Green jobs mapping study in Indonesia

Advance Draft

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Indonesia Country Office
Regional Office for Asia and the Pacific
Director's foreword

Indonesia is fast becoming a world leader in the promotion of sustainable development and it has committed itself to not only achieving job-rich economic growth, but has also set ambitious targets for the promotion of development that is environmentally sustainable. Reconciling these objectives and driving forward sustainable growth with equity represents a distinct set of challenges for the world of work. Given the considerable diversity in socio-economic conditions across Indonesia and high levels of informality and vulnerability, realizing inclusive and sustainable growth requires attention to the integration of social and environmental objectives within development strategies.

Employment or "Green Jobs" can be thought of as an intersection that brings together economic, social and environmental objectives. Economic activities provide people with livelihoods and also impact on the environment and climate change - and vice versa. A key point here is ensuring that employment is sustainable in the short, medium and long term - which is intricately linked to the use of the environment and the decency of work. Green Jobs can also be used as a tool for achieving environmental objectives linked to the mitigation of and the adaption to climate change.

Indonesia has embraced the concept of "Green Jobs" and has mainstreamed the concept in strategic plans and is increasing looking towards promoting green jobs through skills and adaptive technology policies. However, in order to effectively promote green jobs, it is important to have a clear understanding of what they actually are. This report has engaged in substantive dialogue with constituents on core issues relating to the identification of standards and criteria that could be used to define and identify green jobs in Indonesia. The results of this analysis found that in 2008 approximately 4 per cent of jobs in Indonesia could be considered to be “Green Jobs” that adhere to environmental safeguards and decent work principles.

This publication is a technical document that systematically outlines green jobs in Indonesia. It was produced with the support from the ILO’s Country Office for Indonesia and Timor-Leste in cooperation with the ILO’s Green Jobs Programme and the ILO’s Employment Intensive Investment Programme. It could not have been prepared without the contributions and cooperation of the Ministry of Manpower and Transmigration, the National Planning Agency, the Ministry of Environment, the National Council on Climate Change, the REDD+ Taskforce, Statistics Indonesia, the Ministry of Tourism and the Creative Economy, the Ministry of Energy and Mineral Resources, the Ministry of Transport, the Ministry of Industry, the Ministry of Public Works, the Ministry of Forestry, the Ministry of Fisheries and Marine Affairs, the Ministry of Agriculture, and APINDO, KSBSI, KSPSI and KSPI.

We expect that the findings of this report will be of great interest to all, particularly policy makers and social partners in Indonesia, who are concerned with working towards a sustainable and job-rich path of economic growth that benefits citizens today and tomorrow.

Peter van Rooij
Director
ILO Country Office for
Indonesia and Timor-Leste
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<td>Asian Development Bank</td>
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<tr>
<td>AIO</td>
<td>Aliansi Organis Indonesia</td>
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<td>AMAN</td>
<td>Aliansi Masyarakat Adat Nusantara (Indigenous Peoples’ Alliance of the Archipelago’s)</td>
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<td>AMDAL</td>
<td>Analisis Mengenai Dampak Lingkungan (Environmental Impact Assessment)</td>
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<td>APEC</td>
<td>Asia-Pacific Economic Cooperation</td>
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<td>APINDO</td>
<td>Asosiasi Pengusaha Indonesia (Indonesia Employers Association)</td>
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<td>ASD</td>
<td>Appropriate Site Development</td>
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<td>ASEAN</td>
<td>Association of South East Asia Nations</td>
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<td>AusAID</td>
<td>Australian Government Overseas Aid Program</td>
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<td>BAPEDAL</td>
<td>Badan Pengendalian Dampak Lingkungan (the Environmental Control Agency)</td>
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<td>BEDs</td>
<td>by-catch exclusion devices</td>
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<td>BEM</td>
<td>Building Environment Management</td>
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<td>BOD</td>
<td>Biological Oxygen Demand</td>
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<td>BP</td>
<td>British Petroleum</td>
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<td>BPS</td>
<td>Biro Pusat Statistik (Bureau Statistic Center)</td>
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<td>BRT</td>
<td>Bus Rapid Transport</td>
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<td>CBIB</td>
<td>Cara Budi Daya Ikan yang Baik (Good Aquaculture Practice)</td>
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<td>CCFPI</td>
<td>Climate Change, Forests and Peatlands in Indonesia</td>
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<td>CDM</td>
<td>Clean Development Mechanism</td>
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<td>CFL</td>
<td>Compact Fluorescent Light</td>
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<td>CFCs</td>
<td>Chlorofluorocarbons</td>
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<td>CIFOR</td>
<td>Centre for International Forestry Research</td>
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<tr>
<td>CNG</td>
<td>Compressed Natural Gas</td>
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<td>COREMAP</td>
<td>Coral Reef Rehabilitation and Management Programme</td>
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<td>CPO</td>
<td>Crude Palm Oil</td>
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<td>CTI</td>
<td>Coral Triangle Initiative</td>
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<td>DMO</td>
<td>Destination Management Organization</td>
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<td>DSDP</td>
<td>Denpasar Sewerage Development Project</td>
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<td>EEC</td>
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<td>ESSV</td>
<td>Energy Self-Sufficient Village</td>
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<td>Forest Resource Information System</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GEF</td>
<td>Global Environment Facility</td>
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<td>GHG</td>
<td>Greenhouse Gases</td>
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<td>GIZ</td>
<td>Deutsche Gesellschaft für Internationale Zusammenarbeit (German International Cooperation)</td>
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<tr>
<td>IDC</td>
<td>International Building Development Centre</td>
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<td>IHC</td>
<td>Indoor Air Health and Comfort</td>
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ILO  International Labour Organization
IMIDAP  Integrated Micro-Hydro Development and Application Programme
IMO  International Maritime Organization
IOA  Indonesia Organic Alliance
IOTC  Indian Ocean Tuna Commission
ISIC  International Standard Industrial Classification
ISPO  Indonesian Sustainable Palm Oil scheme
IUPHHK-HA  Izin Usaha Pemanfaatan Hasil Hutan Kayu Pada Hutan Alam (Utilisation license of timber forest products in production forests)
IUPHHBK-HA  Utilization Permit of Non Wood Forest Products in natural forests
IUPHHBK-HT  Izin Usaha Untuk Membangun Hutan Tanaman Pada Hutan Produksi (Utilization Permit of Non Wood Forest Products in production forests)
IUU  Illegal, Unreported and Unregulated
JAMKESDA  Jaminan Kesehatan Daerah (Regional Health Insurance)
JAMKESMAS  Jaminan Kesehatan Masyarakat (National Health Insurance for the Poor and Near Poor)
JAMSOSTEK  Jaminan Sosial Tenaga Kerja (Social Security Workforce)
JED  Jaringan Ekowisata Desa (Village Ecotourism Network)
KBLI  Klasifikasi Baku Lapangan Usaha Indonesia (the Standard Industrial Classification of Indonesia)
LEI  Lembaga Ekolabel Indonesia (Indonesian Ecolabelling Institute)
LeSOS  Lembaga Sertifikasi Organik Seloliman
LPG  Liquefied Petroleum Gas
LUCF  Land-use Change and Forestry
MAL  Mutu Agung Lestari
MENHUT  Kementerian Kehutanan (Ministry of Forestry)
MIFEE  Merauke Integrated Food and Energy Estate
MLC  Maritime Labour Convention
MMAF  Ministry of Marine Affairs and Fisheries
MoTCE  Ministry of Tourism and Creative Economy
MP3EI  Master Plan for Acceleration and Expansion of Economic Development
MRC  Material Resources and Cycle
MRT  Mass Rapid Transportation
MRV  Measures, Reporting and Verification Mechanisms
NASAA  The National Association for Sustainable Agriculture, Australia
NGO  Non-Government Organizations
NGV  Natural Gas Vehicles
NPK  Nitrogen, Phosphorus and Potassium
NTB  Nusa Tenggara Barat
NTFP  Non-timber forest products
PAMOR  the Participatory Guarantee System
PERPRES  Peraturan Presiden (Presidential Regulation)
PERTAMINA  Perusahaan Pertambangan Minyak dan Gas Bumi Negara (State Owned Oil and Gas Company)
PFCs  Perfluorocarbons
PV  Photovoltaic
PLN  Perusahaan Listrik Negara (State Electricity Company)
PNPM-Mandiri  Program Nasional Pemberdayaan Masyarakat Mandiri (National
Programme for Community Empowerment

PPIP
Program Pembangunan Infrastruktur Perdesaan (Rural Infrastructure Development Programme)

PPKGO
Persatuan Petani Kopi Gayo Organik (the Gayo Organic Coffee Farmers Association)

PROPENAS
Program Pembangunan Nasional (General Guideline of National Development)

PROPER
Program for Pollution Control Evaluation and Rating (Program Penilaian Peringkat Kinerja Perusahaan dalam Pengelolaan Lingkungan Hidup)

P2KH
Program Pengembangan Kota Hijau (Green City Development Program)

REDD
Reduction of emissions from deforestation and forest degradation

RENSTRA
Rencana Strategis (Strategic Plan)

RPJMN
Rencana Program Jangka Menengah (National Medium-Term Development Plan)

RSPO
Roundtable on Sustainable Palm Oil

OKPO
Otoritas Kompeten Pangan Organik (Organic Agriculture Competencies)

OPEC
Organization of Petroleum Exporting Countries

SAKERNAS
Survey Angkatan Kerja Nasional (the National Labour Force Survey)

SCORE
Sustaining Competitive and Responsible Enterprises

SFP
Sustainable Fisheries Partnership

SHS
Solar Home Systems

SIPI
Surat Izin Penangkapan Ikan (Fishing Permit Documents)

SKKNI
Standar Kompetensi Kerja Nasional Indonesia (Indonesia’s National Work Competence Standards)

SMEs
Small and Medium Enterprises

SNI
Standar Nasional Indonesia (Indonesian National Standards’)

SUROFINDO
Superintending Company of Indonesia

TPA
Tempat Pemrosesan Akhir (Landfill)

TEDs
Turtle Exclusion Devices

UN
United Nations

UNDP
United Nations Development Programme

UNFCCC
United Nation Framework Convention on Climate Change

UNEP
United Nations Environment Programme

UNWTO
United Nations World Tourism Organisation

WAC
Water Conservation

WWF
World Wide Fund for Nature
Acknowledgements

This publication was prepared with strong collaboration with stakeholders, including government, workers and employer, on the topic of green jobs and the promotion of decent work in a greener economy. This publication is based on a preliminary mapping of green jobs prepared by GHK Consultants in the context of the Green Jobs in Asia Project, a project funded under the Australian Government - ILO Partnership Agreement (2010 - 2015). Further research by an ILO team associated with international and national experts of various horizons has been completed and has led to the finalization of the present report.

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Executive Summary

This executive summary outlines the results of a green jobs mapping study conducted in 2011 and 2012 in Indonesia under the ILO Green Jobs initiative. The purpose of the mapping study was to identify key economic sectors with environment related activities that are creating green jobs in Indonesia and to offer some suggestions on how to move forward. The study was part of the Green Jobs in Asia project that sought to increase access to reliable sources of data and information on green jobs for constituents in Indonesia. The results of the study identified what sectors of the economy are creating green jobs and will provide policy makers with statistical data to support further policy development and green employment.

The study identified core environment related sectors and green sub sectors, and estimated the numbers of core environment related jobs and green decent jobs found in each of the economic sectors analysed. The report also includes policy recommendations for further action to promote green jobs within the green sub-sectors identified by the study.

The executive summary is presented in the following sections:

- Main findings.
- Background.
- Methodology.
- Core environment related sectors and green sub sectors.
- Decent Work.
- Conclusions.

A comprehensive research and analysis programme on green jobs is planned by the ILO for Indonesia consisting of three core objectives to:

i. Better understand where green jobs are found across the economy and in which sectors and to identify the existing barriers to transform existing environment related jobs into decent green jobs.

ii. Asses the potential for creating new jobs including green jobs by transitioning to a low-carbon, green economy.

iii. Collect the necessary elements for the development of a strategy on skills for green jobs that can fully reap the benefits of a greener economy.

The Green Jobs mapping study was developed under phase 1 of the green jobs programme for Indonesia and aimed to address the first objective. The results of the study will be able to assist and give guidance to both national and local government on how best to plan and implement low carbon activities while addressing the social and labour challenges within the Indonesian context. It is envisioned that the results and recommendations from the study will feed in to an Indonesian Green Jobs Road Map developed by a national task force on Green Jobs (consisting of ILO constituents and other relevant stakeholders). The Road Map will provide guidance to policy makers on the creation and promotion of green jobs both at the national and local levels that will be in line with existing government development plans and poverty reduction programmes.

Driving the Indonesian economy towards a more environmentally sustainable and low carbon development path will bring profound and lasting adjustments to the socio-economic structures of Indonesia, triggering shifts in the labour markets that will create demand for
new skills and re-skilling programs as well as specific measures to facilitate a just transition for workers, employers and enterprises, such as social protection programmes and financial schemes. The results of the study may assist policy makers in Indonesia with the transition.

**Main Findings**

The research findings of the mapping study demonstrate the important potential that exists in Indonesia for further green job creation at the sectoral level. The study estimated that there were approximately 8.8 million core environment related jobs in Indonesia and that approximately 4 million jobs were assessed to be green jobs by adhering to decent work principles. The sectors with the highest potential for further green job creation were agriculture, manufacturing and transport, as well as significant potential also found in forestry, fisheries and construction if appropriate policies are implemented to promote environmentally sustainable activities and to address the decent work deficits in the sectors. The table below highlights the green employment figures ascertained from the study.

Table 1: Estimated core environment related jobs and green jobs in Indonesia.

<table>
<thead>
<tr>
<th>Key sectors</th>
<th>Core environment related jobs</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>4,809,584</td>
<td>2,434,667</td>
</tr>
<tr>
<td>Forestry</td>
<td>213,620</td>
<td>97,630</td>
</tr>
<tr>
<td>Fisheries</td>
<td>549,012</td>
<td>241,739</td>
</tr>
<tr>
<td>Mining &amp; Energy</td>
<td>6,780</td>
<td>4,820</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1,062,761</td>
<td>331,538</td>
</tr>
<tr>
<td>Construction</td>
<td>414,780</td>
<td>187,752</td>
</tr>
<tr>
<td>Transportation</td>
<td>1,659,606</td>
<td>603,593</td>
</tr>
<tr>
<td>Tourism</td>
<td>21,407</td>
<td>10,665</td>
</tr>
<tr>
<td>Waste</td>
<td>73,462</td>
<td>73,462</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,811,012</strong></td>
<td><strong>3,985,866</strong></td>
</tr>
</tbody>
</table>

Most of the green jobs in Indonesia were found in the agriculture sector, where almost 50 per cent of the core environment related jobs were found to be green jobs because of the importance of the green sub sectors such as organic and low impact crops cultivation and smallholder rubber production which are creating a lot of green employment.

In the forestry sector, sub sectors such as non-timber forest products involve activities that are community based and provide lower levels of remuneration. However, activities to promote sustainable natural forests such as environmental certification have helped increase green jobs in this sector.
In the fisheries sector, aquaculture has the greatest potential to become an important sector for green jobs as most of its activities are export oriented and follow good labour practices.

It was estimated that approximately 71 per cent of core-environment related jobs in the energy and mining sector would be green jobs. In the energy sector the share of renewables has been steadily increasing in the energy mix as a consequence of mitigation policies. Since many of these jobs are highly skilled and found in a well regulated sector, they were considered to be green jobs.

In the manufacturing sector the highest number of core-environment related jobs was found in rattan and bamboo manufacturing, where 31 per cent of the jobs were estimated to be green jobs. Activities such as sustainable edible oil production and green agro-processing were also found to have important potential to generate more green jobs.

The Indonesian construction industry is rapidly expanding and sub sectors such as green buildings, irrigation, water management and other related activities provide huge opportunities for green job creation should further investments be made in these areas. Good practices such as green procurement, green certification and recycling could yield considerable benefits and create significant numbers of green jobs. However, the study also highlighted the important scope for improvement in working conditions and productivity and the need for higher OSH compliant practices.

The transport sector’s core-environment sub-sector came from the mass public transportation systems; in which green jobs could be generated in bigger number should more investments be made in infrastructure such as for the expansion of the rail network.

Although the number of green jobs and environment related jobs in the tourism sector is still low, there exists potential to increase numbers through policies that promote eco-tourism, green homestays and green spas.

**Background**

The Indonesian green jobs mapping study is part of the ILO’s wider efforts to develop the research and analysis capacities of constituents in the Asia and Pacific region in regards to green jobs under the Green Jobs in Asia project. Similar green job mapping studies have also been undertaken in Bangladesh, Malaysia and the Philippines as well as more advanced analytical work using DySAM modelling tools and input output tables.

The ILO/UNEP framework definition on Green Jobs is direct employment in economic sectors and activities which reduce their negative environmental impacts ultimately resulting in levels that are sustainable. These jobs are those that help to reduce the consumption of energy and raw materials, de-carbonize the economy, protect and restore ecosystem services and biodiversity and minimize the production of waste and pollution. In addition, a job can only be termed green by the ILO if it is decent work. The decent work aspect of green jobs is based on four strategic objectives; productive employment; fair income opportunities; social protection and social security for workers and their families as well as rights for social dialogue. The study also refers to core environment related jobs which are jobs sustained by activities related to the environment as defined by compliance with relevant national standards but which do not fulfil the parameters of decent work. At its heart, the concept of
green jobs combines the aspirations of the society at large for a low-carbon, environmentally friendly, climate-resilient world with social equity and decent work for all.

In Indonesia it is widely acknowledged that the unsustainable use of resources, population growth, increasing pollution and green-house gas emissions, water contamination and the deterioration of natural capital in general pose severe threats to eco-systems, livelihoods and the sustainability of the region as a whole. Regarding climate change, the government of Indonesia has committed to reduce greenhouse gas (GHG) emissions by 26 per cent compared to business as usual and by up to 41 per cent with international support by 2020. The country’s commitment to pursue a greener development path with greener employment opportunities was further elucidated by the President of Indonesia at the 100th International Labour Conference in June 2011 where he declared the government’s intention to advance a national green skills development strategy, a decentralized youth apprenticeship programme for green jobs and measures to foster entrepreneurship, green apprenticeships and self-employment in environmentally friendly sectors.

In order to achieve these GHG emission reduction targets the government has recognized that climate change planning cannot be separated from national economic and social development planning and has developed the Indonesia Climate Change Sectoral Roadmap (ICCSR) to reduce greenhouse gas emissions. The ICCSR outlines the mitigation and adaptation efforts that will be implemented by the government across a wide range of economic sectors. These efforts will affect the labour market, the profiles of jobs and the skills required as well as the incomes and activities of people who rely heavily on the environment for their livelihoods. The drive for greater sustainability will demand reductions in energy and materials intensity and cleaner production processes as well as the jobs and skills needed to implement the changes.

The development of a green economy and green jobs can increase the capacity of Indonesia to adapt to climate change and promote low carbon, environmentally friendly development in a socially inclusive way. The government of Indonesia recognizes the need to pursue more environmentally sustainable economic growth patterns and to enact policies and legislation to tackle environmental degradation and climate change while continuing economic growth and social progress. A green economy must be about reducing poverty and increasing economic resilience against the adverse effects of climate change, as well as about generating income and decent employment for workers without affecting the environment and ensuring the viability and competitiveness of enterprises. New sustainable ways of managing resources and producing goods and services will be needed to ensure that Indonesian economic growth continues to become more climate-resilient and sustainable.

Methodology

The study assessed the environment-economy-employment linkages at the national level, mapped existing core environment-related jobs in the Indonesian labour market and provided a baseline estimate of the current scale and distribution of green jobs. The objective was to develop the analytical capacity of ILO constituents (government, employers and workers) in Indonesia to assess the economic and employment impacts of a green development strategy through the development of a green jobs mapping study to enable decision makers to better understand the economic and social implications.
The green jobs mapping study applies a mixed method approach that incorporates techniques that include the collection of qualitative data from key informants and focus group discussions as well as analysis of quantitative data from the National Labour Force Survey (SAKERNAS). This data was then used to examine the structure of the economy; identify green sub-sectors, estimate environmentally sustainable employment in those green sub-sectors; examine how many of those jobs adhered to decent work principles and then estimate the numbers of green jobs in that particular sector.

The first step in the methodology for estimating green jobs involves understanding the structure of the economy and its links to employment as per the international standard classification of industry. Each sector of the economy is then examined to determine the particular sub-sectors that are strongly integrated with the environment. In Indonesia it was determined that there were nine core sectors where green jobs were clustered, namely, agriculture, forestry, fisheries, mining and energy, manufacturing, construction, transportation, tourism and waste. Green sub-sectors that exist within these parent sectors were determined through a combination of focus group discussions with key focal points from each of the sectors as well as a thorough literature review of national laws and regulations, voluntary standards and activities that are associated with each sector. Criteria for determining the extent to which activities could be considered to be sustainable within an identified subsector we also identified. Once the green sub-sectors were identified and agreed upon by the ILO's constituents, the labour force survey was used to generate estimates for employment that could be considered to be environmentally sustainable within each green sub-sector.

The final step involved in estimating green jobs involved the introduction of criteria to provide insight on employment quality or "decent work". Focus group discussions with the ILO's constituents determined that variables providing insight on adequate earnings, formality, safe working environment, access to social security, social dialogue and employers' and workers’ representation were highly relevant for the estimation of the decency of work in each green sub-sector. Estimates for green jobs were then derived using a combination of insights collected from focus group discussions and data from the labour force survey.

Core environment related sectors and green sub sectors.

Agriculture

Indonesia’s agricultural sector is one of the largest sectors in the economy and was found to have the greatest number of green jobs. The total number of core environment related jobs in the agricultural sector was estimated to be 4.8 million in August 2008. This accounts for approximately 12.3 per cent of jobs in the agricultural sector. Out of these, 2.4 million jobs or 6.24 per cent of jobs in the agricultural sector could be considered as green jobs. The study identified seven green sub-sectors with the potential to create more green jobs, namely, low impact rice farming, low impact crops cultivation, smallholder rubber, sustainable palm oil, organic plantations for beverages, low impact poultry, and combination farming.

In order to increase the number of green jobs in the agriculture sector in Indonesia it would be important to support the further development of organic and low-impact farming techniques in rice cultivation and other crops and plantation beverages, as well as increasing access to organic certification labeling for certified farmers.
**Fishing**

Of the 549,012 core environment related jobs found in the fisheries sector it was estimated that just under half of them or 241,739 were green jobs. Three green sub-sectors with potential for green job creation were identified within the fisheries sector, namely, sustainable fishing in the formal economy for export, seaweed farming and good practices in aquaculture.

Most of the green jobs in the fisheries sector are in good practices in aquaculture, followed by sustainable fishing in the formal economy for export. In order to increase the number of green jobs in the fisheries sector in Indonesia it would be important to support the implementation and enforcement of regulations to ensure catching quotas and international treaties on fishing are adhered to and to improve employment quality and conditions. Programmes may be developed to provide fishermen with access to training programmes on value chain activities to increase the producer’s share of the border price and help raise incomes.

Aquaculture could also become an important green sub-sector for green jobs as it is predominantly export oriented and follows good labour practices. While the seaweed sub-sector also offers a lot of potential for further green job creation as it provides opportunities for fishing communities to diversify and raise their income and improve the reliability of their income in a sustainable way.

**Forestry**

The study identified 213,620 core environment related jobs and 97,630 green jobs in the forestry sector. Due to the important implication for adapting to climate change, the forestry sector is recognised as holding some of the greatest potential for further green job creation in Indonesia. The green sub-sectors with the highest number of environmentally sustainable jobs included natural production forests that follow SFM law, followed by jobs in forest services, protection and conservation.

To create more green jobs in forestry the government could introduce supporting policies which promote value chain development and diversification while promoting access to competitive markets and access to finance. Sustainable natural forest concessions through certification and inspections from the Eco-Labelling Institute (Forestry Stewardship Council) and the Ministry of Forestry may also spur further growth in the sector. Green jobs may also be generated through climate change mitigation activities such as UN-REDD that reduce deforestation, such as jobs in forest rehabilitation and conservation, community outreach and forest mapping as well as additional jobs created related to carbon trading and green finance.

**Mining and Energy**

The study only identified 6,780 core environment jobs in the sector, with 4,820 being classed as green jobs. Most of the green jobs were found in the renewable energy sub sector because they are highly skilled and in a well regulated sector.

In order to expand the number of green jobs in the mining and energy sector there is a need to better utilize the untapped potential in Indonesia and to rapidly expand the development of the geothermal, biomass and renewable energy (solar, wind and hydro-power) sub-sectors. Indonesia is estimated to hold 40 per cent of the world’s feasible geothermal reserves holding great potential for green employment creation if these renewable sources of energy can be
harnessed. To ensure that work is both sustainable and decent in the sector it would also be important to ensure that enterprises are members of employers’ organizations and that the workers have the right to freedom of association and collective bargaining as well as adequate training.

**Manufacturing**

The total number of core environment related jobs in the manufacturing sector was estimated at 1,062,761, which is equivalent to 8.5 per cent of all the jobs in manufacturing in 2008 and of these 331,538 (2.6 per cent) can be classified as green jobs. Thirteen green sub-sectors were identified by the study, namely, sustainable edible oils, green agro-processing, lean manufacturing of garments, rattan and bamboo manufacturing, manufacturing of materials that promote sustainability, production of organic chemicals and fertilisers, organic soaps, sustainable essential oils, green cement, manufacturing of pedicabs and bicycles, manufacturing of machinery for steam, turbine and windmills, energy efficiency initiatives and recycling.

The rattan and bamboo manufacturing sub sectors offer the most potential for further green jobs growth while green agro-processing, organic fertilizers, sustainable essential oils and recycling activities can play an important role in supporting the economy to become more environmentally sustainable. As new policies are introduced over the coming years to promote sustainability in the manufacturing sector it will be important for industries that emit high levels of GHGs to identify strategies to reduce emissions by examining energy sources and how to better use energy throughout the production cycle. Solutions for mitigating GHGs may include switching to renewable sources, converting waste into energy sources, or adopting green technologies that are more energy and resource efficient. The demand for green jobs and people with green skills to implement the changes is also expected to grow.

**Construction**

Within the construction sector there exists huge potential for the development of green jobs if decent work deficits can be overcome. Of the 414,780 environment related jobs found in the sector approximately 187,752 were classified as green jobs. By providing remuneration above the minimum wage and providing workers with access to health insurance and injury compensation mechanisms many of the core environment jobs may be upgraded to green jobs.

The majority of the jobs in the construction sector involved the building of commercial and residential buildings and the construction of roads. Developers may be encouraged to use the green building certification process and to adopt green procurement standards in their projects. Further jobs may be created in the sector through the use of recycled materials and inputs as well as adopting environmentally sound waste management practices. Many of those working in irrigation, particularly community based irrigation, would benefit from receiving support to adopt appropriate technologies and structures to assist in the maintenance of irrigation systems.

**Transport**

The study identified 1,659,606 environment related jobs in the transport sector and 603,593 green jobs (9.8 per cent of all jobs in the sector). The three main green sub-sectors identified
as creating green jobs within the transport sector were mass public transport, non-motorised transport and rail, river and sea transport.

Green jobs could be generated in larger numbers if more investments are made in low carbon transportation systems, such as the expansion of the rail network and mass public transport on roads. Policies may focus on improving the quality of current transport options to support an increase in demand, while also exploring the possibility for public-private partnerships (PPP) to increase the supply of rail and public transport options. Furthermore, it would also be important to ensure that enterprises in the transport sector are members of employers’ organizations and that the workers have the right to freedom of association and collective bargaining to address decent work deficits.

Tourism

In the tourism sector the estimated number of core environment related jobs was 21,407, which is equivalent to less than 1 per cent of the jobs found in the tourism sector. The number of green jobs is almost half as much at 10,665. Four green sub-sectors were identified within the tourism sector, namely, sustainable accommodation services, sustainable tourism services, sustainable management of tourism destinations and green spas. In Indonesia tourism activities, such as eco-tourism and forest-based tourism are growing rapidly. If forest eco-systems are well maintained and tour guides are well informed on sustainable tourism practices such economic activities can support sustainable development objectives.

Efforts to promote green hotels, green homestays, green spas and the sustainable management of tourism destinations can engage local people, creating more green businesses and green employment opportunities in the process while protecting the environment. To support the expansion of green jobs in the tourism industry, it would be important to support the implementation of the Ministry of Tourism and Creative Economy's Strategic Plan for Sustainable Tourism and Green Jobs, which seeks to address issues such as applying a sustainable approach within tourism planning, providing education and training that promotes sustainable tourism, and promoting employment standards in tourism, among others.

Waste

The waste sector in Indonesia is characterised by under-funding, lack of skills, and local organization of the waste collection. Much of the work is undertaken on an informal basis so green job estimates of 73,462 working in the sector were quite low in relation to the numbers of people involved. Further development and implementation of the 3R programme in Indonesia would significantly increase the numbers of green jobs in the sector. Also targeting waste pickers and providing them with trainings on occupational safety and health (OSH), access to health insurance and social protection services as well as basic environmental awareness can help reduce decent work deficits in the sector.

Decent Work

The ILO decent work agenda seeks not just the creation of jobs, but of high quality jobs around the world. The green job agenda seeks to promote decent work in environment related activities as countries institute policies and programmes to tackle unsustainable development
patterns and climate change. It is important to consider that not all environment-related jobs are necessarily decent jobs. This leaves scope for not only creating new green jobs in green sub-sectors but also by improving the sustainability of existing jobs (greening) across the whole economy where much more green employment may be created. Policies enacted for greater economy-wide sustainability and environmental protection are expected to drive the growth of both new green economic sectors and the demand for green skills.

The decent work analysis undertaken by the study found that most social issues regarding employment in environment related jobs are found across all other sectors of the economy as well. Issues such as low remuneration, lack of labour regulation enforcement and ensuring workers have the right to freedom of association and collective bargaining have all contributed to decent work deficits across the labour market.

Much work in Indonesia is often undertaken on an informal basis, thus much of the work cannot be classified as decent by definition. In many cases, it’s mostly the non-compliance with existing labour standards or their inadequate enforcement that raises barriers to labelling jobs as ‘green’ such as jobs in fisheries or waste management. Interventions to enforce labour standards can contribute significantly to improving decent work aspects transforming these types of informal jobs to genuine green jobs.

Conclusion

The discussion on how best to promote green jobs in Indonesia is on-going. The Green Jobs mapping study completed under phase 1 of the project was the first step in a process to better integrate social and labour considerations with the environment pillar of national sustainable development policy in Indonesia. The results of the mapping study have laid the groundwork for further analysis of the labour market.

Whilst there is substantial growth potential for creation green jobs in certain sectors, not all of the work currently available within these sectors may be considered ‘green’ according to the ILO definition. Quantifying green jobs is not a straightforward process, particularly in regards to using indicators to ascertain if they adhere to decent work principles in the informal economy. Information on working conditions, wages or other indicators are not yet comprehensively measured or collected in Indonesia. Moreover, identifying direct environment related jobs is not a straightforward process in the absence of official figures. Even when environment related jobs can be identified, understanding the quality of these jobs can often be challenging. In further studies it may be useful to further examine what proportion of jobs created by environment related activities and investments in climate resilience may be considered to be green and whether these new jobs adhere to decent work principles allowing them to be classed as green jobs. In particular, it will be important to ascertain the proportion of growth in green jobs when compared to the overall employment growth rate and whether green jobs have actually exceeded that growth.

The decent work analysis undertaken by the study identified a number of decent work deficits, found in green segments of the economy where issues such as low occupational health and safety, income insecurity and low productivity are common features such as in forestry, fisheries, and waste recycling. In addition, it was found that some of the most important social and labour issues found across all sectors of the economy are no different in environment related jobs.
Policies enacted for greater economy-wide sustainability are expected to drive the growth of both new green economic sectors as well as more traditional sectors. The key to this transformation would be to support small and micro size enterprises to become more sustainable in their business operations as well as creating the conditions in the economy for the large scale production, labeling and marketing of economically and socially sustainable green products and services. This ‘greening’ of existing jobs can significantly increase the numbers of green jobs across the economy as a whole.

In addition, there is also a need to take a more synergetic approach under the Indonesia Climate Change Sectoral Roadmap (ICCSR) and to further assess the employment and skills demand dimensions of the low-carbon, environmentally friendly policies introduced in different key sectors of the economy. The ICCSR may be further integrated with labour and social related policies to encourage more green jobs and the greening of existing jobs. Moreover, developing national framework legislation on green jobs and incorporating further environmental considerations into economic development plans such as the Medium-Term Development Plan 2010-2014 and Long Term Development Action Plan (2005-2025) will be critical in the coming years to effectively mainstream the green jobs agenda outlined by the President into the national development process.

It is also important to strengthen the role of social partners (Employers and Trade Unions) in Indonesia in the decision making process by including them in national consultative mechanisms on climate change and green jobs. Social partners can provide effective services, trainings and information about green jobs to their members as well as promoting green jobs in their action plans for the next five years.
Chapter 1: Introduction

1.1 Background

The Asia-Pacific region has been at the forefront of much of the world’s recent growth in economic activity, enabling many countries to make significant progress in reducing poverty and enhancing the quality of life for millions of their citizens. However, this rapid rate of industrialisation has not matched the unemployment challenge and has created a myriad of challenges to the environment. Resource scarcity, environmental degradation, climate change and population growth pressures are compounding existing challenges to economic growth and poverty alleviation in the Asian and Pacific region and have compelled governments to pursue greater environmentally sustainable economic growth patterns.

In view of the impacts of climate change, rapid urbanization and a large growing population, new sustainable ways of managing resources and producing goods and services will be needed for Indonesian economic growth to be more climate resilient and sustainable. A green economy can increase the capacity of Indonesia to adapt to climate change and promote low carbon, environmentally friendly development in a socially inclusive way. Concepts of green growth and green jobs are so cross-cutting in nature that it will take a multi-pronged approach involving all stakeholders to effectively shift towards a greener economy while also creating decent work and supporting social equity. Policies enacted for greater economy-wide sustainability are expected to drive the growth of green economic sectors, green businesses and green jobs over the coming decades. The transition will vary from sector to sector and will depend on the specific economic conditions and development plans. New jobs, industries and businesses will be created, some jobs will be substituted, some jobs may be lost, while many existing jobs will simply be transformed and turned greener. Employment policies in Indonesia need to be adjusted to cope with these changes and to ensure a just transition.

Policy measures aimed at supporting a shift to more sustainable growth and development trajectories have far-reaching implications for the employment and labour market dynamics in Indonesian economic sectors. By integrating climate change action plans and low carbon development strategies with labour policies and green skills development programmes, progress can be made towards harmonizing environmental and social considerations into economic development planning, strengthening the three pillars of sustainable development and effectively linking Millennium Development Goal 1 (poverty reduction) and Millennium Development Goal 7 (protecting the environment) making them mutually supportive rather than conflicting.

Policy makers have already developed the Indonesia Climate Change Sectoral Roadmap (ICCSR) to provide a set of prioritised recommendations for the Medium-Term Development Plan 2010-2014 and for successive national development plans until 2030. The Roadmap covers 13 key mitigation related sectors such as agriculture, forestry, coastal areas, industry, energy and transportation that will have implications on the sustainability of livelihoods as well as the development of further green jobs. The Indonesia Climate Change Trust Fund (ICCTF) has also been established to support the implementation of 150 low carbon measures.

The ILO’s Green Jobs in Asia project and green jobs mapping study in Indonesia were developed to deepen ILO constituents’ understanding about the need for greater environmentally sustainable economic growth, the impacts of climate change and the need
for gender sensitive employment opportunities across the labour market that are both decent and sustainable.

1.2 What are green jobs

The promotion of green jobs can assist Indonesia during the transition towards a low-carbon, environmentally friendly and climate resilient economy. According to the ILO and UNEP framework definition, green jobs are direct employment in economic sectors and activities which reduce their negative environmental impacts ultimately resulting in levels that are sustainable. These jobs are those that help to reduce the consumption of energy and raw materials, de-carbonize the economy, protect and restore ecosystem services and biodiversity and minimize the production of waste and pollution. In addition, a job can only be termed green by the ILO if it is decent work. The decent work aspect of green jobs is based on four strategic objectives; productive employment; fair income opportunities; social protection and social security for workers and their families as well as rights for social dialogue.

The study also refers to core environment related jobs which are jobs sustained by activities related to the environment as defined by compliance with relevant national standards but which do not fulfill the parameters of decent work.

Green jobs can be found in almost every sector but in Indonesia they are predominantly focused in agriculture, forestry, fisheries, mining and energy, manufacturing, construction, transport, tourism and waste. It is important to understand where these jobs are located and what makes them environmentally friendly and decent and how we can make more of them, therefore these were the sectors chosen for the green jobs mapping study.

At its heart, the concept of green jobs combines the aspirations of the society at large for a low-carbon, environmentally friendly, climate-resilient world with social equity and decent work for all.

1.3 Approach to the study

This report outlines the results of a green jobs mapping study conducted in Indonesia from 2011 to 2012 under the ILO Green Jobs initiative. The purpose of the study was to identify existing green sub-sectors and environment related employment in Indonesia and to estimate the numbers of green jobs as well as analyse the potential for further green job creation. This is to support the national target of a voluntary reduction in greenhouse gas (GHG) emissions by 26 per cent and by up to 41 per cent with international support as outlined by the President of Indonesia in 2009 at the G-20 Summit, Pittsburgh, U.S. The mapping study will provide recommendations to assist policy makers to create more green jobs while making the shift towards a low-carbon, environmentally friendly and climate resilient economy that can reduce social gaps, support development goals and realize decent work.

The study assessed the environment-economy-employment linkages at the national level, mapped existing core environment-related jobs in the Indonesian labour market and provided a baseline estimate of the current scale and distribution of green jobs and level of economic activity dependent on the environment. The objective was to develop the analytical capacity of ILO constituents (government, employers and workers) in Indonesia to assess the economic and employment impacts of a green development strategy through the development
of a green jobs mapping study to enable decision makers to better understand the economic and social implications.

The study provides key information on the sectors which promote environmentally friendly decent work (green jobs), and provides further policy recommendations for the Government and the social partners to enable them to identify entry points for further green job creation that can support a just transition towards a greener economy.

1.4 Research

The Indonesian green jobs mapping study is part of the ILO’s wider efforts to develop the research and analysis capacities of constituents in the Asia and Pacific region in regards to green jobs. Similar green job mapping studies have also been undertaken in Bangladesh, Malaysia and the Philippines. The following Indonesian economic sectors were identified for further analysis to identify the numbers of environmentally sustainable jobs and green jobs: Agriculture; Fisheries; Forestry; Energy and Mining; Manufacturing; Construction; Transport; Tourism and Waste.

The research methodology for the mapping study examined the structure of the economy; identified green sub-sectors, estimated environmentally sustainable employment in those green sub-sectors; examined how many of those jobs adhered to decent work principles and then estimated the numbers of green jobs in that sector. Challenges to data collection and data analysis are discussed at the end of each chapter as well as sector-specific policy recommendations which may be implemented to encourage the growth of more decent work and green jobs in Indonesia.

1.5 Overview of the Indonesian context

1.5.1 Environment

Indonesia’s vulnerability to climate change is dictated by its unique physical and socioeconomic attributes spread across an archipelago of thousands of islands, which includes a high population density, in particular in coastal and low-lying areas and the prominence of forestry, agriculture and fishing in providing livelihoods. These people are likely to be disproportionately affected by the impacts of climate change and rising sea levels.

The government of Indonesia has committed to reduce greenhouse gas (GHG) emissions by 26 per cent compared to business as usual and by up to 41 per cent with international support. In order to achieve this target, the government has recognised that climate change planning cannot be separated from national economic and social development planning and has developed a National Action Plan to reduce greenhouse gas emissions by 2020. The five main sectors that will be targeted include; forestry and peat lands, agriculture, energy and transportation, industry, and waste. In 2005, it was estimated that total GHG emissions for the three main greenhouse gases (without Land Use, Land Use Change and Forestry (LULUCF)) reached 665,543 Gg CO2e. With the inclusion of LULUCF, total net GHG emissions for
Indonesia were estimated at 1,791,371 Gg CO2e.\textsuperscript{1} It is widely acknowledged that the unsustainable use of resources, high levels of pollution and greenhouse gas emissions, and the deterioration of natural capital in general pose severe threats to Indonesia’s eco-systems and the region as a whole. These challenges threaten the very basis of economic growth and development and endanger the livelihood security for millions of people who are dependent on those resources.

Increasing levels of GHG emissions, pollution and toxins, water contamination and environmental degradation will demand reductions in energy and materials intensity and cleaner production processes to achieve sustainable development. These changes will need to be accompanied by major organizational and behaviour modifications across society, both in the public and private sectors. Therefore, measures to respond to the impacts of climate change will require the active engagement and consultation between the government, employers and workers. The results of the green jobs mapping study will be able to assist and give guidance to both national and local government on how best to plan and implement low carbon activities while addressing the social and labour challenges within the Indonesian context.

