatial plans should provide spatial guidelines for investors of the individual projects on tourism development.</td>
</tr>
<tr>
<td>Project Execution</td>
<td>Guidelines for Project Execution (MP3EI &amp; others)</td>
<td>Before developing tourism activities in and around protected areas, the studies on likely impacts on biodiversity and ecosystems shall be carried out and its results considered when designing and approving the tourism activities. When doing so, the management of the protected areas shall be involved in conducting these studies as well as in the permitting process. If newly proposed tourism facility requires amendments of the spatial plan (local or provincial) the SEA shall be applied in accordance with the Indonesia legislation and its results shall also be considered within permitting process (as mentioned described above). Before approving tourism development, the appropriate capacity of water supply, solid waste and waste water management systems has to be ensured. Together with planning of the tourism development the public transport system shall be developed to avoid further impacts (air pollution and noise) from individual traffic in urban areas. There should be a strong emphasis on energy and water efficiency of the new tourism facilities</td>
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<tr>
<td>Vertical measures</td>
<td>Improving Institutional Environmental Management &amp; Coordination</td>
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<td></td>
<td>MP3EI Greening Audits</td>
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The expert in WATER ENVIRONMENTS
## Table 8.8  Recommendations for Connectivity

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Connectivity</th>
</tr>
</thead>
</table>
|                         | Adjustments of MP3EI / RPJMN                      | Through MP3EI/RPJMN set strict goals, investment levels, and operationalized steps to meet national goals for clean drinking water, sustainable modes of transportation, and wastewater/waste management to:  
  - extend water and wastewater management initiatives for all growing urban centers  
  - extend alternative public transport initiatives to all growing urban centers  
  
Besides investing in the road development, the MP3EI should provide a framework for investments in low-emission transportation modes (e.g. provide higher support to railroads, extensive use of public transport – see below, or enhance inter-modality) and thus promote a shift towards more sustainable transport promote  

The MP3EI focuses on development of mass transportation and integrated systems for public transport only in the context of Greater Jakarta Area, while other urbanized areas across the country face similar traffic-related problems. Emphasis on development of public transport shall be put also in other relevant regions within policies and regulations for Connectivity in Economic Corridors.  

Pursuit of environmental quality (reduction of negative externalities) should be recognized among the other key points of the implementation of the Vision for Strengthening of National Connectivity. Subsequently, the MP3EI should – among its policies and regulations for Connectivity – promote measures to mitigate likely adverse environmental and health effects related to the transport infrastructure development  

RPJMN should stipulate a need for public investments to sanitation and water supply schemes, as well as elaborate the strategy for expanding Corporate Social Responsibility (CSR) – i.e., to encourage private suppliers of improved technology, for the producers of sanitation products (soaps, toilet rolls etc), and to become engaged in extending finance.  

RPJMN should make a clear commitment to addressing environmental dimension of the transport infrastructure development  

RPJN should make appropriate financial allocation for supporting development of integrated public transportation systems in regions beyond the Jakarta Metropolitan Area.  

RPJMN should stipulate (with appropriate funds allocated) initiation of the study evaluating the connectivity of key wildlife areas and resulting in suggestions for good planning and project design practice to maintain and improve the connectivity for animals. |
|                         | Amendments of Legal and Regulatory Framework       | The Government should establish and legislate the land price standards enabling calculation of the compensation i.e. the financial amount which should be given to the land rights holder to avoid significant differences between various cases.  
  
The system of land zoning and pricing mechanism for each zone should be developed and legislated.  

It can be recommended to introduce standards higher than EURO 2, which would cover all cars in the country. |
### Recommendations and Mitigation Measures