It is important that economic and labour policies are integrated with climate and environment related policies and programmes to promote more inclusive growth and enhance green jobs opportunities. Environmental agendas may be integrated with social policies that promote green employment thus strengthening the social pillar of national sustainable development in Indonesia. Labour policies may be linked with environmental standards and targets, national adaptation plans of action (NAPAs), nationally appropriate mitigation actions (NAMAs) and climate change strategies. These environment-related agendas will create demand for skills for green and greener jobs and new employment opportunities, so it is imperative that labour strategies are developed in tandem and prepare the labour market for the transition. Recently, the National Climate Change Council (NCCC) of Indonesia has been working with several national institutions and the ILO to address the employment dimension in climate change policies. Collaborations between the ILO, NCCC, Ministry of Youth Affairs and Sports, the UN-REDD Task Force and the Bank of Indonesia are also facilitating further integration of green jobs into the existing climate change and development policy framework.

Green investments in climate change adaptation can strengthen social capital by focusing on the employment creation effects of the activities as well as proposing social protection measures to climate vulnerable populations. Other social agendas related to youth, gender, disabilities, etc. may also be better linked with environmental agendas. For example, entrepreneurship and apprenticeship training for youths can be linked to the green jobs agenda.

\subsection*{1.5.2 Economy}

Indonesia’s recent strong economic performance and higher than average annual GDP growth rates have been linked to strong domestic consumption, demand for primary resources and strong investment growth. However, the Indonesian economy continues to be exposed to external risks associated with falling export demand and reduced foreign investment as well as the myriad of environmental challenges. Indonesia is currently in a structural transition

\textsuperscript{1} Ministry of Environment – Republic of Indonesia (2010), Indonesian second communication under the UNFCCC, accessible at \url{http://unfccc.int/files/national_reports/non-annex_i_natcom/submitted_natcom/application/pdf/indonesia_snc.pdf}
period and issues such as climate change and sustainable development have become an increasingly important aspect of policy making at the national level. A number of important policy measures have already been developed such as the National Action Plan to address Climate Change and the Long Term Development Action Plan (2005-2025) that demonstrate Indonesia’s commitment to pursue a greener and more sustainable development path.

As a green economy begins to take shape in Indonesia many sectors of the economy will need to find new sustainable ways of doing things and this will have repercussions on livelihoods, incomes and employment. Some energy intensive sectors such as manufacturing, pulp and paper and cement are beginning to shift production patterns, requiring investments in environmentally sustainable processes and green technologies and evolving social relations with workers. A green economy must be about reducing poverty and increasing economic resilience against the adverse effects of climate change, as well as about generating income and decent employment for workers without affecting the environment and ensuring the viability and competitiveness of enterprises. A just transition is required: to maintain productive capacity, to develop new skills, including skills for new green jobs and more sustainable jobs; to develop, transfer and deploy new technologies and; to develop financial schemes better linked to climate risks. Green jobs will play a key role over the coming years in greening the activities of carbon-intensive industries, small and medium size enterprises (SMEs) and the wider economy as a whole.

Driving the Indonesian economy towards a more environmentally sustainable and low carbon development path will bring profound and lasting adjustments to the socio-economic structures of Indonesia, triggering shifts in the labour markets that will create demand for new skills and re-skilling programs as well as specific measures to facilitate a just transition for workers, employers and enterprises, such as social protection programmes and financial schemes.

Sectoral development in Indonesia is being supported by the Master Plan for Acceleration and Expansion of Economic Development (MP3EI), which provides the overall framework for economic growth and development in Indonesia between 2011 and 2025.

It applies a three-pronged approach to promoting prosperity in Indonesia, including:

• sectoral development in six economic corridors;
• investing in infrastructure to promote connectivity; and
• strengthening human resources and national science and technology.

It is important that specific measures for green jobs are synchronised and integrated with both national and local economic development plans and environmental objectives to ensure communities benefit both in the short and long term.

1.5.3 Employment

The government of Indonesia has already started to integrate environmental concerns into existing labour and social policies. In fact, green job activities are already aligned with existing national development priorities, which are pro-growth, pro-jobs, pro-poor and pro-environment, as articulated by the Indonesian President at the 100th International Labour Conference in June 2011. The President made references to green apprenticeships during his speech and made a call for a Global Coalition for Youth Employment. He declared the
government’s intention to advance a national green skills development strategy, a decentralized youth apprenticeship programme for green jobs and measures to foster entrepreneurship and self-employment in environmentally friendly sectors\(^2\). By better integrating social and employment dimensions into the development decision-making process Indonesia can create a more inclusive and sustainable growth pattern.

According to the Indonesia Climate Change Sectoral Roadmap (ICCSR), mitigation and adaptation efforts will be implemented by the government in a wide range of sectors. These efforts will affect the labour market, the profiles of jobs and the skills required as well as the incomes and activities of people who rely heavily on the environment for their livelihoods. There is also major potential for upgrading and up-skilling existing jobs to improve sustainability creating the need for a green skills development strategy. For example, some mitigation efforts related to the prevention of deforestation will require an upgrade of the skills development strategies at the national and the provincial levels.

Furthermore, green jobs have also been included in Indonesia’s new Decent Work Country Program (DWCP), currently being formulated among ILO constituents, and is referenced under **Priority 1**: Employment creation priority for inclusive and sustainable growth.

### 1.6 Structure of the report

The introduction sets the scene by discussing the need for environmentally sustainable economic development in Indonesia and how cross cutting issues related to the environment, economy and labour are driving the transition towards a green economy. It discusses how green jobs and a green economy can work towards achieving equitable sustainable development in Indonesia. This is followed by a comprehensive explanation of the green jobs mapping study methodology in chapter 2.

An in-depth analysis of green jobs in each chosen sector is then presented. These chapters include an analysis of the sector in terms of labour, environmental challenges, policy and decent work aspects. The chapters describe the numbers of environmentally sustainable jobs present in that sector and an estimate on how many can be classified as green jobs.

The results of the study will provide policy-makers with useful information about the current progress made at the national level in regards to environmentally sustainable economic development and identify where there is scope for further growth and what measures might help deliver more decent work in those economic activities.

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Chapter 2 – Methodology - An overview of the approach

2.1 Overview

Green jobs have a critical role to play in Indonesia’s efforts to develop a socially inclusive green economy that eradicates poverty. A more sustainable growth pattern that puts the emphasis on job creation, in particular for the poor, and that is more respectful of the environment will be accompanied by shifts in the labour market with new green jobs and some jobs being greened. In a context of continuous economic growth, other types of jobs may be substituted or may decrease. In order to promote green jobs as an engine of inclusive growth, it is important to understand where these jobs are located and what makes these jobs environmentally friendly and decent. This requires a good knowledge of each sector of the Indonesian economy as well as the use of relevant data and information. In order to understand green jobs in Indonesia this study follows a specific methodology based on a step-by-step approach.

Based on the objectives of the Green Jobs in Asia Project, the overarching research question of the green jobs mapping study relates to the investigation of the potential number of jobs that can be qualified as ‘green jobs’ according to the ILO/UNEP’s definition of green jobs. The key concerns are the compliance with decent work criteria and the environmental sustainability of the activities undertaken. An assessment of green jobs in Indonesia requires an assessment of prevailing conditions and an assessment of shifts towards sustainability and decent work, in a way that quantifies and qualifies green jobs within the context of statistical frameworks, national and voluntary environmental standards and other contextual factors influencing employment.

The specific underlying research questions are:

- Which sectors of the Indonesian economy have a strong link to the environment?
- What are the key trends and issues in these sectors regarding environment and employment?
- Which specific sub-sectors within an economic sector could be considered to be sustainable?
- What is the employment dimension of sub-sectors that are sustainable?
- What is the quality and decency of employment in sustainable sub-sectors?

The green jobs mapping study applies a mixed method approach that incorporates techniques that include the collection of qualitative data from key informants and focus group discussions as well as analysis of quantitative data from the National Labour Force Survey (SAKERNAS). The research methodology has been tested to ensure that the approach is reliable (the same result is achieved on a number of occasions) and valid (measures what it is intended to measure).

In order to understand green jobs in Indonesia, it is first necessary to understand the structure of the economy and how the economy relates to employment in Indonesia. This analysis will give important information on the size and scale of each sector of the economy and the structure of employment in these sectors.

After understanding the structure of the economy, it is necessary to examine each sector to determine those sub-sectors that are highly integrated with the environment. This means
identifying activities which are dependent from the environment, such as activities that rely on natural resources. This also includes activities which might have a negative impact on the environment, either by the over-use of resources or by the production of waste. In Indonesia nine sectors were identified through this process, namely:

- Agriculture;
- Forestry;
- Fishery;
- Mining and energy;
- Manufacturing;
- Construction;
- Transport;
- Tourism; and
- Waste

Each of the identified sectors has particular characteristics and different types of regulations that have encouraged economic activities to become more sustainable. Within each sector, some activities provide opportunities for sustainable development and the creation of green jobs. For example, the recycling economy has great potential for green job creation, should the right investments in infrastructure and/or human development be made. The tourism sector in Indonesia as in other parts of Asia has an untapped potential for ecotourism and this may also be considered as a sustainable activity. Efforts from the Government of Indonesia to regulate unsustainable activities in each sector can also lead to the development of more sustainable practices that will create green jobs linked to the greening process and greening others. Examination of these efforts can lead to the identification of green sub-sectors within each parent sector, e.g. green buildings under building/construction, sustainable agriculture, renewable energy under the energy sector, etc.. In practice, green sub-sectors were determined based on tangible indicators selected through a range of methods including a review of the literature and focus group discussions.

Once sub-sectors were identified, it was necessary to consider how each of those sub-sectors relates to employment and existing classifications of industry. To further illustrate, the National Labour Force Survey uses a schema based on the International Standard Industrial Classification (ISIC) to ensure that data classification frameworks are coherent and reliable. The ISIC is a classification model that gives a comprehensive framework for data collection of productive activities and industries. In order to provide more details about a specific sector of the productive economy, activities are classified into categories. There are four levels of classification, namely “sections” (Agriculture, Forestry and Fishing being ‘Section A’), “divisions” (2-digits level), “groups” (3-digits level) and “classes” (4-digits level). These levels are internationally standardized and enable analysis of data in a systematic way.3 The identified green sub-sectors should be mapped against this classification schema, so that employment estimates that are generated for green sub-sectors are consistent with current mechanisms for estimating employment in Indonesia.

Green jobs are not just jobs that are environmentally friendly - they are also jobs that are consistent with criteria associated with decent work. Decent work is an essential element of

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equitable, inclusive and sustainable development. It involves opportunities for work that are productive and deliver a fair income, that provide security in the workplace and social protection for workers and their families, and that give people the freedom to express their concerns, to organize and to participate in decisions that affect their lives. A green job is therefore a job that supports environmental sustainability, while giving opportunities for workers to improve their livelihoods and their rights.

Examples of criteria for determining if a job is environmentally friendly and decent include the compliance with national laws in the labour and environmental domains, environmental voluntary standards or government targets, the wage by sector, the number of hours worked per week and access to social protection, among others. In addition, a job might be considered to be a “green job” if a particular job in a green sub-sector provides an improved livelihood and enhanced working conditions in comparison to “standard jobs” within the sector in general. Several focus group discussions (FGDs) were held to discuss which criteria would be relevant for identifying and estimating green jobs in Indonesia.

The final step in the methodology involves bringing together the criteria associated with the decent work concept and the criteria used to develop the green sub-sectors to determine the jobs that are environmentally sustainable and also decent. Jobs identified in each green sub-sector need to comply with both criteria of environmental sustainability, and criteria of decent work in order to be identified as a “green job”.

Therefore, the process of estimating green jobs can be considered to be a step-by-step process of “zooming in” from the macro-economy to the green economy to sustainable employment and finally to green jobs (see figure below).

The following sections provide a more detailed description of the methodology for estimating green jobs in Indonesia.

2.2 Method for examining the structure of the economy

The first step was to assess the economic and employment structure in Indonesia, in order to get a better understanding of economic activities and livelihoods in the targeted sectors, and how these activities relate to the environment. The review was informed by data from Statistics Indonesia and other government agencies, as well as data sets from various UN agencies and the World Bank. More specifically, sectoral profiles were prepared that provided information on:

- The importance of the sector to the economy: including data on the GDP contribution, the size of the sector in terms of production and employment, and the distribution of activities throughout the country. GDP and other economic data were taken from
institutional sources (the World Bank, and FAO for the forestry, agriculture and fisheries sector). Data relating to specific trends within the sectors, such as the distribution of activities and their importance to the economy, were taken from the relevant ministries.

- The importance of the sector to the environment: including more detailed information on the environmental issues faced by each sector. Issues associated with sustainability were identified through official reports to the Government, UN agencies, as well as other reports generated by specialist organizations.

With a better understanding of the economic and environmental trends in each sector, it was easier to determine sub-sectors that could have a positive environmental impact.

2.3 Method for identifying green sub-sectors

2.3.1 Identification of green sub-sectors

The criteria for determining trends towards environmental sustainability by sector covered a comprehensive set of environmental issues and mechanisms for addressing these issues. Impacts such as carbon emissions, loss of biodiversity through unsustainable practices, deforestation and over-use of lands were identified as issues. Trends towards sustainability also include efforts to improve energy and resource efficiency for example in industry, transport and construction, minimizing waste generation, controlling and preventing pollution of air and water, the sound management of chemicals, natural resource management including water, promoting renewable sources of energy, as well as adaptation to climate change.

There are several approaches that the government and civil society can apply to make progress on the abovementioned issues. To monitor the efforts towards sustainability in each sector, the study considered national laws and instructions on the environment, regulations and other strategic plans. Voluntary approaches including sector based standards, labels and codes and associated management systems, as well as activity-based approaches were also considered.

- **National law and instructions** – economic activities that fall under specific laws and regulations on the environment can be considered to be green sub-sectors if they are consistent with legislation. For example, a green sub-sector in the forestry sector could be associated with economic activities in natural production forest areas that follow laws associated with sustainable forestry management.

- **Government regulations** – economic activities that are influenced by plans and regulations that promote sustainable development can be considered to be green sub-sectors. For example, the Ministry of Marine Affairs and Fisheries released a regulation on Best Practices in Fishing Farming and economic activities that follow this regulation could comprise a green sub-sector.

- **Voluntary standards** – economic activities that are associated with voluntary standards emanating from industry, the civil society and not for profit organizations. For example, organic farming is supported by organizations and certification agencies, such as the AIO (Aliansi Organis Indonesia).

- **Activity-based approaches** – economic activities can be considered to be green because of their low resource use, positive environmental impacts or reduction of pressure on natural resources. For example, bee-keeping and honey production
can allow for the sustainable use of forestry resources. To further illustrate, seaweed farming can be used to support livelihood diversification among fishermen and reduce pressure on fishing stocks.

Laws, regulations, standards and activities that address environmental issues were identified by sector through a desk review, using information from relevant ministries and government agencies and peak bodies in civil society.

2.3.2 Focus group discussions

Following the initial sectoral analysis, it was necessary to conduct in-depth discussions with stakeholders in order to confirm and further identify green sub-sectors within each sector. Stakeholder consultation, in the form of Focus Group Discussions (FGDs) and key informant interviews was an essential element of this process.

Eight ministries were invited to participate to the stakeholder consultation, namely Forestry, Transportation, Fisheries and Maritime Affairs, Agriculture, Public Works, Energy and Mineral Resources, Tourism and Industry.\(^4\) The focus group discussions were held in December 2011 and January 2012 with the participation of target ministries, associated academic specialists and employers’ organizations, as well as representatives from the Ministry of Manpower and Transmigration and the Ministry of Environment. The purposes of the FDGs were to identify green sub-sectors and identify preliminary estimates of the number of environmentally sustainable jobs in each of these sub-sectors. Particular focus was given to identifying national laws in the different sectors which ensure that the economic activities are environmentally sustainable. During the FGDs, PowerPoint presentations were given to the stakeholders, in order to provide a better understanding of the different concepts related to green jobs and decent work. The FGDs involved answer and questions sessions, debates and brainstorming on green jobs in Indonesia.

The information shared during FDGs resulted in amendments to the preliminary list of sub-sectors identified in mapping of the structure of the economy, adding some green sub-sectors and also removing sub-sectors where they were thought to not provide employment in environmentally sustainable activities. The FDGs also helped stakeholders to have a better understanding of the concept of green jobs and decent work.

2.4 Method for estimating sustainable employment in the green sub-sectors

This step focused on mapping the green sub-sectors identified in the previous step with the ISIC/KBLI standards, in order to ensure that the employment estimates generated were consistent with general statistical frameworks and methods for estimating employment in Indonesia. The employment estimates were based on data from the National Labour Force Survey (Sakernas), which uses the Standard Industrial Classification of Indonesia from 2005 (KBLI) to classify the industry in which people work. The KBLI follows the ISIC standard,

\(^4\) Unfortunately Focus Group Discussions with the Ministry of Tourism and the Ministry of Energy and Mineral Resources did not take place. Consultations therefore comprised of key informant interviews for Tourism and Mining and Mineral Resources.
but adds another level of classification to the ISIC’s 4-digit level classification system. KBLI’s 5-digit classification includes activities that are specific to Indonesia, thus providing more details about activities undertaken by workers in the Indonesian economy. The Labour Force Survey (Sakernas) is carried out twice a year and collects information on national labour market characteristics of all working age individuals from the sampled households. This study uses Sakernas data come from August 2008, which was carried out in all of Indonesia’s 33 provinces with a total household sample of 293,088 and a response rate of 98.58 per cent. Information was collected through questionnaires provided to individual household members aged 10 years and older. The data extracted from this survey covers three characteristics: employment, unemployment and underemployment, and working age population not in the labor force (school, housekeeping, etc.). Estimates are representative at the district level. Weights are provided in order to generate population estimates.

Additional information from research studies and other data sources were used to determine the extent to which classifications at the five digit level of the ISIC/KBLI were “environmentally friendly”. Based on literature and on key informant interviews, in some cases it was determined that 100 per cent of particular activities undertaken at the five digit level were “environmentally friendly”, while in other cases it was determined that only a proportion of the particular activities undertaken at the five digit level were “environmentally friendly”. In the forestry sector for example, it was determined that activities associated with the collection of rattan were 100 per cent sustainable due to government regulations on the industry. Another example is seaweed farming in the fisheries sector, which was also considered to be 100 per cent sustainable because it helps farmers to diversify their production and to prevent over-fishing.

Research studies and data sets were not available to support all employment estimations at the five digit level. Subsequently, in some cases key informants provided recommendations on the proportion of activities undertaken at the five digit level that should be classified as “environmentally friendly”. The key informants are experts in their field and include academics, heads of farmers’ cooperatives, independent experts or people who have a great knowledge of the sector of activity.

2.5 Method for defining and estimating green jobs

Once estimates for employment in green sub-sectors were generated using the Sakernas data set as described above, it was then necessary to understand the conditions of employment within these sub-sectors in order to generate “green jobs” estimates. There are many different indicators that can be used to provide information on decent work. The ILO Country Office for Indonesia and Timor-Leste has prepared a decent work country profile for Indonesia in 2012, which includes decent work indicators that examine the following:

- Economic and social context for decent work: Analyses the impacts of economic and development policies on employment. Indicators include the number of children that are not in school, the wage difference between male and female, and the female share of employment by industry.

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Employment opportunities: Indicators include the employment-to-population ratio and employment by status of employment, as well as unemployment by age, gender and industries.

Adequate earnings and productive work: Indicators include wages and inequalities related to wages, with reference to average earning by occupation and average real wage of men and women.

Decent hours: Indicators cover excessive hours (more than 48 hours a week under the ILO Convention, and more than 40 hours a week according to Indonesia’s Manpower Act), and insufficient hours. Indicators include average weekly hours of work (by gender and age) and the excessive working hour ratio.

Combining work, family and personal life: Stresses the need to share time between work, family life (including maternity leave) and personal life. The main indicator used here is commuting time (eg. travelling hours before and after work).

Child labour: This includes child labour (including all working children aged 5 to 12, and children aged 15 to 17 who work more than 40 hours a week), forced labour and hazardous child labour.

Stability and security of work: Indicators cover casual workers and their wages, and the formal-to-informal employment ratio.

Equal opportunity and treatment in employment: Focuses specifically on women, children and disabled people at work. Indicators include the female share of employment and gender wage gap.

Safe work environment: Examines the health and safety situation at work, and the risk of occupational injuries. Indicators include the frequency of occupational injuries and the number of labour inspectors.

Social security and worker’s access to health cover: Includes indicators such as the number of registered workers and employers, and the number of workers covered by healthcare benefits.

Social dialogue, employers’ and workers’ representation: Social dialogue includes negotiation, consultation and exchange of information between employers and workers. Indicators include union density amongst workers, membership of employers’ associations and incidence of strikes and lockouts.

As there are many indicators that provide information on decent work, it was necessary to identify the indicators that could help to estimate green jobs through quantitative means (using the Sakernas data set), and the remaining indicators that would need to be provided through qualitative mechanisms.

It was determined that the estimates for environmentally sustainable decent employment could be split by workers that are paid below and above the minimum wage using the Sakernas data set. However, information on other indicators of decent work, such as a safe working environment and access to social protection would need to be determined through qualitative means. This is because information on these indicators doesn’t correspond with the Sakernas data set, nor would further estimates from the Sakernas data set that relate to the abovementioned indicators be considered to be valid and reliable.

An additional factor to be considered in the estimation of green jobs is that these jobs are likely to be more environmentally and economically sustainable in the long term. As the activities are sustainable in the long term, workers are likely to have a more stable and secure
After analysis of the ‘Decent Work’ indicators, four indicators were considered to be highly relevant in the estimation of the decency of work in each green sub-sector, namely:

- Adequate earnings and productive work;
- Safe work environment;
- Social security and worker’s access to health cover; and
- Social dialogue, employers’ and workers’ representation.

Data on earnings can be analysed with the Sakernas data set, while information on the work environment, access to social protection and social dialogue needs to be informed through qualitative information.

2.5.1 Decent work by earnings

Wage data from the Sakernas survey and minimum wage thresholds were used as a first step towards estimating the environmentally sustainable employment that could be considered to be a “green job”. The nominal minimum wages by province were published by Statistics Indonesia in their “Trends of the Selected Socio-Economic Indicators of Indonesia” publication. Minimum wages vary considerably by province, from 500,000 IDR per month in East Java to 1,105,500 IDR per month in Papua. The simple average national minimum wage for Indonesia was calculated at 743,200 IDR per month in 2008.

In Indonesia, minimum wages are determined every year by the Wage Council at the provincial level. The minimum wage calculation uses a ‘basket of goods’ approach, with components such as food and beverages, clothes, education, health, transportation and recreation costs, as well as savings taken into consideration. Other factors used to determine the minimum wage in each province include the consumer price index, wages in surrounding provinces, the business foreclosure rate and the unemployment rate. These indicators are combined with contributions from various ministries, labour organization representatives and statistics bodies to determine the minimum wage in each province.6

To estimate the proportion of environmentally sustainable employment that pays a minimum earning, the simple average minimum national wage from 2008 (743,200 IDR) was used as the threshold. That is, those receiving above 743,200 IDR per month could potentially have a “green job”, while those receiving less than 743,200 IDR per month could not be considered to have a “green job”.

2.5.2 Focus group discussions on employment conditions in the green sub-sectors

To further qualify whether environmentally sustainable jobs are also decent, further focus group discussions (FGDs) were held with workers’ organizations to determine whether the jobs in the selected sub-sectors could be considered as decent. The FGDs focused on how to qualify “decent work” in targeted sub-sectors. Representatives from the workers’ organizations were asked specific questions on decent work for every sub-sector, with particular attention paid to:

• Risks at work, including information on the nature of risks and hazards to which workers are exposed and measures taken to mitigate risks;
• Access to social protection, including information on the types of social protection available to workers; and
• Organizations and industrial relations, including information on employers’ and workers’ organization membership as well as on the organizations producers and traders.

The objective was to obtain qualitative information about the working conditions in different sub-sectors in order to understand the extent to which the various sub-sectors provide green jobs. This information, combined with the criteria of minimum wage used above, was helpful to identify more precisely the number of green jobs in each sub-sector.

2.6 Challenges during data collection and data analysis

There were two main issues that provided challenges during the data collection and data analysis process, namely:

1. The lack of accurate data on employment within the green sub-sectors: In many cases there was no information on the number of jobs in the sub-sectors of interest. Consequently, other information had to be used to help to define the employment estimates.
2. The lack of information on regulation implementation: in the case of some sectors, there was considerable information on the policy initiatives and strategies of government related to the sector of interest, but very little information on what has actually happened as a consequence of these initiatives on the ground.

As a consequence of the above, there are several data gaps in each sub-sector of interest. Moreover, many of the figures have been estimated and therefore may not provide accurate reflections of the employment situation in practice. In the absence of exact figures, two methods have typically been used to calculate job numbers:

• Using ratios: in most cases information was available on the size of the green sub-sector of interest and based on this information it was possible to calculate the proportion of employment in each sub-sector.
• Applying assumptions: in some cases it was necessary to apply a general assumption to calculate the number of jobs in a green sub-sector. For instance, an assumption could be made regarding the number of jobs per hectare for those sub-sectors associated with organic farming.

Given these limitations, it must be stressed that the job estimates provided rely on limited information and the use of certain assumptions. The estimates represent therefore a useful first attempt and shall be refined and updated further through complementary research or when additional information and data is gathered.
Chapter 3 – Green jobs in agriculture

Indonesia’s agricultural sector is one of the largest sectors in the economy. The agricultural sector is an important resource for both the country’s economic growth and social development, however many of the activities of the agricultural sector take place in the informal economy and are characterised by low productivity, low wages and poor working conditions. Increasing the productivity of the agricultural sector, while promoting the sustainable management of resources is therefore a high priority. To support sustainable and inclusive growth, this chapter provides key information on the agricultural sector in Indonesia, including economic trends and linkages between the environment and employment. It discusses the impacts that the agricultural sector has on the environment and what actions are being undertaken to improve the sector’s environmental sustainability. On the basis of this information and extensive consultations, sub-sectors providing environmentally-friendly activities and employment associated with these activities have been identified. A further discussion on the decency of work in these sub-sectors provides the basis for estimating green jobs in the agricultural sector.

3.1 Overview of the agriculture sector

Indonesia’s economic structure is currently dominated by the primary industries, including the agricultural and mining sectors. To illustrate, the agricultural sector accounted for 11.46 per cent of the country’s GDP in 2010, making it the third largest contributor of income after the manufacturing industry sector and the trade, hotel and restaurant sector. 7

In 2010, there were 41.5 million workers employed in the agricultural sector as a whole (including forestry, hunting and fisheries), and approximately 37.8 million of these workers were employed in agriculture in its narrow sense (food crops, horticulture, plantation and livestock). 8 Agriculture is therefore a labour-intensive sector, providing jobs to approximately 35 per cent of Indonesia’s labour force. Indonesia’s economic growth strategy seeks to support development of the agricultural sector by promoting value chain development, through expanding processing and services that are related to agriculture. This has seen the share of workers who are directly employed in the agricultural sector decline over time, while employment in agro-processing and trade services have been increasing. To illustrate, between 2004 and 2009, the share of employment in agriculture, forestry, hunting and fisheries dropped from 43.3 per cent to 39.7 per cent 9 whereas trade, restaurant and hotel sector went from 20.4 per cent to 20.9 per cent of the total workforce.

In 2008, 37.8 million workers in agriculture were informally employed. This represents 91.5 per cent of the total workforce in the sector. 10 Moreover, although the sector is labour-intensive, average working hours tend to be lower than in other sectors, with 37 hours per week on average for labourers (in comparison, average working hours in the trade and services sector are 51 per week). Efforts to improve agricultural productivity are a focus of the Government and are being supported through improving the quality of seeds and other inputs, provision of training on farming techniques and improving access to markets. However, more can be done to support the organization of farmers and connecting workers in

7 BPS Statistics
8 Ibid.
9 Ibid.
10 Ibid.
the agricultural sector to stable markets, particularly through value chain development and the development of producers’ and workers’ associations.

Agricultural commodities in Indonesia are divided into four main categories: food crops, plantations, horticulture and livestock (animal husbandry) with paddy (rice field) as the dominant food crop produced in Indonesia. In 2010, 66.5 million tons of rice were produced, covering a total area of 13.2 million hectares.\(^1\) FAO estimates that approximately 21 million households – or 10 per cent of the population - are involved in rice production.\(^2\) Indonesia is the third largest rice producer in the world, and it is also the world’s seventh largest rice importer as the Indonesian population is one of the largest consumers of rice, with an average consumption of 91.1 kg per capita per year.\(^3\) However, the reduction of the area used for paddy fields is a challenge in the long-term. Every year approximately 14,000 hectares of paddy field are lost.\(^4\) The change of rainfall patterns and the increase of droughts are also likely to reduce the capacity of rice production. It is estimated that by 2025, the production of paddy will decrease by 1.8 million tons from the current production level.\(^5\) Therefore, ensuring rice security is one of the main concerns for the country. To sustain domestic needs, Indonesia is importing rice from neighbouring countries. The Minister of Trade forecasted that Indonesia needed to import 2 million tons of rice in 2012 to cover demand, even though the country plans to achieve self-sufficiency by 2014.\(^6\) Other important food crop commodities include corn, covering a total area of 4.13 million hectares in 2010, and cassava, with an area of 1.183 million hectares.\(^7\)

In Indonesia, the main plantation commodities include palm oil, sugar cane, rubber, cocoa, coffee, tobacco and tea. Over the last decades, the land used for plantations has expanded rapidly, from 2.35 million hectares in 1996 to more than 6 million hectares in 2009. The main contributor to this expansion is palm oil. Since 1994 the area for palm oil has increased exponentially, going from 992,400 hectares in 1995 to more than 5 million hectares in 2010.\(^8\) Most of the plantations are located in Sumatra and Kalimantan. The expansion of the palm oil sector has implications for paddy production, with many farmers shifting from paddy production to palm oil.

Crude palm oil is currently one of the country’s largest export commodities, supplying approximately 43 per cent of the world’s market in 2010. The world's demand for palm oil products is rising by approximately 5 per cent per year, driven by demands for edible oils, cosmetics and bio-fuels. Crude palm oil production reached 14.29 million tons in 2010.\(^9\) In 2010, 8.267 million tons of crude palm oil were exported, representing an export value of

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\(^{11}\) BPS Statistics \(^{12}\) FAO (2011), Indonesia and FAO: Achievements and success stories, http://www.fao.org/fileadmin/templates/rap/files/epublications/IndonesiaedocFINAL.pdf \(^{13}\) Ministry of Agriculture, http://www.deptan.go.id/Indikator/labe-15b-konsumsi-rata.pdf \(^{14}\) Ministry of Environment – Republic of Indonesia (2010), Indonesian second communication under the UNFCCC, Jakarta, Indonesia. Accessible at http://unfccc.int/files/national_reports/non-annex_i_natcom/submitted_natcom/application/pdf/indonesia_snc.pdf \(^{15}\) Ibid. \(^{16}\) FAO (2012), “Asia Pacific Food Situation Update”, FAO Regional Office for Asia and the Pacific, Bangkok, Thailand. http://www.fao.org/docrep/015/an019e/an019e00.pdf \(^{17}\) BPS Statistics. \(^{18}\) Note that these figures have to be treated with caution as they can vary according to the source; according to the Second Communication on Climate Change by the GoI and the UNFCCC, the palm oil plantation area was 6.6 million hectares in 2008 whereas the Ministry of Agriculture reported a total of 7.36 million hectares on the same year. \(^{19}\) BPS Statistics.
7.65 million USD. The remaining 6 million tons were used for domestic purposes, especially for cooking needs.

Although most of the palm oil plantations are owned by the private sector, approximately 42 per cent of palm oil land is owned by small holders. In 2008, 48 per cent of the plantations were managed by private industries, 11 per cent were state-owned and 41 per cent were managed by local smallholders.

Data from the labour force survey (Sakernas) in 2008 indicates that approximately 1 million people are employed in oil palm plantations, and this figure becomes higher when considering auxiliary employment in palm oil processing and associated activities (in the manufacturing and trade services sectors). Palm oil and other plantation commodities are important for the production of bio-fuels and bio-ethanol. Under Government plans, Indonesia will use palm and jatropha as the primary feedstock for biodiesel, and sugarcane and cassava as the primary feedstock for ethanol.

The Government of Indonesia is planning to expand biofuels production in order to meet growing demand in energy and fuel and to be less dependent on oil imports. The Presidential Regulation No. 5/2006 on National Energy Policy plans that five per cent of energy needs will be met by biofuels by 2025.

The Ministry of Agriculture’s Action Plan also aims to reach 32 million tonnes of cassava production for fuel ethanol by 2025, which would require conversion of an additional 1.36 million hectares of land for agricultural purposes. It is expected that workers on cassava farms will have increased from 5,000 in 2006 to 183,000 in 2025. This increase in biofuels production can represent an alternative to petroleum fuels and create jobs opportunities in the plantation sector.

Indonesia also has a large number of livestock including broiler, chicken, duck, goat and beef cattle, most of them being located in Java, Sumatra and Sulawesi. Chicken meat production amounted to 1.65 million tons in 2010, eggs to 1.38 million tons and pig meat to 654,200 tons. In 2009, livestock contributed to Indonesia’s GDP by 2 per cent. Chicken in Indonesia is produced both intensively in factories and in domestic or village settings. The village chicken is known as "ayam kampung", in general terms could be considered to be a free-range chicken.

The agricultural sector experiences challenges related to land tenure and land conversion. Natural forests are converted into areas for paddy and plantation production, and as urban settlements expand they encroach on agricultural lands. A joint report from the UNFCCC and the Government of Indonesia estimates that conversion of rice fields for non-agricultural usage, such as urban settlements, was approximately 0.77 per cent per year.

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20 BPS Statistics
21 MP3EI
24 Assuming: Factory investment per unit = IDR 125 billion; Assuming 0.135 full time workers per hectare per year. From GSI, IISD (2008), Biofuels – at what cost? Government support for ethanol and biodiesel in Indonesia
3.2 Importance of agriculture to the environment

The agricultural sector is dependent on natural resources and influences the environment; it therefore has a strong role to play in addressing climate change issues. The 2007 Indonesian Action Plan on Addressing Climate Change estimated that the agricultural sector was responsible for the emission of 96.42 million tonnes of carbon. Rice field exploitation and techniques associated to rice cultivation contribute to 64 per cent of the agricultural emissions, with a total of 61.78 million tons of carbon emitted in 2005.\textsuperscript{26} Recent research indicates that paddy production can reduce its emissions through reducing the amount of time the fields are flooded, with no impact on the production quantity or quality. Other sectors which contribute to GHG emissions are animal husbandry (20 per cent), agriculture land (4 per cent), land fires (3.7 per cent) and burning of agricultural waste (8.2 per cent).

The palm oil industry represents a challenge for environmental sustainability in Indonesia. The production of palm oil has been linked to deforestation, and accounts for 5 per cent of LUCF’s GHG emissions, especially in regions such as Sumatera, Kalimantan and Papua. Palm oil is expanded through the conversion of agricultural lands or natural forests into plantations. Many forests are converted for palm oil production through acquisition of natural forest conversion permits. There have been claims that companies with such permits harvest existing timber and clear the land for agricultural cultivation, but do not necessarily convert the land into palm oil plantations, leaving the land lying idle with negative impacts on the local communities.\textsuperscript{27} Therefore, poor land use management represent a threat for the soils and the environment.

Agriculture also accounts for a large part of Land Use and Forest Change (LUCF) emissions, through deforestation and conversion of land to plantations. The cultivation of crops often leads to the clearance of peat swamp forests through draining and then burning the land. Approximately 50 per cent of the world’s peat swamp forests (14 million ha) are located in Indonesia, with six million hectares of this land being used for cultivation.\textsuperscript{28} Peat lands are important for biodiversity and the provision of ecosystem services, such as carbon sequestration. Moreover, much of the soil in peat land areas does not support intensive agricultural cultivation and requires high levels of inputs to improve productivity. An example of the effects of peat land degradation on the environment can be seen in the ex mega rice project areas in Central Kalimantan. In 1995 President Suharto ordered over one million hectares of peat swamp in Central Kalimantan to be drained for conversion to rice growing. This was known as the “mega rice project”. After the peat was drained and canals built, it was found that the soil conditions were not suitable for supporting intensive agriculture. The canals have since been used for transportation of timber and much of the peat land is either abandoned, being turned into palm oil plantations or being used by indigenous people for smallholder agricultural purposes. The degraded land burns frequently, leading to transboundary haze, high levels of greenhouse gas emissions and increases in livelihood vulnerability.

There are currently plans under way to create a food production centre in Papua through a project that is known as the Merauke Integrated Food and Energy Estate (MIFEE). The

\textsuperscript{28} Peat Portal, “Peat Management in Indonesia” [online]. Available at: \url{http://www.peat-portal.net/index.cfm?&menuid=69&parentid=43}
MIFEE project is located across 1.2 million hectares, and will grow food crops and non-food crops and support livestock. Crops include rice, corn, soybeans, sorghum, wheat, vegetables and fruits, as well as sugar, rubber and palm oil. Livestock for animal husbandry will include chickens, cows, goats and rabbits. To ensure the environmental sustainability of the MIFEE, the Government has put in place environmental safeguards including environmental impact assessments, although there have been concerns from civil society about consultation and sustainability of the initiative.

Lowlands in Indonesia are particularly subject to climate change issues, especially sea level rise and the increase of rainfall. As predicted by the World Bank, rainfall will increase from 2 per cent to 3 per cent per year in Indonesia, entailing an increase in the risk of flooding. It is also said that the sea level in the Jakarta Bay area will increase by approximately 0.57 centimetres per year and subsequently inundate productive coastal zones, reduce farming and coastal livelihoods. The expansion of rice and palm oil plantations increases the pressure on lowland areas, and stresses the need for more sustainable practices. In addition, traditional farming practices have used shifting agricultural techniques, which entails clearing land (through slash and burn techniques) and planting paddy on the land for two seasons and then shifting to another location. Often paddy and rubber trees are planted at the same time, and once the community has finished using the land for paddy production it becomes a rubber plantation. Such approaches depend on the supply of land, and as the area for land conversion reduces, it will become necessary for communities to farm more intensively and to maintain land for agricultural production.

The current trends in climate variations are also likely to have an impact on the agricultural patterns in the country. Climate change will induce an increase of natural phenomena such as El-Nino, putting many farmers’ production at risk. The length of the wet season also tends to be shorter in Java, South Sumatra and Kalimantan, increasing the risks of droughts in these regions. The rise of sea level is also a concern in coastal areas. Such changes put the agriculture sector at risk. For example, the current cropping production system (rice-rice production) might not be the most effective food production system, as it depends heavily on irrigation water. Climate change also causes to an increase of temperature, about 0.2 to 2.5°C that will also enhance the development of crops pests and diseases. Many lands have been contaminated by pests, resulting in loss of productivity. Food crops and horticulture are particularly at risk. For example, Java lost 3.2 million tons of milled rice cumulative production and 700,000 hectare of rice-cultivated area in the 1997 – 1998 El Nino. It is predicted that without the efforts of climate change adaptation, rice and corn production in Indonesia will decrease up to 27 per cent and 14 per cent respectively by 2050. To avoid these problems in the future, the Government seeks to reinforce information and communication systems, to improve irrigation schemes and to promote the use of organic fertilizers.

Fertilizer consumption has been rising steadily over the years. Although fertilizers contribute to increases in production and efficiency, their use can have negative impacts on the soils and

33 Ibid.
on the environment including contamination of air and water. Most fertilizer consumption in Indonesia is used for lowland rice crops. Fertilizers manufactured in Indonesia include urea, superphosphate, ammonium sulphate, NPK (Nitrogen, Phosphorus and Potassium) and organic fertilisers. However, the use of fertilizers and particularly urea, represents a threat for the environment. Indonesia’s second national communication under the UNFCCC reported that urea was responsible for the emission of approximately 3,500 Gg of carbon, due to a chemical reaction when urea is added to soil during fertilization. Pesticides used by farmers and plantation owners are also a concern, with inappropriate use of pesticides and fertilizers often leading to water pollution and damaging ecosystems.

In addition, agricultural production produces organic solid waste that needs to be managed. Waste can occur in the processing stage of agriculture production. For instance, the palm oil sector faces a challenge with managing the waste of empty fruit bunches when palm oil is being manufactured. On farms and in plantations producers need to manage the waste associated with crop harvest. For instance, the organic waste of cassava crops includes the section of the plant above the ground, as well as roots that are not part of the cassava harvest. Such wastes can be composted or ploughed back into the soil, and used to enhance soil quality for the next harvest.

3.3 Key trends towards sustainability

The revitalisation of agriculture has been placed as one of the key priorities in the National Action Plan to address Climate Change and in the Long Term Development Action Plan (2005-2025). Indonesia’s efforts to respond to the pressures of climate change in the agricultural sector include the strengthening of research, development, and dissemination of sustainable agriculture practices, the diversification of staple foods by promoting non-rice food sources, improving waste management and water management in rice production and improving technology and information transfer. Many other initiatives have been put in place to improve the sustainability of the sector, especially regarding sustainable palm oil production and organic agriculture.