<table>
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<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Connectivity</th>
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<tbody>
<tr>
<td><strong>Enhancing sustainability of national sectoral planning</strong></td>
<td>Relevant sectoral plan should provide instructions for implementing environmental assessment steps into transport infrastructure planning, including evaluation of alternatives. The strategy for enhancing the waste management scheme in the country should be prepared and implemented. Economic instruments to address waste management issues include (i) command and control (quantities or standards-based measures – especially for hazardous materials), (ii) market-based instruments (taxes – e.g., on landfills, subsidies, permit trading schemes etc), (iii) technology/spending programmes (including private financial initiatives - PFI), (iv) non-regulatory behavioral instruments (such as information and awareness campaigns), and (v) negotiated agreements (e.g., quantity- and quality-based, with major private or public entities generating large amounts of waste). Current thinking suggests that clear analysis is needed to determine what may be the most suitable instrument for different types of waste, the particular local populations, and the stage of the waste hierarchy involved – i.e., waste prevention and re-use, recycling, recovery and disposal.</td>
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</table>
| **Integrating national sustainability issues in provincial planning** | Allocate appropriate funding on extending:  
- water and wastewater management initiatives  
- alternative public transport initiatives  
for all growing urban centers in each province through the provincial development plans (RPJDP) |
| **Guidelines for Project Execution (MP3EI & others)** | Ensure proper application of AMDAL for all MP3EI transport infrastructure projects. Adequate tiering and linkage of environmental assessment and management to transport planning (i.e. the SEAs and/or EIAs of different levels of transport infrastructure planning should be tiered) needs to be ensured, which includes:  
- At the network level – to determine whether and how the nodes in a transport network in a jurisdiction and its neighbours should be connected to each other by infrastructure for any mode of transport, i.e. ‘multi-modal’ planning;  
- At the corridor level – to determine the best way to connect two traffic attraction nodes to each other with any mode of transport infrastructure;  
- At the project level – to determine the detailed location and design of the proposed infrastructure.  
- Modal alternatives (e.g. railway vs. motorway vs. passenger sea line connection) at network level should be developed sufficiently to permit assessment of the plan as a whole.  
- At the corridor level, the assessment should address the issues that influence the decision (i.e. which of the main alternatives should be chosen, and under which environmental conditions?).  
- The corridor and project levels measures should be developed and implemented to keep connectivity among the key wildlife areas (i.e. planning of bio-corridors and relevant technical measures).  
- When approving a network-level or corridor-level plan, which provides consent for transport infrastructure development, there should... |
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<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Connectivity</th>
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<td>be sufficient confidence that unacceptable environmental impacts will not occur when the project is further developed and implemented. Following types of environmental impact need to be addressed consistently during both policy and project design preparation: • Global and regional impacts: emission of air pollutants, natural resource depletion, adaptation to likely consequences of the climate change, acidification, photochemical smog • Local transport impacts: local air pollution, noise, land uptake, impact on water resources, impact on biodiversity (especially habitat fragmentation and effects of opening new areas by transport infrastructure), visual / landscape impacts, impacts on human health, social impacts</td>
</tr>
<tr>
<td><strong>Vertical measures</strong></td>
<td>Improving Institutional Environmental Management &amp; Coordination</td>
<td>There is a need to strengthen the enforcement of the Law No. 2/2012 on Acquisition of Land for Development in the Public Interest and coordination among the relevant authorities. Although coordination between local governments and the Ministry of Public Works and the Ministry of Forestry is regulated by legislation, the practice indicates a lack of communication and cooperation.</td>
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<td>MP3EI Greening Audits</td>
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8.5 Roadmap

The purpose of the Roadmap is to determine the actions needed for implementing proposed mitigation measures—or at least for launching the procedures which would result in the implementation. Since the most of recommendations raised by the MP3EI Policy SEA is targeted on the various levels of the governmental authorities, the roadmap has to be developed through the discussion with the key governmental stakeholders involved in the MP3EI i.e. Bappenas, KLH and other KP3EI members. The table below provide an example of the roadmap and it also indicates which point the process of implementing the measures can be driven by the M3PEI SEA—it can still provide support to the GOI in making adjustments of the MP3EI (should it be the case) and to certain extent also assist with addressing certain issues in the RPJMN, however further activities (e.g. legal amendments, enhancing planning scheme etc.) have to be managed and coordinated by relevant governmental agencies.