There are many actions that have been taken to improve the sustainability of the agricultural sector. The following sections refer to specific measures that have been undertaken to enhance sustainability in agricultural crops, plantations and in livestock.

3.3.1 Organic and low-impact agriculture

Organic agriculture not only benefits the environment, but also helps farmers to work in decent conditions, due to reduced chemical exposure and access premium markets for selling produce. Producers can also benefit from higher income, because the price of organic fertilizer is often cheaper than non-organic products. Organic agriculture is actively supported by the Government, with a number of decrees and rules regulating the sector. For instance, Regulation No. 70/Permentan/SR.140/10/2011 on organic fertilizers specifies the

36 http://www.ifad.org/events/gc/33/roundtables/sp/pi_bg_e.pdf
requirements for the distribution and use of organic products. Organic fertilizers should be in compliance with this regulation.\(^\text{38}\)

The Ministry of Agriculture’s Decree No. 432/Kpts/OT.130/9/2003 specifies the need for the development of organic food and the creation of a regulation body to formulate policies and certifications.\(^\text{39}\) Following this regulation an authority called the Authority for Organic Agriculture Competencies (Otoritas Kompeten Pangan Organik - OKPO) was made in charge of the accreditation of certificates for organic products. As of 2007, seven national and international organic certification bodies were approved by the OKPO, including Sucofinco, MAL, Indofice, Persada, Sumatera Barat, leSOS and BIOcert. The National Standard SNI 01-6729-2002 for organic food production issued in 2002 and revised in 2010 provides a framework for accreditation of organic products.

In 2009, the Government set a target to minimise the use of chemical fertilisers, and in 2010 the “Go Organic 2010” programme set the aim for Indonesia to be one of the main organic food producers in the world. Currently however, organic produce is mainly destined for the domestic market. These products tend to be certified by national bodies through OKPO accreditation. Products for export, on the other hand, are usually certified by international certification bodies such as IMO, Control Union, NASAA Australia, Naturland, Ecocert, Goca and Australian Certified Organic.

Efforts are being made to improve access for farmers to the organic market, especially small-scale farmers. This is being largely led through the Participatory Guarantee System (PAMOR) which was set up in 2008 to improve socio-economic conditions of small-scale farmers, and improve their access to organic cultivation, production, and marketing, in compliance with SNI Standard on Organic Food Production.\(^\text{40}\) In 2006 there were approximately 50,000 hectares of agricultural land under organic management (0.2 per cent of total agricultural land), across some 45,000 farms. The Ministry of Agriculture’s directory for organic farming lists 49 firms producing organic products, such as rice, fruits, vegetables, tea, herbs, medicinal plants, and dairy products, and 41 firms producing organic fertilizers and pesticides.\(^\text{41}\)

Obtaining certification from one of the seven certification bodies is often unaffordable for many small-scale farmers. To improve their access to organic food production, the Indonesian Organic Alliance developed the PAMOR certification in accordance with SNI standards. PAMOR certification provides a simplified set of procedures and lower costs for certification of agricultural products sold at the local, regional and national level. In addition, there is an estimated 16.3 hectares with PAMOR certification, 94 hectares of organic aquaculture and more than 32,000 hectares of wild collection areas. There are an estimated 14 organic coffee farmer groups comprising about 1,900 farmers in the Gayo Organic Coffee Farmers Association (PPKGO).\(^\text{42}\)

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\(^{38}\) http://perundangan.deptan.go.id/admin/file/Permentan-70-11.pdf


\(^{40}\) http://www.pamor-indonesia.org/

\(^{41}\) http://www.isda2010.net/var/isda2010/storage/original/application/38bed6111f373e962ee118f337f2db.pdf

There is also an additional 1,565 hectares of land which is managed using organic methods but which is not certified. Finally, it is estimated that approximately 10 per cent of farmers use organic farming inputs and/or are implementing organic farming measures.

In Indonesia, the most active organization concerning organic agricultural practices is the Indonesia Organic Alliance, formerly called BIOCert. This organization was established to promote the development of organic agriculture and the protection of smallholder farmers. The IOA works closely with local and foreign partners and has also established the BIOCert certification for organic farming.\textsuperscript{43}

Table: Organic agricultural land in 2009

<table>
<thead>
<tr>
<th>Main land use</th>
<th>Main crop type</th>
<th>Organic land (ha)</th>
<th>Agricultural land (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural land and crops</td>
<td>Agricultural land and crops</td>
<td>9,013</td>
<td></td>
</tr>
<tr>
<td>Arable crops</td>
<td>Cereals</td>
<td>560</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicinal and aromatic plants</td>
<td>2,913</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mushrooms</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vegetables</td>
<td>92.3</td>
<td></td>
</tr>
<tr>
<td>Arable crops total</td>
<td></td>
<td>12,579</td>
<td></td>
</tr>
<tr>
<td>Permanent crops</td>
<td>Cocoa</td>
<td>2,386</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coconut</td>
<td>936</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coffee</td>
<td>31,580</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fruit</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicinal and aromatic plants</td>
<td>849</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nuts</td>
<td>3,574</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tea</td>
<td>206</td>
<td></td>
</tr>
<tr>
<td>Permanent crops total</td>
<td></td>
<td>39,549</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>52,128</td>
<td></td>
</tr>
</tbody>
</table>

\textit{Source: Indonesia Organic Alliance, 2010}

Organic meat farming in Indonesia is not yet broadly implemented. Although some meat products such as chicken are found under the ‘organic’ label, no certification has been granted for organic meat products. However, sustainable practices of chicken meat and poultry production can be found in the kampung (villages), with low impact on the environment. Such practices are called ‘low-impact farming’.

\subsection*{3.3.2. Smallholder farming}

Indonesia has a very large number of smallholder farms, with an estimated 17 million small farms being found throughout the country. Smallholder farms, also known as family farming, are usually defined as farms with less than 2 hectares of land area who depend on household members for most of the labour.\textsuperscript{44} Smallholders may use more environmentally sustainable techniques, given their low intensity and therefore reduced impacts on the environment.\textsuperscript{45} Problems related to fertiliser and pesticide use are usually avoided given the relatively low level of inputs used by smallholders compared to larger, more intensive agricultural systems. However, a lack of knowledge can also mean that the farming practices of smallholders have

\textsuperscript{43} Indonesia Organic Alliance, http://www.organicindonesia.org

\textsuperscript{44} http://www.ifad.org/events/gc/33/roundtables/pl/pi_bg_e.pdf

\textsuperscript{45} http://www.ifad.org/events/gc/35/doc/concept_e.pdf
adverse impacts on the environment.\textsuperscript{46} For example, slash and burn practices can be used for clearing land and poor water management can lead to land degradation.

Mixed farming is the combined use of livestock and crops to make better use of these resources. For example, biomass produced by livestock can be reused for crop cultivation while straws and bran produced through crop cultivation can be given to animals. This circular use of resources throughout the production cycle is more sustainable and reduces waste.\textsuperscript{47}

Rubber cultivation can also be sustainable in the case of jungle rubber production. Indonesia is the second largest producer of natural rubber in the world after Thailand, and approximately 55 per cent of the cultivation is by smallholders. ‘Jungle rubber’ or ‘rubber agro-forestry’, is a technique used by smallholders where the rubber trees are planted among other forest trees and fruit trees, creating a forest rich in biodiversity and less prone to fire hazard. This system is considered to be sustainable as it preserves ecosystems and reduces the risks of deforestation.\textsuperscript{48}

### 3.3.3. Sustainable palm oil production

Although palm oil has negative effects on the environment, it is also provides income and livelihoods for many people in rural areas. Several palm oil companies in Indonesia are members of the Roundtable on Sustainable Palm Oil (RSPO) initiative. Created in 2004, the RSPO is a voluntary and membership-based organization bringing together palm oil growers, retailers, NGOs and other stakeholders involved in the palm oil industry, to promote standards for a sustainable growth and use of palm oil products.\textsuperscript{49} The RSPO is internationally recognized. As of 2012, there were 18 companies in Indonesia certified by RSPO, representing a total area of 463,786 hectares and 2.27 million tons of crude palm oil.\textsuperscript{50}

In March 2011, Indonesia launched its own sustainable palm oil standard, the Indonesian Sustainable Palm Oil scheme (ISPO). The ISPO became officially effective as of March 2011 and it is hoped that all palm oil plantation companies will have obtained the ISPO certificate by December 2014, as specified by Regulation No. 19/Permentan/OT.140/3/2011 on Sustainable Palm Oil Production.\textsuperscript{51} The ISPO assesses compliance in areas such as environmental management, farming techniques and corporate social responsibility (98 indicators which elaborate seven principles and criteria). RSPO certification is voluntary and the ISPO will be mandatory, that is, non-compliance will be punishable under Indonesian law. However, ISPO is still at an early stage of implementation and there is little data available on the number of firms which already comply with ISPO standards.

In addition to the ISPO and RSPO, the NGO Rainforest Alliance also has a standard for palm oil, but no companies have yet been certified for this standard. However, similar standards

\textsuperscript{46} http://www.ifad.org/events/gc/35/doc/concept_e.pdf
\textsuperscript{49} http://www.rspo.org/
\textsuperscript{50} RSPO Certification Data, http://www.rspo.org/en/grower_certification
\textsuperscript{51} http://perundangan.deptan.go.id/admin/p_mentan/Permentan%20No.19%20Tahun%202011%20%28pedoman%20kelapa%20sawit%20brkelanjutan%29.pdf
exist in the coffee, cocoa, banana and tea industries and there are currently 41 producers in these sectors that have met the "sustainable agricultural network" certification standards.\(^{52}\)

### Case study: Improving farmer’s response to climate change: The Climate Field Schools

With droughts, floods, and natural disasters directly threatening crops and plantations, the need for appropriate skills and tools to address climate change is particularly important. In 2002, the Ministry of Agriculture launched its first ‘Climate Field School’ (Sekolah Lapang Iklim) for farmers in the district of Kabupaten Indramayu (West Java). This initiative, funded by both the national budget and the local government budget, is intended to increase capacity of farmers to deal with climate change issues. Farmers often have poor access to information and do not know how to interpret weather forecasts, instead relying on their traditional knowledge of weather patterns. The training provided by the Ministry therefore aimed to increase farmers’ ability to interpret weather data - both historical and forecast.

In 2007, a Climate Field School operated in Gunung Kidul, near Yogyakarta. The programme lasted for five months and involved approximately twenty farmers. In this region, rice can only be planted once a year, but there are several opportunities for cultivation of other crops. During the sessions, farmers received training on soil and water management, such as how to measure rainfall, how to prevent field water losses and how to build up organic matter. Training in the field was also provided. For example, farmers were taught how to measure rainfall on a day-to-day basis.

Prior to receiving the training, farmers were unsure about the effects of climate change on their crops. They were also using shifting agricultural and slash and burn techniques. Now, they reported they had a greater understanding of climate change and strategies for managing weather variation. For example, to cope with the risks of drought due to the change in rainfall patterns, one strategy was to build ridges in the rice fields, to prevent water from running off the fields. This strategy, along with other approaches such as the daily measurement of rainfall using gauges in the fields, enabled farmers get a better understanding on how to adapt to the changing environment. They are now able to manage their crop in a more effective way, and generate more revenues from their activities.

The Climate Field School programmes have now expanded to more than one hundred districts, with sometimes one hundred farmers per district. The training provided to farmers not only helps to reduce the impact of their activities on the environment, but also to improve their economic revenue and their livelihoods.

**Sources:**


### 3.4 Identified green sub-sectors

Green sub-sectors which are likely to provide environmentally sustainable employment were identified through a combination of desk review and focus group discussions (FGD) with stakeholders from the agricultural sector. The green sub-sectors are outlined in the table

\(^{52}\) [http://sustainablefarmcert.com/findfarms.cfm](http://sustainablefarmcert.com/findfarms.cfm)
below. These include low-impact rice cultivation and other low-impact crops, sustainable palm oil, organic plantations for beverages, low-impact poultry and combination farming. Ornamental crops and various agricultural services were not considered to meet criteria for being classified as a “green sub-sector”.

Table: Green sub-sectors in agriculture and the environmental screening criteria

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Proposed screening criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low impact rice farming</td>
<td>National law: Ministry of Agriculture’s Decree No. 432/Kpts/OT.130/9/2003, which created the Authority for Organic Agriculture Competencies (Otoritas Kompeten Pangan Organik - OKPO). The OKPO accredited seven certification bodies (Sucofinco, MAL, Indofice, Persada, Sumatera Barat, leSOS and BIOcert) for organic production. National Standard SNI 01-6729-2002 for organic food production, revised in 2010, also serves as a guideline for accreditation of organic products.</td>
</tr>
<tr>
<td>Low impact crops cultivation</td>
<td>National law: OKPO, and National Standard SNI 01-6729-2002 for organic food production (see above).</td>
</tr>
<tr>
<td>Smallholder rubber</td>
<td>Activity based approach: The technique used by smallholders for rubber cultivation, called jungle rubber, is considered as sustainable. Rubber trees are planted amongst other forest trees and fruit trees, creating a forest rich in biodiversity and less prone to fire hazard.</td>
</tr>
<tr>
<td>Sustainable palm oil</td>
<td>Voluntary standard: the RSPO (Round table on Sustainable Palm Oil) is an internationally-recognised organization bringing together palm oil growers, retailers, NGOs and other stakeholders involved in the Palm Oil industry, to promote standards for a sustainable growth and use of palm oil products. Companies in Indonesia can become members on a voluntary basis.</td>
</tr>
<tr>
<td>Organic plantations for beverages</td>
<td>National law: OKPO, and National Standard SNI 01-6729-2002 for organic food production (see above).</td>
</tr>
<tr>
<td>Low impact poultry</td>
<td>Activity-based approach: chicken and poultry from the community villages, known as ‘kampung’ chicken, are raised in a way that minimizes the impact on the environment.</td>
</tr>
<tr>
<td>Combination farming</td>
<td>Activity based approach: the circle production (combined use of livestock and crops, and the reutilization of biomass for other productive activities) ensures a more optimal use of the resources, and minimizes the waste.</td>
</tr>
</tbody>
</table>

Source: Authors’ own data

3.5 Decent work in agriculture

In 2008, there were approximately 39 million people working in the agricultural sector. The sector is dominated by informal employment, comprising 95.1 per cent of the work force (see table below). It is therefore difficult to estimate the decency of work in the agriculture sector,
considering the high proportion of jobs in the informal economy and lack of data at the micro level on individual occupations.

**Table: Formal and informal employment in the agriculture sector, 2008**

<table>
<thead>
<tr>
<th>Description</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total jobs in agriculture</td>
<td>38,996,259</td>
</tr>
<tr>
<td>Total formal jobs in agriculture</td>
<td>1,929,914</td>
</tr>
<tr>
<td>Total informal jobs in agriculture</td>
<td>37,066,345</td>
</tr>
<tr>
<td>Estimated proportion of informal jobs in agriculture</td>
<td>95.1%</td>
</tr>
</tbody>
</table>

*Source: Author’s estimate based on BPS data*

Data from the 2008 Sakernas survey can however provide information on the type of activities carried out by workers. The majority of people employed in the agricultural sector (22.9 per cent) are employers assisted by temporary workers. 22.9 per cent of people working in the agricultural sector are employees, while 21 per cent work as own account workers (see table below). Own account workers, unpaid workers and employer assisted by temporary workers represent the smallholder workforce, accounting for 66 per cent of people working in the agricultural sector. Most people who work in the agricultural sector are labourers, followed by traders and then professionals. The average wage in the agriculture, forestry, hunting and fisheries sectors in 2008 was 546,739 IDR per month for labourers, and 854,546 IDR per month for employees. The average working time is 38 hours per week.

**Table: Occupations and employment status of agriculture workers, 2008**

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Per cent</th>
<th>Main occupation</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own account</td>
<td>21.0</td>
<td>Professional, technical, related</td>
<td>5.4</td>
</tr>
<tr>
<td>Employer assisted by temporary worker</td>
<td>22.9</td>
<td>Administrative and managerial</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Employer assisted by permanent worker</td>
<td>3.1</td>
<td>Clerical and related worker</td>
<td>3.2</td>
</tr>
<tr>
<td>Employee</td>
<td>22.9</td>
<td>Sales worker</td>
<td>14.5</td>
</tr>
<tr>
<td>Casual employee in agriculture</td>
<td>5.0</td>
<td>Service workers</td>
<td>3.8</td>
</tr>
<tr>
<td>Casual employee not in agriculture</td>
<td>2.9</td>
<td>Agricultural labourer</td>
<td>55.1</td>
</tr>
<tr>
<td>Unpaid workers</td>
<td>22.2</td>
<td>Other Labourer</td>
<td>16.6</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

*Source: Authors’ estimate based on BPS data*

In terms of qualifications, only 20.4 per cent of the workers were considered to be skilled (completed certificates, diplomas, degrees etc). 26.1 per cent are unskilled, and 53.5 per cent are semi-skilled. The skills needed for sustainable cultivation are high, but currently farmers receive little training. On average 26 per cent of people working in the agricultural sector reported that they had received training. However, awareness levels on health and safety or good work practices are still likely to be low.

Conditions of work in the sector can be hazardous, and access to social security and union membership is low. This is particularly the case in the rice cultivation sector, where occupational health and safety practices are limited, and where workers are more vulnerable and in precarious situations. In some sectors such as palm oil cultivation, workers have better access to union membership.
Many people in the agricultural sector belong to a farmers’ union or cooperative that provides support with accessing inputs, sale of produce, access to finance and collective bargaining. Farmers’ unions and cooperatives often also provide savings and credit facilities for their members, which can help to reduce the risks and vulnerabilities to which rural populations are exposed.
### Table: Description of working conditions in green sub-sectors

<table>
<thead>
<tr>
<th>Green sector</th>
<th>Decent work indicator</th>
</tr>
</thead>
</table>
| Low impact rice farming    | Risks at work: There are a range of risks that workers in low impact rice farming are exposed to, namely:  
  - Workplace accidents, particularly if farmers and workers don’t have adequate training. On average 25 per cent work had received training;  
  - Workers in the agricultural sector are exposed to the weather and different terrains, which entails risk of injury;  
  - Workers in the agricultural sector are exposed to various animals and insects (tigers, monkeys, mosquitoes), which entails risk of injury and sickness.  

Social protection: Workers in the formal economy have access to formal social protection options. Outsourced workers and other informal economy workers may access Jamkesmas and Jamkesda for health coverage.  

Organization and industrial relations: Many people who work in low impact rice farming are smallholders who are assisted by family members. These farmers may sell their surplus produce locally through local cooperatives or local traders. However often farmers are unorganized and subsequently don't always benefit from collective bargaining arrangements. Medium and large scale farmers are often connected with trading networks and farmers cooperatives. Work can be precarious with more workers hired during planting and harvesting times. 

Overall, jobs in low impact rice farming that pay above the minimum wage in the formal economy could be considered decent. Jobs in the informal economy can considered as decent if the workers are not underemployed and have a job all-year round and receive remuneration that is above the minimum wage.  

| Low impact crops cultivation | See notes above.                                                                                                                                                                                                                                                                                                                                 |
| Smallholder rubber          | Risks at work: There are a range of risks that workers in rubber are exposed to, namely:  
  - Workers in rubber forests are exposed to the weather and different terrains, which entails risk of injury;  
  - Workers in rubber forests are exposed to various animals and insects (tigers, monkeys, mosquitoes), which entails risk of injury and sickness.  
  - As work associated with smallholder rubber plantations is largely community based, workers have limited access to training opportunities which entails increases in injury. However, 31 per cent of people workers in rubber reported that they had received training. |
Social protection: As work in smallholder rubber is community-based and largely in the rural informal economy, formal social protection options are limited. However, social protection coverage for health should be available from Jamkesmas and Jamkesda.

Organization and industrial relations: Smallholder rubber is largely community-based and therefore employers’ and workers’ organizations are not extensively involved in these sectors. Communities often organize informally and bargain collectively with traders that collect rubber from their village. However, the discrepancy between the price that farmers are paid per kilo of rubber and the price of rubber at the national level can be considerable.

Smallholders involved in rubber that pay above the minimum wage are likely to be decent, however, jobs that pay below the minimum wage could not be considered to be decent.

Sustainable Palm Oil

Risks at work: There are a range of risks that workers in palm oil are exposed to, namely:
- Workers in palm oil are exposed to the weather and different terrains, which entails risk of injury;
- Workers in palm oil are exposed to various animals and insects (tigers, monkeys, mosquitoes), which entails risk of injury and sickness.
- Work associated with palm oil can involve conflict between communities and enterprises.
- Work associated with palm oil tends to involve large scale companies, however, only 20 per cent work workers in this sector indicated that they had been trained.

Social protection: Workers in the formal economy have access to formal social protection options. Outsourced workers and other informal economy workers may access Jamkesmas and Jamkesda for health coverage.

Organization and industrial relations: Work in palm oil plantations involves large scale companies, state own-enterprises and smallholder farmers. State-owned enterprises and large companies have formal mechanisms for industrial relations. However, the palm oil sector uses unorganised outsourced workers to provide labour at planting and harvest times, which has implications for the decency of work in this sub-sector. Smallholder farmers often sell their produce to large palm oil companies and have limited bargaining power if they are unorganized.

Jobs in sustainable palm oil in the formal economy that pay above the minimum wage are likely to be decent, however, jobs that pay below the minimum wage and jobs that are precarious could not be considered to be decent.

Organic plantations for

Risks at work: There are a range of risks that workers in plantations for beverages are exposed to, namely:
- Workers in plantations for beverages are exposed to the weather and different terrains, which entails risk of injury;
### Beverages

- Workers in plantations for beverages are exposed to various animals and insects (tigers, monkeys, mosquitoes), which entails risk of injury and sickness.
- Workers in organic plantations for beverages should have received training on organic farming techniques during the certification period. However, overall, only 22 per cent of workers in beverage plantations have received training.

**Social protection:** Workers in the formal economy have access to formal social protection options. Outsourced workers and smallholder farmers may access Jamkesmas and Jamkesda for health coverage.

**Organization and industrial relations:** Organic plantations for beverages involve large companies that have formal mechanisms for industrial relations, as well as smallholder farmers. Farmers that are certified to be organic normally belong to cooperatives or other types of farmer groups that are organized. However, companies sometimes use unorganised outsourced workers to provide labour at planting and harvest times, which has implications for the decency of work in this sub-sector.

Jobs in organic plantations for beverages in the formal economy that pay above the minimum wage are likely to be decent, however, jobs that pay below the minimum wage in the informal economy could not be considered to be decent.

### Low Impact Poultry

**Risks at work:** There are a range of risks that workers in low impact poultry are exposed to, namely:
- Workers in low impact poultry are exposed to the weather and different terrains, which entails risk of injury;
- Workers in low impact poultry work directly with chickens and are at risk of injury and are also exposed to diseases that chickens carry, such as the avian influenza. However, many workers reported that they had not received training.

**Social protection:** Workers in the formal economy have access to formal social protection options. Workers in the informal economy in rural areas may access Jamkesmas and Jamkesda for health coverage.

**Organization and industrial relations:** Many people who work in low impact poultry are smallholders who are assisted by family members. These farmers may sell their produce locally through local cooperatives or local traders. However often farmers are unorganized and subsequently don't always benefit from collective bargaining arrangements. Medium scale farmers involved with low impact poultry are often connected with trading networks and farmers’ cooperatives, which increases bargaining power.

Overall, jobs in low impact poultry that pay above the minimum wage in the formal economy could be considered decent. Jobs in the informal economy can considered as decent if the workers are not underemployed and have a job all-year round.
and receive remuneration that is above the minimum wage.

| Combination farming | Risks at work: There are a range of risks that are associated with combination farming, namely:  
- Workers in combination farming are exposed to the weather and different terrains, which entails risk of injury;  
- Workers in combination farming work directly with livestock and are at risk of injury and are also exposed to diseases that livestock carry, such as the avian influenza. Approximately 30 per cent of workers reported that they have been trained.  

Social protection: Workers in the formal economy have access to formal social protection options. Workers in rural areas in the informal economy may access Jamkesmas and Jamkesda for health coverage.  

Organization and industrial relations: Many people who work in combination farming are smallholders who are assisted by family members. These farmers may sell their surplus produce locally through local cooperatives or local traders. However often farmers are unorganized and subsequently don't always benefit from collective bargaining arrangements.  

Overall, jobs combination farming that pay above the minimum wage in the formal economy could be considered decent. Jobs in the informal economy can considered as decent if the workers are not underemployed and have a job all-year round and receive remuneration that is above the minimum wage. |

*Source: Authors’ own data*
The number of jobs in each of the identified green sub-sectors has been estimated. These are shown in the table below, alongside a description of the source of the estimate. The total number of environmentally sustainable jobs estimated is 4,809,584, which is equivalent to 12.3 per cent of all jobs in agriculture in 2008. The green sub-sector with the highest number of environmentally sustainable jobs is low impact crops cultivation, which includes rice farming. This is closely followed by jobs associated with smallholders in the rubber plantations. Less people were employed in organic tea, coffee and cocoa production.

Table: Environmentally sustainable employment in agriculture, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Employment estimate</th>
<th>Source / Method of calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low impact crops cultivation</td>
<td>2,295,258</td>
<td>Estimate from Sakernas 2008, proportion of KBLI codes 1111, 1112, 1121, 1122, 1125, 1131 and 1132 based on Indonesian Organic Alliance estimates that 10 per cent of land area is certified organic.</td>
</tr>
<tr>
<td>Smallholder rubber</td>
<td>2,030,923</td>
<td>Estimate from Sakernas 2008, KBLI code 1115, based on quantitative data from Sakernas where 55 per cent of the workers in the rubber plantations are smallholders.</td>
</tr>
<tr>
<td>Sustainable Palm Oil</td>
<td>134,156</td>
<td>Estimate from Sakernas 2008, KBLI code 1134, based on data from RSPO. Total certified area is 453,786 hectares, which represents 9 per cent of the palm oil area. Therefore it could be assumed that 9 per cent of jobs in the sector are environmentally sustainable.</td>
</tr>
<tr>
<td>Organic plantations for beverages</td>
<td>43,663</td>
<td>Estimate from Sakernas 2008, KBLI code 1135, based on data from the Indonesian Organic Alliance. There are 34,172 hectares of tea, coffee and cocoa organic land, which represents 1.75 per cent of total tea, coffee and cocoa plantation area. Therefore it could be assumed that 1.75 per cent of jobs in the sector are environmentally sustainable.</td>
</tr>
<tr>
<td>Low impact poultry</td>
<td>64,572</td>
<td>Estimate from Sakernas 2008, KBLI code 1223, considering that 100 per cent of native chicken are raised in a sustainable way.</td>
</tr>
<tr>
<td>Combination farming</td>
<td>241,012</td>
<td>Estimate from Sakernas 2008, KBLI code 1300, based on qualitative information that mixed farming is 100 per cent sustainable.</td>
</tr>
<tr>
<td><strong>Total “environment core” jobs</strong></td>
<td><strong>4,809,584</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas
### 3.7 Estimating green jobs

By combining both qualitative insights from key informants on employment conditions in the agriculture sector and quantitative information from the labour force survey, it is estimated that 6.24 per cent of jobs in the agriculture sector could be considered as green jobs.

**Table: Green job estimates in agriculture, 2008**

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low impact crops cultivation</td>
<td>1,065,569</td>
</tr>
<tr>
<td>Smallholder rubber</td>
<td>1,138,858</td>
</tr>
<tr>
<td>Sustainable Palm Oil</td>
<td>81,087</td>
</tr>
<tr>
<td>Organic plantations for beverages</td>
<td>18,845</td>
</tr>
<tr>
<td>Low impact poultry</td>
<td>23,881</td>
</tr>
<tr>
<td>Combination farming</td>
<td>106,427</td>
</tr>
<tr>
<td><strong>Total green jobs</strong></td>
<td><strong>2,434,667</strong></td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

Most green jobs are in low impact crop cultivation (includes rice) and smallholder rubber. Though the number of people employed in sustainable palm oil, combination farming and organic beverage plantations is lower than the other sub-sectors, the proportion of environmentally sustainable jobs that are green jobs is higher (see table below).

**Table: Green jobs as a proportion of environmentally sustainable jobs in agriculture, 2008**

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Per cent of environmentally sustainable jobs that are green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low impact crops cultivation</td>
<td>46.4%</td>
</tr>
<tr>
<td>Smallholder rubber</td>
<td>56.1%</td>
</tr>
<tr>
<td>Sustainable Palm Oil</td>
<td>60.4%</td>
</tr>
<tr>
<td>Organic plantations for beverages</td>
<td>43.2%</td>
</tr>
<tr>
<td>Low impact poultry</td>
<td>37.0%</td>
</tr>
<tr>
<td>Combination farming</td>
<td>44.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50.6%</strong></td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

In order to increase the number of green jobs in the agriculture sector in Indonesia it is important to support the further development of organic and low-impact farming in rice cultivation and other crops and plantation beverages. The number of workers in these sectors is high and there is a great potential for creation of green jobs. It would be important to promote the certification of organic activities through the OKPO and the certification bodies accredited by the Ministry of Agriculture. Concerning palm oil, it would be necessary to reinforce the sustainable palm oil initiative, from the national to the local levels. The ISPO standard is compulsory and should therefore be promoted. Furthermore, it would also be important to ensure that agricultural enterprises are members of employers’ organizations and that workers have the right to freedom of association and collective bargaining. Promotion of training should also be encouraged.
To promote green jobs in low impact poultry and combination farming, it would be important to focus on improving employment conditions and the bargaining power of these workers in the value chain. These activities are often undertaken by smallholder own account workers in the informal economy. Therefore the organization of these workers into cooperatives may also help to improve the bargaining power of workers and their share of the border gate price. Strategies on diversification may also support improvements in livelihoods.
Chapter 4: Green jobs in forestry

Indonesia’s forests are amongst the worlds most diverse and richest in terms of biodiversity. These resources are important for the country’s economic growth; however forests are vulnerable to over-exploitation and deforestation. The sustainable management of forests is therefore a high priority. To support sustainable and inclusive growth, this chapter provides key information on the forestry sector in Indonesia, including economic trends and linkages between the environment and employment. It discusses the impacts that forest-based activities have on the environment and what actions are being undertaken to improve the sector’s environmental sustainability. On the basis of this information and extensive consultations, sub-sectors providing environmentally friendly activities and employment associated with these activities have been identified. A further discussion on the decency of work in these sub-sectors provides the basis for estimating green jobs in forestry.

4.1 Overview of the forestry sector

In 2010, forest cover in Indonesia was estimated by the UN Food and Agricultural Organization (FAO) at 94.4 million hectares, which represents 52 per cent of the total land area. However, forest coverage in Indonesia has shrunk rapidly since the 1950s due to deforestation, largely due to logging activities. Indonesian forests are very diverse, hosting one of the largest ecosystems in the world. Indonesia has the world’s third most extensive forest cover, after Brazil and the Democratic Republic of Congo. The main types of forests in Indonesia are lowlands and peat swamp forests (mostly found in Kalimantan), monsoon forests, savannah grasslands and alpine forests. Indonesia is also the home of one of the largest mangrove areas in the world, covering 3.2 million hectares, mostly in lowland forests.

The permanent forest estate of Indonesia covers an area of 81.8 million ha and is divided into three categories:

- Production forests (HP) are designated for the production of wood, fibre, bio-energy and non-wood forest products. They include limited production forest (HPT) and convertible production forest (HPK). Production forests are under concession and follow a management plan. This is the largest category, covering 49.7 million hectares, or 52% of the total forest area.
- Protected forests (HL) are designated for the protection of soil and water;
- Conservation forests (HK) are designated for the preservation of biodiversity, and they can be part of protected forests area.

Other forests used for specific purposes are social services forests, multiple purposes forests, and non-forest land (APL) which include community forests. Mangrove and peatland forests have a great potential for carbon storage and ecological value that warrants their preservation. However, these areas encounter challenges associated with logging and the degradation of lands.

55 FAO (2010), Global Forest Resources Assessment: interactive database
Indonesia has the largest forestry industry in the Asia and Pacific region; however, the sector has experienced significant changes over time.\(^\text{58}\) GDP data from Statistics Indonesia indicates that the forestry sector has been growing in real prices (20 billion IDR in 2004 to 45 billion IDR in 2009), but it remains stable as a proportion of GDP and in constant prices. Indonesia has increased its value-added log production (greater processing of the raw material) and this trend has led to the expansion of the pulp and paper (P&P) industry, which has made Indonesia the ninth largest producer of pulp in the world.\(^\text{59}\) However, log production from natural forest concessions has been on a steady decline over the last 10 years, while log production from the conversion of natural forests and from timber plantations has been rising due to policy reforms.

According to data from the labour force survey, employment in the forestry sector comprises only a small share of employment in Indonesia (less than one per cent). In 2008 employment in the forestry and hunting sector was estimated at just over half a million (excludes labour in processing). On average, 30 per cent of the workforce was under 30 years old, and only 20 per cent of the workers were formal sector workers. It is therefore important to support improvements in the working conditions of forestry and hunting sector workers.

The forestry sector includes activities associated with teak, pine, mahogany sonokeling, albasia, jeunjing, sandalwood, acacia and eucalyptus production forests, as well as non timber forest products such as the harvesting of rattan, tea-tree oil plantations and the harvesting of pine and other resins. Areas of forest zoned as production forests can be developed and converted from a natural forest to a production forest with concessions. The Ministry of Forestry provides inspection and land classification services. Other services include forest protection and nature conservation, as well as rehabilitation and reforestation. Timber harvesting and timber extraction also fall under the forestry sector. Approximately 80 per cent of gross value added from the forestry sector comes from production forests, and the remaining 20 per cent comes from non-timber forest products, forest services and timber harvesting services.

With over 90 million hectares of forests, Indonesia has huge potential to profit from the carbon market. The Indonesia Forest Climate Alliance estimates that selling carbon credits in the global market could generate revenues between USD $650 million and USD $1 billion a year.\(^\text{60}\) However, in order to participate, the measurement, verification, and reporting tools need to be in place, as investors need to be assured that reductions are taking place. In addition to this, Indonesian forests are not only valuable for producing forest products, but are also important destinations for tourists. Therefore, it is important for Indonesia to strike the right balance between production, protection and conservation in its forests.

### 4.2 Importance of forestry to the environment

In 2007 the World Bank estimated that Indonesia was the third largest contributor of GHG emissions in the world, largely due to rapid rates of deforestation and peat land degradation. According to the study, emissions from land use change and forestry (LUCF) represent 85%


per cent of the country’s total emissions. Peat land degradation – due to fires and deforestation – is a particular concern as it accounts for 73 per cent of the LUCF emissions. However, it is noted that methodologies for estimating carbon emissions are still developing in Indonesia, particularly for land use change and peat land degradation, and estimates provided by the World Bank, the Ministry of Environment and the National Council for Climate Change vary considerably.

In 2007 Indonesia’s deforestation rate was ranked second fastest in the world by the FAO. Between 1990 and 2000, 19.1 million ha of forest were lost, which represents an average loss of almost 2 million ha per year. More recent studies indicate that deforestation has slowed down between 2000 and 2006, with an average loss of 1.2 million ha per year. According to the FAO, 4.9 million tons of pulp were produced each year between 2005 and 2009, with the majority of pulp wood plantations coming from natural forest conversion. Forest conversion and deforestation is likely to continue to be significant, unless timber plantation development is more effective and plantations become more productive.

Many communities and households in Indonesia are dependent on forests. According to the Indigenous Peoples’ Alliance of the Archipelago’s (AMAN), there are 50 to 70 million indigenous people in Indonesia, most of them living in forest areas. In Kalimantan only, there are approximately 610 Indigenous Communities whose lives depend on forests. These communities are particularly vulnerable to climate change, forest destruction, legal and illegal logging, and land tenure issues. They are dependent on the use of forest resources to support their livelihoods, and these livelihood activities can be both sustainable and unsustainable.

The forestry sector is a key sector for the transition to a low-carbon economy. Because of their capacity to store carbon, forests represent a great potential for the reduction of greenhouse gas emissions. Deforestation and forest degradation not only contribute to the loss of biodiversity, but also influence climate stability, as it increases greenhouse gas releases in the atmosphere. Worldwide, emissions from deforestation represent 15 to 17 per cent of total GHG emissions. Climate change mitigation can be achieved through reducing deforestation and forest degradation, while adaptation to climate change will only be possible with the sustainable management of the world’s forests.

Indonesia’s forests have an important role to play in the global environment, however, Indonesia accounts for almost 20 per cent of the world’s annual deforestation. Adequate policies at the national and local level are needed to support global efforts towards the reduction of greenhouse gas emissions through protection of forests.

64 FAO (2010), http://www.fao.org/docrep/014/i1211m/i1211m09.pdf
66 Indigenous People’s Alliance of the Archipelago (AMAN), http://www.aman.or.id/
4.3 Key trends towards sustainability

The Government has made management of the environment and natural disasters to be one of the key priorities in its medium term development plan. In regard to climate change and forest management, it seeks to increase management and rehabilitation capacity in peat lands and to intensify efforts for reducing deforestation. There are several key regulations that support the shift towards sustainability in the forestry sector. For instance, in 2005 the Presidential Instruction No.4 on the Eradication of Illegal Logging in Forest Areas and Circulation throughout the territory of Indonesia was issued, in which the President ordered 12 Ministries, the Attorney General, Head of Police of Republic of Indonesia, Chief of Indonesian National Army, and local government leaders to accelerate the eradication of illegal logging in Indonesian forests. The Government aims to:

- Replenish the forests in the rural areas and replant trees in the urban areas.
- Promote low impact logging practices.
- Improve forest policy and enforcement of regulations in forest management.
- Improve technology and information transfer in order to speed-up adaptation, innovation and adoption.
- Strengthen research and development of sustainable forest management.
- Review and revise present forest and forest law management policies to provide stronger and more accountable measures.

According to FAO, in 2005 33.4 million ha of forest were under sustainable forest management, and 48.7 ha had a management plan in 2005 (which represents half of the total forest area).

The Forest Management Act no.41/1999 requires natural resources to be managed and protected for the benefit of local communities. Private lands are commonly managed by local communities, with timber species being the main crops cultivated. In these areas agro-forestry often takes place, with local communities being able to plant crops alongside the cultivated trees. It has been reported that such activities have been effective in conserving biodiversity, improving public relations, reducing social conflicts and livelihood creation.\(^69\)

<table>
<thead>
<tr>
<th>Community forestry in Gunung Kidul</th>
</tr>
</thead>
<tbody>
<tr>
<td>Since 1986 the Ministry of Forestry has operated a successful project in Gunung Kidul that engages the community in forestry management. The idea was to create opportunities for work for community members, while helping to address problems such as deforestation and soil erosion. Projects carried by community members include:</td>
</tr>
<tr>
<td>- Pine tree plantation and resin extraction;</td>
</tr>
<tr>
<td>- Corn, peanuts and soy plantation between pine trees, for a more efficient use of available land;</td>
</tr>
<tr>
<td>- Collection of Malaleuca leaves for oil refining.</td>
</tr>
<tr>
<td>- Waste management of Malaleuca leaves through composting and use as an energy source.</td>
</tr>
</tbody>
</table>

The Ministry of Forestry ensures the sustainable management of forests by supporting the livelihoods of community members, which helps to prevent illegal logging. The pine tree plantations are based on a quota system; 600 to 700 trees are allocated to 100 community members which are able to extract approximately 100 kg of resin per week. As the community members are linked with stable markets to sell their produce, they are ensured a regular income. Concerning the Malaleuca oil plantation, the Ministry of Forestry has established a small scale factory for processing the leaves into oil and community members collect leaves from the plantations and deliver them to collection points for processing at the factory. The initiative is estimated to reach 10,000 people in the region. Because of the increasing price of Malaleuca oil, the community benefits from significant income that helps to ensure the sustainable management of the forest.

This initiative shows that forest management can be achieved in a sustainable way by engaging communities in forestry projects. Not only does it contribute to climate change mitigation and adaptation efforts, but it also creates work opportunities and sustainable income for people living in forest areas.


Regarding the management of forest concessions, three standards can be used to certify that forests are sustainably managed: the Indonesian Ecolabelling Institute (LEI-Lembaga Ekolabel Indonesia), the Forest Stewardship Council (FSC) and the Government’s sustainable management laws. The Indonesian Ecolabelling Institute (LEI) has developed forest certification systems for natural, plantation and community forests as well as certification for the chain of custody. As of February 2011, 500,000 ha of natural forests, 540,000 ha of plantations, 25,000 ha of community forests and 6 ha of industry forests had been certified under the Eco-Labelling Institute. The LEI has also developed a Memorandum of Understanding with the International Forestry Stewardship Council (FSC) to accelerate forest certification in Indonesia. However, progress in this area is dependent on the recognition of customary land rights.

Most of the forests under the LEI and the FSC certifications also comply with the sustainable management criteria of the Government. Therefore, these forests can be grouped into one category when estimating green jobs. According to a study carried out by the Directorate General of Forestry Enterprise Management, on a total of 140 concessions representing 14.2 million ha, only 6.8 million were qualified as sustainably managed. Thus, it can be estimated that 48 per cent of natural forests concessions have applied the principles of sustainability in their operations.