Table 8.9 Roadmap for Implementing Proposed Mitigation Measures

<table>
<thead>
<tr>
<th>Decision-making levels</th>
<th>Category of MP3EI SEA Measures</th>
<th>Method of Implementation</th>
<th>Actions to be done</th>
<th>Time schedule</th>
</tr>
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<tbody>
<tr>
<td>Policy and Planning</td>
<td>Adjustments of MP3EI</td>
<td>Initiating discussion at the KP3EI platform on how to integrate proposed modifications in the existing version MP3EI. MP3EI SEA experts would optimally join the negotiations to provide detailed recommendations.</td>
<td>• Presentation of MP3EI SEA recommendations to the KP3EI • Decision on possible amendments of the MP3EI • Planning further process according to the decision</td>
<td>June 16, 2014</td>
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<td></td>
<td>Integrating measures in RPJMN</td>
<td>Elaborating and integrating relevant measures proposed by the MP3EI SEA in the RPJMN during its preparation and anchoring the key priorities in the Presidential Decree</td>
<td>• Presentation of MP3EI SEA recommendations to RPJMN planning team • Participation of MP3EI SEA experts in further RPJMN drafting</td>
<td>???</td>
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<td></td>
<td>Amendments of Legal and Regulatory Framework</td>
<td>Launching discussion between Bappenas and KLH to determine details on further actions.</td>
<td>• Initial meeting between Bappenas and KLH (with possible assistance of MP3EI SEA experts) to discuss further steps</td>
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<td></td>
<td>Enhancing sustainability of national sectoral planning</td>
<td>Opening discussion during preparation of the RPJMN (to be coordinated by Bappenas and inviting relevant ministries) to address linkages between the RPJMN and sectoral</td>
<td>• Organizing initial working with relevant sectors to present MP3EI SEA recommendations and prepare the work plans for their implementation</td>
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<tr>
<td>Decision-making levels</td>
<td>Category of MP3EI SEA Measures</td>
<td>Method of Implementation</td>
<td>Actions to be done</td>
<td>Time schedule</td>
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<td>plans regarding integration of measures proposed by the MP3EI SEA</td>
<td>integration in relevant sectoral plans</td>
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<td></td>
<td>Integrating national sustainability issues in provincial planning</td>
<td>Bappenas should coordinate focused communication with the MOPW and MOHA on integration of the recommendations given by the MP3EI SEA at the provincial level.</td>
<td>• Organizing initial working with MOPW and MOHA to present MP3EI SEA recommendations and prepare the work plan for further cooperation with provinces</td>
<td>• ??</td>
</tr>
<tr>
<td>Project Execution</td>
<td>Guidelines for Project Execution (MP3EI &amp; others)</td>
<td>The discussion on practical application of the guidelines should optimally involve governmental authorities at the provincial level, which are responsible for permitting procedures.</td>
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<td>• ??</td>
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<tr>
<td>Vertical measures</td>
<td>Improving Institutional Environmental Management &amp; Coordination</td>
<td>Since intergovernmental negotiations on necessary arrangements may take rather longer time, it is recommended to initiate the process by “bilateral” discussion between Bappenas and KLH to design further steps</td>
<td>• Initial meeting between Bappenas and KLH (with possible assistance of MP3EI SEA experts) to discuss further steps</td>
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<td></td>
<td>MP3EI Greening Audits</td>
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**Water**


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Electricity for All: Options for Increasing Access in Indonesia, World Bank (2005)


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Center for International Forestry Research (CIFOR), 2011, Indonesia’s forest moratorium: A stepping stone to better forest governance? Working Paper 76


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81 http://www.who.int/quantifying_ehimpacts/national/countryprofile/indonesia.pdf
References

Hansen, M. C., 2009, Quantifying changes in the rates of forest clearing in Indonesia from 1990 to 2005 using remotely sensed data sets. Environmental Research Letters 4


World Bank, 2006, Sustaining Economic Growth, Rural Livelihood, and Environmental Benefits: Strategic Options for Forest Assistance in Indonesia

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ASEAN Center for Biodiversity, 2010. ASEAN Biodiversity Outlook.


Coastal Areas

ADB MARINE AND FISHERIES SECTOR STRATEGY STUDY SUB SECTOR STRATEGY REVIEW 2005 http://earth01.net/RGDudley/PDF/MASECSTU.pdf


Toward Integrated Coastal Zone Management in Indonesia: Framework Assessment and comparative analysis

http://www.un.org/depts/los/nippon/unnff_programme_home/fellows_pages/fellows_papers/nurhidayah_0910_indonesia_PPT.pdf


UNDP 2004  “Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand” CORAL REEFS IN THE SOUTH CHINA SEA  UNEP/GEF , Regional Working Group on Coral Reefs, United Nations Environment Programme 2004

UNDP 2004  “Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand” Mangrove IN THE SOUTH CHINA SEA  UNEP/GEF , Regional Working Group on Mangroves, United Nations Environment Programme 2004

UNDP 2004  “Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand” Seagrass IN THE SOUTH CHINA SEA  UNEP/GEF , Regional Working Group on Seagrass, United Nations Environment Programme 2004


Environmental Management


Indonesian Center for Environmental Law (ICEL) 2008. Environmental Compliance and Enforcement in Indonesia: Rapid Assessment.


**Industry and Mining**


**Energy and Waste**


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APPENDIX A

MP3EI Economic Analysis Methodology
Appendix A: Approach and Methodology for Economic Analysis

A.1 Approach

The MP3EI SEA assesses the impacts of the proposed investments in infrastructure and economic activities on the key strategic issues, and draws up recommendations for improvements and alternatives to the MP3EI for accelerating and expanding the sustainable economic development in Indonesia. Economic analysis is applied to estimate the nature and scale of environmental and socioeconomic impacts of proposed investments, with a view to understanding their strategic implications within the MP3EI as a whole.

Broadly, an overall cost-benefit analysis approach has been taken to consideration of the proposed investments in each economic corridor, with the purpose of identifying, quantifying and valuing environmental impacts in monetary terms. This type of analysis (including the incorporation of environmental impacts in monetary terms) is conceptually relatively simple, and is widely used to form a basis for decision-making. Including the economic costs implied by investments’ environmental impacts will ceteris paribus strengthen the SEA as a whole, and provides a firmer basis for decision-making regarding proposed modifications to MP3EI.  

It is important to realise at the outset that the level of economic analysis that can be undertaken of individual investments’ environmental impacts in the economic corridors (and for each of the economic corridors as a whole) can only be commensurate with the level of detail of particular investments (i.e., nature, scale, location) and the biophysical (e.g., emissions, habitat loss, water pollution, etc) and social impacts (e.g., on health) which can be identified. In this sense, the scope and depth of the economic analysis is essentially determined by the level of detail that arises from the initial evaluation of the MP3EI Policy and pre-scoping and scoping work at the EC level, respectively.

Additionally, in practice, measuring the monetary value of environmental impacts arising from investments in agriculture, industry, mining, roads, rail, ports etc can be a difficult, time-consuming, and expensive process. The impacts of investments on natural resources (e.g., land, forests, water) are usually hard to value, as the components of their total economic value (TEV) are typically not captured in market prices, and must be either imputed (using techniques such as hedonic pricing, contingent valuation, travel cost methods etc) or estimated using secondary sources. In the present situation, values – adjusted if necessary - from existing case studies are therefore mainly introduced (i.e., the use of the ‘benefits transfer’ approach), when found appropriate; this approach is simply more practical than original data collection.

A.2 Methodology

The initial economic analysis of the MP3EI uses a largely case study-based approach to identify and demonstrate potential generic environmental implications that may arise when

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82 The economic analysis will be performed in compliance with best international practices e.g. OECD guidelines on SEA /1/, OECD/DAC SEA and ecosystem services /2/ and OECD cost benefit analysis and the environment /3/.

83 TEV comprises both use values (including direct use such as resource use, recreation, and indirect use from regulating services) and non-use values, e.g. the value people place on protecting nature for future use (option values) or for ethical reasons (bequest and existence values).
implementing activities under the MP3EI. The examples used are cases – as far as possible – based on Indonesian or other Southeast Asian examples.

Initial economic analysis provides some insight on the environmental consequences associated with the MP3EI Policy - represented by 22 Economic Activities and the theme of Connectivity. To facilitate the initial economic evaluation, these activities have been grouped into the following eight economic categories:

1. Agriculture / Forestry
2. Light Industry / Heavy Industry
3. Mining
4. Energy
5. Fisheries
6. Tourism
7. Development of strategic areas
8. Connectivity

In relation to these types of activities envisaged for the various economic corridors, very recent work undertaken by 'The Economics of Ecosystems And Biodiversity' (TEEB) programme has captured some of the features of natural capital (i.e., land, water, air) use by major different primary industry and activity types, with a view to the promotion of awareness of the true environmental cost of these activities. (Because market prices of natural resources do not typically reflect all dimensions of TEV, natural resource use is almost always undervalued. Likewise, the full costs imposed on society by such activities as proposed within MP3EI are also not entirely borne by producers – notably in the form of health costs and pollution). As such, the broad findings of the TEEB work (which is at the frontier of contemporary global environmental economics) are of direct relevance to MP3EI decision-makers, as the true potential scale of externalities of proposed investments in economic corridors may be made clearer.

Table 1, over, summarises some of the general findings of the TEEB work in relation to major economic corridors’ activities. What may be particularly relevant in the present case are the stated estimates of the relationship between natural resource cost and total sector (or ‘activity’) revenue. This derived ‘impact ratio’ essentially captures the potential extent of de facto under-pricing of natural resource use that different activities in the economic corridors might represent, and thus the greater difference between the expected revenues from investments in the Master Plan and their true costs to the Indonesian economy. What is also relevant is that impacts on natural capital can also vary with regions and sectors significantly – suggesting considerable scope for better use of natural capital with thoughtful investment design policies.

More typically, environmental economics work has traditionally focused on estimating the true value (i.e., in capturing all constituent components of TEV) of different types of resources or urban environments, to understand what the economic consequences of loss or change (from a variety of impact sources) might be. A typography of potential environmental and socioeconomic impacts on different types of natural resources from the specific activities proposed for the economic corridors – and examples sources of data or information about at least some of them - are summarized in Table 2, over.