The Government Regulation no. 6/2007 on forest arrangement and formulation of forest management plan as well as forest exploitation (amended by Regulation no. 3/2008), specifies the three areas where forest management plans are to be established, namely, conservation forests, protection forests and production forests. The Government is able to issue licences for forests that are zoned for production and protection, however, according to the regulation, the Government still holds control on the forests and permit holder must make

70 http://www.lei.or.id
sustainable use of forest resources. Specifically, the regulation provides guidelines on the use of environmental services in protected and production forests, and on the collection, cultivation and harvesting of timber and non-timber forest products.\(^{71}\)

Further details of the utilisation license of timber forest products in production forests (IUPHHK-HA) are provided by the two following regulations:

- Regulation of the Ministry of Forestry no. 19/Menhut-II/2007 on the licence for extension of forest area for joint utilisation of forest timber in industrial timber;\(^{72}\)
- Regulation of the Minister of Finance no. p.52/Menhut-II/2008 on procedures and requirements for extension of business licence for utilisation of natural timber forest products.\(^{73}\)

These regulations provide details on the requirements to obtain a licence for harvesting, logging and reforestation of timber forest products. For example, a licence can be granted if exploitation complies with certain environmental criteria, or if timber crops do not damage the environment. Concerning non-timber forest products (NTFP) such as rattan, palm, bamboo and silk, the same kind of regulation regarding the licensing of exploitation has been issued by the Government. Regulation no. 36/Menhut-ii/2008 on the Utilization Permit of Non Wood Forest Products in natural forests (IUPHHBK-HA) or in production forests (IUPHHBK-HT) provide details on the requirements to obtain such licence.\(^{74}\)

Various services are provided by the Ministry of Forestry, as well as other non government organizations (NGOs), including forest protection and nature conservation, as well as rehabilitation and reforestation. The most active NGOs in the forestry sector include Forest Watch Indonesia (FWI), World Wide Fund for Nature (WWF) and Telapak. FWI regularly provides reports and recommendations about the sustainable management of forests, addressed to communities and government bodies. WWF supports conservation, certification and sustainable livelihood issues. Telapak also tries to strengthen links between communities, business practitioners and government authorities. Other NGOs, such as the Indonesian Corruption Watch and Greenomics, have developed partnerships with the Ministry of Forestry on critical governance issues.\(^{75}\)

In addition to this, the Ministry of Forestry provides inspection and land classification services. In 2006, the Government launched the FOMAS (Forest Monitoring and Assessment System), to increase access to data and information. The project provides stakeholders with up-to-date monitoring of changes in forest cover and deforestation, in order to support better forest management. In addition to the FOMAS, in 2008 the Ministry of Forestry implemented the Forest Resource Information System (FRIS) to promote better governance and transparency in forest management.\(^{76}\)

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The Ministry of Forestry is making efforts to combat forest and land fires. In 2001, the Government Regulation No.4 on the Control of Pollution Damage and Related Environment to the Forest and or Land was implemented to improve the handling of forest fires. Initiatives include institutional strengthening, development of early warning and detection system, and the provision of equipment, facilities and training.

The United Nations Reduction of emissions from deforestation and forest degradation (UN-REDD) programme also has high potential to support Indonesia in its efforts to mitigate climate change. The Indonesia UN-REDD programme aims to strengthen multi-stakeholder participation and to implement decentralized activities in order to reduce carbon emissions. It provides financing to community projects and includes measures, reporting and verification mechanisms (MRV) to ensure that the objectives are met. Many donors have been providing support for Indonesia REDD initiatives. Examples of current projects include the World Bank’s “Forest Carbon Partnership Facility” (FCPF) and AusAID’s “Kalimantan Forests and Climate Partnership” (KFCP) with a focus on peat land rehabilitation. Previous initiatives include the Climate Change, Forests and Peatlands in Indonesia project (CCFPI, 2001-2006), which assisted local populations to tackle the issues of peatland degradation and supported the sustainable management of resources. The Central Kalimantan Peat land Project conducted between 2006 and 2008 and financed by the Dutch Government, was another initiative to protect peat lands from degradation. Using a community-based approach, the project helped to improve land use and supported sustainable livelihoods for local communities.77

In 2010 the Government of Norway signed a letter of intent with the Government of Indonesia to provide support for Indonesia’s efforts in reducing deforestation. Indonesia agreed on a freeze on native forest clearing between 2011 and 2013, in return for USD $1 billion from Norway for forest protection until 2020.78 Although there are potentially negative employment impacts for the palm oil, pulp and paper industries, employment in the forestry sector could be boosted by the mitigation actions on deforestation, for example through jobs in forest rehabilitation and conservation, community outreach and forest mapping.79 In addition, the funding provided will support green value chain development in the forestry and related sectors. In total, the World Bank estimates that approximately 40 donors have provided more than USD one billion to support Indonesia’s forestry sector over the last two decades.80

4.4 Identified green sub-sectors

Green sub-sectors which are likely to provide environmentally sustainable employment were identified through a combination of desk review and focus group discussions (FGD) with stakeholders from the forestry sector. The green sub-sectors are outlined in the table below. These include natural production forests that follow SFM law, sustainable natural forest concessions, harvesting of rattan, non-timber forest products and forest services, protection and conservation. Timber harvesting and timber extraction were not considered to meet the criteria for being classified as a “green sub-sector”.

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77 http://www.ckpp.org/
79 ’Skills for Green Jobs’ – Indonesia Report (2009), ILO. Forest mapping gives accurate status and boundary of forest areas, which will affect logging activities and eventually contribute to reduction of carbon emissions
80 Ibid.
<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Proposed screening criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural production forests that follow SFM law</td>
<td><strong>National law:</strong> Government regulations, including Forest Management Act No.41/1999; Presidential Instruction No.4 on Eradication of Illegal Logging in Forest Areas and Circulation to promote low impact logging practices; Forest Strategic Plan (Renstra). There are several types of different production forests in Indonesia, including those that are managed by the Ministry of Forestry through state owned enterprises, those that are managed by communities and those that are associated with private sector companies such as APP and APRIL.</td>
</tr>
<tr>
<td>Sustainable natural forest concessions</td>
<td><strong>Voluntary standard:</strong> Certification is conducted by the Indonesian Ecolabelling Institute (LEI-Lembaga Ekolabel Indonesia) and the Forest Stewardship Council (FSC). Certification is based on sustainable forest management, including ecosystem stability and the management of endangered species, the sustainability of resources and yield. The standards prescribe assessment and mitigation of environmental impacts and maintenance of critical forest areas, as well as the implementation of management plans, effective monitoring and assessment. Certification also requires compliance with relevant laws, including tenure and use rights. Tenure, social cohesion within communities and conflict resolution mechanisms are included in the social criteria. Certified forests should therefore be more resource efficient and have fewer negative impacts on the environment than conventional farms, as well as providing better work for employees. Presence of a management plan should ensure the sustainable management of the protected area, including reducing the environmental impacts of associated activities.</td>
</tr>
<tr>
<td>Collection, harvesting and cultivation of rattan</td>
<td><strong>National law:</strong> Rattan is a non-timber forest product (NTFP). There is a law that regulates rattan collection, cultivation and harvesting (Government Decree PP.6/2007 Jo No.3/2008 and the Ministerial Decree P. 36/Menhut-II/2008) to get a Utilization License for Non-Timber Forest Products in Natural Forest (IUPHHK-HA) or Planted Production Forests (IUPHHBK-HT). There are several types of environments where rattan is extracted, including those that are managed by communities and those that are associated with private sector companies.</td>
</tr>
<tr>
<td>Non-timber forest products</td>
<td><strong>National law:</strong> Other non-timber forest products include resins and oils extracted from plants. Ministerial Decree P. 36/Menhut-II/2008 on Utilization License Non-Timber Forest Products in Natural Forest (IUPHHK-HA) or in Planted Production Forests (IUPHHBK-HT). There are several types of environments where non timber forest products are extracted, including those that are managed by the Ministry of Forestry through state owned enterprises, those that are managed by...</td>
</tr>
</tbody>
</table>
Green sub-sector | Proposed screening criteria
--- | ---
 | communities and those that are associated with private sector companies.

| Forest services, protection and conservation | Activity based approach: The forestry sector is subject to inspection of both labour and environmental conditions to ensure that environmental and labour standards are being upheld. Forest services, protection and conservation are activities the Forest Protection Agency deals with as well as NGOs that provide services. The main activities include:
- Forest inspection and land classification;
- Forest protection and nature conservation;
- Reforestation and rehabilitation. |

Source: Authors’ own data

4.5 Decent work in forestry

The forestry and hunting sector employed approximately 553,944 people in 2008, of which 79 per cent were working in the informal economy (see table below). It is difficult to estimate the decency of work in the forestry sector, considering the high proportion of jobs in the informal economy and lack of data at the micro level on individual occupations.

Table: Formal and informal employment in the forestry and hunting sector, 2008

<table>
<thead>
<tr>
<th>Description</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total jobs in forestry and hunting</td>
<td>553,944</td>
</tr>
<tr>
<td>Total formal jobs in forestry and hunting</td>
<td>115,206</td>
</tr>
<tr>
<td>Total informal jobs in forestry and hunting</td>
<td>438,738</td>
</tr>
<tr>
<td>Estimated proportion of informal jobs in forestry and hunting</td>
<td>79%</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

However, data from the labour force survey can provide some information on working conditions, particularly on wages, employment status and occupation type, provision of training and working hours. For the forestry and hunting sector, the labour force survey estimates that 28 per cent of people in the forestry sector are own account workers, 22 per cent were employees and 18 per cent were labourers (see table below). Many own-account workers in the forestry sector work on a piece rate basis, which means that they do not receive a wage per se, but get paid on a quantity basis. The average wage in the agriculture, forestry, hunting and fisheries sectors in 2008 was 546,739 IDR per month for labourers, and 854,546 IDR per month for employees. It is therefore likely that a substantial proportion of workers in the forestry and hunting sector earn less than the average minimum wage in Indonesia, which was 743,200 IDR per month in 2008. This is associated with the seasonal and part-time nature of the work, particularly in plantations.

Table: Occupations and employment status of forestry workers, 2008

<table>
<thead>
<tr>
<th>Employment status</th>
<th>Per cent</th>
<th>Main occupation</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own account worker</td>
<td>28 %</td>
<td>Professional, technical, related</td>
<td>&lt;1 %</td>
</tr>
<tr>
<td>Employer assisted by temporary worker</td>
<td>15 %</td>
<td>Administrative and managerial</td>
<td>&lt;1 %</td>
</tr>
<tr>
<td>Employer assisted by permanent worker</td>
<td>3 %</td>
<td>Clerical and related worker</td>
<td>2 %</td>
</tr>
<tr>
<td>Employee</td>
<td>22 %</td>
<td>Sales worker</td>
<td>&lt;1 %</td>
</tr>
</tbody>
</table>
In terms of occupation, most people were considered to be forestry workers or other types of labourers. 90 per cent of workers were unskilled, nine per cent of workers were semi-skilled and one per cent of workers are skilled. On average people employed in the forestry sector worked for 36 hours per week. When asked whether workers had received training and capacity building, 13 per cent of workers reported that they had received training, 60 per cent reported that they had not received training and 27 per cent were unclear as to whether training had been provided. Awareness levels on health and safety or good work practices are therefore likely to be low, and it will be important to support skill formation in the forestry sector in order to improve productivity and working conditions.

Employment in the forestry sector, particularly in logging, can be considered to be dangerous due to its physically demanding nature, the routine exposure to climatic conditions and heavy equipment operation. However, current trends in forestry are moving from unsustainable logging to commercial plantations and community based forestry management, which generally use more sustainable modes of cultivation, management and harvesting. Forest enterprises that follow sustainable forest management (SFM) techniques and are member of employers’ organizations can provide an environment that allows for the regulation of worker’s rights and working conditions. It is likely that jobs that pay above the minimum wage in those enterprises could be considered to be green jobs. Jobs in forestry services that follow Government employment regulations could also be considered to be green jobs. Jobs in the forestry sector that are largely community based, such as those in non-timber forest products or rattan do not typically have extensive involvement with employers’ and workers’ organizations. However, communities often organize informally and bargain collectively with buyers, therefore, jobs that pay above the minimum wage in non-timber forest products could be considered to be green jobs. The table below provides a more comprehensive discussion on decent work indicators in the identified green sub-sectors in forestry.

---

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural labourer</td>
<td>18%</td>
</tr>
<tr>
<td>Non-agricultural labourer</td>
<td>0%</td>
</tr>
<tr>
<td>Family worker</td>
<td>15%</td>
</tr>
<tr>
<td>Service workers</td>
<td>2%</td>
</tr>
<tr>
<td>Forestry worker</td>
<td>85%</td>
</tr>
<tr>
<td>Other labourer</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

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81 Unskilled = education levels equivalent with junior high school; Semi skilled = education levels equivalent with senior high school; Skilled = education levels equivalent to diploma and above.
## Description of working conditions in green sub-sectors

<table>
<thead>
<tr>
<th>Green sector</th>
<th>Decent work indicator</th>
</tr>
</thead>
</table>
| Natural production forest that follows SFM law | **Risks at work:** There are a range of risks that workers in natural production forests are exposed to, namely:  
  - Accidents in the felling of timber, particularly if workers do not have adequate training. On average 17 per cent of workers had received training;  
  - Workers in forests are exposed to the weather and different terrains, which entails risk of injury;  
  - Workers in forests are exposed to various animals and insects (tigers, monkeys, mosquitoes), which entails risk of injury and sickness.  

  **Social protection:** Workers in the formal economy have access to formal social protection options. Outsourced workers and other informal economy workers may access Jamkesmas and Jamkesda for health coverage.  

  **Organization and industrial relations:** State-owned enterprises and large companies, such as Asia Pulp and Paper and April Asia in natural production forests, are members of APINDO and workers unions have members in these areas. Therefore there are frameworks for cooperating on industrial relations issues within their green sub-sectors. However, enterprises in production forests sometimes use unorganised outsourced workers to provide services, which have implications for the decency of work in production forests. Jobs can be precarious with more workers hired during planting and harvesting times. Overall, jobs in the industrial forests that pay above the minimum wage in the formal economy could be considered decent. Jobs in the informal economy can also be considered as decent if the workers are not underemployed and have a job all-year round.  

<table>
<thead>
<tr>
<th>Sustainable natural forest concessions</th>
<th>See notes above.</th>
</tr>
</thead>
</table>
| Rattan                                  | **Risks at work:** There are a range of risks that workers in rattan are exposed to, namely:  
  - Workers in forests are exposed to the weather and different terrains, which entails risk of injury;  
  - Workers in forests are exposed to various animals and insects (tigers, monkeys, mosquitoes), which entails risk of injury and sickness.  
  - As work associated with rattan is largely community based, workers have limited access to training opportunities which entails increases in injury. It has been reported that 59.5 per cent of the workers have not received training, while there is no information available for the remaining 40.5 per cent.                                                                                                                                                                                                                                                                                             |
| Non timber forest products (NTFP) | **Social protection:** As rattan work is community based and largely in the rural informal economy, formal social protection options are limited. However, social protection coverage for health should be available from Jamkesmas and Jamkesda.

**Organization and industrial relations:** Rattan is largely community-based and therefore employers’ and workers’ organizations are not extensively involved in these sectors. However, communities often organize informally and bargain collectively with buyers.

Jobs in rattan that pay above the minimum wage are likely to be decent, however, jobs that pay below the minimum wage could not be considered to be decent. |
|---|---|
| **Risks at work:** There are a range of risks that workers in NTFP are exposed to, namely:
  - Workers in forests are exposed to the weather and different terrains, which entails risk of injury;
  - Workers in forests are exposed to various animals and insects (tigers, monkeys, mosquitoes), which entails risk of injury and sickness.
  - As work associated with NTFP is largely community based, workers have limited access to training opportunities which entails increases in injury. | |
| **Social protection:** As NTFP work is community based and largely in the rural informal economy, formal social protection options are limited. However, social protection coverage for health should be available from Jamkesmas and Jamkesda.

**Organization and industrial relations:** NTFP is largely community-based and therefore employers’ and workers’ organizations are not extensively involved in these sectors. However, communities often organize informally and bargain collectively with buyers. In some cases the Ministry of Forestry has supported market access and negotiations with traders.

Jobs in NTFP that pay above the minimum wage are likely to be decent, however, jobs that pay below the minimum wage could not be considered to be decent. | |
| Forest services, protection and conservation | **Risks at work:** There are a range of risks that workers in forest services, protection and conservation are exposed to, namely:
  - Workers in forests are exposed to the weather and different terrains, which entails risk of injury;
  - Workers in forests are exposed to various animals and insects (tigers, monkeys, mosquitoes), which entails risk of injury and sickness.
  - Work associated with forest services, protection and conservation can involve managing conflict between communities and enterprises. |
All workers in the Forest Service Inventory and Land Classification Area were reported to have received training. However, 45.3 per cent of workers in the Forest Protection and Conversation sector have been trained, and 35.8 per cent have not. In the Reforestation and Rehabilitation sector, this figure is lower: only 18.6 per cent of workers have received training, and 52.1 per cent have not.

**Social protection:** Workers in the formal economy have access to formal social protection options. Outsourced workers and other informal economy workers may access Jamkesmas and Jamkesda for health coverage.

**Organization and industrial relations:** State-owned enterprises and large companies have formal mechanisms for industrial relations. However, work associated with forest services, protection and conservation sometimes uses unorganised outsourced workers to provide services, which have implications for the decency of work in this sub-sector.

Jobs in forest services, protection and conservation in the formal economy that pay above the minimum wage are likely to be decent, however, jobs that pay below the minimum wage in the informal economy could not be considered to be decent.

*Source: Authors’ own data*
4.6 Estimating environment related employment

The number of jobs in each of the identified green sub-sectors has been estimated. These are shown in the table below, alongside a description of the source of the estimate. The total number of environmentally sustainable jobs estimated is 213,620, which is equivalent to 38.6 per cent of all jobs in forestry and hunting in 2008. The green sub-sector with the highest number of environmentally sustainable jobs is natural production forests that follow SFM law, followed by jobs in forest services, protection and conservation. This is closely followed by jobs in rattan and non-timber forest products. Less people were employed in sustainable natural forest concessions. As the forestry sector is in general considered to be a ‘green’ sector, there is considerable space to improve regulations and inspections in order to increase the overall number of jobs that could be considered to be environmentally sustainable.

### Job estimates: Environmentally sustainable employment in forestry and hunting, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Employment estimate</th>
<th>Source / Method of calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural production forests that follow SFM law</td>
<td>88,262</td>
<td>Estimate from Sakernas 2008, proportion of KBLI codes 2011-2019 based on qualitative information from key informants indicating that the majority of government, community based and formal private sector natural production forests follow SFM law.</td>
</tr>
<tr>
<td>Sustainable natural forest concessions</td>
<td>7,685</td>
<td>Estimate from Sakernas 2008, proportion of KBLI code 2020 based on Ministry of Forestry estimates that 48 per cent of natural forests concessions have applied the principles of sustainability in their operations.</td>
</tr>
<tr>
<td>Rattan</td>
<td>27,154</td>
<td>Estimate from Sakernas 2008, KBLI code 2031 based on qualitative information that rattan farming/harvesting is all low impact.</td>
</tr>
<tr>
<td>Non-timber forest products</td>
<td>20,284</td>
<td>Estimate from Sakernas 2008, KBLI code 2032, 2033, 2035, 2039 based on qualitative information that non-timber forest product farming/harvesting is all low impact.</td>
</tr>
<tr>
<td>Forest services, protection and conservation</td>
<td>70,235</td>
<td>Estimate from Sakernas 2008, KBLI codes 2041, 2042, 2043, 2049 based on qualitative information that all services support forest conservation and protection.</td>
</tr>
<tr>
<td><strong>Total “environment core” jobs</strong></td>
<td>213,620</td>
<td>Source: Authors’ estimates based on BPS Sakernas</td>
</tr>
</tbody>
</table>

4.7 Estimating green jobs

By combining both qualitative insights from key informants on employment conditions in the forestry sector and quantitative information on from the labour force survey, it is estimated
that 17 per cent of jobs in the forestry and hunting sector could be considered to be green jobs.

**Table: Green jobs estimate for the forestry and hunting sector, 2008**

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural production forest that follows the SFM Law</td>
<td>38,759</td>
</tr>
<tr>
<td>Sustainable natural forest concessions</td>
<td>4,841</td>
</tr>
<tr>
<td>Total jobs in rattan</td>
<td>14,659</td>
</tr>
<tr>
<td>Non timber forest products</td>
<td>6,328</td>
</tr>
<tr>
<td>Forest services, protection and conservation</td>
<td>33,043</td>
</tr>
<tr>
<td>Total sustainable employment</td>
<td>97,630</td>
</tr>
<tr>
<td>Total sustainable employment (per cent)</td>
<td>17.6 per cent</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

Most green jobs are in forest services, protection and conservation and natural production forests that follow SFM law, followed by workers in rattan. Though the number of people employed in sustainable natural forest concessions is lower than the other sub-sectors, the proportion of environmentally sustainable jobs that are green jobs is quite high.

**Table: Green jobs as a proportion of environmentally sustainable jobs in the forestry and hunting sector, 2008**

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Per cent of environmentally sustainable jobs that are green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural production forest that follows the SFM Law</td>
<td>43.9%</td>
</tr>
<tr>
<td>Sustainable natural forest concessions</td>
<td>63.0%</td>
</tr>
<tr>
<td>Total jobs in rattan</td>
<td>54.0%</td>
</tr>
<tr>
<td>Non timber forest products</td>
<td>31.2%</td>
</tr>
<tr>
<td>Forest services, protection and conservation</td>
<td>47.0%</td>
</tr>
<tr>
<td>Total</td>
<td>45.7%</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

Employment in non-timer forest products is generally community based and provides lower remuneration; therefore the number of jobs that could be considered to be green jobs was lower. As jobs in non-timber forest products are largely community based, it is likely that they would benefit from activities associated with value chain development in order to increase the producer’s share of the border price. This implies a narrowing of the cost of the trader’s margin (trading revenue minus out-of-pocket costs), the processor’s margin, transport, finance, or packaging materials relative to final prices. This can be done through improving organization and access to competitive markets, improving access to finance, and through processing to add value to commodities.

In order to increase the number of green jobs in the forestry sector in Indonesia it would be important to promote sustainable natural forest concessions through certification and inspection associated with the Eco-Labelling Institute (Forestry Stewardship Council) and the Ministry of Forestry. Furthermore, it would also be important to ensure that forest enterprises are members of employers’ organizations and that workers have the right to freedom on associated and collective bargaining. Natural production forests and forest services,
protection and conservation can improve inspection to guarantee sustainable management and can also provide workers with training opportunities. In order to improve income and revenue, workers, employers and the government could consider potentials associated with carbon trading markets as well as with fair trading markets.

Forests are also tourist destinations and the promotion of sustainable tourism can be a good way to support forest conservation while also creating employment opportunities for local people. In Indonesia tourism activities, such as eco-tourism and forest-based tourism, are growing rapidly. If both forest eco-systems are well maintained and tour guides are well informed on sustainable tourism practices such economic activities can support sustainable development objectives (see further information in the chapter on tourism).

Finally, in the context of global efforts to reduce greenhouse gas emissions, the Government of Indonesia may issue additional policies and strengthen the monitoring and inspection of existing policies that focus on forest protection at both national and local levels. This may not only promote sustainable forest management at the local level but could potentially increase the number of green jobs in the economy.
Chapter 5: Green jobs in fisheries

Indonesia’s fisheries sector is amongst the most diverse and the richest in terms of biodiversity in the world. The fisheries sector supports livelihoods and economic growth, while also providing a source of food and nutrition for millions of people in Indonesia. However, the fisheries sector is vulnerable to over-exploitation, environmental mismanagement and the impacts of climate change. Sustainable use of oceans and freshwaters is therefore a high priority. To support sustainable and inclusive growth, this chapter provides key information on the fisheries sector in Indonesia, including economic trends and linkages between the environment and employment. It discusses the impacts that the commercial fishing and aquaculture sectors have had on the environment and what actions are being undertaken to improve the sectors’ environmental sustainability. On the basis of this information and extensive consultations, sub-sectors providing environmentally-friendly activities and employment associated with these activities have been identified. A further discussion on the decency of work in these sub-sectors provides the basis for estimating green jobs in fisheries.

5.1 Overview of the fisheries sector

The fishery sector (capture fisheries and aquaculture) in Indonesia contributed 2.8 per cent of GDP in 2008 and has been growing since then. Following a dip in fish production in 2001 (due to the Asian financial crisis), both production and return on produce has rapidly increased. Between 2005 and 2010, the fisheries sector increased its production from 6.1 million tonnes to 10.8 million tonnes.\(^{82}\) Between 2009 and 2010 fisheries activities grew by 10.3 per cent on average, with aquaculture growing faster than capture fishing (see table below).

Table: Composition of Indonesian Fisheries Production 2009-2010 in tons

<table>
<thead>
<tr>
<th>Fisheries sub-sector</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capture fisheries</td>
<td>5,107,971</td>
<td>5,348,440</td>
</tr>
<tr>
<td>- Marine fisheries</td>
<td>4,812,235</td>
<td>4,846,880</td>
</tr>
<tr>
<td>- Inland open water</td>
<td>295,736</td>
<td>501,506</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>4,708,563</td>
<td>5,478,062</td>
</tr>
<tr>
<td>- Marine aquaculture</td>
<td>2,820,083</td>
<td>3,385,552</td>
</tr>
<tr>
<td>- Brackish water</td>
<td>907,123</td>
<td>990,403</td>
</tr>
<tr>
<td>- Pond culture</td>
<td>554,067</td>
<td>627,643</td>
</tr>
<tr>
<td>- Cage culture</td>
<td>101,771</td>
<td>117,860</td>
</tr>
<tr>
<td>- Floating nets</td>
<td>238,606</td>
<td>272,705</td>
</tr>
<tr>
<td>- Paddy-field</td>
<td>86,913</td>
<td>83,900</td>
</tr>
<tr>
<td>Total</td>
<td>9,816,534</td>
<td>10,826,502</td>
</tr>
</tbody>
</table>

Source: MP3EI, 2011

The most valuable fishery export in Indonesia is shrimp. Shrimp farming accounts for a significant proportion of activity, with over 65,000 households deriving their income from shrimp farming.\(^{83}\) Data from the Ministry of Marine Affairs and Fisheries indicates that in

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2007, shrimp represented a major export, worth USD 1 billion, followed by skipjack/tuna (USD 304 million) and seaweed (USD 57.5 million). Indeed, Indonesia is the world’s third largest tuna producing country and one of the world’s largest seaweed exporters. Although the production of pearls was relatively small in terms of volume (only 13 tons) it was also significant in terms of export value (USD 12.6 million). The main importers of fisheries commodities are Japan, Singapore, South Korea, Hong-Kong and the USA.

According to data from Statistics Indonesia, in 2008 approximately 1.7 million people indicated that work associated with the fisheries sector was their primary economic activity. In terms of overall employment in Indonesia, the fisheries sector comprises less than 5 per cent of work opportunities in the agriculture, forestry, hunting and fisheries sector, and only 1.6 per cent of total employment in Indonesia. However, it is likely that many more people engage in income generating activities in the fishery sector as their secondary economic activity. Moreover, many people involved in the fisheries sector are located in rural and remote communities with relative high levels of poverty.

Indonesia’s coastal and marine sector, in particular the small-scale fisheries supported by coral reef ecosystems, is a significant productive asset for the country. The World Bank estimated that healthy coral reef ecosystems annually produce marine products worth on average USD 15,000 per km$^2$. Coral reefs are a significant source of food and livelihoods for approximately 10,000 coastal villages across the country. Furthermore, small-scale fishing constitutes the vast majority of activity in the fisheries sector.

Information from the Directorate General of Fisheries Product Processing and Marketing under the Ministry of Marine Affairs and Fisheries indicated that there are approximately 590,000 fishing vessels of all sizes operating in Indonesia, among which there are only approximately 6,000 boats over 30 tons scattered around the country. This data confirms that the majority of fishing practices in Indonesia involve small scale operations or are associated with coastal or freshwater fishing.

The Indonesian Government wants to diversify its exports, and the fisheries sector is being targeted as one of the sectors with which to achieve such diversification. Development of the fisheries sector is noted in the Master Plan for Acceleration and Expansion of Economic Development (MP3EI), which provides the overall framework for growth and development in Indonesia between 2011 and 2025. The plan is targeting development of the fisheries sector in Sulawesi, in Bali / Nusa Tenggara and in Papua / Kepulauan Maluku and the plan indicates that IDR 41 trillion (USD 4.5 billion) between 2010 and 2014 has been allocated to support this growth. In Sulawesi, the fisheries sector contributes approximately 22 per cent of regional output in the agriculture, forestry, hunting and fisheries sector (70 per cent catch fisheries and 30 per cent aquaculture). In Nusa Tenggara, the fishery sector contributes approximately 13 per cent of regional output in the agriculture, forestry, hunting and fisheries sector. The MP3EI notes that the fisheries sector in Papua / Kepulauan Maluku is an area that needs to be further developed based on the existing potential conditions.

The MP3EI connects the fisheries sector not only with opportunities for accelerating economic growth, but also with national food security. To illustrate, fishery products are the

85 [http://www.fao.org/docrep/009/a0477e/a0477e0b.htm](http://www.fao.org/docrep/009/a0477e/a0477e0b.htm)
86 [http://www.wri.org/publication/content/8135](http://www.wri.org/publication/content/8135)
largest source of animal protein in Indonesia, with consumption reaching 30.4 kg/capita or 72 per cent of animal protein consumption/capita in 2010. Of a total of 6.1 million tons of fish produced in 2007 (excluding aquatic plants), 5.2 million tons were used for the domestic market for food consumption and the remaining 0.9 tons were exported.

The development of the fisheries sector faces challenges associated with competition from the region, particularly from Thailand and Viet Nam, which have more developed fishing industries. In addition, the sector now has to adhere to stricter requirements regarding packaging, product safety, traceability and eco-labelling. There is also a need to improve the regulation and monitoring of fisheries. Importantly, baseline data and improvements in the monitoring of resources are required in order to prevent overexploitation of resources. Issues associated with access to inputs, attracting foreign and domestic direct investment, developing supply chains, improving infrastructure and supporting development of human resources, also require attention.

5.2 Importance of fisheries to the environment

Indonesia has an abundance of both marine and freshwater areas that can support activities in the fisheries sector. Approximately, 76 per cent of Indonesia’s surface area is sea, and there are over 5,500 freshwater rivers and lakes throughout the country. However, the sector faces many challenges that are associated with the sustainable use of resources. In particular, overfishing is a problem in some areas, and could continue to be a problem if the safeguards that are currently in place are not accompanied with effective monitoring and enforcement tools and resources. One of the main strategies put in place by the Government to support the transition to more sustainable use of fishing resources is associated with development of the aquaculture sub-sector.

Despite the abundance of resources, Indonesia suffers from overfishing. In 2008, it was reported that over-fishing had occurred in the Java Sea, the Malaka strait, Karimata strait and that the growing aquaculture sub-sector was placing extra pressure on wild fish stocks. Shrimps stocks have been particularly affected by over-fishing due to trawl fishing practices; however data from the Ministry of Marine Affairs and Fisheries shows that the shrimps stocks have recovered since 2004. Tuna fishing is also contentious as tuna is considered to be a shared international resource that is in high demand. The overexploitation of long-line and shrimp fisheries has seen both the quality and the quantity of catch sizes reduced, with increases in the discarding of by-catch. The Arafura Sea has been especially affected, with the discarding of by-catch estimated at 80 per cent of total catch (230,000 tons/year). In Sulawesi there are problems of overfishing in some areas of the sea, particularly in the exploitation of demersal fish and shrimp fisheries in South Sulawesi, and large pelagic fish in North Sulawesi.

Snapper as well as crab and other types of shellfish are also reported to be over-exploited. However, as snapper and shellfish farming occurs mostly in the informal economy, it is difficult to control their exploitation. However, many projects to improve fisheries practices have been created to promote community-based management and awareness on the sustainable use of these resources.94.

One reason why fishing resources have been overexploited in some areas of Indonesia relates to illegal fishing, which is generally carried out by domestic boats that operate without a fishing operations permit (SIUP) or fishing permit documents (SIPI), as well as on foreign boats that are fishing illegally in Indonesian waters. The catches on these boats are not reported to authorities and there is a lack of human and physical resources to monitor and enforce regulations. An additional issue in the fisheries sector is associated with illegal fishing of Indonesian boats in, for example, Australian waters. If caught, penalties can entail imprisonment and loss of livelihood through income loss and asset confiscation. To reduce the environmental impact of fisheries, the Government needs to increase its human and physical resources and reduce fishing activities in some overfished areas and increase support for sustainable livelihoods in other areas that still have additional capacity.

Indonesia’s marine fishery catch currently totals approximately 6 million metric tons (mt) a year and the Ministry of Marine Affairs and Fisheries have estimated that marine fishery stocks are currently between 6 million mt to 8 million mt. They have estimated that an annual catch of up to 80 per cent of fisheries stock should be sustainable if areas are not overfished.95 In areas that are over fished, the Ministry has been providing boats that allow fisherman to go further offshore, thus allowing coastal stocks to recover. They have also been encouraging diversification into seaweed production or fish processing.

Mangrove clearing is one of the main environmental consequences of shrimp farming. In Sumatra shrimp farms are largely situated in former mangroves, such as in Aceh and Lampung which hosts the world’s largest shrimp farm (18,000 ponds).96 The conversion of mangroves and wetland areas to ponds for brackish water fish and shrimps may entail the depletion of mangrove resources and the release of effluents high in biological oxygen demand (BOD) and suspended solids.97 In addition, shrimp farmers face problems associated with severe depletions in stocks due to disease, soil degradation and poor management practices. It is estimated that 100,000 ha of small, brackish-water ponds (tambaks) are no longer feasible, resulting in limitations on livelihood options for communities.98

The aquaculture industry encompasses activities associated with hatcheries (broodstock, egg, larvae through to small juvenile or post-larva), nurseries (an intermediate stage requiring more intensive feeding, grading and management) and grow-out (advanced fingerling or post-larvae through to harvest). Aquaculture occurs in freshwater, brackish water and marine settings and involves seaweed, molluscs, crustaceans and finfish. Hatcheries activities are generally non-extractive and have a minimal impact on the environment, however, broodstock may be sourced from wild populations. Sourcing of wild broodstock is most

94 http://www.sustainablefish.org/fisheries-improvement (see section on snapper and crabs).
common with black tiger shrimp (*Penaeus monodon*) hatcheries, and to a much lesser extent with finfish hatcheries.

Freshwater aquaculture can occur in cages and in ponds and inputs from feed and resultant nutrients need to well managed. Brackish water aquaculture can occur in intensive and traditional settings. Sustainability issues in brackish water aquaculture are associated with the establishment and operation of the ponds, however, traditional smallholder brackish water aquaculture is considered to be more sustainable than intensive commercial brackish water aquaculture. Marine aquaculture includes seaweed, finfish and various types of shellfish. Sustainability issues in marine aquaculture include the sourcing of seed stock and feeds. Most finfish now come from hatcheries, but all lobsters are still sourced from the wild. However, lobsters collected as puerulus (newly settled from the plankton) may be considered to be sustainable sourced due to the high levels of post-settlement mortality. Feeds in marine aquaculture may use a high proportion of fish meal in compounded feeds and may use 'trash' fish, and such practices have implications for the sustainability of fishing practices.

The seaweed sub-sector is a growing industry, with Indonesia being one of the world’s major exporters of raw and processed seaweed products. National seaweed production in 2010 reached 3 million tons and is expected to increase. The seaweed sub-sector is generally considered to be less environmentally harmful than other mariculture practices, as it can diversify livelihoods in fishing communities and therefore reduce pressure on fishing stocks. Evidence suggests that the environmental impacts of seaweed farming are minimal and in some cases, may even be beneficial by increasing production of herbivorous fishes and shellfish. However, seaweed farming can influence patterns of sedimentation and water movement, and alters the natural habitat, but they can also help to protect from erosion. Materials used to build seaweed farms also impact on the sustainability of the sub-sector, with it reported that nearby resources, such as timber from mangrove forests have been used to create seaweed farms.

Damage to coral reefs is one of the most pressing issues in aquaculture activities in the country. Degradation of coral reefs is mostly due to unsustainable practices, such as over-fishing, blast fishing and poison fishing. Industrial effluents, sewage and agricultural discharges have also placed the ecosystems of Indonesia's reefs at risk. In 2002, a report from the World Resources Institute suggested that human activities threatens over 85 per cent of Indonesia’s reef area, with nearly one half at high threat. The Government has made efforts to reduce unsustainable fishing practices through projects and management tools (e.g. limited entry licensing and gear restrictions), however there is limited information on the effectiveness of these strategies to date.

5.3 **Key trends towards sustainability**

National Law on Fisheries No. 31/2004 provides the overall framework for the fisheries sector and includes measures to ensure the preservation and protection of the environment. Under this law, the Ministry for Marine Affairs and Fisheries is to regulate fishing gear, allowable catch, fish breeding, prevention of pollution and protection of fish.

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100 http://www.crc.uri.edu/download/Alt_Livelihood.pdf

101 http://www.fao.org/docrep/field/003/AB728E/AB728E05.htm

The main objectives of the Law are to:

- create a coastal community who are able to sustainably manage their natural resources;
- maintain a clean and healthy marine and coastal environment so as to preserve fish stocks and encourage diversity of aquatic products;
- improve the management of fisheries through the establishment of an independent regulatory body, enhancing regulation, increasing public participation in regulation and improving the law system.

Act No 31/2004 also restricts the use of chemicals, biological agents, explosive materials and equipment/constructions which may threaten the sustainability of fish resources and the environment. The use of chemicals and water quality is monitored by Aquaculture Development Centres set up by the Directorate of Aquaculture. The law was revised in 2009 (No. 45/2009) to cover various issues including management and conservation of fish resources and aquaculture. Prior to 2004, the National law No. 22/1999 provided the framework for sustainable management of the fisheries sector.

In 2007, the Ministry of Marine Affairs and Fisheries released a regulation on Best Practices in Aquaculture (Cara Budidaya Ikan yang Baik - CBIB), No. KEP. 02/MEN/2007. The regulation aims to promote food safety through better fishing practices. Measures include; the control of feed, fertilizers and other hazardous chemicals, and verifies sanitary requirements throughout the whole production process (including harvest, management and distribution). Smallholders and enterprises can be certified on CBIB and provided with certificates. The Ministry of Marine Affairs and Fisheries also announced a regulation on Quality Assurance and Safe Fishing (Pengendalian sistem jaminan mutu dan keamanan hasil perikanan) No. PER. 19/MEN/2010. The regulation aims to control the quality of fishing practices and the compliance with national/international standards. Specific measures of verification are being used, such as laboratory tests and risk assessment tools.

In addition, in 2004 the Directorate General of Aquaculture issued guidelines for sustainable aquaculture, especially for shrimp pond farming. The purpose of these guidelines was to encourage eco-friendly and sustainable production of shrimps. These guidelines focused on the following areas:

- water management;
- pond preparation;
- restriction on the utilisation of chemicals and drugs;
- solid waste and effluent management.

Following the promotion of sustainable aquaculture, there has been a heightened awareness of the importance of mangrove restoration and rehabilitation. In many shrimp farming communities, community-based management of mangrove restoration takes place with reforestation being one of the main activities. Furthermore, more farmers are cultivating

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103 ibid
seaweed, which provides access to alternative sources of income and can subsequently reduce pressure on fishing stocks.\textsuperscript{106}

To support the conservation of fishing resources, the Ministry of Marine Affairs and Fisheries (MMAF) has implemented a number of management methods, including limited entry licensing, zoning and area and gear restrictions. Anti-trawling measures include by-catch exclusion devices (BEDs) for demersal by-catches, and turtle exclusion devices (TEDs) for trawls and traps.\textsuperscript{107}

Concerning tuna and Illegal, Unreported and Unregulated (IUU) fishing, Indonesia is a signatory to various multilateral tuna fishing agreements and is unable to increase its tuna catch unilaterally as tuna resources are shared with other countries. In 2001, Indonesia and the Philippines agreed a fishing agreement to share access to Indonesian waters where a major part of the tuna resources originate. Indonesia is also a member of the IOTC (Indian Ocean Tuna Commission) and agreed on adopting management measures to ensure conservation of the tuna stocks. In addition, importing markets (Japan, USA, EU – which account for 70 per cent of exports) monitor conditions to ensure they comply with sustainable fishing policies and public health regulations in their own countries as per trade agreements. The Government is making serious efforts to address illegal tuna fishing and is part of various partnerships, such as the Sustainable Fisheries Partnership (SFP). This partnership aims to create cooperation between buyers, suppliers and producers to improve management practices and policies.\textsuperscript{108}

Illegal fishing and unregulated fishing in Indonesia mostly occurs in the informal economy, where fishermen operate without permits and subsequently do not report their catch or pay taxes to the Government. While the Government employs public servants to provide service patrols, investigation and protection for fishing, these activities need to be up-scaled to improve sustainability in the fishing sector.

The sustainable use of fishing resources is closely connected with the livelihoods of fishing communities. To support sustainability and the improvement of livelihoods, the Ministry of Marine Affairs and Fisheries is supporting the implementation of a programme known as the “Program for Improvement Fisherman Living” (Presidential Decree No. 10 of 2011). This programme was implemented in 2012 in 1,426 villages across all provinces and targeted 112,037 fishing households. The programme sought to provide cold storage facilities that use solar power, business development services and access to microfinance, among others.\textsuperscript{109}

As Indonesia has one of the world’s most bio-diverse marine environments, President Yudhoyono called for a Coral Triangle Initiative (CTI) in August 2007, involving Indonesia, Malaysia, the Philippines, Timor-Leste, Papua New Guinea, and the Solomon Islands. The Coral Triangle Initiative aims to enhance coral conservation, promote sustainable fisheries and ensure food security in the face of climate change.\textsuperscript{110} Another multilateral initiative is the Coral Reef Rehabilitation and Management Programme (COREMAP) funded by the World
Bank and other multilateral donors. It helps to establish a viable and institutionalized coral reefs management system and to improve the welfare of communities. This long term programme is based on three phases and runs from 1998 to 2015.\textsuperscript{111}

<table>
<thead>
<tr>
<th>Sustainable livelihoods in Maluku through seaweed cultivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia is one of the world’s major exporters of raw and processed seaweed products. The production of raw seaweed is estimated at 2.6 million tons per year and is expected to increase. The seaweed sector is closely linked with small-scale coastal sea fisheries, and many of the local fishermen move into and out of seaweed farming and fishing depending on commodity prices, perceived risk and access to livelihoods.</td>
</tr>
<tr>
<td>Jobs in the seaweed sector offer opportunities for fishing communities to diversify their income and improve the reliability of their income in a sustainable way. Moreover, seaweed is considered to be environmentally sustainable, as it can reduce pressure on fishing stocks. The seaweed sector therefore offers a great opportunity to generate green jobs.</td>
</tr>
<tr>
<td>In 2009, the Government of Indonesia targeted eleven provinces to promote seaweed development and to increase the value of raw seaweed production. Maluku was one of the provinces selected, because of its potential to meet market demands and to create employment. The archipelago province of Maluku has around 11,000km of coastlines and the quality of water and culture area fits the requirement for seaweed production. From 2007 to 2009 total seaweed production in Maluku increased more than three-fold from 1,500 tons to approximately 5,000 tons of dried seaweed.</td>
</tr>
<tr>
<td>To support sustainability and decent livelihoods, fishery extension officers in almost all Maluku districts have provided training to over 1,000 people from seaweed producing communities. Training has supported both the development of seaweed farming skills and business skills. For example, in Nuruwe village, 150 seaweed farmers have received technical training and tools to support the sustainable cultivation of seaweed. With this support, it is expected that each group member will be able to earn an additional IDR 300,000 per month from seaweed production.</td>
</tr>
</tbody>
</table>

5.4 **Identified green sub-sectors**

Green sub-sectors which are likely to provide environmentally sustainable employment were identified through a combination of desk review and focus group discussions (FGD) with stakeholders from the fisheries sector. The green sub-sectors are outlined in the table below. These include sustainable fishing in the formal economy for export, seaweed farming and good practices in aquaculture. Marine and fisheries production and postharvest services and informal fishing in the sea were not considered to meet to criteria for being classified as a “green sub-sector”.

\textsuperscript{111} http://www.coremap.or.id/tentang_coremap/mengenal_coremap/
Table: Green sub-sectors in fisheries and the environmental screening criteria

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Proposed screening criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable fishing in the formal economy for export</td>
<td>National Law: Law on Fishery No. 31/2004, which stipulates provisions on utilization of fish resources, either for fish catching or fish breeding, in Indonesia according to the international conditions, to ensure their preservation and the protection of the environment. Under this law, the Ministry for Marine Affairs and Fisheries is to regulate fishing gear, allowable catch, fish breeding, the prevention of pollution and protection of fish. The law was revised in 2009 (No. 45/2009) to cover various issues including the management and conservation of fish resources and aquaculture.</td>
</tr>
<tr>
<td>Seaweed farming</td>
<td>Activity based approach: Seaweed can be identified as a green sub-sector as it can provide alternative activities for fishing villages to improve their economic conditions and to reduce pressure on fishing stocks. Seaweed farming can be beneficial for the environment through increasing production of herbivorous fishes and shellfish, however, the establishment of seaweed farms requires timber and this needs to be well managed.</td>
</tr>
<tr>
<td>Good practices in aquaculture</td>
<td>National Law: Law on Fishery No. 31/2004, which stipulates provisions on the utilization of fish resources, either for fish catching or fish breeding, in Indonesia according to the international conditions, to ensure their preservation and the protection of the environment. Under this law, the Ministry for Marine Affairs and Fisheries is to regulate fishing gear, allowable catch, fish breeding, the prevention of pollution and protection of fish. Furthermore, the law indicates that aquaculture farms are not allowed to use chemicals or to pursue certain activities which may be harmful to the sustainability of fish resources and/or the environment of fisheries management areas. The law was revised in 2009 (No. 45/2009) to cover various issues including management and the conservation of fish resources and aquaculture. A ministerial decree (No. KEP. 02/MEN/2007) on good practices in aquaculture has also been prepared.</td>
</tr>
</tbody>
</table>

Source: Authors’ own data

5.5 Decent work in fisheries

The fisheries sector employed approximately 1.7 million people in 2008, of which 19.5 per cent were working in the informal economy (see table below). It is difficult to estimate the decency of work in the fisheries sector, considering the high proportion of jobs in the informal economy and lack of data at the micro level on individual occupations.

Table: Formal and informal employment in the fisheries, 2008

<table>
<thead>
<tr>
<th>Description</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total jobs in fisheries</td>
<td>1,662,780</td>
</tr>
<tr>
<td>Total formal jobs in fisheries</td>
<td>324,435</td>
</tr>
<tr>
<td>Total informal jobs in fisheries</td>
<td>1,338,346</td>
</tr>
<tr>
<td>Estimated proportion of informal jobs in fisheries</td>
<td>19.5 per cent</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas
However, data from the labour force survey can provide some information on working conditions, particularly on wages, employment status and occupation type, provision of training and working hours. For the fisheries sector, the labour force survey estimates that 20.6 per cent of people in the fisheries sector are own account workers, 27.8 per cent were employees and 20.4 were employers assisted by temporary workers (see table below). Many people that are self-employed in the fisheries sector work on a piece rate basis, which means that they do not receive a wage per se, but get paid on a quantity basis and need to bargain with traders. The average wage in the agriculture, forestry, hunting and fisheries sectors in 2008 was 546,739 IDR per month for labourers, and 854,546 IDR per month for employees. It is therefore likely that a substantial proportion of workers in the fisheries sector earn less than the average minimum wage in Indonesia, which was 743,200 IDR per month in 2008.

Table: Occupations and employment status of fishery workers, 2008

<table>
<thead>
<tr>
<th>Employment status</th>
<th>Per cent</th>
<th>Main occupation</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own account worker</td>
<td>20.6</td>
<td>Professional, technical, related</td>
<td>5.4</td>
</tr>
<tr>
<td>Employer assisted by temporary worker</td>
<td>20.4</td>
<td>Administrative and managerial</td>
<td>0.9</td>
</tr>
<tr>
<td>Employer assisted by permanent worker</td>
<td>3.8</td>
<td>Clerical and related worker</td>
<td>3.7</td>
</tr>
<tr>
<td>Employee</td>
<td>27.8</td>
<td>Sales worker</td>
<td>16.9</td>
</tr>
<tr>
<td>Agricultural labourer</td>
<td>6.1</td>
<td>Service workers</td>
<td>5.5</td>
</tr>
<tr>
<td>Non-agricultural labourer</td>
<td>5.1</td>
<td>Fisheries worker</td>
<td>44.3</td>
</tr>
<tr>
<td>Family worker</td>
<td>16.2</td>
<td>Other labourer</td>
<td>23.2</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

In terms of occupation, most people work as fisheries labourers or other types of labourers. 90 per cent of workers were unskilled, nine per cent of workers were semi-skilled and one per cent of workers are skilled.\(^{112}\) On average people employed in the fisheries sector worked for 39 hours per week. When asked whether workers had received training and capacity building, 21.3 per cent of workers reported that they had received training, 60.9 per cent reported that they had not received training and 17.8 per cent were unclear as to whether training had been provided. Awareness levels on health and safety or good work practices, such as the CBIB, are therefore likely to be low. Employment in the fisheries sector, particularly in sea fishing, can be considered to be dangerous due to the routine exposure to climatic conditions, risk of falling overboard and heavy equipment operation. Moreover, evidence in the past has also shown that fishing can be a very hazardous occupation, both with respect to living and working conditions.\(^{113}\) There is often little security or certainty of income or access to social protection as much of the work is in the informal economy. In addition, as many fishing activities take place out at sea or other remote locations, working conditions can be difficult to monitor, which makes it difficult to enforce national or local laws and regulations.\(^{114}\)

Jobs in the fisheries sector that are largely community based, such as those in seaweed or aquaculture don’t typically have extensive involvement with employers’ and workers’ organizations. However, communities often organize informally and bargain collectively with buyers, therefore, jobs that pay above the minimum wage in such areas could be considered

\(^{112}\) Unskilled = education levels equivalent with junior high school; Semi skilled = education levels equivalent with senior high school; Skilled = education levels equivalent to diploma and above.


to be green jobs. The table below provides a more comprehensive discussion on decent work indicators in the identified green sub-sectors in fisheries.

The framework for industrial relations needs to be improved in the sea fishing sector and the Government is currently working on ratifying the ILO’s Maritime Labour Convention (MLC). The MLC provides a framework for comprehensive rights and protection at work for the world's seafarers. The Convention aims to achieve both decent work and secure economic interests in fair competition.
<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Decent work indicator</th>
</tr>
</thead>
</table>
| Sustainable fishing in the formal economy for export | **Risks at work:** There are a range of risks that workers in sea fishing are exposed to, namely:  
- Workers in sea fishing are exposed to the weather and changing sea conditions, which entails risk of injury;  
- Workers in sea fishing travel on boats to sea, which entails risk, especially if boats are not sea worthy;  
- Workers are sometimes sent into the seas without adequate training. Data show that only 18.1 per cent of workers involved in catching fish at sea receive training, and 62.6 per cent had no training at all.  
  
**Social protection:** Workers in the formal economy have access to formal social protection options. Outsourced workers and other informal economy workers may access Jamkesmas and Jamkesda for health coverage.  
  
**Organization and industrial relations:** There is currently limited collaboration between workers and unions in the sea fishing sector. Workers on the sea fishing boats generally do not directly communicate with employers, but with the boat captain and industrial relations is therefore not clear. However, workers can form workers cooperatives and organise to collectively negotiate with traders.  
  
As work in the “sustainable fishing formal export sector” is in the formal economy, jobs that pay above the minimum wage are likely to be decent, however, jobs that pay below the minimum wage in the informal economy could not be considered to be decent. The framework for industrial relations needs to be improved in the sea fishing sector and the Government is currently working on ratification of the Maritime Labour Convention (MLC). The MLC provides a framework for comprehensive rights and protection at work for the world's seafarers. The Convention aims to achieve both decent work and secure economic interests in fair competition. Once signed, it will give Indonesian seafarers an access to better conditions of work. |
Workers in seaweed can be organised in cooperatives, and there are cases where Jamsostek has contacted such cooperatives to provide social protection services.

**Organization and industrial relations:** Seaweed is largely community-based and therefore employers’ and workers’ organizations are not extensively involved in these sectors. However, communities often organize informally and bargain collectively with buyers. Further organization of the sector is needed to improve the income of workers and improve the quality of products so that seaweed workers can access export markets where there are premium prices.

Jobs in seaweed that pay above the minimum wage and involve formal and informal cooperatives are likely to be decent, however, jobs that pay below the minimum wage could not be considered to be decent.

<table>
<thead>
<tr>
<th>Good practices in aquaculture</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risks at work:</strong> There are a range of risks that workers in aquaculture are exposed to, namely:</td>
<td></td>
</tr>
<tr>
<td>• Workers are exposed to the weather and changing conditions, which entails risk of injury, however this risk is low;</td>
<td></td>
</tr>
<tr>
<td>• Workers have limited access to training as the work is largely informal or undertaken by smallholders. In this sector, 24.5 per cent of workers have received training while 58.5 per cent have not.</td>
<td></td>
</tr>
<tr>
<td><strong>Social protection:</strong> Workers in the formal economy have access to formal social protection options. Informal economy workers may access Jamkesmas and Jamkesda for health coverage.</td>
<td></td>
</tr>
<tr>
<td><strong>Organization and industrial relations:</strong> Aquaculture is largely undertaken by smallholders and therefore employers’ and workers’ organizations are not extensively involved in this sector. However, smallholders often organize informally and bargain collectively with traders.</td>
<td></td>
</tr>
<tr>
<td>Jobs in aquaculture that pay above the minimum wage and involve formal and informal cooperatives are likely to be decent, however, jobs that pay below the minimum wage could not be considered as decent.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ own data
4.6 Estimating environment related employment

The number of jobs in each of the identified green sub-sectors has been estimated. These are shown in the table below, alongside a description of the source of the estimate. The total number of environmentally sustainable jobs estimated is 549,012, which is equivalent to 41 per cent of all jobs in fisheries in 2008. The green sub-sector with the highest number of environmentally sustainable jobs is good practices aquaculture. This is closely followed by jobs in fishing in the formal economy for export. Less people were employed in seaweed farming.

**Job estimates: Environmentally sustainable employment in fisheries, 2008**

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Employment estimate</th>
<th>Source / Method of calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable fishing in the formal economy for export</td>
<td>209,690</td>
<td>Estimate from Sakernas 2008 KBLI code 5011 based on the assumption that 19 per cent of workers in the fishery sector are in the formal sector.</td>
</tr>
<tr>
<td>Seaweed farming</td>
<td>45,446</td>
<td>Estimate from Sakernas 2008 KBLI code 5014 based on information from key informants that all seaweed farming is low impact.</td>
</tr>
<tr>
<td>Good practices in aquaculture</td>
<td>293,876</td>
<td>Estimate from Sakernas 2008 KBLI codes 5031, 5032, 5041, 5042, 5043, 5044 based on information from key informants that most hatcheries are low impact and that approximately half of the activities in fish cultivation are consistent with best practices in aquaculture.</td>
</tr>
<tr>
<td><strong>Total “environment core” jobs</strong></td>
<td><strong>549,012</strong></td>
<td>Source: Authors’ estimates based on BPS Sakernas</td>
</tr>
</tbody>
</table>

4.7 Estimating green jobs

By combining both qualitative insights from key informants on employment conditions in the fisheries sector and quantitative information on from the labour force survey, it is estimated that 18.06 per cent of jobs in the fisheries sector could be considered to be green jobs.

**Table: Green job estimate for the fisheries sector, 2008**

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable fishing in the formal economy for export</td>
<td>82,614</td>
</tr>
<tr>
<td>Seaweed farming</td>
<td>15,787</td>
</tr>
<tr>
<td>Good practices in aquaculture</td>
<td>143,338</td>
</tr>
<tr>
<td>Total sustainable employment</td>
<td>241,739</td>
</tr>
<tr>
<td><strong>Total sustainable employment (per cent)</strong></td>
<td><strong>18.06%</strong></td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

Most green jobs are in good practices in aquaculture, followed by sustainable fishing in the formal economy for export. The sub-sector with the lowest employment estimates for green
jobs is seaweed farming. Employment in seaweed farming is generally community based and provides lower remuneration; therefore the number of jobs that could be considered to be green jobs was lower. However, this sector also has a high potential for growth and access to export markets that pay premium prices, and therefore trends may improve in the future, particularly if value chain activities can increase the producer’s share of the border price.

The sub-sector with the highest proportion of environmentally sustainable jobs to green jobs was good practices in aquaculture. Sustainable fishing, the formal sector for export and seaweed farming had lower proportions of jobs that could be considered to be green jobs, indicating a need for a greater focus on improving employment quality.

Table: Green jobs as a proportion of environmentally sustainable jobs in the fisheries sector, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Per cent of environmentally sustainable jobs that are green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable fishing in the formal economy for export</td>
<td>39.4%</td>
</tr>
<tr>
<td>Seaweed farming</td>
<td>34.7%</td>
</tr>
<tr>
<td>Good practices in aquaculture</td>
<td>48.8%</td>
</tr>
<tr>
<td>Total</td>
<td>44.0%</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

In order to increase the number of green jobs in the fisheries sector in Indonesia it would be important to support the implementation of regulations of the fishery sector, in order to ensure catching quotas and international treaties on fishing are followed and to improve employment quality. In the aquaculture sector it would be important to ensure that valuable coastal habitats, such as mangroves are not depleted from the encroachment of fishing or other activities, including expansion of urbanization. It would also be important to ensure that the effluent associated with fishing is appropriately managed. Furthermore, there is currently a limited understanding of “sustainable harvest” and it would be essential to understand the degree to which particular types of fisheries resources can be harvested from the ocean in a sustainable manner.

To improve sustainability in the aquaculture sub-sector, it would be important to support current regulations and decrees in their implementation. At present there are only a limited number of fish farmers that are certified on good practices aquaculture, however, this reflects the high costs of certification and the limited access to certification agencies. Moreover, there is little evidence that certification provides benefits to producers. Instead current systems may elongate the supply chain by inserting more intermediate links. In addition, certification schemes are largely driven by demand from markets in Europe and America, and markets that are more important for Indonesia (such as China and the Middle East) currently do not have certification requirements. However, it is important to promote good aquaculture practices regardless of certification requirements. Therefore, further assistance could also be provided to support the organization and collective bargaining capacities of aquaculture farmers in order to increase their productivity and share of the border gate price. Seaweed farmers would also benefit from such measures.

There are sustainability issues in marine finfish and lobster farming associated with the sourcing of seed stock and feeds provided to the fish. While there are indications that marine finfish and lobster farming are increasingly using hatchery reared fingerlings and feeding
compounded feeds, it was difficult to access data on the extent to which these practices had been adopted in the marine finfish and lobster farming sub-sectors. These activities have subsequently not been included as a sustainable sub-sector. However, the sustainability of farming in these sub-sectors could be improved with further support for the implementation of regulations and adoption of techniques to support sustainable sources of seed stock. The sustainability of sourcing juvenile animals from the sea needs to be further understood.

Furthermore, it would also be important to ensure that the Maritime Labour Convention is ratified so that employers and workers can engage formally in matters on industrial relations. Fisheries inspection services should continue to work on services related to sustainable catch management and can also provide employers and workers with training opportunities. In order to improve income and revenue, workers, employers and government could consider potential associated with fair trading markets.
Chapter 6:  Green jobs in mining and energy

Indonesia has an abundance of natural resources, and is one of the world's largest producers of nickel, tin, bauxite, steel and copper, while also holding a large volume of the world's oil and gas reserves. These resources are important for the country’s economic growth, and will play an increasingly important role with the Master Plan for the Expansion and Acceleration of Economic Development indicating intentions to expand value adding to primary commodities in the future. The mining and energy sector involves activities which can be found both in the regulated and the unregulated economy in Indonesia. It involves the extraction of natural resources and it is important that activities in this sector are regulated by labour and environmental standards that support social and environmental sustainability. To support sustainable and inclusive growth, this chapter provides key information on the mining and energy sector in Indonesia, including economic trends and linkages between the environment and employment. It discusses the impacts that mining and energy based activities have on the environment and what actions are being undertaken to improve the sector’s environmental sustainability. On the basis of this information and extensive consultations, sub-sectors providing environmentally friendly activities and employment associated with these activities have been identified. A further discussion on the decency of work in these sub-sectors provides the basis for estimating green jobs in mining and energy.

6.1  Overview of the mining and energy sector

Indonesia is rich in fossil and non-fossil resources and has been a major energy exporter globally. Oil is still the largest source of economic revenue for the country, although production is now in decline. In 2010, Indonesia produced 300.9 million barrels of crude oil, which is 38 per cent less than in 1996 where the country produced 485.5 million barrels. In 2010, the Mining and Quarrying sector contributed to 11.1 per cent of the country’s GDP. The contribution has risen since 2004, when it accounted for only 8.9 per cent of the total GDP. Non-oil and gas mining represent the largest contribution to the sector’s GDP (46.4 per cent), followed by oil and gas mining (40.2 per cent) and quarrying (13.4 per cent).

Energy consumption has risen, increasing the concern for energy security. Indonesia’s energy consumption has increased rapidly as the economy has grown. Primary energy consumption increased by nearly 50 per cent between 1998 and 2008. In 2010 oil was the major energy source, with 36.4 per cent of total consumption, followed by biomass (28.8 per cent), and coal (13.6 per cent). Industry is the major consumer of energy, representing 35.5 per cent of total primary energy consumption.

In 2008 the mining and quarrying sector employed 1,070,540 people, and the electricity, gas and water sector 201,114 people, representing only 1 per cent and 0.2 per cent of the total workforce respectively. However, the contribution of the sectors to the country’s GDP is high. Unlike the agriculture sector which is very labour-intensive, these two sectors are capital intensive and provide fewer jobs per unit of value added but a larger contribution to the economy.

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116 BPS Statistics
The sections below provide a further description of activities within the Indonesian mining and energy sector, including discussion on oil production and refining, natural gas, mining and electricity.

6.1.1 Oil production and refining

Indonesia was a member of the OPEC (Organization of Petroleum Exporting Countries) from 1962 to 2009. Indonesia has suspended its membership as it ceased to be a net exporter of oil. Oil production in the country has slowly decreased since 1998, with current oil fields maturing and the identification of new oil fields still in progress.\textsuperscript{118} Indonesia currently needs to import oil to meet its domestic demand. In 2010 14.2 million tons of crude oil were imported, with a value of IDR 80,610 billion.\textsuperscript{119} However, the discovery of recoverable oil in East and Central Java, estimated to total approximately 600 million barrels, could significantly change the country’s energy self-sufficiency.\textsuperscript{120}

Currently, the oil sector is dominated by international oil companies, such as Chevron, Total, Exxon and BP. Chevron is the largest producer, accounting for 40 per cent of the total crude oil production. Chevron owns the two largest oil production fields, which are located on the east coast of Sumatra. PT Pertamina (a state owned enterprise) accounts for approximately 15 per cent of the crude and condensate production, which makes it the second largest oil producer in Indonesia. PT Pertamina owns eight oil refineries in Indonesia and the company has planned several refinery upgrades and expansions.

The Government directly subsidises oil prices in order to support the purchasing power of poor households. Consequently, oil product prices in Indonesia are among the lowest in South-East Asia. In 2010, fossil fuel subsidies accounted for approximately USD 10 billion which represented 10 per cent of the Government’s tax revenues.

6.1.2 Natural gas

Indonesia produced 3.4 million barrels of natural gas in 2010. This was the highest production value since 1996. The production has seen slight fluctuations over time, with an average of around 3 million barrels per year.\textsuperscript{121} Up to 70 per cent of natural gas reserves are located offshore, and exploited by international companies (Total, ConocoPhilips and ExxonMobil). PT Pertamina represents 15 per cent of upstream natural gas production. According to the Energy Information Administration, Indonesia is the sixth largest net exporter of natural gas – both liquid and gaseous – with 30.2 million tons exported, representing a total export value of IDR 127,319 billion in 2010.\textsuperscript{122} The main importing countries include; Japan, Singapore, South Korea and Taiwan. Indonesia is however still dependant on imports for its production; in the MP3EI, the country has planned to expand its reserves by carrying out the exploration of new gas fields in some regions.

\textsuperscript{118} ibid
\textsuperscript{119} BPS Statistics
\textsuperscript{121} BPS Statistics
\textsuperscript{122} BPS Statistics
6.1.3 Mining

Indonesia’s mining products include coal, copper, gold, silver, tin, bauxite and nickel. Coal is the main contributor to Indonesia’s mining revenues. In 2010, Indonesia produced more than 325 million tons of coal. The majority of the production is being exported to Asian markets. Indonesia is therefore the world’s second largest coal exporting country, after Australia. 290 million tons of coal were exported in 2010, representing a value of IDR 171,519 billion. The demand for coal in the electricity services sector is expected to double by 2014. To secure domestic demand, the Government has set an obligation for producers to sell 24 per cent of their production within the country. Indonesia is producing both of the two main types of coal, namely brown coal or lignite, and black coal (including anthracite and sub bituminous coal).

Indonesia is also the world's fourth largest producer of nickel, producing 190,000 tons of nickel per year. Nickel is mined in Sulawesi and in Maluku provinces. Indonesia currently does not have any refining facilities for nickel and at present over 50 per cent of the nickel is exported in the form of nickel ore. Plans are under way for developing processing facilities, however, support is first needed to reduce the social and environmental impact of nickel mining and to improve the regulatory environment in order to attract investors.

Copper is also produced in Indonesia, mostly in the Papua region where 45 per cent of the reserves are found. In 2009, more than 300,000 tons of copper were exported. However, the production is stagnating, mainly because of labour issues and the occurrence of natural disasters in the region.

Under the MP3EI, the Government plans to have increased capacity to process tin, nickel and bauxite in the country by 2013, to meet external demand. Indonesia is currently the world's fourth largest producer of bauxite, and the 7th world reserves provider. The reserves are estimated to be 24 million tons; however, the production is still not optimal – in 2009, only 5.5 million tons were produced. Bauxite is mined in Kalimantan and is mostly used for aluminium production. Indonesia exports 65,000 tons of tin per year, making it the second largest producer in the world.

6.1.4 Electricity

In 2008 Indonesia produced 122 million MWh of electricity; 86 per cent of this was generated from conventional thermal sources (oil, natural gas, coal), 8 per cent from hydroelectric and 6 per cent from geothermal and other renewable sources. 86 per cent of the energy sector is owned by PT PLN (Perusahaan Listrik Negara), a state-owned company. Consumption of electricity accounts for approximately 12 per cent of final energy consumption after coal, fuel and natural gas. In terms of electricity sales, households and the industry sector represent the largest market segment, accounting for 40 per cent and 36.4 per cent of the electricity sales, respectively. However, according to the Energy Information Administration, 65 per cent of the population did not have access to the electricity grid in 2009. The energy sector currently does not have the capacity to expand at a rate that matches growing demand. Therefore, people in more remote areas of the country that are still beyond

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the reach of energy transmission networks rely on traditional energy sources and biomass. In 2010, biomass consumption accounted for 26.6 per cent of total energy consumption.\textsuperscript{126}

Indonesia has considerable scope for further developing geothermal power; the country is estimated to hold 40 per cent of the world's feasible reserves. Under the MP3EI, the Government is planning to develop geothermal plants in several regions of Papua and North Maluku.

6.2 Importance of the mining and energy sector to the environment

The energy sector is the second largest contributor to GHG emissions after Forestry and Land Use and Forest Change (LUCF). According to the Second Communication under the UNFCCC, emissions from the energy sector accounted for 369,800 GigaTons of GHGs, which represents 20 per cent of total emissions (55 per cent when excluding LUCF emissions). The main contribution of GHG emissions in the energy sector is fuel combustion.

In addition, the impacts of the mining and energy sector on the environment include; air pollution, land degradation from coal mining, loss of biodiversity, and exploitation of coastal areas for terminals, shipping and cooling water. For example, the MP3EI notes that nickel mining poses environmental challenges including "air pollution, land degradation, land disputes, and the disruption of ecosystems, as well as social challenges arising from the many immigrants from outside the region."\textsuperscript{127}

Fuel subsidies currently absorb more than ten per cent of the state budget and result in environmental costs, particularly in regards to air pollution. While the subsidies have provided support to consumers, particularly poor households, to increase their purchasing power, high fuel consumption still has serious implications for the environment. These include increases in emissions of particulate matter such as sulphur, lead and nitrogen oxides, which are becoming a growing public health concern as they are responsible for respiratory illnesses and other illnesses.\textsuperscript{128}

To diversify energy supply and reduce the dependency on oil, the government is planning to increase coal production for power generation. However, coal also contributes to the release of carbon emissions with carbon dioxide and carbon monoxides, nitrogen oxides (NO\textsubscript{x}), sulfur dioxides (SO\textsubscript{x}) and particular matter (PM\textsubscript{10}) in the atmosphere. Furthermore, current pollutant emission standards in Indonesia are less stringent than in other countries throughout the region. Coal mining also threatens environmental sustainability, especially in small-scale and middle-scale coal industries, with damages such as water pollution from coal preparation plants or poor management of topsoil.\textsuperscript{129} Companies often do not rehabilitate the used land: according to the State of Environment Report, 56 per cent of the ex-mining area in East Kalimantan has not been restored, as of 2005.\textsuperscript{130} Exploitation of protected forest areas for mining purposes and illegal mining activities, especially small-scale illegal mining, are also threats to the environment.

\textsuperscript{127} MP3EI 2011, page 164
\textsuperscript{128} http://www.unep.ch/eth/publications/energySubsidies/Energysubreport.pdf
\textsuperscript{130} Ibid.
Indonesia remains highly dependent on fossil fuels. There is the potential for renewable energy to play a much larger role, especially to fulfil rural energy needs and to create new economic activities. However, the subsidies for fossil fuels pricing and electricity tariffs create a challenge for the viability of the renewable energy sector.

Biomass represents the most affordable and accessible energy supply for the rural population. Biomass usually comes from rice, sugar or palm oil residues, and it is estimated that 26.6 percent of energy consumption comes from biomass. However, its excessive use is a threat for the environment. Exploitation contributes to the loss of Indonesia’s biomass resources, through illegal logging and conversion of forest land to agricultural lands. Therefore, it is important to understand the linkages between the expansion of biomass and what this means for forest conversion and the use of productive agricultural lands.

6.3 Key trends towards sustainability

Industry is one of the priority sectors under the Climate Change Roadmap of the Government (see UNFCCC). Efforts to mitigate GHG emissions in the mining and energy sector will be undertaken through energy conservation, the promotion of renewable energies such as geothermal, biomass waste, solar PV, wind energy, and biogas. Energy efficient technologies applicable to the mining and energy sector should also be promoted.

The Government has undertaken many actions to reduce the environmental impact of the mining and energy sectors. For instance, there are many government policies and regulations that seek to reduce dependency on oil and to improve the sustainability of the energy sector, including:

- Gradual removal of energy market distortions such as fuel and electricity subsidies, by adjusting the administered price of fuel, with the aim to eventually remove the subsidies for both fuel and electricity.
- Promotion of the use and development of renewable energy through providing incentives on the import and use of green energy technologies, support for research and development and integration of renewable energies in the power grid, among others.
- Promotion of energy efficiency and conservation measures for the public through providing support for investment in energy efficient products in the form of tax incentives and soft loans, provision of public awareness raising campaigns and energy efficiency labelling, among others.
- Promotion of energy efficiency and conservation measures for industry through encouraging the use of natural gas, energy auditing, provision of tax incentives for the construction industry to meet energy efficiency standards for buildings and the promotion of "cleaner production" for industries, among others (a demand rather than supply intervention).

The Government has also issued several relevant decrees and regulations related to the promotion of alternative sources of energy, namely:

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132 World Bank, [http://go.worldbank.org/G86L8GYVC0](http://go.worldbank.org/G86L8GYVC0)
• The Ministerial Decree No. 0002/2004 on Green Energy Policy aims to increase the utilization of renewable energy, and to raise public awareness on energy efficiency. This comes as a first milestone towards the use of renewable energy.
• Presidential Decree No.5 / 2006 sets a target for an increase new and renewable energy in the national primary energy mix from 4.3 per cent in 2008 to 17 per cent in 2025. The total investment required for this development of new and renewable energy sources up to the year 2025 has been estimated at more than USD 13 billion. This Decree also supports the Government’s Energy Blueprint Action for 2005-2025, including roadmaps for geothermal, solar and nuclear energy. The decree seeks to significantly reduce the use of oil for energy consumption to below 20 per cent through increasing the use of coal, natural gas, geothermal, biofuel and renewables.
• Law No. 30 / 2007 on Energy stipulates that the national and local governments are to focus on the provision of energy, especially to remote and poor areas, by maximizing renewable energy sources. The Law on Energy further stipulates that the provision of renewable energy by companies and individuals will receive the incentives from the Government.
• Indonesia’s National Energy Policy to 2030 has an economy-wide target of a one per cent per year reduction in energy intensity.
• In 2006, the Government embarked on a “Fast Track” plan to add 10 gigawatts of clean energy to the grid by 2014 (and another 10 GW of coal-based generation).
• The Presidential Regulation No. 70/2009 calls for the generalization of voluntary standards regarding energy efficiency, and for incentives on imports of energy-saving equipments, and low interest rates on investments in energy conservation. Aside from this, Indonesia has also started to implement measures to promote energy efficiency. For instance, Presidential Regulation No. 2/2008 on Energy and Water Efficiency provides guidelines for government institutions to promote energy and water efficiency. The Regulation also saw a National Committee on Energy and Water Efficiency formed, which is to focus on formulating policies and strategies related to energy and water efficiency, and on promoting public awareness. To support energy efficiency the Ministry of Energy and Mineral Resources is assisting enterprises to reduce their energy consumption through provision of energy auditing services. Energy audits have commenced in oil and gas, mining, steel, fertilizers and cement companies to assess costs of expected energy savings. However, energy efficiency initiatives focus on addressing issues associated with demand, rather than supply, and is therefore further discussed in other chapters.

In terms of mining, efforts have been made throughout the years and the negative impact of mining practices on the environment has slowed down. The World Bank estimated in 2000 that the conditions in the sector have improved, with some large-scale companies such as Kaltim Prima implementing programmes on land rehabilitation, including tree planting and reforestation.  

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field maintenance. Such trends have continued over time, however, issues associated with illegal mining and corruption continue to hinder sustainable development within the sector.

The sections below provide a more in-depth discussion on trends towards sustainability and focuses on renewable energies, geothermal energy, hydropower, biomass and biofuel and solar power.

6.3.1 Renewable energy

The potential for small scale renewable energy is high in Indonesia, as Indonesia has a large number of small power grids where additional capacity through renewable energy resources can provide significant economic and environmental benefits. The Government has issued several regulations and decrees concerning renewable energy, including:

- The Ministerial Decree No. 1122K/30/MEM/2002 on Small Distributed Power Generation Using Renewable Energy, which was launched with the objective of promoting renewable energy small-scale power plants by allowing enterprises to sell power to the local utility’s power grid (if already accessible). The maximum allowable capacity of the power plant is up to 1 MW and the electricity price is 60 per cent of the utility’s production cost if it is connected to the low voltage grid and 80 per cent of the utility’s production cost if it is connected to medium voltage grid.
- The Ministerial Regulation No. 002/2006 on Medium Scale Power Generation using Renewable Energy follows a strategy similar to the abovementioned for use of renewable energy in medium-scale power plants.
- The Government Regulation No. 26/2006 on Electricity Supply and Utilization aims to prioritize renewable energy for power generation and to regulate the supply and utilization of electricity.

Whilst there is considerable scope for the development of renewable energy, the sector is still in its early stages. By 2010, one study had estimated that there were 142 small and medium-sized companies operating in the energy sector, of which 31 described their operations as being related to the renewable energy sector. The table below indicates the amount of renewable energy actually utilized compared to the potential, with the data indicating that only a relatively small amount of potential has been exploited. The renewable energy technologies with the greatest scope for deployment in Indonesia are geothermal, biofuels, hydropower and solar.

Table: Potential and installed capacity of renewable energy options in Indonesia in 2008 (MW)

<table>
<thead>
<tr>
<th>Renewable energy source</th>
<th>Potential</th>
<th>Installed capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>75,670</td>
<td>4,200</td>
</tr>
<tr>
<td>Geothermal</td>
<td>27,000</td>
<td>1,052</td>
</tr>
<tr>
<td>Mini / Micro hydro</td>
<td>450</td>
<td>86</td>
</tr>
<tr>
<td>Biomass</td>
<td>49,810</td>
<td>445</td>
</tr>
<tr>
<td>Solar</td>
<td>4.8 kWh / m$^3$ / day</td>
<td>12</td>
</tr>
<tr>
<td>Wind</td>
<td>9,290</td>
<td>0.6</td>
</tr>
</tbody>
</table>

One other important source of employment in renewable energy could be through the Energy Self-Sufficient Village (ESSV) programme. The EESV programme aims to reduce communities’ dependency on fossil fuels and to increase their self-sufficiency by developing local resources. It was officially launched in 2007 and covered 200 villages, either through the provision of bio-energy such as bio-fuels, and non bio-energy such as micro-hydro, solar energy and biogas.\footnote{Source: International Energy Agency (2008) with data from the Ministry of Energy and Mineral Resources.}

### 6.3.2 Geothermal energy

As a volcanic archipelago, Indonesia is estimated to hold approximately 40 per cent of the world’s geothermal reserves, with the potential to generate 27,000 MW of power. However, as of 2009 only 1.179 MW have been developed, mainly on Java and Sumatra.\footnote{Ministry of Agriculture, IAARD, http://pse.litbang.deptan.go.id/eng/index.php?option=com_content&task=view&id=236&Itemid=157} Under the 2006 Energy Blueprint Action, Indonesia plans to increase the utilization of geothermal energy to 5 per cent of total energy supply by 2025. The Government has issued two key regulations to support this goal, namely:

- Law No. 27/2003 on Geothermal, which regulates the management and development of Indonesia’s geothermal resources in order to improve their sustainability and to support economic growth in the sector.
- Government Regulation No. 59/2007 on Geothermal Business Activities sets the framework for the Roadmap of Geothermal Development, under which it is planned to increase geothermal capacity to 6,000 MW in 2020 and 9,500 MW in 2025.

The Ministry of Energy and Mineral resources estimated that an increase of 4,733 MW in geothermal capacity production could save approximately 200,000 barrels of oil per day, and contribute to the reduction of GHG by 28.3 tons CO2 per year.

Several projects are being implemented to develop geothermal activities under the Clean Development Mechanism (CDM). Current CDM projects include the Sarulla Geothermal Project and the Bandarjaya Rice Husk Power Plan in Sumatra for biomass power generation (see box below). The Government, with support from the Asian Development Bank (ADB), is expanding the exploitation of geothermal reserves on Sulawesi in order to meet 50 per cent of the main grid’s peak demand. Through a project titled "The Renewable Energy Development Sector Project", the ADB is financing two out of four 20 MW generating plants in Lahendong, a major field for geothermal production, lifting Lahendong’s capacity to 80 MW. The further development of geothermal activities will require strong commitment from the Government in order to attract the much needed investments from private developers.\footnote{Harsoprayitno (2009), “Geothermal Development in Indonesia”, Ministry of Energy and Mineral Resources. Accessible at http://apecenergy.tier.org.tw/database/db/ewg38/Persentasi/1_Geothermal_Development_in_Indonesia.pdf.}

### 6.3.3 Hydropower

Indonesia has a large hydropower potential, but these resources have not been fully exploited yet. Hydropower potential is estimated at 75,674 MW, of which approximately 50 per cent is

\footnote{Ibid.}
exploitable. However, infrastructure to support hydropower exploitation is a key constraint, with capacity installed for generation of only 4,200 MW in 2008. Infrastructure to support mini and micro-hydro (50 kW-500 kW) also needs to be further developed.