The papers identified in the table do not all quantify monetary costs from each of the identified impacts of the activities, but they do provide at least some data from Indonesian or comparable

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84 Natural Capital At Risk : The Top 100 Externalities Of Business (2013). TEEB. TEEB is a multi-stakeholder Platform for supporting the uptake of natural capital accounting in business decision-making. It is supported by G8 and UNEP; see www.teeforbusiness.org

85 The global estimate is that natural capital/environmental costs account for about 13% of the revenue of primary sectors.

86 The TEEB work is essentially a metadata exercise which draws on global studies and sources. The findings cited here are in relation to activities as reported for east or southeast Asia only.
sources from which money values may be imputed, and/or they summarise the key methodological features of environmental and social impact valuation in these circumstances.
<table>
<thead>
<tr>
<th>MP3EI Activities</th>
<th>Relevant Primary Sector Activity Natural Resource use Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture / Forestry</td>
<td>Rice farming in SE Asia is heavily ecosystem/landuse-damaging and water dependent, and also pollutes water through fertilizer (eutrophication of nitrates and phosphates) and pesticide residues – overall the sector has a strongly positive impact ratio. Some agriculture activities are very highly damaging – eg, cattle ranching, soybean, oilseeds – others are much less so – eg vegetables production. Palm oil production especially impacts on terrestrial ecosystem services and biodiversity and carbon stock capacity of virgin forests in SE Asia, despite relatively small areas (vis-à-vis rice). Many impacts are embedded in supply chain. <strong>MP3EI implications - Scope for (i) more climate-smart agriculture (ii) greater internalization of costs (through taxes) (iii) greener and more closely integrated supply chains</strong></td>
</tr>
<tr>
<td>• Palm Oil</td>
<td></td>
</tr>
<tr>
<td>• Rubber</td>
<td></td>
</tr>
<tr>
<td>• Food agriculture</td>
<td></td>
</tr>
<tr>
<td>• Animal husbandry</td>
<td></td>
</tr>
<tr>
<td>• Cocoa</td>
<td></td>
</tr>
<tr>
<td>• Timber</td>
<td></td>
</tr>
<tr>
<td>Light Industry / Heavy Industry</td>
<td>Iron and steel, cement and petroleum-related activities all have very high absolute impacts on natural capital, although the very high sector revenues tend to reduce impact ratios. GHG emissions are particularly important, but air pollution from sulphur dioxide, nitrous oxides and particulates from fossil fuels are also important. Particularly significant in imposition of health costs. Many of the environmental costs of these activities are embedded in upstream activities of retailers and suppliers. <strong>MP3EI implications – (i) locations of processors, transporters etc physically closer to primary producers and (ii) the promotion of green supply chains can reduce environmental impacts</strong></td>
</tr>
<tr>
<td>• Defence equipment</td>
<td></td>
</tr>
<tr>
<td>• Transportation equipment</td>
<td></td>
</tr>
<tr>
<td>• Food and beverages</td>
<td></td>
</tr>
<tr>
<td>• Textile</td>
<td></td>
</tr>
<tr>
<td>• Shipping</td>
<td></td>
</tr>
<tr>
<td>• Oil and gas, petrochemicals</td>
<td></td>
</tr>
<tr>
<td>• Ferrous and Non-Ferrous Metal processing</td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td>Broadly as for heavy industry, with localized land and water impacts and GHG emissions. <strong>MP3EI Implications – less scope for improving value chains (limited processing) BUT (i) greater internalization of natural capital costs through more robust tax regimes, and (ii) stronger enforcement of existing and new technical standards</strong></td>
</tr>
<tr>
<td>• Nickel</td>
<td></td>
</tr>
<tr>
<td>• Copper</td>
<td></td>
</tr>
<tr>
<td>• Bauxite</td>
<td></td>
</tr>
<tr>
<td>• Coal</td>
<td></td>
</tr>
<tr>
<td>• Steel</td>
<td></td>
</tr>
<tr>
<td>MP3EI Activities</td>
<td>Relevant Primary Sector Activity Natural Resource use Features</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Energy</td>
<td>Any power generation using coal has massive natural capital costs and high impact ratios. <strong>MP3EI implications – greater prominence in national energy strategy to (i) hydropower and (ii) renewables</strong></td>
</tr>
<tr>
<td>Fisheries</td>
<td>Fisheries is the fourth-biggest ‘landuse’ impact globally. Concerns exist about sustainability of such activities in Indonesian waters. <strong>MP3EI implications - improved regulatory environment</strong></td>
</tr>
<tr>
<td>Tourism</td>
<td>Non-primary sector - not identified specifically in TEEB</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Non-primary sector - not identified specifically in TEEB</td>
</tr>
<tr>
<td>Development of strategic areas</td>
<td>Non-primary sector - not identified specifically in TEEB</td>
</tr>
</tbody>
</table>
### Table A. 2  Typography of Potential Environmental and Socioeconomic Impacts From MP3EI Activities