Like geothermal energy, hydropower requires robust capital investment. Moreover, many hydropower sources are located in remote areas, which make them difficult to exploit. To support micro-hydro projects in rural areas, the UNDP launched in 2007 the Integrated Micro-Hydro Development and Application Programme (IMIDAP) with the financial support from the Global Environment Facility (GEF). The project included capacity building for Small and Medium Enterprises, and the implementation of community-based micro-hydro projects in rural Indonesia. As of 2009, the project had trained 344 micro-hydro stakeholders and contributed to the reduction of 280,000 tons of CO$_2$.\footnote{UNDP (2009), Project Facts: Rural Development with Renewable Energy. Accessible at: http://www.undp.or.id/factsheets/2009/ENV/Microhydro.pdf} The Government of Indonesia, with support from GIZ, has also supported investments in micro-hydro technology, and has been able to supply electricity to some 20,000 rural households and SMEs through the development of micro-hydro projects.\footnote{International Energy Agency (2008), Energy Policy Review of Indonesia, http://www.iea.org/textbase/nppdf/free/2008/Indonesia2008.pdf}

### 6.3.4 Biomass and biofuel

Indonesia has a large potential for biofuels development, with a high diversity of biofuel supply and land availability. The development of biofuels is also an opportunity to create jobs, to alleviate poverty and to reduce dependency on fossil fuel supplies. Under the Energy Blueprint Action Plan Indonesia will use palm and jatropha as the primary feed stocks for biodiesel, and sugarcane and cassava as the primary feed stocks for ethanol.\footnote{Ministry of Energy and Mineral Resources (2007), “Biofuels Development in Indonesia”, USDA Global Conference on Agricultural Biofuels: Research and Economic. Accessible at: http://www.ars.usda.gov/meetings/biofuel2007/presentations/IP-B/Kussuryani.pdf}


As Indonesia is the world’s largest producer of crude palm oil (CPO) — a feedstock for biodiesel production — it has the potential to become the global leader in biodiesel production and to provide a model for plantation sustainability. However, there are significant challenges in ensuring that the concept of sustainability is applied consistently throughout the biodiesel supply chain, including matters such as inter-ministerial cooperation and monitoring of the implementation of regulations in rural and remote settings. Nevertheless, there is great potential for the creation of environmentally friendly jobs related to biofuels in both the agriculture sector and in the processing sectors. In 2008 it was was
estimated by the Department of Energy and Mineral Resources that the biofuel industry employed 1,040 people in processing and distribution.\textsuperscript{146}

Biomass also represents a source of renewable energy. The total potential is estimated at 50 MW. The development of biomass as a source of energy involves waste recycling from the farming and forestry industries, integrating biomass with the local economic development plans, boosting the use of biomass energy conversion technology and development of value chains, and increasing research and development of waste recycling for conversion to biomass energy.\textsuperscript{147}

\begin{table}[h]
\centering
\begin{tabular}{|l|}
\hline
\textbf{Clean Development Mechanism (CDM) projects in the renewable energy sector} \\
\hline
The Bandarjaya Rice Husk Power Plan is a CDM project falling under biomass power generation. The project is a small-scale project in the village of Bandarjaya, Sumatra, which is expected to generate 3 MW of electricity for the Southern Sumatra electricity grid. The plant cooperates with ten small rice mills, which collectively produce 54,000 tons of rice husks a year. Through using biomass technologies it is estimated that the plant will reduce 12.7 thousand tons of CO\textsubscript{2} emissions per year, over ten years. \\
\textit{Source: Orford, M., S. Raubenheimer and B. Kantor “Chapter on Indonesia” in Climate Change: The Kyoto Protocol’s Clean Development Mechanisms: South-South-North Stories from the Developing World} \\
\hline
\end{tabular}
\caption{Clean Development Mechanism (CDM) projects in the renewable energy sector}
\end{table}

\subsection*{6.3.5 Solar power}

Indonesia has a high capacity for solar energy production. As of 2008, approximately 12 MW of solar photovoltaic (PV) systems were installed in Indonesia, including some 100,000 solar home systems (SHS) generating 5 MW. The systems are being used for domestic purposes, such as lighting, television, communication, battery charging and refrigeration. Recently, the Government has allocated some USD 12 million for installing another 30,000 SHS systems.\textsuperscript{148}

\subsection*{6.4 Identified green sub-sectors}

Green sub-sectors which are likely to provide environmentally sustainable employment were identified through a combination of desk review and focus group discussions (FGD) with stakeholders from the mining and energy sectors. The green sub-sectors are outlined in the table below. These include geothermal, biomass production and distribution, and electricity from renewable energy sources. Renewable energy includes solar energy, wind energy and hydro-power. Biofuel was considered as an alternative to fossil fuels, however, the sustainability of the sector is to be determined due to connections with deforestation and palm oil exploitation. For example, it might be that biofuel production from palm oil could only be considered as environmentally sustainable if the palm oil plantation it considered to be sustainable. Mining activities such as coal, copper, nickel and bauxite mining, and fossil fuels (oil, natural gas) were not considered to meet to criteria for being classified as a “green sub-sector”.

\begin{thebibliography}{99}
\bibitem{146} GSI, IISD (2008), Biofuel – at what cost? Government support for ethanol and biodiesel in Indonesia
\end{thebibliography}
Table: Green sub-sectors in mining and energy and the environmental screening criteria

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>Proposed screening criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal</td>
<td>National law: Law No. 27/2003 on geothermal, and Government Regulation No. 59/2007 on Geothermal Business Activities. Geothermal has reduced emissions per output, in comparison to conventional energy production (fossil fuel), improved resource efficiency and sustainability.</td>
</tr>
<tr>
<td>Renewable energy</td>
<td>National law: Presidential Decree No. 5/2006 stating that 4.3 per cent of the energy mix must come from renewable energy and biomass (2008). Renewable energy reduces CO\textsubscript{2} per output, improves resource efficiency and increases sustainability (e.g. reduced emissions, environmental impact) in comparison to conventional (fossil fuel) energy production. Renewable energy includes installed energy capacity from solar, wind and hydro power.</td>
</tr>
<tr>
<td>Biomass</td>
<td>National law: Presidential Decree No. 5/2006 stating that 4.3 per cent of the energy mix must come from renewable energy and biomass (2008).</td>
</tr>
</tbody>
</table>

Source: Author’s own data

6.5 Decent work in mining and energy

As mentioned earlier, in 2008 the mining and quarrying sector employed 1,070,540 people, and the electricity, gas and water sector 201,114 people, representing only 1 per cent and 0.2 per cent of the total workforce respectively. Informal work tends to be higher in the mining and quarrying sector, with 63 per cent of jobs being informal. Jobs in the energy, gas and water sector have a lower proportion of informality (22 per cent). This trend is also found in terms of skills; 80 per cent of the workers were reported to be unskilled in the mining and quarrying sector, with only 24.5 per cent of the workers being unskilled in the energy, gas and water sector.

Approximately 50 per cent of the workers in the mining and quarrying sector are employees, while approximately 20 per cent are own account workers and a further 20 per cent are casual labourers. In the electricity, gas and water sector approximately 85 per cent of workers are employees and the remaining people are either own account workers (8 per cent), employers (5 per cent) or casual labourers (2 per cent). In terms of occupation, over 85 per cent of workers in the mining and quarrying sector were labourers and the remaining workers were either professionals, clerical or service workers. In the electricity, gas and water sector approximately 45 per cent of workers were labourers, 15 per cent professionals and 25 per cent clerical staff.

In 2008 the average number of hours worked by labourers in the mining and quarrying sector was 47 hours a week and the average remuneration was IDR 1,653,192 per month, while in the electricity, gas and water sector the average number of hours worked was 43 hours a week and the average remuneration was IDR 1,878,379 per month. For employees in the mining and quarrying sector the average number of hours worked was 49 hours a week and average remuneration was 2,130,774, while for the electricity, gas and water sector the average number of hours worked by employees was 43 hours a week and the average remuneration was IDR 1,941,746. In general it can be concluded that workers in the
electricity, gas and water sector work fewer hours on average and receive higher rates of average remuneration than workers in the mining and quarrying sector.

When asked if training had been provided in the workplace, 20 per cent of workers in the mining and quarrying sector reported that they had received training, while 60 per cent reported that they had not been trained and the remaining 20 per cent were unsure. In the electricity, gas and water sector, 27 per cent of workers had received training, while 52 had not and 21 per cent were unsure as to whether training had been provided. Therefore it is likely that awareness levels on health and safety or good work practices are still likely to be low in these two sectors.

Conditions of work in the mining and quarrying sector can be hazardous, particularly when the activities are taking place in the informal economy. There are ongoing disputes relating to employment quality in the mining and quarrying sector, particularly in the sector's more traditional areas. Information on employment quality in the geothermal sub-sector was not easily accessible, however, employment in this sub-sector is likely to be in the formal sector and follow labour market regulations. Employment in the electricity, gas and water sector involves technical work that is undertaken by labourers and can require various types of safety equipment and tools. The majority of this work takes place in the formal sector and follows labour market regulations, though there has been industrial action undertaken in this sector to improve employment quality. In general, employment in the electricity, gas and water sector is likely to provide more secure conditions of work, and better access to social protection and union membership than jobs in the mining and quarrying sector - with the exception of employment in geothermal. The following table provides a more in-depth consideration of employment conditions in the identified green sub-sectors.
<table>
<thead>
<tr>
<th>Green sector</th>
<th>Decent work indicator</th>
</tr>
</thead>
</table>
| Geothermal   | **Risks at work:** Employment in this sub-sector typically requires specialist training and it is necessary for employers to ensure that their enterprise and workers are constantly up-to-date with skills requirements in order to avoid injury.  

**Social protection:** Workers in the formal economy have access to formal social protection options. Outsourced workers and other informal economy workers may access Jamkesmas and Jamkesda for health coverage.  

**Organization and industrial relations:** State-owned enterprises and large companies, such as Chevron, are members of APINDO and workers' unions have members in these areas. Therefore there are frameworks for cooperating on industrial relations issues within this green sub-sector.  

Overall, jobs in the Geothermal that pay above the minimum wage in the formal economy could be considered decent. |
| Renewable energy | **Risks at work:** Employment in this sub-sector has a low number of risks to which workers are exposed. However, work in this sub-sector requires training and special tools and equipment to ensure the safety of workers.  

**Social protection:** Workers in the formal economy have access to formal social protection options. Outsourced workers and other informal economy workers may access Jamkesmas and Jamkesda for health coverage.  

**Organization and industrial relations:** State-owned enterprises and large companies are members of APINDO and workers' unions have members in these areas. Therefore there are frameworks for cooperating on industrial relations issues within this green sub-sector. Most workers are employed in the formal sector; however, outsourced workers have been used to provide services at times.  

Overall, jobs in the renewable energies (solar, wind, water) that pay above the minimum wage in the formal economy could be considered decent. Jobs in the informal economy may be considered decent if the workers are not underemployed and have a job all-year round. |
| Biomass | **Risks at work:** Biomass production can be undertaken in factories or through community based initiatives. In both settings it is important that workers are training on how to operate the equipment.  

**Social protection:** Biomass production can be undertaken in factories in formal settings and also undertaken through |
community based initiatives in the rural informal economy. Therefore, workers in the formal economy should have access to formal social protection options. Workers in community settings may not have access to such information, but should still be able to access social protection services from Jamkesmas and Jamkesda.

**Organization and industrial relations:** Activities associated with biomass can be implemented by companies of different sizes and by communities, and can therefore occur in the formal and informal sector. Activities in the informal sector typically do not allow workers the same protections as activities in the formal sector. Employers in the formal sector who are members of APINDO provide opportunities for formal mechanisms for cooperating with workers through unions.

Overall, jobs in the biomass that pay above the minimum wage in the formal economy could be considered decent. Jobs in the informal economy may be considered decent if the workers are not underemployed and have a job all-year round.

*Source: Authors' own data*
6.6 Estimating environment related employment

The number of environmentally sustainable jobs in the energy and mining sector has been estimated in each of the sub-sectors (geothermal, renewable energies and biomass). The total number of environmentally sustainable jobs estimated is 6,780. Geothermal has been identified as providing 100 per cent of the environmentally sustainable jobs due to the capacity of the sector to provide sustainable energy. As for renewable energy and biomass, figures have been estimated according to the information provided in the Presidential Decree No. 5/2006. The Decree mentions that 4.3 per cent of the energy mix came from renewable energy in 2008.

Table: Environmentally sustainable employment in energy and mining, 2008

<table>
<thead>
<tr>
<th>Green Sub-sector</th>
<th>Employment estimates</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal energy</td>
<td>288</td>
<td>Sakernas data code 11102 (Exploitation of Geothermal Energy) considering that 100 per cent of jobs in the sector are environmentally sustainable.</td>
</tr>
<tr>
<td>Renewable energy</td>
<td>5,778</td>
<td>Sakernas data code 40101-40104, considering that 4.3 per cent of the jobs are environmentally sustainable (Presidential Decree No. 5/2006).</td>
</tr>
<tr>
<td>Biomass</td>
<td>714</td>
<td>Sakernas data code 40201, 40202 and 24119, considering that 4.3 per cent of the jobs are environmentally sustainable (Presidential Decree No. 5/2006).</td>
</tr>
<tr>
<td>Total `environment core’ jobs</td>
<td>6,780</td>
<td>Source: Author’s estimates based on BPS Sakernas</td>
</tr>
</tbody>
</table>

The total number of environmentally sustainable jobs in mining and quarrying is estimated at 288 jobs (geothermal), which represents 0.03 per cent of the jobs within the sector. In the electricity, gas and water sector, the total number of environmentally sustainable jobs is estimated at 6,942, which represents 3.5 per cent of the jobs within the sector.

6.7 Estimating green jobs

By combining both qualitative insights from key informants on employment conditions in the energy and mining sector, and quantitative information from the labour force survey, it is estimated that there are 4,820 green jobs in the electricity, gas and water sector and the mining and quarrying sector.

Table: Green job estimates for the energy and mining sector, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal energy</td>
<td>288</td>
</tr>
<tr>
<td>Renewable energy</td>
<td>3,949</td>
</tr>
<tr>
<td>Biomass</td>
<td>583</td>
</tr>
<tr>
<td>Total green jobs</td>
<td><strong>4,820</strong></td>
</tr>
</tbody>
</table>

Source: Author’s estimates based on BPS Sakernas
Most green jobs are found in the electricity, gas and water sector. The total number of green jobs is estimated at 4,532 jobs, which represents 2.3 per cent of jobs within the sector. Green jobs in the mining and quarrying sector remain low. The total number of green jobs in mining and quarrying is estimated at 288 jobs, which represents 0.03 per cent of the jobs within the sector. However, all jobs in geothermal energy were considered to both sustainable and decent. A high proportion of jobs within the renewables and biomass sub-sectors were also considered to be both sustainable and decent.

### Table: Green jobs as a proportion of environmentally sustainable jobs in the energy and mining sector, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Percentage of environmentally sustainable jobs that are green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal energy</td>
<td>100%</td>
</tr>
<tr>
<td>Renewable energy</td>
<td>68%</td>
</tr>
<tr>
<td>Biomass</td>
<td>82%</td>
</tr>
<tr>
<td>Total</td>
<td>71%</td>
</tr>
</tbody>
</table>

*Source: Author's estimates based on BPS Sakernas*

In order to expand the number of sustainable and decent jobs in energy and mining, it would be important to commit to expanding the geothermal, biomass and renewable energy sub-sectors more rapidly. As mentioned in early sections of this chapter, Indonesia has a great untapped potential for expansion of geothermal, biomass and renewable energy. It would be important to promote use of energy from these sources where possible and to commit to research and development activities that allow use of energy from these sources to become more accessible to industry and households.

To ensure that work is both sustainable and decent in the energy and mining sectors, it would also be important to ensure that enterprises are members of employers’ organizations and that the workers have the right to freedom of association and collective bargaining. Promotion of training should also be encouraged.

As mentioned earlier, it will also be important to understand the impact that the expansion of biomass has on forest conversion and use of agricultural lands in order to ensure that shifts to renewable energy sources are sustainable in the broader sense.
Chapter 7:  Green jobs in manufacturing

This chapter provides key information on the manufacturing sector in Indonesia, including economic trends and linkages between the environment and employment. It discusses the impacts that the manufacturing sector has on the environment and what actions are being undertaken to improve the sector’s environmental sustainability. On the basis of this information and extensive consultations, sub-sectors providing environmentally friendly activities and employment associated with these activities have been identified. A further discussion on the decency of work in these sub-sectors provides the basis for estimating green jobs in the manufacturing sector.

7.1 Overview of the manufacturing sector

Manufacturing has long been an important sector in the Indonesian economy, with much of the production capitalizing on the country’s rich natural resources from agriculture, mining and forestry. According to the latest data available from the Central Bank of Indonesia (Q1/2012), the manufacturing industry represents almost one quarter of the total domestic product of Indonesia,\(^\text{149}\) which is consistent with the manufacturing sectors of other South-East Asian countries, such as Thailand and Philippines.\(^\text{150}\) Indonesia has particularly increased its manufacturing production and exports in the last few years, thanks to a combination of low cost factors of production and a growing domestic market. In 2011 the sector’s growth rate was 6.2 per cent, mainly due to the expansion of the food, beverage and tobacco and transport equipment and machinery sectors.\(^\text{151}\)

According to data released by the Minister of Industry, in 2010 the manufacturing industries that contributed the most to gross national product include food, beverage and tobacco (7.24 per cent of GDP) and the transportation industry (6.06 per cent), principally due to growing domestic demand. Relevant industries are also the fertilizer, chemical and rubber industries (2.74 per cent) and textile, leathers and footwear manufacturing (1.93 per cent).\(^\text{152}\)

Despite its overall growth, the manufacturing sector has followed a very heterogenic pattern of growth between 2007 and 2011, with a negative growth rate in wearing apparel and drops in communication equipment production, but also with constant growth in the leather and paper industries. In 2010, automotive and heavy machinery production grew by 10.53 per cent compared with the more traditional commodities such as food and beverages and fertilizers and chemicals which only grew by 2.73 per cent and 4.63 per cent respectively.\(^\text{153}\)

\(^\text{149}\) Bank Indonesia (2012), http://www.bi.go.id/sdds/
\(^\text{150}\) World Development Indicator (2010), http://databank.worldbank.org
\(^\text{152}\) Ministry of Industry Republic of Indonesia (2011), Industry Facts and Figures
<table>
<thead>
<tr>
<th>Description</th>
<th>Average 2007</th>
<th>Average 2008</th>
<th>Average 2009</th>
<th>Average 2010</th>
<th>Average 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and Beverages</td>
<td>5.19</td>
<td>2.65</td>
<td>11.15</td>
<td>6.41</td>
<td>8.34</td>
</tr>
<tr>
<td>Tobacco</td>
<td>15.9</td>
<td>14.63</td>
<td>25.54</td>
<td>4.7</td>
<td>9.22</td>
</tr>
<tr>
<td>Textiles</td>
<td>11.17</td>
<td>3.38</td>
<td>-5.41</td>
<td>0.07</td>
<td>8.12</td>
</tr>
<tr>
<td>Wearing Apparel</td>
<td>-23.03</td>
<td>-28.72</td>
<td>-8.77</td>
<td>0.57</td>
<td>5.38</td>
</tr>
<tr>
<td>Tanning and Dressing of Leather</td>
<td>-0.47</td>
<td>14.01</td>
<td>0.87</td>
<td>10.27</td>
<td>10.28</td>
</tr>
<tr>
<td>Paper and Products</td>
<td>15.48</td>
<td>3.17</td>
<td>1.84</td>
<td>-2</td>
<td>7.36</td>
</tr>
<tr>
<td>Chemicals and Chemical Products</td>
<td>35.84</td>
<td>-6.84</td>
<td>2.77</td>
<td>5.38</td>
<td>11.93</td>
</tr>
<tr>
<td>Rubber and Plastics</td>
<td>-12.49</td>
<td>8.89</td>
<td>2.95</td>
<td>2.31</td>
<td>-8.57</td>
</tr>
<tr>
<td>Non-metallic Products</td>
<td>0.33</td>
<td>-9.46</td>
<td>-1.98</td>
<td>2.72</td>
<td>8.16</td>
</tr>
<tr>
<td>Basic Metals</td>
<td>12.09</td>
<td>6.31</td>
<td>-5.63</td>
<td>3.29</td>
<td>16.26</td>
</tr>
<tr>
<td>Fabricated Products except Machinery and Equipment</td>
<td>-23.34</td>
<td>-14.61</td>
<td>-8.07</td>
<td>4.13</td>
<td>3.83</td>
</tr>
<tr>
<td>Machinery and Equipment</td>
<td>43.05</td>
<td>-9.34</td>
<td>-0.8</td>
<td>6.63</td>
<td>-3.43</td>
</tr>
<tr>
<td>Electrical Machinery and Equipment</td>
<td>-22.06</td>
<td>1.59</td>
<td>0.64</td>
<td>-3.6</td>
<td>11.42</td>
</tr>
<tr>
<td>Radio, Television and Communication Equipment and</td>
<td>50.46</td>
<td>13.29</td>
<td>-2.58</td>
<td>9.01</td>
<td>2.85</td>
</tr>
</tbody>
</table>
Data provided by Statistics Indonesia illustrates that there is a large disparity in the geographic locations of industries. The secondary sector is clearly concentrated in Java, where the number of medium and large manufacturing enterprises exceeds 21,200. Conversely, in the rest of the country the overall number of medium and large industries amounts to only 4,487. Moreover, there has been a trend towards the further concentration of the manufacturing sector in Java: in 2001 the portion of industries on the island of Java was 81 per cent; by 2008 it had reached 83 per cent.\textsuperscript{154} This situation entails high transport costs, with primary commodities produced outside Java and then being transported to Java for processing. This indicates a need for strategies to ensure inclusive value chain development, such as the strengthening of cooperatives and workers’ and employers’ organizations in order to ensure an equitable relationship between producers’ margins and marketing margins.

Sectoral development in Indonesia is supported by the Master Plan for Acceleration and Expansion of Economic Development (MP3EI), which provides the overall framework for growth and economic development in Indonesia between 2011 and 2025.

It applies a three-pronged approach to promoting prosperity in Indonesia, including:

- Sectoral development in six economic corridors;
- Investing in infrastructure to promote connectivity; and
- Strengthening human resources and national science and technology.

The MP3EI is supporting further development of the manufacturing sector on Java, with focus given to the production of food and beverages, textiles, transportation and defence equipment. It is also planned to promote the steel and rubber industries in Sumatra and Kalimantan.

An increasing number of workers have been involved in the manufacturing sector over the last 10 years, reaching 13.3 per cent of the total labour force in 2011 (compared to 11.8 per cent of workers in 2004). The manufacturing output growth contributes to domestic demand and attracts foreign direct investment to Indonesia.\textsuperscript{155} Data from the Ministry of Industry calculated that employment in small scale businesses in the manufacturing sector amounted to more than 7.5 million jobs in 2006 in approximately 2.8 million businesses.

\textsuperscript{154} BPS, \url{http://dds.bps.go.id/eng/tab_sub/view.php?table=1&daftar=1&id_subyek=09&notab=1}

Comparatively, 3.7 million workers were employed in approximately 11,000 medium scale enterprises and 250,000 workers in approximately 760 large scale enterprises.\textsuperscript{156}

The manufacturing sub-sector which employs the highest number of workers is the food and beverage sub-sector, due to demand from the growing domestic market (in 2009 it employed 834,305 workers). Strong job growth is also evident in the rubber and plastic industry (employing 526,199 workers in 2009), mainly due to the expansion of new plantations and production facilities that have been recently undertaken in Indonesia. The recycling industry has doubled its number of workers over a five year period, going from 2,743 workers in 2005 to almost 5,500 in 2009. Other manufacturing sub-sectors, however, saw negative employment growth, such as the wearing apparel sub-sector, which lowered its employment share from 10.7 per cent in 2005 to 8.7 per cent in 2009.

A potential area of expansion for Indonesia’s manufacturing is linked with “fair trade” and associated initiatives. Both in the academic literature and in practice, the advantages from its implementation are undisputed: economic benefits such as access to equitable finance and export markets that pay premium prices, as well as social effects (no child labour, freedom of association) and reduced environmental impacts (safe use of agrochemicals, proper waste management). Further work can be done to connect Indonesian producers and manufacturers with such international export networks. The profile of fair trade should also be raised nationally among consumers, employers and government in order to enhance equitable trade in domestic markets.

\textbf{7.2 Importance of the sector to the environment}

Although Indonesia has a strongly diversified manufacturing sector, little information on the impact of industries on the environment is available. According to the “Indonesia Environment Monitor” of 2003 by the World Bank, the manufacturing sector consumed 6 million kiloliters of gasoil, 1 million kiloliters of diesel oil, more than 4 thousand kiloliters of fuel oil, 48 thousand kiloliters of kerosene and almost 140 billion cubic meters of coal per annum.\textsuperscript{157} In 2005, Indonesia’s industrial sector was responsible for over 40 per cent of the country’s fossil fuel emissions (including the electricity used in manufacturing).

According to the Indonesia Second National Communication under the United Nations Framework Convention on Climate Change (UNFCCC) of 2010, the sub-sectors producing the most emissions within manufacturing are the mineral industry (67 per cent), followed by the chemical industry (22 per cent) and the metal industry (10 per cent).\textsuperscript{158} In particular, cement production contributed 11.5 million tons of carbon in 2005. The manufacturing sector has a heavy reliance on coal, which is responsible for approximately 70 per cent of industry’s emissions. Smaller manufacturers tend to use more electricity in production, compared to larger producers. Steel rolling is also a large consumer of electricity and is another large contributor to carbon emissions in manufacturing. Production of iron and steel, pulp, porcelain and fertilizer are more dependent on the use of natural gas as an energy source. It is important for industries, particularly those that are high emitters, to identify strategies to reduce emissions through the examination of energy sources and uses of energy throughout

\begin{footnotesize}
\begin{enumerate}
\item Ministry of Environment Republic of Indonesia (2010), Indonesia Second National Communication Under The United Nations Framework Convention
\end{enumerate}
\end{footnotesize}
the production cycle. Solutions may include switching to renewables, converting waste into energy sources, or adopting green technologies that are more energy efficient.

The manufacturing sector is strongly linked to the environment as it uses inputs from the primary sector in order to produce goods. However, the manufacturing sector is dominant in Java and many primary commodities are grown and extracted in other areas of Indonesia. As a consequence, the total emission footprint of products is greater due to the transportation of raw materials from various parts of Indonesia to industries on Java. Moreover, industrial products represent an important share of Indonesian exports. According to data from the World Bank, exports from the manufacturing sector constituted 37 per cent of total exports in 2010.\(^{159}\) It is therefore relevant to emphasize the link between the way manufacturing goods are produced in Indonesia and the global environment in order to shift towards a more sustainable economy.

An important feature of the manufacturing sector is that production can be based on natural or synthetic sources. For example, organic fertilizers are increasingly attracting more investors, undermining the domination of chemical fertilizers in the sector. In fact, the cheaper production costs of organic fertilizers have boosted their production in Indonesia, pulled also by the global demand for organic products (especially from Japan, South Korea and Taiwan). Furthermore, in some regions of the country there is evidence of the traditional use of livestock waste for fertilizing waste: in Central Lampung and Sukabumi districts chicken manure has been used for decades for maize cultivation.\(^ {160}\)

The manufacturing sector also produces products that help consumers and households to reduce their emissions. For instance, it manufactures energy efficient light bulbs and other energy efficient appliances. It also produces solar panels and wind-turbines that provide renewable energy. However, limited information is available on the contribution of these initiatives to the economy. Producers in the manufacturing sector as well as government can play an important role in raising consumer awareness on energy efficiency, in order to build demand for such products. Indonesia has been very effective at promoting the use of efficient lighting throughout the majority of households, while more effort should be done to improve the use of renewable energy. According to a study developed by the World Bank, the renewable energy sector is still underdeveloped, with several barriers and few incentives. For example, while the potential for geothermal energy in Indonesia is estimated at 27 GW, the actual installed capacity is only 807 MW.\(^ {161}\)

As the manufacturing sector is highly integrated with the environment through its use of inputs from agriculture and mining, it can set standards on the raw materials it uses for inputs. For example, furniture factories can commit themselves to use only certified timber or sustainable rattan and bamboo. The paper making industry can source its inputs from waste materials or from certified forests to make eco-friendly paper.

Finally, the manufacturing sector is a large producer of waste and can have a positive impact on the environment through recycling both its own waste and waste from consumers. The Indonesia Second National Communication under the UNFCCC estimated that waste in

\(^{159}\) World Development Indicator (2010), http://databank.worldbank.org


Indonesia increased from 6.3 million tons in 2000 to 12.5 million tons in 2005. One of the key sources of solid waste in the manufacturing sector is associated with agro-industries. This includes the husks from rice processing and empty fruit bunches (EFBs) from palm oil processing. There is a need for strengthening the management of such waste through recycling programmes and lean manufacturing approaches. This issue has been taken up by the corporate social responsibility programmes of some firms operating in agro-processing; however there is need for a sector wide approach to address solid waste management. Waste management in the manufacturing sector is also reported to contribute to the degradation of water resources, with need for the strengthening of inspections to prevent the untreated discharge of waste. In particular, the Ministry of Environment estimated that industrial liquid waste reached approximately 23.6 million tons COD in 2000 and 23.7 million tons COD in 2005, with pulp and paper industries considered as the largest polluters.  

7.3 Key trends towards sustainability

Industrial processes emit a range of greenhouse gases, including carbon dioxide and carbon monoxide, methane (CH4), nitrous oxide (N2O) and perfluorocarbons (PFCs) in the form of CF4 and C2F6. Carbon emissions account for the vast majority of emissions in manufacturing, with carbon dioxins amounting to 93 per cent of total greenhouse gas emissions in the sector. However, the current regulatory environment in Indonesia does not directly control carbon emissions and other emissions associated with industrial processes.

For instance, the Decree of the State Minister of Environment/Kep. MENLH No. 129 of 2003 titled “Quality standard of emission of oil and natural gas business and/or activity” deals with the standard quality of emissions for industrial processes, but its requirement for stationary emission sources from industrial processes does not include carbon or other GHG emissions (conversely, it covers opacity, hydrogen sulfide and other hydrocarbon gases).

However, the Ministry of Industry is currently trying to improve manufacturing competitiveness by applying the concept of Green Industry. According to the official definition, “green industries can be defined as industries that produce environmental goods and services, such as the recycling industry, waste management industry and manufacturing of clean technologies”. However, the concept also implies the implementation of sustainable processes in a wider sense, such as cleaner production, recycling, low-carbon technologies, eco-design, eco-products, resource efficiency and energy conservation. In order to stimulate industries to meet environmental quality standards and an efficient use of natural resources, the Regulation 05/M-IND/PER/1/2011 from the Ministry of Industry acknowledges the necessity of rewarding firms that have made efforts towards a greener economy.

Good practices include:

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162 Ministry of Environment Republic of Indonesia (2010), Indonesia Second National Communication Under The United Nations Framework Convention
163 Ministry of Environment Republic of Indonesia (2010), Indonesia Second National Communication under the United Nations Framework Convention
164 Ministry of Industry Republic of Indonesia (2011), Industry Facts and Figures
To support these efforts, the Government has created eco-labels for environmentally friendly products, such as detergents and textiles, which can help Indonesian companies to enter global markets, to cut production costs and to reduce carbon emissions. The strategy supports cleaner production through savings on energy and intensive use of green technologies. Training is being provided on green industry issues and technical guidelines on reducing carbon emissions in steel and cement industries have been prepared. This has led to the development of 'green cement' and to a cut in the energy usage in the cement industry in half between 1990 and 2000 (mainly due to a shift from wet to dry-kiln processes). Energy efficient initiatives have focused on the production of energy saving lights (CFL), with the implementation of a 3-star label to certify the most environmentally sustainable products (i.e. best light intensity/watt). To further illustrate, Indonesia’s second largest cement producer, PT Indocement Tunggal Prakasa Tbk (Indocement), is undertaking a project to reduce the company’s yearly emissions by more than 907 thousand tons of CO_{2} over 15 years. Abatement activities include using alternative materials to replace the use of primary fossil fuels; substitution of clinker (used in the production of cement) with limestone, which produces very little emissions in production; optimisation of production so as to reduce power consumption; and the use of waste as alternative fuels in the production of cement.

Moreover, the Ministry of Industry is encouraging the shift to a greener economy by undertaking several actions, such as:

- encouraging international cooperation for sharing knowledge;
- advocating coordination between governments, civil society and the private sector in order to convince the public on the importance of a greener economy;
- boosting research for green technologies;
- promoting certifications and standards for environmentally friendly products.

In order to implement green industries, the Government has gradually created a normative framework including regulations such as:

- Regulation No. 33 of 2007 from the Ministry of Industry concerning the Prohibition of Ozone Depleting Producing and Producing Goods that Use Ozone Depleting;
- Regulation No. 86 of 2008 from the Ministry of Industry on Technical Guidelines for Use and Procedures for Non-CFC Logo Usage Monitoring and Non-Halon & Non CFC;
- Regulation No. 24 of 2006 from the Ministry of Trade on Importation of Ozone Depleting Substances.

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165 http://202.47.80.12/detail_peraturan.php?id=731
166 AIRD (2009), Mitigation approach for industry sector, Agency for Manufacturing Research and Development, Centre for Research and Development of Resources, Environment and Energy, Jakarta
In addition, the Indonesian law provides relief on import duties for green technology equipment and bans the import of goods that are not environmentally friendly. For example, in 2008 Indonesia banned the import of chlorofluorocarbons (CFCs) and methyl bromide ahead of the phase-out of ozone depleting substances in 2010 falling under the Montreal Protocol. Indonesia is also producing its own green technologies for the local and global market through the manufacturing of machinery for steam, turbines and windmills. In addition, Indonesia is manufacturing pedicabs and bicycles that support the transport services sector and provide households with alternative green transport options.

The share of small enterprises in the manufacturing sector in Indonesia is over 35 per cent. A survey of 54 small and medium enterprises (SMEs) that sought to determine the extent to which cleaner production methods have been adopted found that 54 per cent of the surveyed SMEs had adopted some level of cleaner production (whether reuse, recycling, or reduction in the resource use). A clear example is given by the manufacturing of sustainable essential oil near Yogyakarta. Every day 34 tons of Melaleuca leaves are collected from 170 community members and sent to small processing factories in order to produce Cajuput oil. The effective management of waste products from the processing of Melaleuca leaves is implemented in the majority of factories. To manage organic waste, the processing plants use power from the burning of leaves that have already been processed. The leaves are also used to develop compost for further expansion of reforestation activities in the region.

Indonesia’s Program for Pollution Control Evaluation and Rating (PROPER) was implemented by the Environmental Control Agency (BA PEDAL) during the period 1995-1998 to counter rapidly-increasing pollution from the manufacturing sector. It was later re-launched in 2002 and focused on combating water pollution caused by industry. The programme is compulsory for large firms in target sub-sectors and open to firms who wanted to join the programme voluntarily. PROPER used a colour-coded scheme to grade the environmental performance of different firms. The results are then publicly disclosed, so as to encourage firms to revise their environmental management. In total, 324 firms joined and during the first phase 83 per cent of the worst ranking firms improved.

Prior to 2000, environmental management of the manufacturing sectors was mainly associated with “end-of-pipe solutions”. In 2006, end-of-pipe treatments in SMEs were subsidized by up to 30 per cent by the Government. However, policy trends on environmental management have since broadened their scope to include consideration of the full production cycle. Indeed, Indonesian civil society organisations as well as the Government have been active in producing materials that promote sustainability (such as books and videos on the environment). For example, the Center for International Forestry Research (CIFOR), located in Bogor, regularly publishes studies on environmental issues, as well as Greenpeace Indonesia, which tries to alert public opinion to sustainable problems through videos and campaigns.

Thanks to this change in public opinion, in the past few years Indonesia saw increasing demand for eco-friendly products, pulled especially by those people with a high standard of living. In particular, there has been an extensive increase in the production of organic soaps.

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167 Another policy measure aimed to improve sustainability is that of Article 26, Paragraph 1, item (d) of Law No. 17 of year 2006 concerning Amendment to Law No. 10 of year 1995 on Customs
and cleaning substances associated with the spa industry. Most commercially produced soap contain synthetic lathering agents, artificial colorants and several other chemicals that might be dangerous both for the human body and the environment, so that spas have started to use natural soaps for their customers. However, while some countries such as the United States have national regulations to label organic soaps (for example, in US a product must contain at least the 95 per cent of organic ingredients to be certified organic), in Indonesia there is no such regulation. Therefore, it would be necessary for the government to further regulate the labelling of organic products, including soaps and essential oils. Despite this lack, however, there is still demand for organic soaps and companies are trying to achieve a more sustainable and cleaner production.

Sustainable agro-processing has great potential for development in Indonesia. However, more can be done to promote sustainability and regulations within the sector. For instance, the coffee industry is trying to become greener with the help of large national and multinational companies, which are implementing sustainable projects in order to reduce the impact of the coffee production on the environment. Coffee producer Javanegra uses the so-called intercropping method in order to plant their coffee trees among other rainforest trees, producing in this way valuable food and energy crops that grow much better under-shading conditions. Moreover, the company is also committed to improve the income of Indonesian coffee growers by ensuring a fair value when they release their green beans and by providing them with a sale premium.

Recycling initiatives in Indonesia are expanding. Recycling in Indonesia currently involves a large number of trash pickers, who are limited in number and are only looking for certain types of trash (such as plastics and metals) for further processing in the manufacturing sector. Consequently, several other types of waste are not collected, which could be instead recycled through integrated systems of waste management. The recycling sector currently lacks regulation and voluntary codes that can set standards in the sub-sector.

Rattan and bamboo manufacturing is also facing a lack in official labelling. The use of renewable materials (bamboo, rattan) in the production process is decision made at the firm level and there are few incentives to promote the use of these materials in the production process. Despite the lack of certification, the sector is considered to be an important sector that provides options that are more sustainable when compared to wood, rubber or metal products.

Lean manufacturing is an operational strategy oriented towards achieving the shortest possible cycle time by eliminating waste and reducing incidental work. The technique aims at increasing profits, consumer satisfaction and working conditions, while also reducing the environmental impact of the firm. It is therefore feasible that lean manufacturing leads to better environmental performances, due to strengthened waste management systems and energy saving strategies. Estimates indicate that of the 3,000 companies in the manufacturing sector in Indonesia, that 13 per cent of these firms have adopted lean manufacturing.

There are currently two programmes that are actively promoting more sustainable and decent jobs in the Indonesian manufacturing sector, namely “Sustaining Competitive and Responsible Enterprises” (SCORE) and Better Work. The SCORE programme is a global
technical assistance programme developed to support small and medium sized enterprises (SMEs) and create decent work. SCORE enables participating enterprises to make major improvements in areas such as working conditions, human resource management, environmental management and enterprise productivity. Better Work Indonesia aims to improve compliance with labour standards and promote competitiveness in global supply chains. The protection of workers’ rights and entitlements helps to distribute the benefits of trade to promote human, social, environmental and economic development.

Puji is 35 years old and has been working for PT. Dream Sentosa Indonesia for the last 9 years. The company, located in Karawang (West Java), employs more than 9,000 workers in the production of garments. Being one of the most experienced employees of the factory, Puji has faced several changes in the organization’s structure. Particularly, in 2009 the management of PT. Dream Sentosa Indonesia implemented a concept known as “lean manufacturing” in its production system. The change affected the daily life of the whole company, especially Puji’s life as she was appointed as the officer responsible for lean production.

The new system has cut various activities that were not adding value to production. Consequently, the factory has been able to reduce its energy consumption and waste through the elimination of various segments in the production line, thus greening the workplace and decreasing the impact of the industry on the environment. A new inventory management system has been put in place in order to optimize the use of available resources. Lean manufacturing has also reinforced the interactions between supervisors and employees, creating a feedback mechanism and the possibility for workers to report their achievements and be rewarded. This new way of working supports the skill development of employees and the sharing of best practices between the management and the workers (e.g., a skill matrix has been created in order to assess competencies within the work force and encourage workers to develop new skills and perform better at work).

Puji now feels more comfortable with her job and she is happy that lean manufacturing contributes not only to better working conditions and energy efficiency, but also to strengthened team cohesion. “In the previous conventional sewing line, the workers were not encouraged to suggest ideas, but now they feel free to express their opinions and they can finally see their ideas implemented in practice” she says. Being in charge of lean production, Puji has also received further training on numerous issues, such as environmental safety and health, effective communication and sexual harassment prevention.

Puji is very satisfied with her job. “I like to work in PT. Dream Sentosa Indonesia” she says “and this is why I have been here for 9 years. I want to work here for a long time.” Thanks to correct energy efficiency and waste management practices, PT. Dream Sentosa Indonesia is gradually greening its production, while at the same time, the new lean manufacturing is contributing to a shift towards a low-carbon world and more decent and sustainable jobs.
Green sub-sectors which are likely to provide environmentally sustainable employment were identified through a combination of desk review and focus group discussions (FGD) with stakeholders from the manufacturing sector. The green sub-sectors are outlined in the table below. These include green agro-processing, the lean manufacturing of garments, rattan and bamboo manufacturing, manufacturing of materials that promote sustainability (such as books and videos on the environment), production of organic chemicals and fertilisers, organic soaps, sustainable essential oils, green cement, manufacturing of pedicabs and bicycles, manufacturing of machinery for steam, turbine and windmills, energy efficiency initiatives (such as lighting) and recycling.

Food and beverage processing, textiles, leather, wood and wood processing, pulp and paper, chemical processing, rubber, glass and ceramics, metal processing and machinery were generally not considered to meet to criteria for being classified as a “green sub-sector”.

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Proposed screening criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable edible oils</td>
<td><strong>Activity based approach:</strong> Effective management of waste products from the processing of the tree leaves is implemented in the majority of factories, making the sub-sector environmental sustainable.</td>
</tr>
<tr>
<td>Green agro-processing</td>
<td><strong>Activity based approach:</strong> The processing of agricultural products can be considered green if the manufacturers have good management of the waste and use energy-saving practices in order to reduce the impact on the environment.</td>
</tr>
<tr>
<td>Lean manufacturing of garments</td>
<td><strong>Activity based approach:</strong> Lean manufacturing is an operational strategy oriented towards achieving the shortest possible cycle time by eliminating waste and reducing incidental work. It therefore leads to better environmental performances, due to strengthened waste management systems and energy saving strategies.</td>
</tr>
<tr>
<td>Rattan and bamboo manufacturing</td>
<td><strong>Activity based approach:</strong> Rattan and bamboo are non-timber forest products (NTFP) and there are laws that regulate their the collection, cultivation, harvesting (Government Decree PP.6/2007 Jo No.3/2008 and the Ministerial Decree P. 36/Menhut-II/2008 on Utilization License Non-Timber Forest Products in Natural Forest (IUPHHK-HA) or in Planted Production Forests (IUPHHBK-HT). Rattan and bamboo manufacturing is labour intensive and involves sanding, sulfuring and drying, after which the materials are then woven into various products.</td>
</tr>
<tr>
<td>Manufacturing of materials that promote sustainability</td>
<td><strong>Activity based approach:</strong> The manufacturing of materials, such as publications and videos, that raise awareness on the environment is likely to be considered a sustainable sub-sector, since it promotes environmental sustainability among public opinion.</td>
</tr>
</tbody>
</table>
Production of organic chemicals and fertilisers

Activity based approach: The use of organic fertilisers and other natural products have lower environmental impacts in comparison with chemical fertilizers, including improved soil conditions, slow-release plant nutrients, retention of soil moisture and the reduction of run-off.