<table>
<thead>
<tr>
<th>Economic Categories &amp; MP3EI Activities</th>
<th>Types of Environmental Impacts And Possible Data Sources</th>
<th>Types of Socio-economic Impacts And Possible Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agriculture / Forestry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Palm Oil</td>
<td>• <strong>Loss of forests</strong> - Eliciting Forest Values For Community Plantations And Nature Conservation; Rowcroft, Studley and Ward, Forests, Trees and Livelihoods, 16:4, (2012)</td>
<td>• Land alienation and sequestration, land conflicts (traditional tenure vs. commercial plantations), land scarcity - <a href="http://www.ecologyandsociety.org/vol">www.ecologyandsociety.org/vol</a> 17/iss1/artz25/#ms_abstract (including Indonesia - Papua, Borneo etc) (2013)</td>
</tr>
<tr>
<td>• Rubber</td>
<td>• <strong>Loss of biodiversity</strong> - Valuation of Ecosystem Services of Biodiversity Conservation Corridor in Mondulkiri and Koh Kong, Cambodia (ADB R-PPTA 7459; (2010);</td>
<td>• Community and individual resettlement - Involuntary Resettlement Sourcebook - Planning and Implementation in Development Projects; World Bank (2004); AND ADB Involuntary Resettlement Guidelines (<a href="http://www.adb.org/site/safeguards/involuntary-resettlement">www.adb.org/site/safeguards/involuntary-resettlement</a>)</td>
</tr>
<tr>
<td>• Food agriculture</td>
<td>• <strong>Pollution of water sources and wetland areas</strong> - Case Studies In Wetland Valuation #3: Ream National Park, Cambodia: Balancing the local opportunity costs of wetland protection; IUCN (2003)</td>
<td>• Reduced food security / restricted access to food and NTFPs; Local Social and Environmental Impacts of Biofuels: Global Comparative Assessment and Implications for Governance. Ecology and Society Vol 16, No. 4 (2011)</td>
</tr>
<tr>
<td>• Cocoa</td>
<td></td>
<td>• Social infrastructure (e.g., education and health services) access impacts, amenity and recreation impacts, noise and disturbance impacts.</td>
</tr>
<tr>
<td>• Timber</td>
<td></td>
<td>• The Economic Valuation of Environmental Amenities and Disamenities: Methods and Applications. Mendelsohn and Olmstead, School of Forestry and Environmental Studies, Yale University, (2009)</td>
</tr>
<tr>
<td><strong>Light Industry / Heavy Industry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Defence equipment</td>
<td>• <strong>Very wide range of solid, liquid and gaseous residues</strong> from manufacturing and petroleum production (trace materials, biological residues, sludges, acids, organic wastes from processing; H/CFCs, volatile compounds, methane, CO₂ nitrous oxide etc released during combustion; leaching of solid and non-solid wastes degrades surface and subsurface water sources; all may affect ecosystem services provision).</td>
<td>• Measuring and valuing environmental impacts; Network for Business Sustainability (2011) <a href="http://nbs.net/wp-content/uploads/NBS-Executive-Report-Impacts.pdf">http://nbs.net/wp-content/uploads/NBS-Executive-Report-Impacts.pdf</a> AND A Summary of Ecosystem Service Economic Valuation Methods; Kaval, Dept of Economics, University of Waikato (2012)</td>
</tr>
<tr>
<td>• Food and beverages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Textile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Shipping</td>
<td></td>
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</tr>
<tr>
<td>• Oil and gas, petrochemicals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ferrous and Non-Ferrous Metal processing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Appendix A: Approach and Methodology for Economic Analysis