Organic soaps

Activity based approach: Most commercially produced soaps contain synthetic lathering agents, artificial colorants and several other chemicals that might be dangerous both for the human body and the environment. Organic soaps, instead, can be considered a green sub-sector, since they use natural sources and reduce the impact on the environment.

Sustainable essential oils

Activity based approach: Effective management of waste products from the processing of the tree leaves is implemented in the majority of factories, making the sub-sector environmental sustainable.

Green cement

Activity based approach: Making traditional cement requires fossil fuels and produces large carbon emissions. Green cement cuts the emissions through using energy efficiency strategies and good waste management.

Manufacturing of pedicabs and bicycles

Activity based approach: Pedicabs and bicycles can be considered to be a green sub-sector as they provide sustainable transport options.

Manufacturing of machinery for steam, turbines and windmills

Activity based approach: Renewable energy production has fewer emissions and environmental impacts compared to conventional (fossil fuel) energy production.

Energy efficiency initiatives

Voluntary standard: Production of energy saving lights (CFL) which are certified with a 3-star label are more environmentally friendly (i.e. best light intensity/watt). Recycling

Activity based approach: Recycling prevents the waste of useful materials and processes them into new products. It reduces the use of new raw materials, decreasing also the consumption of energy and air pollution.

Source: Author's own data

7.5 Decent work in manufacturing

The manufacturing sector employed approximately 12,549,376 people in 2008, of which 29 per cent were working in the informal economy (see table below). Although this is still a large proportion, the share of shadow employment in the manufacturing sector is less than that of other sectors, such as forestry (79 per cent) or tourism (75 per cent).

Table 3: Formal and informal employment in the manufacturing sector, 2008

<table>
<thead>
<tr>
<th>Description</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total jobs in manufacturing</td>
<td>12,549,376</td>
</tr>
<tr>
<td>Total formal jobs in manufacturing</td>
<td>8,887,003</td>
</tr>
<tr>
<td>Total informal jobs in manufacturing</td>
<td>3,662,373</td>
</tr>
<tr>
<td>Estimated proportion of informal jobs in manufacturing</td>
<td>29%</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas
Data from the labour force survey can provide some information on working conditions, particularly on wages, employment status and occupation type, provision of training and working hours. For the manufacturing sector, the labour force survey estimates that 13 per cent of people in the manufacturing sector are own account workers, 54 per cent were employees and 7.5 per cent were labourers (see table below). Many own-account workers in the manufacturing sector work on a piece rate basis, which means that they do not receive a wage per se, but get paid on a quantity basis. The average wage in the manufacturing sector in 2008 was 868,886 IDR per month for labourers, and 929,776 IDR per month for employees. It is therefore likely that a substantial number of workers in the manufacturing sector earn more than the average minimum wage in Indonesia, which was 743,200 IDR per month in 2008.

Table 4: Occupations and employment status of manufacturing, 2008

<table>
<thead>
<tr>
<th>Employment status</th>
<th>Per cent</th>
<th>Main occupation</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own account worker</td>
<td>13 %</td>
<td>Professional, technical, related</td>
<td>2 %</td>
</tr>
<tr>
<td>Employer assisted by temporary worker</td>
<td>12 %</td>
<td>Administrative and managerial</td>
<td>2 %</td>
</tr>
<tr>
<td>Employer assisted by permanent worker</td>
<td>4 %</td>
<td>Clerical and related worker</td>
<td>5 %</td>
</tr>
<tr>
<td>Employee</td>
<td>54 %</td>
<td>Sales worker</td>
<td>2 %</td>
</tr>
<tr>
<td>Agricultural labourer</td>
<td>0 %</td>
<td>Service workers</td>
<td>3 %</td>
</tr>
<tr>
<td>Non-agricultural labourer</td>
<td>7.5 %</td>
<td>Agricultural labourer</td>
<td>&lt;1 %</td>
</tr>
<tr>
<td>Family worker</td>
<td>9.5 %</td>
<td>Other labourer</td>
<td>86 %</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

In terms of occupation, most people were considered to be labourers, being employees or casual labourers. 68 per cent of workers were unskilled, 28 per cent of workers were semi-skilled and 4 per cent of workers were skilled. On average people employed in the manufacturing sector worked for 46 hours per week. This is more than the maximum working hours stipulated in Indonesia, with excessive working hours defined as over 40 hours per week, with scope for an additional 14 overtime hours per week (Manpower Act, No. 30).

When asked whether workers had received training and capacity building, 18 per cent of workers reported that they had received training, 64 per cent reported that they had not received training and 18 per cent were unclear as to whether training had been provided. Awareness levels on health and safety or good work practices may therefore be low. No information could be identified with regard to the occupational health and safety of workers.

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173 Unskilled = education levels equivalent with junior high school; Semi skilled = education levels equivalent with senior high school; Skilled = education levels equivalent to diploma and above.

in the manufacturing sector, although it is likely that some workers will face poor working conditions with some potential for injury given the type of machinery used and the lack of safety measures in some of the sub-sectors. Moreover, some sub-sectors may also involve exposure to chemicals or other dangerous substances (e.g. the production of textiles, light bulbs and paper products).

There is some evidence to suggest that there are a high number of children working in the sector, as a joint ILO and BPS study highlighted that more than 10.4 per cent of working children aged 5 to 17 years are found in the manufacturing industry.\(^{175}\)

The manufacturing sector includes home-based industries, SMEs, large firms and multinationals. There are distinct differences in the employment conditions in each enterprise type, with large enterprises in the formal economy offering greater access to social protection and providing comparatively better working conditions than home-based industries in the informal economy. However, outsourcing is often encountered in the manufacturing sector, which has implications for employment quality. Unions have been campaigning in order to shift workers from outsourced contracts to staff contracts and have indicated that often they are forced to resort to industrial action in order to support quality improvements in employment conditions.

Therefore, in the manufacturing sector it could be argued that for employment to meet the criteria for decent work, it should be in the formal economy and provide remuneration at the minimum wage.

Some of the green sub-sectors that were identified require specific training, tools and equipment in order to ensure that working conditions are safe. In particular, work that involves the operation of machinery may entail a need for the provision of specific training on occupational health and safety. The labour force survey from 2008 asks if enterprises had provided support to workers to increase their ability and skill at work. Only energy efficiency initiatives, the manufacturing of materials that promote sustainability, and the cement sub-sectors revealed that over 40 per cent of workers were supported with skills training initiatives. Therefore there is a need to improve the training and support services provided to workers in order to improve employment quality in the manufacturing sector in general.

### 7.6 Estimating environment related employment

The number of jobs in each of the identified green sub-sectors has been estimated. These are shown in the table below, alongside a description of the source of the estimate. The total number of environmentally sustainable jobs estimated is 1,062,761, which is equivalent to 8.5 per cent of all jobs in manufacturing in 2008. The green sub-sector with the highest number of environmentally sustainable jobs is rattan and bamboo manufacturing. This is followed by jobs in green agro-processing and in the recycling industry.

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\(^{175}\) BPS and ILO (2009), Working children in Indonesia 2009
### Table: Environmentally sustainable employment in manufacturing, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Employment estimate</th>
<th>Source / Method of calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable edible oils</td>
<td>6,737</td>
<td>Estimate from Sakernas 2008, KBLI code 15143-15145.</td>
</tr>
<tr>
<td>Green agro-processing</td>
<td>31,979</td>
<td>Estimate from Sakernas 2008, KBLI code 15311-15317.</td>
</tr>
<tr>
<td>Lean manufacturing of garments</td>
<td>13,774</td>
<td>Estimate from Sakernas 2008, KBLI code 17301, 17302, 17303, 17304, 17400.</td>
</tr>
<tr>
<td>Rattan and bamboo manufacturing</td>
<td>951,490</td>
<td>Estimate from Sakernas 2008, KBLI code 20103, 20104, 20291, 20292, 20293, 20294, 20299, 36102.</td>
</tr>
<tr>
<td>Manufacturing of materials that promote sustainability</td>
<td>170</td>
<td>Estimate from Sakernas 2008, KBLI code 22302.</td>
</tr>
<tr>
<td>Production of organic chemicals and fertilisers</td>
<td>3,626</td>
<td>Estimate from Sakernas 2008, KBLI code 24121.</td>
</tr>
<tr>
<td>Sustainable essential oils</td>
<td>2,822</td>
<td>Estimate from Sakernas 2008, KBLI code 24924.</td>
</tr>
<tr>
<td>Green cement</td>
<td>11,123</td>
<td>Estimate from Sakernas 2008, KBLI code 26411.</td>
</tr>
<tr>
<td>Manufacturing of pedicabs and bicycles</td>
<td>7,968</td>
<td>Estimate from Sakernas 2008, KBLI code 31501.</td>
</tr>
<tr>
<td>Recycling</td>
<td>22,204</td>
<td>Estimate from Sakernas 2008, KBLI code 37100, 37200.</td>
</tr>
<tr>
<td><strong>Total “environment core” jobs</strong></td>
<td><strong>1,062,761</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

Some of the sub-sectors that have been identified are linked to the production of green goods and services, while some are linked to the ‘greening process’, irrespective of whether green products are produced. For example, energy efficiency initiatives include the manufacturing of energy efficient light bulbs, while green cement has focused on reducing emissions associated with production processes.

### 7.7 Estimating green jobs

By combining both qualitative insights from key informants on the employment conditions in the manufacturing sector and quantitative information from the labour force survey, it is estimated that 2.6 per cent of the jobs in the manufacturing sector could be considered to be green jobs.
Table: Green job estimates for the manufacturing sector, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable edible oils</td>
<td>4360</td>
</tr>
<tr>
<td>Green agro-processing</td>
<td>10,455</td>
</tr>
<tr>
<td>Lean manufacturing of garments</td>
<td>13,774</td>
</tr>
<tr>
<td>Rattan and bamboo manufacturing</td>
<td>274,152</td>
</tr>
<tr>
<td>Manufacturing of materials that promote sustainability</td>
<td>86</td>
</tr>
<tr>
<td>Production of organic chemicals and fertilisers</td>
<td>578</td>
</tr>
<tr>
<td>Organic soaps</td>
<td>2899</td>
</tr>
<tr>
<td>Sustainable essential oils</td>
<td>1072</td>
</tr>
<tr>
<td>Green cement</td>
<td>7045</td>
</tr>
<tr>
<td>Energy efficiency initiatives</td>
<td>5708</td>
</tr>
<tr>
<td>Manufacturing of pedicabs and bicycles</td>
<td>3348</td>
</tr>
<tr>
<td>Recycling</td>
<td>8061</td>
</tr>
<tr>
<td><strong>Total green jobs</strong></td>
<td><strong>331,538</strong></td>
</tr>
<tr>
<td><strong>Total green jobs (per cent)</strong></td>
<td><strong>2.6 per cent</strong></td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

Most green jobs are in rattan and bamboo manufacturing, followed by the lean manufacturing of garments and green agro-processing. The recycling sector also has a higher number of green jobs, however, the proportion of green jobs to environmentally sustainable jobs is fairly low (36.3 per cent), indicating a need for initiatives to promote job quality within the sub-sector.

Though the number of people employed in the manufacturing of energy efficient initiatives is lower than the other sub-sectors, the proportion of environmentally sustainable jobs that are green jobs is quite high. Similarly, the number of people employed in organic soaps and sustainable edible oils also low, but many of the environmentally sustainable jobs could also be considered to be green jobs.

The lean manufacturing of garments was considered to be a practice that was typically found in firms owned by foreign companies in Indonesia. As these companies are obliged to follow labour market regulations, it was assumed that all jobs related to lean manufacturing of garments should also meet the criteria for decent work.

Table: Green jobs as a proportion of environmentally sustainable jobs in the manufacturing sector, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Per cent of environmentally sustainable jobs that are green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable edible oil</td>
<td>64.7%</td>
</tr>
<tr>
<td>Green agro-processing</td>
<td>32.7%</td>
</tr>
<tr>
<td>Lean manufacturing of garments</td>
<td>100.0%</td>
</tr>
<tr>
<td>Activity</td>
<td>Percentage</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Rattan and bamboo manufacturing</td>
<td>28.8%</td>
</tr>
<tr>
<td>Manufacturing of materials that promote</td>
<td>50.7%</td>
</tr>
<tr>
<td>sustainability</td>
<td></td>
</tr>
<tr>
<td>Production of organic chemicals and fertilisers</td>
<td>15.9%</td>
</tr>
<tr>
<td>Organic soaps</td>
<td>64.2%</td>
</tr>
<tr>
<td>Sustainable essential oils</td>
<td>38.0%</td>
</tr>
<tr>
<td>Green cement</td>
<td>63.3%</td>
</tr>
<tr>
<td>Energy efficiency initiatives</td>
<td>89.9%</td>
</tr>
<tr>
<td>Manufacturing of pedicabs and bicycles</td>
<td>42.0%</td>
</tr>
<tr>
<td>Recycling</td>
<td>36.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31.2%</strong></td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

In order to promote green jobs in the manufacturing sector it is important to have initiatives that focus on increasing the sustainability of the sector, as well as initiatives to support improvements in employment quality.

In particular, green agro-processing, rattan and bamboo manufacturing, organic fertilizers, sustainable essential oils and recycling activities play an important role in supporting an economy to become more environmentally sustainable. However, these activities can only be effective at supporting a transition to a green economy if they are socially and environmentally sustainable. Less than 40 per cent of the jobs mentioned in these five sectors meet the criteria that would allow them to be considered as both socially and environmentally sustainable. Supporting the organization of people working in these sub-sectors and value chain development may help to improve employment quality. The Government may also consider various fiscal policy options in order to support the development of these sub-sectors.

There is potential for expanding the number of green jobs in sustainable edible oils and green agro-processing through the provision of incentives/disincentives to firms to support sound management of the waste and the application of energy-saving practices in order to reduce impacts on the environment. Currently, it is estimated that only a small proportion of firms in agro-processing have put such measures in place, with the UNFCCC report noting that one of the key sources of solid waste in the manufacturing sector is associated with agro-industries and the discarded fruit bunches from palm oil processing.

In the weave, textiles, garment and apparel sectors there is scope to improve the social and environmental efficiency of factory processes and for lean manufacturing approaches to be adopted further throughout the sector. Initiatives such as those undertaken by the ILO's Better Work programme, which provides advisory services to garment factories on how to improve
efficiency across a range of indicators, could be key in supporting a sectoral shift to a green economy model.

It is important for factories to make commitment to using sustainable or certified materials of inputs in order to promote environmental friendly products. Furthermore, it would be necessary to have further regulations and policies on eco-labeling, to allow for the better marketing of sustainable products, particularly in organic soaps and essential oils. It would also be important to strengthen linkages and partnerships with agencies that promote fair trading practices, in order to expand market access and the market share for manufacturers who produce green products.

The manufacturing sector has many activities that were not considered to meet the criteria for being classified as a "green sub-sector" at this time. It is important that those industries, such as steel manufacturing, pulp processing, ceramics, motor vehicle manufacturing, rubber processing and plastics, adopt strategies to reduce their environmental impact and improve their employment quality in the future.
Chapter 8: Green jobs in construction

Indonesia’s construction sector has been increasing over the last number of years, in order to support the acceleration of economic growth and address constraints to development. The development of the construction industry is important for the country’s economic growth, but the types of investments and the way these investments are made has important implications for the sustainability of the sector and the overall economy. As Indonesia has committed to “sustainable growth with equity”, the construction sector needs to come to grips with how to become more environmentally friendly while being also socially sustainable. Concepts for understanding how to shift to a green growth model in the construction sector include notions such as economic resilience (measured through productivity), environmental sustainability (measured through use of resources, climate resilience and impacts on the environment) and inclusiveness (participation society and impact on development). Concepts such as green buildings and green construction are being defined.

To support sustainable and inclusive growth, this chapter provides key information on the construction sector in Indonesia, including economic trends and linkages between the environment and employment. It discusses the impacts that the construction sector’s activities have on the environment and what actions are being undertaken to improve the sector’s environmental sustainability. On the basis of this information and extensive consultations, sub-sectors providing environmentally friendly activities and employment associated with these activities have been identified. A further discussion on the decency of work in these sub-sectors provides the basis for estimating green jobs in construction.

8.1 Overview of the construction sector

The Medium Term Development Plan for 2010-2014 (RPJMN) notes that the development of infrastructure is important for a number of reasons, including for the acceleration of growth, for the revitalization of agriculture, and for the inclusiveness of growth.

Subsequently, investment in infrastructure has been increasing. To illustrate this point, in 2005 the construction sector contributed IDR 195,111 billion or 7.03 per cent to gross domestic product (GDP). By 2011 the construction sector contributed IDR 756,538 billion or 10.19 per cent to GDP (see figure below). The acceleration of the construction sector is set to continue, with the strengthening of national connectivity being one of the pillars of Indonesia’s plan for acceleration and expansion of economic development between 2011 and 2025.
Employment in the construction sector has also been growing. In 2005, the construction section employed 4.6 million people or 4.86 per cent of the labour force. By 2011 employment in the construction sector had grown to 6.3 million people and accounted for 5.78 per cent of employment in Indonesia. The majority of employment in the construction sector is in the building of commercial and residential buildings and in the construction of roads.

The construction sector includes activities that can broadly be grouped into five categories, including building construction, transport infrastructure, water infrastructure, communications and electricity. Building construction includes land preparations and the building of residential, commercial and government buildings. Transport infrastructure includes the building of roads, bridges, railways, tunnels, ports and airports. Water
infrastructure includes irrigation, dams and water storage, water supply, wastewater management and drainage. Communications includes the construction of telecommunication systems and navigation tools and signals for use on land, water and air, as well as installation of these systems. Electricity includes the distribution and storage of oil and gas and the construction of mining infrastructure, as well as installations of electricity, gas and water supply. The Indonesian Government is currently prioritizing investment in transport, information and communication technology and energy.

Indonesia has been active in using fiscal policy to stimulate the economy in times of economic downturn and has incorporated additional allocations for investments in infrastructure in stimulus packages. For example, in 2009 the Government of Indonesia announced a stimulus package worth IDR 73.3 trillion (approximately 1.4 per cent of GDP), comprising primarily of tax cuts, subsidies, and increased infrastructure expenditure. The infrastructure component of the stimulus package was worth IDR 12.1 trillion and was to create an additional one million short-term work opportunities through use of labour intensive approaches. Investments were to support social and economic objectives, while also creating jobs. The package channeled investment into infrastructure projects including:

- Transport infrastructure development;
- Communications infrastructure development;
- Energy infrastructure development;\(^\text{176}\)
- Housing infrastructure development;
- Market infrastructure development;
- Agricultural infrastructure development;
- Improvements to vocational training centres;
- Rehabilitation of warehouses for storage of staple goods.

The Government sought to use infrastructure investments to respond to the economic shock, while also increasing the resilience of the overall economy in the long term. Investments in local level infrastructure are also made in several of the government’s poverty reduction programmes, including the National Programme for Community Empowerment (PNPM-Mandiri or Program Nasional Pemberdayaan Masyarakat Mandiri), Rural Infrastructure Development Programme (Program Pembangunan Infrastruktur Perdesaan (PPIP)) and the Employment Intensive Programme (Padat Karya Prouktif and Padat Karya Infraktur). Based on community’s needs, these programmes invest in social, transport and agricultural infrastructure, and may also be connected to access to credit and value chain development activities.

In addition to supporting local investments, the Government has been developing plans at the national level to support national roads, ports, water supply and management, public transport and air transport, among others. The Government is seeking to cooperate with the private sector under its public-private partnership scheme in order to accelerate infrastructure investment, and has been embarking on legislative and institutional reforms to promote this.

Indonesia faces several challenges accelerating investment in infrastructure. For example, the archipelago geography of Indonesia presents challenges for regional connectivity. The quality of infrastructure in many regions in Indonesia is currently inadequate for supporting industrial development, with narrow and damaged roads, outdated rail infrastructure,

\(^{176}\) Including labour intensive micro-hydro projects.
inefficient sea ports and poor electricity and ICT connections hampering development. In order to address these issues, the MP3EI is seeking to support improvements in connectivity between the primary sectors and markets. Investments have a particular focus on providing a facilitative environment for domestic and export markets. One example is the Sunda Straits Bridge, between Java and Sumatra, which is expected to facilitate the development of producer and market connectivity between the two islands.

Other infrastructure challenges relate to the responsibility for constructing and maintaining assets, and provision of support for the training and certification of those working in the construction sector. For instance, the national, provincial, district and sub-district public works offices are all involved in investing in transport infrastructure. Public works at the national level is responsible for national roads and the province is responsible for provincial roads, etc. When there is a finite budget, decisions have to focus balancing the need for maintaining existing assets and investing in new assets. Further support is needed to ensure that the decisions that are made on the spending of infrastructure funds are efficient and effective in both maintaining and expanding infrastructure.

In addition, the maintenance of assets can be a contentious issue, as in programmes such as PNPM where assets are developed and then handed over to local governments. The local government is then becomes responsible for maintaining the asset, but no additional budget is allocated to support this. There are also some types of infrastructure that have unclear asset maintenance lines of responsibility. For example, the Ministry of Public Works is responsible for maintaining roads that are three meters wide and above, but the authority responsible for maintaining roads that are less than three meters wide is often unclear and contentious.

The reason for the weak state of infrastructure in Indonesia has been attributed to difficulties in land acquisition, weak institutional and human capacity, poor governance and limited access to finance. These factors compound in the context of rent-seeking behaviors and lack of market competition. In addition, in transport infrastructure access to finance is identified as a key barrier, while in ports and air transport there is a perception that the sector provides low rate of return on investment. Investments in electricity need to come to grips with supply costs and distribute risk throughout the supply change.

8.2 Importance of construction to the environment

The RPJMN notes that many environmental problems, such as water, air, soil pollution, and floods in urban areas, are closely related to the absence of an adequate or appropriate infrastructure. For example, further investments in water control infrastructure are needed to prevent flooding and are part of good urban development. Road infrastructure and buildings have direct and indirect implications for the environment, and it is important to understand how this infrastructure improves or deteriorates the environment. It is also important to increase the climate resilience of such infrastructure. Therefore, investment in infrastructure can both improve and deteriorate the environment. Subsequently, the construction sector in Indonesia requires that environmental impact assessment evaluations (AMDAL) are undertaken prior to the commencement of works. There are also regulations regarding environmental management efforts and environmental monitoring efforts (UKL/UPL), which need to be applied in cases where it is not necessary to undertake an AMDAL. This is

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important, as poorly planned infrastructure can create environmental hazards and risks, such as flooding or destabilization of soils.

Investment in infrastructure is a necessity that will continue to expand. For instance, for transport infrastructure, growth in the number of vehicles and the demand for convenient transport options will require the development of the road network and challenge policymakers to develop innovative options to respond to issues associated with congestion, environmental responsibility and spatial planning. Investing in infrastructure, for example in relation to water course management, river banks management and infrastructure for agriculture (irrigation) is important to increase resilience of the economy against the adverse effects of climate change and sustain production in agriculture. Other types of investments are required, such as in roads and buildings, so that they become more resistant to adverse climate events (climate resilient construction).

In addition, construction is an important sector when it comes to greenhouse gas emissions. Globally, major efforts are being undertaken to try to reduce the carbon footprint of this sector as well as to minimize the environmental impacts due to infrastructure after the construction process, which includes enhancing resource efficiency, recycling of waste construction materials (debris) and prevention of river erosions, among others. As with other economic sectors, the transportation of building materials from different regions and countries contributes towards GHGs emissions. A report on construction in Java assessed the sourcing habits of road, water installation and building constructions. The results of the study indicate that materials such as aluminum, stone and rocks were sourced from 10-25km away, while concrete, cement and asphalts were sourced from different regions and provinces (more than 25km away). Wood materials tended to be sourced from more remote locations, as did specialized materials such as steel. It must be noted that the high carbon intensity of the sector comes from cement production and the use of energy intensive cement kilns. Important efforts are being made in the industry to improve the production process and reduce energy use through various environmentally friendly techniques and green technologies.

Therefore, it can be seen that infrastructure investment creates demand for inputs throughout the construction process and the manufacturing of these inputs is often energy intensive, and therefore entails emissions of carbon and the depletion of natural resource stocks. Inputs include materials from mines and quarries, timber and other high carbon materials such as cement and galvanized steel. Data on carbon emissions from the construction sector are grouped with emissions from the manufacturing sector in Indonesia. However, it is important to note that shifts towards the use of renewable inputs and renewable sources of energy can help to reduce the environmental impact of the construction sector, as can quality standards that ensure the long term durability and efficiency of assets.

The construction sector also has the responsibility for providing infrastructure to manage waste, particularly waste water. For instance, the Denpasar Sewerage Development Project (DSDP) is a flagship project that was developed in an effort to address issues related to the pollution of river water, ground water and wells, and address the need for waste water treatment. It is important that such facilities are able to effectively respond to the volume of waste that will be generated over the life time of the asset and that plans are put in place to address capacity constraints as the population and number of buildings increase.

Effective waste management is not just about whether the "end processing" infrastructure can adequately meet needs, it is also about ensuring that waste does not become a bottleneck in various systems and that processes from various infrastructure investments do not create new waste problems. For example, there are a number of factors that are associated with the reduction of water quantity and quality in Indonesia, including upstream construction and processing activities that lead to increased sedimentation in and pollution of rivers due to underdeveloped solid waste management systems. Further focus on assessment of the impact of infrastructure investments on the environment may be needed in order to safeguard the environment from potential degradation.

The construction sector includes infrastructure investments, such as irrigation and water management facilities, that support environmental management. The environmental impact of irrigation and water management networks is linked to the planning and coordination undertaken within the overall catchment area of the investment, as well as the availability of funds for the maintenance of the implemented schemes. Irrigation and water management infrastructure can be affected by water pollution from nutrient run off, over exploitation of aquifers and erosion, among others. It has been widely reported that irrigation infrastructure in Indonesia has been poorly maintained. The situation seems to indicate a need for the rehabilitation of depleted networks, while at the same time ensuring that strong community based maintenance systems are in place. There were approximately 3.68 million ha of irrigation systems in Indonesia in 2010. Approximately 50 per cent of this infrastructure was considered to be in good condition, while 14 per cent was in a fair condition, 28 per cent was in a poor condition and 6 per cent was considered to be ruined.

Finally, processes that are concerned with the design and installation of amenities in various types of infrastructure, such as electricity and water as well as insulation have an impact on the environment. The technology choices that are made in these processes can have a long term impact on the resource efficiency of the investment. For example, it is estimated that buildings have the capacity to reduce their projected emissions by as much as 29 per cent by 2020, through adopting greener construction techniques.\footnote{IPCC (2007) Fourth Assessment Report}

### 8.3 Key trends towards sustainability

The construction sector has many standards and regulations that relate to building construction, transport infrastructure, water infrastructure, communications and electricity. The regulatory environment that is associated with construction has been shifting towards more sustainable practices in recent years. For instance, a requirement for investing in infrastructure is the completion of an environmental impact assessment (AMDAL) as per Government Regulation No. 27/1999.

In addition, regulations on the environment, land tenure and spatial planning all impact on the construction and infrastructure investment. For instance, the Law No. 32/2009 on Protection and Management of the Environment provides the parameters for environmentally sustainable development in Indonesia and this law has been used to ensure that the agricultural infrastructure investment in Papua known as Merauke Integrated Food and Energy Estate (MIFEE) is in line with sustainable development principles. Presidential Regulation (Perpres) No. 71/2012 on Land Procurement Procedures for Development and
Public Interest provides regulations on planning, preparation, execution and delivery of outcomes for public facilities as well as infrastructure development.

There are several specific initiatives that have been undertaken to promote ‘green construction’ (or environmentally friendly construction) in Indonesia. For example, in 2010 the Green Building Council launched a green building rating system called "Greenship" to assess new buildings. The system targets commercial construction and covers six rating criteria, including:

- Appropriate Site Development (ASD);
- Energy Efficiency Conservation (EEC);
- Water Conservation (WAC);
- Material Resources and Cycle (MRC);
- Indoor Air Health and Comfort (IHC);
- Building Environment Management (BEM).

It is expected that this new rating system, which is voluntary for the time being, will provide certification of new "green" buildings and will also have some spillover effects through boosting the demand for environmentally friendly building products. This rating system will be able to build upon a number of international voluntary standards being adopted progressively, in particular by international and big national companies and buildings such as ISO 14001 on environmental management systems or more recently ISO 50001 on Energy management.

There has also been a rise in the construction of eco-buildings (both commercial and residential buildings). Examples of this include the building that houses the International Building Development Centre (IDC) and the Central Library Building at the University of Indonesia. These buildings have sustainable features, such as increased natural daylight and air flow to reduce electricity usage and greater use of renewable construction materials.

The movement towards green buildings is most apparent in Jakarta, where the Provincial Government has issued Government Regulation No. 38/2012 on Building Permits and Certification of Building Usage with minimum standards set to support the expansion of "green buildings". The regulation ensures that all new buildings are energy efficient, recycle their water usage and have lower emissions, and supports the retrofitting of older buildings with green technologies. In other parts of Indonesia companies in the construction sector can follow Green Building Certification Processes that have been provided by the Green Building Council on a voluntary basis. Another important aspect of green buildings is reducing the consumption of environmentally unsustainable materials. For example, the construction of two schools in Jakarta, which are being piloted as part of the green building concept, have reduced the content of wood in building materials so as to lower the impact of construction on deforestation. Such practices are set to increase following the implementation of the green building decree. However, these initiatives are still in their infancy and are yet to be expanded widely in the country.

Part of the efforts made in reducing the environmental impact of this critical sector for carbon emissions relate to the retrofitting of the existing built stock. Demand for retrofitting of buildings with appropriate technologies and renewable energy systems is set to increase with Presidential Decree No.5 / 2006 setting the target for the contribution of renewable energy in the national primary energy mix from 4.3 per cent in 2008 to 17 per cent by 2025.
The Green City Development Programme (Program Pengembangan Kota Hijau - P2KH), which is based on Law No. 26/2007 on Spatial Planning and Development, is to be implemented in 60 regencies from 2012 onwards. The programme seeks to develop cities to support local spatial plans and focuses on eight areas of need: green planning and design, green community, green open space, green water, green waste, green energy, green transportation, and green buildings.

The Ministry of Public Works also prepared a revitalization programme in 210 cities that provides support to end processing areas (Tempat Pemrosesan Akhir (TPA)) through grant funding in order to improve the management of solid and liquid waste and to increase the scope of waste management services in communities. In order to access these funds, district level governments need to prepare sanitation strategies, which include elements on garbage (solid waste), domestic waste water and urban drainage, and procure financial commitments from all levels of government to reduce environmental pollution, manage water resources and support the ongoing operation and maintenance of these waste management systems.

In regional and rural areas in Indonesia there is a culture of using a combination of local labour, light equipment and locally available materials and skills as the main resources in the construction, rehabilitation and maintenance of local rural transport networks, particularly village level assets. Such approaches tend to be less resource intensive than capital intensive methods of constructing roads, which often entail importing labour, materials and heavy equipment in the construction process. There have been efforts recently to further develop district and village road networks in Indonesia through the application of the ILO's "Local Resource Based Approach" (LRB), which follows the concept of optimizing the use of local resources in the construction process, but includes innovations in both asset and employment quality that can improve the environmental, social and economic sustainability of infrastructure investment. For example, the LRB approach supports the use of durable, low-maintenance construction materials, such as galvanized steel for foot-bridges (compared to wood) which may decrease degradation of local forests while also ensuring that communities have sustained access to livelihoods. The LRB framework also advocates for "community contracting" approaches, which ensures that local workers benefit from the local employment opportunities and capacity building initiatives that are created during asset construction. The application of the LRB approach provides opportunities for the creation of green jobs and also for the greening of existing jobs.

A better road

Nias is a beautiful tropical island situated in North Sumatra Province. It is an important tourist destination in Indonesia, especially for surfers, who travel from all over the world to ride the renowned waves of Nias Islands. Despite all that Nias has to offer, the majority of its inhabitants are living in poverty and they face many barriers to market participation and social services access.

Mrs. Murniati Bate’e is one of Nias Island’s indigenous people originating from Dahana Village in Gunungsitoli Idanoi sub-district. When the ILO’s Rural Access and Capacity Building Project commenced reconstruction on a 1,235 meter road situated in Dahana Village, many local people - both contractors and road reconstruction workers - gained work from the project. The project used the local resource based approach to implement the works, and completed the works using cold bitumen emulsion, which avoids the burning of wood and exposure to chemicals or other dangerous substances during the heating of conventional
bitumen for road works.

After the works were completed, the ILO formed a group for road maintenance from within the local community that was made up of 8 (eight) women in April 2010. The group was responsible for clearing the drainage along the side of the road and removing the weeds, as well as ensuring that the reconstructed road was in good condition.

In conjunction with the skill enhancement of this newly formed women group, the ILO provided some training on group management and also explained the type of work – and the quality of work - that was expected from the group. “I appreciated this training as it helped us to understand what we have to accomplish and how to divide tasks within the group. Through this training, I now have a greater self-confidence for undertaking work on road maintenance. I have learnt that I can maintain the assets of my community if I am given the opportunity. The income that I received from this job has allowed me to pay my children’s fees for school tuition and to buy a new stove,” said Mrs. Bate’ smiling happily.


8.4 Identified green sub-sectors

Green sub-sectors which are likely to provide environmentally sustainable employment were identified through a combination of desk review and focus group discussions (FGD) with stakeholders from the construction sector. The green sub-sectors are outlined in the table below. These include green buildings, labour intensive transport infrastructure, irrigation and water management and installation of renewables. In general telecommunications, aviation and navigation infrastructure as well as installation of various conventional items were not considered to meet to criteria for being classified as a “green sub-sector”.

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green buildings</td>
<td>Voluntary standard: The Government has recently established a green building rating tool, a voluntary environmental rating system that evaluates the environmental design and construction of buildings. The rating tool covers the sustainability of the site, energy, water and waste management, material resources, indoor quality, innovation, transportation and social economy. These are divided into credits, and points are awarded in each credit. New building construction and existing office buildings were prioritised for assessment. For new buildings, an energy saving standard of between 10 and 40 per cent of the Indonesian National Standards’ [SNI] building energy standard has been set.</td>
</tr>
<tr>
<td>Labour intensive transport</td>
<td>Activity based approach: In rural areas in Indonesia there is a culture of using a combination of local labour, light equipment and locally available materials and skills as the main resources in the construction, rehabilitation and maintenance of local rural transport networks. Such approaches are less resource intensive than capital intensive methods of constructing roads, which often entail importing labour, materials and heavy equipment in the construction process.</td>
</tr>
<tr>
<td>Irrigation and water management</td>
<td>Activity based approach: Irrigation and water management are important investments for climate proofing agricultural areas and ensuring effective management of potable and waste water.</td>
</tr>
</tbody>
</table>
Installation of renewables

| Activity based approach: Installation of renewables results in fewer GHG emissions and environmental impacts compared to the installation of conventional (fossil fuel) technologies. |

8.5 Decent work in construction

The construction sector employed approximately 5,438,965 people in 2008, of which approximately 64 per cent were working in the informal economy. It is difficult to estimate the decency of work in the construction sector, considering the high proportion of jobs in the informal economy and lack of data at the micro level on individual occupations.

However, data from the labour force survey can provide some information on working conditions, particularly on wages, employment status and occupation type, provision of training and working hours. For the construction sector, the labour force survey estimates that 7.2 per cent of people in employed are own account workers, 35.7 per cent were employees and 47.9 per cent were labourers (see table below). Many labourers in the construction sector work on a daily rate basis in the informal economy. The average wage in the construction sector in 2008 was 899,440 IDR per month for labourers, and 1,094,256 IDR per month for employees. It is therefore likely that a substantial proportion of workers in the construction sector earn the average minimum wage in Indonesia, which was 743,200 IDR per month in 2008.

Table: Occupations and employment status of construction workers, 2008

<table>
<thead>
<tr>
<th>Employment status</th>
<th>Per cent</th>
<th>Main occupation</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own account worker</td>
<td>7.2%</td>
<td>Professional, technical, related</td>
<td>2.3%</td>
</tr>
<tr>
<td>Employer assisted by temporary worker</td>
<td>4.2%</td>
<td>Administrative and managerial</td>
<td>2.0%</td>
</tr>
<tr>
<td>Employer assisted by permanent worker</td>
<td>4.3%</td>
<td>Clerical and related worker</td>
<td>2.1%</td>
</tr>
<tr>
<td>Employee</td>
<td>35.7%</td>
<td>Sales worker</td>
<td>0.3%</td>
</tr>
<tr>
<td>Casual Agricultural labourer</td>
<td>0%</td>
<td>Service workers</td>
<td>2.2%</td>
</tr>
<tr>
<td>Casual non-agricultural labourer</td>
<td>47.9%</td>
<td>Agricultural worker</td>
<td>0%</td>
</tr>
<tr>
<td>Family worker</td>
<td>0.7%</td>
<td>Other labourer</td>
<td>90.0%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

In terms of occupation, most people were employed as construction labourers - 90 per cent. 77.1 per cent of workers were unskilled, 19.2 per cent of workers were semi-skilled and 3.8 per cent of workers are skilled. On average employees and labourers in the construction sector both worked for 47 hours per week. When asked whether workers had received training and capacity building, nine per cent of workers reported that they had received training, 67 per cent reported that they had not received training and 24 per cent were unclear as to whether training had been provided. Awareness levels on health and safety or good work practices are therefore likely to be low.

No comprehensive information could be identified on occupational health and safety in the Indonesian construction sector, although it is likely that many labourers work in poor conditions that do not meet safety standards. For instance, many construction labourers are

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180 Unskilled = education levels equivalent with junior high school; Semi skilled = education levels equivalent with senior high school; Skilled = education levels equivalent to diploma and above.
required to work on scaffolding structures at high levels and often do not have the appropriate equipment to ensure their safety. Given the low number of people that reported that they had been trained, risk of injury may be high given the types of machineries used and the location of construction sites. In general employment in the construction sector can be dangerous due to its physically demanding nature, the routine exposure to climatic conditions, heavy equipment operation and site conditions. Moreover, some activities may involve exposure to chemicals or other dangerous substances (e.g. heating of bitumen for road works), that entail health risks.

Work in the construction is typically short-term and is often undertaken by casual labourers on a daily basis. Subcontracting is common due to the project based nature of construction work. Subcontracting also means that workers often work without formal contracts and have limited access to social protection and injury compensation mechanisms.

The trend of subcontracting has implications for access to labour rights as well as on skills formation in the construction industry. Indeed, most workers in the construction sector have not followed training courses that have provided them with certified skills. There is currently a "National Movement for Training in Construction" initiative that has sought to consolidate and develop competencies in the formal construction, which is seeking to provide support for transforming activities in the informal economy into decent and productive jobs that support sustainable livelihood improvement. However, in regional and remote areas capable technicians are rare and there are many barriers to accessing formal training opportunities.

Industrial relations and collective bargaining have special significance in the construction industry due to the high mobility of workers and the short term nature of project based work and the large number of small contractors that operate within the industry. Many people who work as daily labourers have limited opportunities to join unions and engage in formal industrial bargaining processes.

In summary it was concluded that in the construction sector it could be argued that for employment to meet criteria for decent work, it should provide remuneration above the minimum wage and provide workers with job security and access to health insurance and injury compensation mechanisms. Due to the technical nature of work in the construction sector, it was considered that workers and employers need to have skills training to ensure that competencies are adequate and that risks associated with construction works are reduced.