## Economic Categories & MP3EI Activities

<table>
<thead>
<tr>
<th>Economic Categories &amp; MP3EI Activities</th>
<th>Types of Environmental Impacts And Possible Data Sources</th>
<th>Types of Socio-economic Impacts And Possible Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>• As for light and heavy industry, PLUS particular risks from acid draining and contaminant leaching, erosion of wastes into surface waters, dewatering, mine tailings and impoundments, air quality, vibration and noise, wildlife disturbance. In forest areas, soil erosion and loss of biodiversity are especial threats. <em>Environmental Assessment of Mining Projects World Bank Environmental Source Book</em> (1998); Gillespie, &amp; Kragt; <em>Accounting for nonmarket impacts in a benefit-cost analysis of underground coal mining in New South Wales, Australia.</em> Journal of Benefit-Cost Analysis 3(2): article 4. (2012)</td>
<td>• As for light and heavy industry, PLUS forced resettlement (see agriculture).</td>
</tr>
<tr>
<td></td>
<td>• Nickel</td>
<td>• human rights abuses (livelihood, freedom/arrests, intimidation by armed forces etc) – e.g., Grasberg/Lorentz in Papua;</td>
</tr>
<tr>
<td></td>
<td>• Copper</td>
<td>• in-migration (including transient settlers, land speculators, informal miners),</td>
</tr>
<tr>
<td></td>
<td>• Bauxite</td>
<td>• new diseases, and</td>
</tr>
<tr>
<td></td>
<td>• Coal</td>
<td>• loss of cultural and aesthetic resources, etc.</td>
</tr>
<tr>
<td></td>
<td>• Steel</td>
<td><em>(Mendelesohn and Olmstead; ibid.)</em></td>
</tr>
<tr>
<td>Marine</td>
<td>• Stock impacts (species web, composition, scale, migration of pelagic/demersal species). <em>Pollution</em> (as for light industry) at fish ports and in riverine environments (from processing facilities), gear and equipment dumping etc. FAO Fisheries</td>
<td>• Commercial and artisanal conflicts over stocks’ access, food security and protein supplies to local markets, recreational conflicts etc; <em>Guidelines For Assessment Of The Social Impact Of Fishery Management Actions</em> - USA National Marine Fisheries</td>
</tr>
</tbody>
</table>
|                                       |                                                        | }
<table>
<thead>
<tr>
<th>Economic Categories &amp; MP3EI Activities</th>
<th>Types of Environmental Impacts And Possible Data Sources</th>
<th>Types of Socio-economic Impacts And Possible Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tourism</strong></td>
<td>• Resource use deterioration and over-exploitation; conflicts between tourist/recreational use and traditional or livelihood uses. Sequestration of water sources for hotels, golf courses etc. Generally - as for natural resources issues under agriculture and forestry above, and also trampling on soils and vegetation, animals' stressing PLUS, pollution, traffic, littering, sewage and solid waste management issues (UNEP. Tourism's Three Main Impact Areas 2013; see general URL, right)</td>
<td>• Generic land (including resettlement) and health issues (see range of sources, above) PLUS increased road accidents (incidence * DALY)</td>
</tr>
<tr>
<td><strong>Connectivity</strong></td>
<td>• Increased emissions (see sources in industry and power, above – plus aviation)</td>
<td>• Land and resettlement issues (see above) – especially peri-urban</td>
</tr>
<tr>
<td>• Transport infrastructure (roads, ports, airports, railroads)</td>
<td>• Increased pollution from vehicles, planes, ships etc (see sources in industry and energy, above)</td>
<td>• Health issues (particulate matter, noise etc; see above)</td>
</tr>
<tr>
<td><strong>Other Infrastructure</strong> (e.g., Water and Sanitation, ICT)</td>
<td>• Increased localised natural resource pressure (see sources in agriculture, above)</td>
<td>• In-migration (see above – mining)</td>
</tr>
<tr>
<td></td>
<td>• Water and sanitation and ICT investments overwhelmingly positive impacts</td>
<td>• Some tourism impacts? (see above)</td>
</tr>
<tr>
<td><strong>Development of strategic areas</strong></td>
<td>• Likely cumulative impact from one or more of economic activities (see sources above), PLUS general intensification of urbanisation (air pollution, solid waste and wastewater increase) and extensification (i.e., pressure on peri-urban areas – especially for land – see sources above)</td>
<td></td>
</tr>
</tbody>
</table>
More generally, major generic data sources for application of benefits transfer material with relevance to activities in the economic corridors include publically accessible international databases such as Envalue and/or EVRI.

There are also now extant a number of meta-data studies that attempt to summarize the findings of multiple exercises in natural resource valuation. All available studies are beset with methodological problems vis-à-vis their use in benefits transfer applications regarding: (i) comparability of resource types across physical locations and time; and, (ii) differences in valuation methods applied (and thus the confidence in robustness, completeness or comparability of estimates). Nevertheless: (i) when a wide variety of available empirical sources are compared and categorized on regional/local bases by fairly precise resource classifications; (ii) methodological procedures are reviewed and found broadly consistent; and (iii) original results regarding derived economic values standardized across time, it is possible to derive plausible economic values for different types of natural resources.

Table 3, over, therefore summarises some ‘best guess’ estimated natural resource values of different types that are likely to be relevant to the economic corridor investments which come either from relevant and relatively reliable individual studies in the Envalue or EVRI databases (even if these only capture specific TEV components) or from a recent and very comprehensive (320 research papers from 300 locations) resource valuation meta exercise on a fuller TEV basis. It is these kinds of values (suitably adjusted) that can be applied to MP3EI corridor investments (when the scoping has been completed) As for the TEEB study, one major implication of all this work is that most of the value represented by these figures are not presently reflected in market prices.

The possible types and extent of impacts (environmental and socioeconomic) from the proposed investments in each economic corridor are obviously be very specific to the investments envisaged, and highly contingent on the actual natural resource and human population conditions in which they are to be implemented. To the extent that these environmental and social impacts can be identified and quantified, estimated monetary values can be applied. These values will be derived from: (i) market prices (where observable), (ii) from secondary sources (i.e., benefits transfers), or (iii) imputed using standard environmental and social cost-benefit techniques - such as measures of Disability Adjusted Life Years (DALYs) for health impacts, TEV estimates for various natural resources etc.

Obviously, the scale of estimated impacts from particular investments having been identified may then lead to recommendations being made regarding (for example): (i) closer scrutiny, re-design or cancellation of individual investments; (ii) re-scaling, scheduling and sequencing of potentially risky investments (to minimise potential cumulative impacts); and, (iii) mitigation proposals (e.g., for carbon offsetting, including expanding REDD+ or greening initiatives). The aggregate value of estimated environment and social impacts expressed in monetary terms can then be compared with the total investment programme for the respective economic corridors as a way of determining the relative importance of possible environmental and socioeconomic impacts to MP3EI as a whole. A fuller overall picture of the potential impacts of the economic corridors in terms of countrywide strategic issues (e.g., human health, livelihood and local communities, land and soil, water, air, forests, biodiversity, coastal resources, industry and mining, energy, and waste management etc) is thereby available to decision-makers.

88 www.evri.ca/Global/Splash.aspx
89 Global estimates of the value of ecosystems and their services in monetary units; de Groot et al. Ecosystem Services 1 (2012)
Table A.3 ‘Best Guess’ Resource Value Estimates For Indonesia 2013 From Benefits Transfer Sources

<table>
<thead>
<tr>
<th>Resource / Situation</th>
<th>Reference / Source(s)</th>
<th>Estimated Value(s)</th>
<th>Comments On Methodology And/Or data</th>
<th>Implied Values For Indonesia 2013&lt;sup&gt;90&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical forests</td>
<td>• de Groot et al&lt;sup&gt;91&lt;/sup&gt; • ENVALUE (Maille and Mendelsohn, 1993) • EVRI (Ekanayake et al, 1992) • EVRI (Kuriyama, 2000)</td>
<td>5,264 668 AUD (2002) 816 Rupee (1993) 501 USD</td>
<td>• Ecosystem Service Value Database (ESVD) of 1350 value estimates • Madagascar, Travel Cost Method • India, WTP (recreation only) • Kushiro Forest/marsh (Japan)</td>
<td>5,790 840</td>
</tr>
<tr>
<td>Fresh water</td>
<td>• de Groot et al</td>
<td>4,267</td>
<td>• ESVD</td>
<td>4,693</td>
</tr>
<tr>
<td>(rivers and lakes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inland wetlands</td>
<td>• de Groot et al</td>
<td>25,682 5.4m USD</td>
<td>• ESVD</td>
<td>28,250</td>
</tr>
<tr>
<td></td>
<td>• EVRI (Do and Bennett, 2007)</td>
<td></td>
<td>For 1% ecosystem service improvement (Viet Nam)</td>
<td>implies very large natural capital value</td>
</tr>
<tr>
<td>Coastal wetlands</td>
<td>• de Groot et al</td>
<td>193,845 &gt;27,000</td>
<td>• ESVD</td>
<td>213,229</td>
</tr>
<tr>
<td></td>
<td>• EVRI (Sathirathai et al, 2000)</td>
<td></td>
<td>Mangrove values only (Thailand)</td>
<td>31,800-40,000</td>
</tr>
<tr>
<td>Coral reefs</td>
<td>• de Groot et al</td>
<td>352,249 &lt;260 VND billion</td>
<td>• ESVD</td>
<td>387,474</td>
</tr>
<tr>
<td></td>
<td>• EVRI EVRI (Nam &amp; Son, 2001)</td>
<td></td>
<td>Coral surrounded island – tourism recreational value only (Viet Nam)</td>
<td>24 m</td>
</tr>
<tr>
<td>Marine</td>
<td>• de Groot et al</td>
<td>491</td>
<td>• ESVD</td>
<td>540</td>
</tr>
</tbody>
</table>

<sup>90</sup> Adjusted to 2013 constant US$ using Manufactures Unit Value (MUV) Index
<sup>91</sup> Values from de Groot are US$/per hectare/per year, expressed in 2007 constant US$. Converted across data source countries on Purchasing Power Parity basis. Quoted figures are averages of the range of data point sources.