8.6 Estimating environment related employment

The number of jobs in each of the identified green sub-sectors has been estimated. These are shown in the table below, alongside a description of the source of the estimate. The total number of environmentally sustainable jobs estimated is 414,780, which is equivalent to 7.6 per cent of all jobs in the construction sector in 2008. The green sub-sector with the highest number of environmentally sustainable jobs is green buildings, followed by jobs in labour intensive transport infrastructure and irrigation and water management. Less people were employed in the installation of renewables.
Job estimates: Environmentally sustainable employment in construction, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Employment estimate</th>
<th>Source / Method of calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green buildings</td>
<td>241,476</td>
<td>Estimate from Sakernas 2008, proportion of KBLI codes 45100-45219 based on qualitative information from key informants.</td>
</tr>
<tr>
<td>Labour intensive transport infrastructure</td>
<td>116,928</td>
<td>Estimate from Sakernas 2008, proportion of KBLI code 45221 and 45222 based on estimates that 57% of people working in road construction live in rural areas.</td>
</tr>
<tr>
<td>Irrigation and water management</td>
<td>53,195</td>
<td>Estimate from Sakernas 2008, 100% of KBLI codes 45224 and 45225</td>
</tr>
<tr>
<td>Installation of renewables</td>
<td>3,182</td>
<td>Estimate from Sakernas 2008, 4.3% of KBLI 45312 and 45314, considering that 4.3 per cent of the energy sources came from renewables in 2008 (Presidential Decree no. 5/2006).</td>
</tr>
<tr>
<td><strong>Total “environment core” jobs</strong></td>
<td><strong>414,780</strong></td>
<td>Source: Authors’ estimates based on BPS Sakernas</td>
</tr>
</tbody>
</table>

8.7 Estimating green jobs

By combining both qualitative insights from key informants on employment conditions in the construction sector and quantitative information from the labour force survey, it is estimated that 3.4 per cent of all jobs in the construction sector could be considered to be green jobs. Decent work criteria for each sub-sector, including wages, access to social protection, industrial relations and risks at work, informed the estimation of jobs are that both socially and environmentally sustainable.

Table: Green jobs estimate for the construction sector, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green buildings</td>
<td>104,548</td>
</tr>
<tr>
<td>Labour intensive transport infrastructure</td>
<td>58,573</td>
</tr>
<tr>
<td>Irrigation and water management</td>
<td>22,333</td>
</tr>
<tr>
<td>Installation of renewables</td>
<td>2,297</td>
</tr>
<tr>
<td><strong>Total green jobs</strong></td>
<td><strong>187,751</strong></td>
</tr>
<tr>
<td>Total green jobs (per cent)</td>
<td>3.4 per cent</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

Most green jobs are in green buildings and labour intensive transport infrastructure. Though the number of people employed in installation of renewables is lower than the other sub-sectors, the proportion of environmentally sustainable jobs that are green jobs is quite high (72.2%), thus reflecting greater employment quality in this sub-sector. A government subsidy programme for retrofitting and installation of renewables may be an effective strategy to support the expansion of green jobs in this sub-sector.
<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Per cent of environmentally sustainable jobs that are green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green buildings</td>
<td>43.3%</td>
</tr>
<tr>
<td>Labour intensive transport infrastructure</td>
<td>50.1%</td>
</tr>
<tr>
<td>Irrigation and water management</td>
<td>42.0%</td>
</tr>
<tr>
<td>Installation of renewables</td>
<td>72.2%</td>
</tr>
<tr>
<td>Total</td>
<td>45.3%</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

Employment in the irrigation and water management sub-sector includes jobs that are undertaken in urban, regional, rural and remote settings. Employment in this sub-sector can be in the formal sector or in community based informal settings. For example, large dams and water reservoirs that are highly engineered and concrete based structures that are designed for highly populated areas are likely to be associated with quality jobs in the formal economy. While those supporting the operation and maintenance of tertiary irrigation canals are likely to either involve district government, small contractors or be community based. Many of those working in irrigation, particularly community based irrigation, would likely benefit from support for adopting appropriate technologies and structures to assist in the maintenance of irrigation systems. In some cases cooperatives may be set up to support water and resource management and provide eco-system services, which may also support improvements in employment quality.

In order to increase the number of green jobs in the "green building" construction sector it would be important for contractors to participate in the green building certification processes and adopt green procurement standards in their projects. It would also be important for those involved in construction to use inputs that are certified "green products" and adopt environmentally sound waste management practices, which would support green job creation in other sectors of the economy.

As mentioned, in regional and rural areas in Indonesia there is a culture of using a combination of local labour, light equipment and locally available materials and skills as the main resources the construction, rehabilitation and maintenance of local rural transport networks. This approach typically provides SME contractors and local labour with short term employment opportunities during construction and rehabilitation works, while stimulating the local economy by providing wage income cash transfers and increasing access to markets and services for local communities. However, often the assets that are created through these investments are poorly constructed resulting in low quality roads and bridges. Quality assets can be created through application of labour intensive approaches that are of the same quality standard of comparative assets built with machine intensive methods. The challenge is associated with capacitating construction sector workers and with ensuring that assets are designed and works implemented to appropriate standards. Addressing such issues would also lead to improvements in employment quality in labour intensive transport infrastructure.

As only 50 per cent of employment in "labour intensive transport infrastructure" and 43 per cent of employment in "green buildings" could be considered to meet criteria for being classified as "green jobs", there is considerable scope for strengthening employment conditions through working with government and employers’ and workers' organizations in application of minimum wages, inspection of construction sites and in procurement and
project design to ensure that work in the labour intensive transport construction and building sub-sectors is decent. One concrete recommendation for improving employment quality would be to consider the endorsement of the International Organization for Standardization’s Standard 10845 on procurement in the construction sector, which includes specifications for key performance indicators that measure factors such as use of local contractors, local resources and local labour, in order to establish a target level for contractors’ performance. Adoption of such a standard would enable procurement systems to respond to aspects of sustainable development (inclusive of economic and social elements) in a meaningful and measureable way.

As mentioned above, environmental impact assessment evaluation is very important for sustainable construction in order to limit environmental damage and risks. Currently Indonesia has regulations regarding environmental impact assessment (AMDAL) and regulations for environmental management efforts and environmental monitoring efforts (UKL/UPL). However, these regulations are not always applied when constructing infrastructure, particularly village-level infrastructure. Therefore, further efforts on monitoring and inspection of these regulations are required in order to improve the sustainability of this sector.
Chapter 9: Green jobs in transport

Indonesia’s transport sector is developing rapidly in land, water and air transport contexts across the archipelago. The transport sector provides access to livelihoods and supports the acceleration of economic growth. However, the transport sector is responsible for a high proportion of carbon emissions in Indonesia and alternative modes of transport that are more sustainable need to be further developed. To support sustainable and inclusive growth, this chapter provides key information on the transport sector in Indonesia, including economic trends and linkages between the environment and employment. It discusses the impacts that transport services have on the environment and what actions are being undertaken to improve the sector’s environmental sustainability. On the basis of this information and extensive consultations, sub-sectors providing environmentally-friendly activities and employment associated with these activities have been identified. A further discussion on the decency of work in these sub-sectors provides the basis for estimating green jobs in transport services.

9.1 Overview of the transport sector

The transport sector contributed approximately 3.4 per cent towards GDP in 2010, with road transport followed by air transport and services allied to transport providing the largest contributions. In terms of employment, the transport sector accounted for almost 5.2 per cent of the total labour force, employing 5,619,022 workers in 2010.

<table>
<thead>
<tr>
<th>Industrial origin</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railway transport</td>
<td>0.04%</td>
</tr>
<tr>
<td>Road transport</td>
<td>1.89%</td>
</tr>
<tr>
<td>Sea transport</td>
<td>0.26%</td>
</tr>
<tr>
<td>River, lake and ferry transport</td>
<td>0.11%</td>
</tr>
<tr>
<td>Air transport</td>
<td>0.54%</td>
</tr>
<tr>
<td>Service allied to transport</td>
<td>0.54%</td>
</tr>
<tr>
<td>Total transport sector</td>
<td>3.38%</td>
</tr>
</tbody>
</table>

Source: Bank Indonesia

Despite Indonesia being an archipelago nation, much of the activities within the transport sector are associated with the road transport systems and further development of the road network is a high priority. However, it is worth noting that Indonesia has a comparatively low density road network, both in terms of road network per 100 people and in terms of per square kilometre. Furthermore, approximately 36 per cent of the road network was reported to be damaged or severely damaged in 2007. The status of the road network impacts travel time, transport costs, transport safety and comfort and access to transport services. Road

182 BPS (2011). Labor Force Situation in Indonesia, August 2010
transport services in Indonesia include public and private mass transport options, as well as services for individuals including motorbikes and car taxis and non-motorised transport (bicycles and pedicabs). Public and private mass transport options are available in most growth centres, however access to transport services in small and medium sized towns as well as in rural areas is often irregular and needs to be negotiated with private transport providers.

In general public transportation services on roads fall short of meeting demand in terms of quality and quantity, and therefore many people still travel in private vehicles. This trend is reflected in motor vehicle statistics, with data from Statistics Indonesia indicating that in 2010 there were approximately 76.9 million motor vehicles on the roads, consisting of 8.8 million private cars, 61 million motorcycles and only 2.25 million public buses. This situation sees roads in Indonesia frequently congested, which entails increases in transportation costs and travel time, as well as escalating emissions in the transport sector. The low rate of use of public buses indicates the need to improve the quality of public transport in order to reduce emissions and ease congestion in big cities.

The transport sector in Indonesian is influenced by the archipelago nature of the country. As Indonesia has over 17,000 islands, priority has been given to developing at least one major port in each of the main islands. In particular, the main harbours are Jakarta (Tanjung Priok), Surabaya, Semarang and Cirebon in Java; Belawan, Pandang, and Panjangon in Sumatra; Balikpapan, Banjarmasin, and Samarinda in Kalimantan; Ujung Pandang and Bitung in Sulawesi; Ambon in Maluku; and Sorong in Irian Jaya. The country has overall more than 300 public ports, 43 of which are international liner service ports.\(^{184}\) Two types of inter-island shipping services are present in Indonesia, namely ferry services that cover short routes and carry a mix of passengers, cars and trucks, as well as shipping services that cover longer distances and are usually reserved for cargo activities. According to the Port Administrator Office, in 2010 inter-island cargo loading in Indonesia reached 182,486,000 tons.\(^{185}\)

Table: Number of passengers and cargo by transportation, 2010

<table>
<thead>
<tr>
<th>Transportation</th>
<th>Passengers (persons)</th>
<th>Cargo (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railway transport</td>
<td>203,270,000</td>
<td>19,113,000</td>
</tr>
<tr>
<td>Sea transport</td>
<td>18,272,000</td>
<td>414,708,000</td>
</tr>
<tr>
<td>Air transport(^{186})</td>
<td>58,338,000</td>
<td>555,000</td>
</tr>
</tbody>
</table>

Source: Statistics Indonesia

Although sea transportation provides fundamental connections between different regions of the country, the number of its passengers using these services is lower than those using rail


\(^{186}\) Air transport includes domestic and international flights, taking into account the departures of passengers and the loading of cargo.
transportation. In 2010, approximately 18,300,000 passengers embarked in ships, while the number of travellers using railways reached 203 million.

With its 5,040 kilometres of railway, the train system in Indonesia is the largest in the South-East Asia region, followed by 4,071 km in Thailand, 2,632 km in Vietnam, 1,849 km in Malaysia and 995 km in the Philippines. However, the connectivity of the rail system in Indonesia could be improved. The South Sumatra route usually carries coal, the West Sumatra traffic is coal and cement, while the North Sumatra railway is used for crude palm oil, however the three networks are not connected. The rail network on Java is connected within the island and freight, including petroleum fuel, fertilizer, cement, coal and containers are transported. In terms of revenue, the South Sumatra Railway contributes 20 per cent of total revenues, the West Sumatra and North Sumatra Railways generate respectively 2 per cent and 3 per cent, while the 75 per cent of the Indonesian Railways revenues is given by Java Railways.

Air transport has exponentially grown over the last few years. The number of passengers of domestic flights increased from approximately 20 million in 2003 to almost 50 million in 2010, while the international air traffic in Indonesia was approximately 4,200,000 passengers in 2003 and approximately 9,500,000 passengers in 2010.

One of the main problems of the Indonesian transport sector remains the scarce connectivity of rural areas to urban areas. A survey conducted by the World Bank in 2009 found that approximately 6 million people were unable to access the motorised transport network and approximately 11 million people were not connected to the road network. Those affected included some of the poorest in the country. Nevertheless, between 2000 and 2010, the total number of vehicles in Indonesia increased from approximately 19 million to almost 77 million. Motorcycles comprise more than 79 per cent of the total vehicle fleet. The annual growth of Indonesia’s vehicle stock is approximately 12 per cent, while the road network grows at approximately 5 per cent per year. The length of roads in Indonesia has grown from 356,000 km in 2000 to 487,000 km in 2010. Car ownership is expected to increase more than two-fold between 2013 and 2035.

9.2 Importance of the sector to the environment

The transport sector is the largest consumer of liquid fuel, principally due to the continuous growth of the vehicle fleet, low fuel price (due to subsidies) and lack of quality public transport options. The energy consumed each year by the transportation sector in Indonesia reaches approximately 12 million kiloliters of gas oil, 12 million kiloliters of premium, 118,000 kiloliters of diesel oil, 185,000 kiloliters of fuel oil and 749,000 kiloliters of other types of fuel. Therefore three types of liquid fuels (gasoline, diesel and jet fuel) account for

99.7 per cent of energy consumed in the sector. According to the Ministry of Environment the combustion of these fuels is responsible for 75 million tons of carbon emissions.\textsuperscript{197}

Despite the large number of rail and maritime transportation options, road transport is dominant and considered to be the main consumer of energy. Consequently, within the transport sector the road transport sub-sector has the largest impact on the environment.\textsuperscript{198} However, it is worth noting that carbon emissions do not follow the composition of the vehicle fleet. For example, motorcycles represent almost 80 per cent of the total vehicles in circulation; however the emissions from cars and trucks in 2005 were the double of those produced by buses and motorcycles.\textsuperscript{199} Studies estimate that by 2030 carbon emissions would grow exponentially, reaching 140 million tons per year for cars and 80 million tons for trucks (respectively 6 and 4 times larger than the estimated motorcycle emissions).\textsuperscript{200}

Indonesia has recently introduced natural gas vehicles (NGV) in order to reduce carbon emissions through the shift from fossil fuels to compressed or liquefied natural gas. It is widely accepted that natural gas engines produce fewer dangerous emissions than any other kind of energy, even if compared to other clean methods, such as gasoline-electric hybrids.\textsuperscript{201} Although the concentration of natural gas vehicles in the Asia Pacific region is the highest in the world with 6.8 million exemplars, few vehicles in Indonesia run on natural gas. The NGV Journal estimates that the overall amount of natural gas vehicles in Indonesia is 5,520.\textsuperscript{202} However, efforts have been by the Government to try to diffuse NGV through making liquefied petroleum gas available in the majority of state-owned Pertamina stations and through using compressed natural gas in TransJakarta buses.

The transport sector provides various options for users that have different degrees of carbon intensity. Trains, for instance, are energy-efficient transportation modes, since they produce less carbon emissions per passenger than other means. According to the Railway Forum, rail carbon emissions per passenger are only 45 per cent of those from cars, 64 per cent of those from buses and 27 per cent of those from short-haul air.\textsuperscript{203} The positive impact of railways on the environment is even greater if we consider that electric trains can use electricity generated by emission-free energy sources, such as solar and wind power. Maritime transportation is also considered less polluting than other modalities. For example, ships typically use diesel engines with few transients, so that polluting emissions are comparatively small. Moreover, almost all the emissions are produced far away from population centres, reducing their impact on people’s health if compared to land-based sources. Finally, public transport is one of the most effective means of transport for individuals to use to reduce emissions. Through reducing the number of vehicles on the streets, public transport reduces air pollution, noise pollution and traffic congestion. According to the American Public Transportation

\textsuperscript{197} KNLH(2008). Emisi Gas Rumah Kaca Dalam Angka, Kementerian Negara Lingkungan Hidup. \\
\textsuperscript{198} Josef Leitmann et al. (2009). Investing in a More Sustainable Indonesia: Country Environmental Analysis. CEA Series, East Asia and Pacific Region. World Bank. \\
\textsuperscript{199} BPPT and KNLH (2009). Technology Needs Assessment for Climate Change. The Agency for the Assessment and Application of Technology (BPPT) and Ministry of Environment. \\
\textsuperscript{200} Low Carbon Development Options for Indonesia (2010). Emissions Reduction, Opportunities and Policies – Transport Sector. \\
\textsuperscript{201} International Association for Natural Gas Vehicles, http://www.iangv.org/natural-gas-vehicles/emissions/ \\
Association, shifting from driving a car for 20 miles to using public transport can reduce carbon emissions by 4,800 pounds per year.\textsuperscript{204}

Transport providers can make choices about the type of fuels that they use in their vehicles and each type of fuel has a different impact on the environment. While fossil fuels (such as coal and petroleum) are considered to be highly polluting, the debate persists on the environmental consequences of biofuels. According to the definition of UNEP, biofuels are “combustible materials derived directly or indirectly from biomass (plants or organic waste)”\textsuperscript{205} They can be solid, such as wood and dried manure, or liquid, such as ethanol and several oils, or they can consist of methane gas. Several studies have demonstrated that reductions in greenhouse gas emissions are linked to the usage of biofuels in transportation.

An important dimension of the transport sector is that it plays an important role in linking economic activities, allowing the movement of goods and services between and within production and markets. This peculiar characteristic means that the transport sector is the whole value chain, and that it therefore has a large potential to support improvements in the overall sustainability of the whole economy. In fact, policies towards a greener transportation system would reflect in a decrease in carbon intensity of the whole value chain, reducing the dependency on fossil fuels and the negative impact on the environment. Consequently, the sector should be considered by policy makers and economic actors of primary importance in tackling inefficient environmental practices.

\section*{9.3 Key trends towards sustainability}

In 2003, the Ministry of Environment approved the Mandatory Disclosure of Automotive Emissions programme in order to implement the Clean Air Act of Indonesia. Its main goal was to boost the production of eco-friendly vehicles, while limiting the importation of “dirty” vehicles. According to the programme, producers need to measure with standard procedures their vehicles’ emissions of CO, HC, NOx, and PM10, and they need to release the results publically. The programme complements Ministerial Decree No. 141/Men-LH/2003, which forces vehicles to be compliant with Euro 2 (by January 2005 for new types of motor vehicles and by January 2007 for all motor vehicle types).

Planned policies to improve the environmental impact of transport include:

\begin{itemize}
  \item promoting public transportation and shifting towards the use of electric trains;
  \item congestion charging in peak hours on weekdays (Area Traffic Control System);
  \item parking management;
  \item improvements in vehicle emissions and the use of clean fuels by providing incentives for car users to convert their cars to better and cleaner fuel use; and,
  \item training programmes for approximately 50,000 people per year in eco-driving.\textsuperscript{206}
\end{itemize}

As part of this approach, the Ministry of Transport is pursuing a programme to expand rail and bus transit systems in Jakarta and in 15 other large population centres. Only 2.5 per cent of commuter trips in Jakarta are currently undertaken by rail. The Ministry has a target to

\begin{footnotesize}
\textsuperscript{204} American Public Transportation Association (2009). Public transportation saves energy and helps our environment. \url{http://www.apta.com/gap/policyresearch/Documents/facts_environment_09.pdf}
\textsuperscript{205} UNESCO, SCOPE and UNEP (2009). Biofuels and environmental impacts, scientific analysis and implications for sustainability. \url{http://unesdoc.unesco.org/images/0018/001831/183113e.pdf}
\textsuperscript{206} \url{http://www.sutp.org/T-MAPPER/downloads/indonesia/}
\end{footnotesize}
increase this to 5 per cent by 2010. Work is already underway to upgrade the Jabodetabek rail system to include double tracking the feeder rail lines to the cities circular rail ring, upgrading the existing 16 stations and building 4 new stations.

Jakarta also has an on-going Mass Road Transit System (MRT) project, a rail based transport system that services over 110km of Jakarta’s roads. Jakarta has already developed some public transport in the form of the BRT (bus rapid transport), the TransJakarta Busway. A similar project, TransJogja Bus, was also implemented in Yogyakarta. There is also a planned development of a 24km monorail system in central Jakarta. The Yogyakarta Bus Replacement project is the country’s first CDM transport project and has projected savings of around 8,700 tons of carbon emissions over 7 years.\(^\text{207}\) The project replaces over 200 buses that are more than 15 years old and retrofits diesel engines with engines that can run on liquefied petroleum gas (LPG). LPG engines consume less fuel per kilometre and have a longer life-span; reducing emissions in the long-run.\(^\text{208}\) A key component of this project is encouraging cooperation between the bus cooperatives and the local government.

There are also initiatives underway to increase electric car production, with the Government aiming to mass produce 10,000 such vehicles by 2014. However, infrastructure needs to be put in place to make certain that this technology can lead to a reduction in carbon emissions through ensuring that electricity can be sourced from renewable sources and that consumers have access to these renewable sources to operate their electric vehicles.

Energy diversification has a key role to play in Indonesia’s sustainable transport strategy, especially promoting the use of bio-fuels and waste cooking oil for motor vehicles to build on existing strengths in the agricultural sector. Indonesia’s Government planned to substitute roughly 10 per cent of its fossil fuel transport consumption with biofuel by 2010.\(^\text{209}\)

Besides the aim to replace oil fuels with biofuels, the Government is also implementing emissions and fuel efficiency reporting (as part of its Mandatory Disclosure of Automotive Emissions programme), and the phasing out of two-stroke motorcycles (which are particularly harmful in terms of air pollution and emissions).\(^\text{210}\) Current mitigation efforts being implemented by the Government, other than the promotion of biofuels, include the promotion of Compressed Natural Gas (CNG) vehicles, specifically providing technical assistance to installing converter kits on public transport in urban areas. Monitoring of air pollution emissions for the transport sector has also been carried out by the Ministry of Environment through the Bluesky programme to test vehicle emissions.\(^\text{211}\)

With regard to non-motorised transport, pedicabs (a three-wheeled rickshaw) are currently being used in Indonesia, and supporting the development of this sector could expand access to green job opportunities. However, there are regulations in place that control where pedicabs can be used in cities for the purpose of regulating traffic flow and increasing safety on roads. These regulations should be reassessed periodically to ensure that they continue to be supportive of the role of non-motorised transport in a green economy.

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\(^\text{207}\) Orford, M., S. Raubenheimer and B. Kantor “Chapter on Indonesia” in *Climate Change: The Kyoto Protocol’s Clean Development Mechanisms: SouthSouthNorth Stories from the Developing World*

\(^\text{208}\) Napitupulu, T., O. Tanujaya, M.H. Soejachmoen “CDM Development in Indonesia”, CDM-ASEAN


The TransJakarta Busway – A Bus Rapid Transit system

The TransJakarta busway is an effective public transport option that provides the citizens of Jakarta with a more convenient and cleaner transport alternative, while also contributing to the reduction of carbon emissions. As of 2010, there were ten available corridors, with a total distance of 172 km and 448 buses. The TransJakarta has offered several benefits, such as:

- The availability of a special lane for the buses improves the flow of traffic, which in turn improves the average travel time.
- The improvement in traffic and travel time has also contributed to savings in fuel. In 2008 a total of IDR 62 billion was estimated to be saved from the reduced fuel consumption of the TransJakarta busway system.
- A reduction of toxic emissions, such as CO₂, NO₂, lead and methane due to the reduction of private vehicles and the increase of buses that run on compressed natural gas (CNG). Data in 2008 indicated that TransJakarta buses avoided the release of 61 million tons of carbon.

There are currently plans to add more corridors to the existing routes to keep up with the rise in passengers every year. Furthermore, with a public-private partnership (PPP), the Ministry of Transport envisages more effective operation of the TransJakarta. Green jobs associated with the TransJakarta system include bus drivers, ticket operators, security officers, infrastructure maintenance workers, and other service providers.

Source: http://www.transjakarta.co.id

9.4 Identified green sub-sectors

Green sub-sectors which are likely to provide environmentally sustainable employment were identified through a combination of desk review and focus group discussions (FGD) with stakeholders from the transport sector. The green sub-sectors are outlined in the table below. These include mass public transport, non-motorised transport and rail, river and sea transport. Taxis, road transport (excluding mass public transport), air transport and other transport services were generally not considered to meet to criteria for being classified as a “green sub-sector”.

Table: Green sub-sectors in transport and the environmental screening criteria

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Proposed screening criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass public transport on roads</td>
<td>Activity based approach: The use of mass public transport can reduce emissions, while also reducing traffic congestion, improving air quality and bring public health benefits.</td>
</tr>
<tr>
<td>Non-motorised transport</td>
<td>Activity based approach: The use of non-motorised transport (pedicabs and bicycles) avoids the emission of gases that would have been emitted if a motorised vehicle were used instead.</td>
</tr>
<tr>
<td>Rail, river and sea transport</td>
<td>Activity based approach: Rail, river and sea transportation is typically less carbon intensive and tends to have reduced environmental impacts when compared to air or motorised road transport.</td>
</tr>
</tbody>
</table>

Source: Authors’ own data
9.5 Decent work in transport

The transport, storage and communication sector employed approximately 6,179,503 people in August 2008, of which 68 per cent were working in the informal economy (see table below). It is difficult to estimate the decency of work in the transport, storage and communication sector, considering the high proportion of jobs in the informal economy and lack of data at the micro level on individual occupations.

Table: Formal and informal employment in the transport, storage and transport, 2008

<table>
<thead>
<tr>
<th>Description</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total jobs in transport, storage and communication</td>
<td>6,179,503</td>
</tr>
<tr>
<td>Total formal jobs in transport, storage and communication</td>
<td>4,392,166</td>
</tr>
<tr>
<td>Total informal jobs in transport storage and communication</td>
<td>6,421,703</td>
</tr>
<tr>
<td>Estimated proportion of informal jobs in transport, storage and communication</td>
<td>68%</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

However, data from the labour force survey can provide some information on working conditions, particularly on wages, employment status and occupation type, provision of training and working hours. For the transport, storage and communication sector, the labour force survey estimates that 54 per cent of people in the transport sector are own account workers, 27 per cent were employees and 7 per cent were labourers (see table below). Many own-account workers in the transport sector work on a piece rate basis, which means that they do not receive a wage per se, but get paid based on the fees gathered from passengers. The average wage in the transport, storage and communications sector in 2008 was 1,231,933 IDR per month for labourers, and 1,364,369 IDR per month for employees. It is therefore likely that a substantial proportion of workers in the transport, storage and communications sector earn more than the average minimum wage in Indonesia, which was 743,200 IDR per month in 2008. However, the average working hours for people in the transport sector is quite high, at an average of 49 hours per week for labourers and 50 hours per week for employees. In addition, large proportions of time of these workers can be spent unproductively, particularly in transport services for individuals (taxis).

Table: Occupations and employment status of transport, storage & communication workers, 2008

<table>
<thead>
<tr>
<th>Employment status</th>
<th>Per cent</th>
<th>Main occupation</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own account worker</td>
<td>54 %</td>
<td>Professional, technical, related</td>
<td>2 %</td>
</tr>
<tr>
<td>Employer assisted by temporary worker</td>
<td>7 %</td>
<td>Administrative and managerial</td>
<td>&lt;1 %</td>
</tr>
<tr>
<td>Employer assisted by permanent worker</td>
<td>3 %</td>
<td>Clerical and related worker</td>
<td>7 %</td>
</tr>
<tr>
<td>Employee</td>
<td>27 %</td>
<td>Sales worker</td>
<td>4 %</td>
</tr>
</tbody>
</table>
In terms of occupation, most people were considered to be "production, and related workers, transport equipment operators and labourers". 60 per cent of workers were unskilled, 31 per cent of workers were semi-skilled and nine per cent of workers are skilled. When asked whether workers had received training and capacity building, 17 per cent of workers reported that they had received training, 62 per cent reported that they had not received training and 21 per cent were unclear as to whether training had been provided. Awareness levels on health and safety or good work practices are therefore likely to be low. Employment in the transport sector is demanding due to its physically demanding nature and the long hours that transport workers are expected to work.

Transport service providers involved in mass transport and transport using water and rail that are member of employers’ organizations can provide an environment that allows for the regulation of worker’s rights and working conditions. It is likely that jobs that pay above the minimum wage in those enterprises could be considered to be green jobs. Jobs in the transport sector that follow Government employment regulations could also be considered to be green jobs. Jobs in the transport sector that are largely community based or informal, such as pedicab drivers, don’t typically have extensive involvement with employers’ and workers’ organizations. However, these workers often organize informally in order to increase their bargaining position; therefore, jobs that pay above the minimum wage in non-motorised transport could be considered to be green jobs.

### 9.6 Estimating environment related employment

The number of jobs in each of the identified green sub-sectors has been estimated. These are shown in the table below, alongside a description of the source of the estimate. The total number of environmentally sustainable jobs estimated is 1,659,606, which is equivalent to 26.9 per cent of all jobs in transport, storage and communication in 2008. The green sub-sector with the highest number of environmentally sustainable jobs is in mass transport on roads. This is closely followed by jobs in non-motorised transport. Less people had sustainable jobs in rail, river and sea transport.

#### Table: Environmentally sustainable employment in transport, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Employment estimate</th>
<th>Source / Method of calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass public transport on roads</td>
<td>809,690</td>
<td>Estimate from Sakernas 2008, 100% of KBLI codes 60214, 60215, 61224 and 61226 based</td>
</tr>
</tbody>
</table>

---

Unskilled = education levels equivalent with junior high school; Semi skilled = education levels equivalent with senior high school; Skilled = education levels equivalent to diploma and above.
Green sub-sector | Employment estimate | Source / Method of calculation
--- | --- | ---
Non-motorised transport | 699,249 | Estimate from Sakernas 2008, 100% of KBLI code 60224 and 60233.
Rail, river and sea transport | 150,667 | Estimate from Sakernas 2008, proportion of KBLI codes 60110, 60120, 60139, 61111-61222 based on qualitative information from key informants that indicates that rail 100% and between 50-70% of sea and river transport could be considered sustainable.

Total “environment core” jobs | 1,659,606 | Source: Authors’ estimates based on BPS Sakernas

### 4.7 Estimating green jobs

By combining both qualitative insights from key informants on employment conditions in the transport sector and quantitative information from the labour force survey, it is estimated that 9.8 per cent of the jobs in the transport, storage and communication sector could be considered to be green jobs.

Table: Green job estimates for the transport sector, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass public transport on roads</td>
<td>379,089</td>
</tr>
<tr>
<td>Non-motorised transport</td>
<td>114,336</td>
</tr>
<tr>
<td>Rail, river and sea transport</td>
<td>110,168</td>
</tr>
<tr>
<td>Total green jobs (per cent)</td>
<td>603,593</td>
</tr>
<tr>
<td>Total green jobs (per cent)</td>
<td>9.8 per cent</td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas

Most green jobs are in mass public transport on roads. Though the number of people employed in rail, river and sea transport is lower than the other sub-sectors, the proportion of environmentally sustainable jobs that are green jobs is quite high.

Table: Green jobs as a proportion of environmentally sustainable jobs in the transport sector, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Per cent of environmentally sustainable jobs that are green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass public transport on roads</td>
<td>46.8%</td>
</tr>
<tr>
<td>Non-motorised transport</td>
<td>16.4%</td>
</tr>
<tr>
<td>Rail, river and sea transport</td>
<td>73.1%</td>
</tr>
</tbody>
</table>
There is a considerable difference between the number of jobs in "non-motorised transport" that could be considered to be environmentally sustainable jobs and the number of jobs that could be considered to be green jobs, indicating a need for support to improve employment quality within the sub-sector. Employment in non-motorised transport is largely informal and although there are indications of the organization of some groups of workers in various areas, many workers in this sub-sector are own-account workers and are paid on a piece rate basis. Further efforts to support the organization of workers in non-motorised transport may help to improve employment conditions and increase the number of green jobs in this sub-sector. Regulations that control where pedicabs may operate may also be revisited in order to reassess the role of non-motorised transports in a green economy.

In order to increase the number of green jobs in transport it would be important to support the expansion of the rail network and mass public transport on roads. Initiatives should also focus on improving the quality of current transport options in order to support an increase in demand, while also investing in infrastructure in order to increase the supply of rail and public transport options. Initiatives may benefit from cooperation between the public and private sector. Furthermore, it would also be important to ensure that enterprises in the transport sector are members of employers’ organizations and that the workers have the right to freedom on associated and collective bargaining.

Jobs in air transport were generally not considered to meet the criteria for being environmentally sustainable due to the sector's intensive use of energy and the limited involvement of air transport in carbon offsetting initiatives. Air transport could reduce its environmental impact through increasing the energy efficiency of machinery and ensuring that routes and travel speeds optimise efficiency. In addition, airlines may consider offsetting mechanisms.

The water and rail transport sub-sectors could reduce environmental impacts further by examining operations and identifying possible abatement measures. These could include regular maintenance of machinery, load optimization measures and increasing the energy efficiency of machinery. In addition, ratification of the ILO's Maritime Labour Convention (MLC), which provides a framework for comprehensive rights and protection at work for the world's seafarers, would support improvement in employment quality within the water transport sector. The Convention aims to achieve both decent work and secure economic interests in fair competition.

In general Indonesia can promote green development and green jobs by reducing dependency on fossil fuels and switching to renewable energy sources. This requires commitment and cross sectoral cooperation from the mining and energy sectors, as well as the transport and manufacturing sectors.
Chapter 10: Green jobs in tourism

Indonesia is growing in popularity as a tourist destination so the sector has important implications on the country’s economic growth. Particularly, the sector contributes significantly to National GDP, national workforce and indirect taxes. But increasing tourism activities may also be a potential threat to natural ecosystems and cultural heritage destinations. It is important to understand these issues in order to support shifts towards more sustainable tourism in Indonesia.

The tourism sector is a cross cutting sector of the economy and includes economic activities that are associated with the hotels, catering and tourism (HCT) sectors, as well as specific segments of the transport sector, which includes travel agencies and tour operators. International tourism includes business and professional travel, visiting friends and relatives, religious travel, and health treatments of travelers crossing a border and spending one or more nights in the host country. Wider definitions of tourism frequently also include the visitor attractions sector, which encompasses natural, cultural and heritage sites, museums, as well as zoos and theme parks.

This chapter will provide key information on the tourism sector, such as economic trends and linkages between the environment and employment. It will discuss the impacts of tourism on the environment and what actions are being undertaken to improve the sector’s environmental sustainability. On the basis of this information and on extensive consultations, environmentally sustainable sub-sectors and employment associated with these activities have been identified. A further discussion on the decency of work in these sub-sectors provides the basis for estimating green jobs in the tourism industry.

10.1 Overview of the tourism sector

Indonesia is famous for both its natural and cultural heritage. Indonesia has over 17,000 islands that are home to attractions such as coral reefs, white sandy beaches, tropical rainforests and volcanoes. Indonesia has a rich cultural heritage with world famous sites such as Prambanan and Borobudur temple and many cultural relics. Indonesian tourism is continually growing and its ranking in terms of tourism competitiveness has improved from 81th place in 2009 to 74th in 2011 out of 139 countries surveyed.213

Tourism from both international and domestic markets provides a significant contribution to economic growth every year. Tourism in Indonesia generally contributes between 4 and 6 per cent of GDP annually, with contributions affected by macroeconomic conditions such as the economic crisis (2008-2009) and reform on fuel subsidies (2006). Indonesia has developed a "tourism satellite account", which measures the economic impact of tourism. Data from the tourism satellite account from 2008 suggests that tourism contributed 4.70 per cent to GDP and provided 4.32 per cent of indirect tax revenues (see table).

Table 1: Selected macroeconomic indicators for tourism in per cent (2004-2008)

<table>
<thead>
<tr>
<th>Variable</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>5.01</td>
<td>5.27</td>
<td>4.30</td>
<td>4.29</td>
<td>4.70</td>
</tr>
<tr>
<td>Indirect tax</td>
<td>7.81</td>
<td>0.18</td>
<td>4.12</td>
<td>4.09</td>
<td>4.32</td>
</tr>
<tr>
<td>Wages and salaries</td>
<td>4.66</td>
<td>4.56</td>
<td>4.44</td>
<td>4.43</td>
<td>4.97</td>
</tr>
<tr>
<td>Employment</td>
<td>9.06</td>
<td>6.97</td>
<td>4.65</td>
<td>5.22</td>
<td>6.84</td>
</tr>
</tbody>
</table>


In 2008, approximately 6.23 million international tourists visited Indonesia\(^{214}\). Total expenditure of the 6.23 million international tourists amounted to approximately USD 7.34 billion, making tourism one the largest foreign exchange earners after oil and gas, coconut oil and processed rubber. The average expenditure per visit per international tourist was USD 1,179 and the average stay was 8.6 days. Especially, in 2012, there were more than 8 million international tourists visiting Indonesia, spending a total amount of USD 9 billion in the country.\(^{215}\) Most tourists come from Singapore, Malaysia and Australia.

Domestic tourism is also a significant contributor to the economy, with it estimated that 117 million domestic tourists (excluding foreign residents travelling domestically) made 222 million trips in 2008. The total expenditure was estimated at IDR 123 trillion. The benefits of tourism are concentrated in Bali and Nusa Tenggara Barat (NTB), with tourism accounting for approximately 46.2 per cent of provincial GDP, 66.4 per cent of indirect taxes and 40.6 per cent of the employment in Bali.

In 2008 it was estimated that tourism contributed 7.2 million direct and indirect jobs and IDR 75 trillion in wages to the Indonesian economy (see table above). Tourism employment data combines traditional economic sectors including hotels and other accommodation services, travel services, transport servicing tourism, restaurants and other food and beverage services, and finally country specific industries activities that relate to management of tourist destinations.

Key challenges that face Indonesia’s tourism industry relate to the development of infrastructure to support tourism across the archipelago and the impact of tourism on the local environment, society and economy. Tourism development has also been hampered by various security threats and conflicts however the industry has been stable for the last five years.

### 10.2 Importance of tourism to the environment

Indonesia has great cultural and natural diversity. The country has the second largest diversity of mammals (with more than 500 species), is fifth in bird diversity (with more than 1500 species) and sixth in amphibian diversity. Indonesia also possesses more than 25,000 flowering plants and has a large variety of hard corals and reef-associated flora and fauna.\(^{216}\) This makes Indonesia one of the world’s most endemic countries – meaning it has the largest number of species found here and nowhere else.\(^{217}\) Indonesia has 50 National Parks throughout the country, covering both land and sea, and a large number of protected reserves.

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\(^{216}\) [Convention on Biological Diversity (undated), http://www.cbd.int/countries/profile.shtml?country=id#status](http://www.cbd.int/countries/profile.shtml?country=id#status)

Indonesia is the largest archipelago in the world, and consists of more than 17 thousands large and small tropical islands fringed with white sandy beaches. It is also an attractive tourist destination due to its rich diversity in culture, including several ancient temples, different types of music, traditional arts and customs.\textsuperscript{218}

Such features make the country highly attractive for tourists, but also mean that the sustainability of tourism is important. Indeed, tourism is one major concern for the environment as it can create pollution, deplete land and lead to natural heritage degradation. Tourism is a human induced activity and the main causes of environmental degradation are linked to the increasing number of visitors throughout the country and the regulatory environment. According Indonesia's "Strategic Plan for Sustainable Tourism", tourists tend to consume more water and energy and to produce more waste than the local population and more than what they would consume at home. Furthermore, increased numbers of tourists contribute to rising GHG emissions from transportation and other activities in the construction and the service industries that have serious impacts on the environment. Indeed, visitors are not always environmentally sensitive and foreign tourists are sometimes unaware of the environmental conditions of the country.

The Government is aiming to promote Indonesia as a “mass tourism destination”, while being aware that the promotion of tourism should be socio-culturally acceptable and environmentally sustainable. If well planned and managed effectively, tourism can have positive outcomes for the country’s economy and employment and can lead to a more sustainable use of resources. However, achieving such goals will require strong participation from stakeholders involved in tourism, from the community level to the national level.

10.3 Key trends towards sustainability

The Ministry of Tourism and Creative Economy (MoTCE), together with Ministry of Manpower and Transmigration (MoMT), Ministry of Environment (MoE), Ministry of Home Affairs (MoHA), Ministry of Youth and Sports (MoYS) and other tourism stakeholders in Indonesia, have already taken concrete steps to promote sustainable tourism. Sustainable tourism development needs good practices through good governance, better management and development of human resources.\textsuperscript{219} Financial support is also necessary and the Government is working with private sector investors to promote the sector.

For example, in rural areas that are particularly affected by environmental degradation, sustainable tourism could represent an alternative livelihood for communities which often rely on income generation from natural resources exploitation.\textsuperscript{220}

The UNWTO (United Nations World Tourism Organization) defines sustainable tourism as:

\begin{quote}
“Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, industry, the environment and host communities”\textsuperscript{221}
\end{quote}

\textsuperscript{218} http://www.indonesia.travel/en/discover-indonesia#tab3
\textsuperscript{219} Ardiwidjaja, R. “Strategic Sustainable Tourism Development in Indonesia” Ministry of Culture and Tourism, Republic of Indonesia, http://www.budpar.go.id/userfiles/file/4032_1283-STRATEGICSUSTAINABLETOURISMDVELOPMENT.pdf
\textsuperscript{220} MoTCE (2012): Strategic Plan for Sustainable Tourism and Green Jobs for Indonesia
\textsuperscript{221} UNWTO in ILO (2012), Sustainable Tourism: decent work and green jobs in Indonesia, white paper
Therefore, sustainable tourism should ensure benefits to all stakeholders, especially those living close to tourist destinations. It should make optimal use of natural and cultural resources, to ensure viable economic development, stable employment and income earning opportunities, ultimately contributing to poverty alleviation.

“Make optimal use of environmental resources; Respect socio-cultural authenticity and host communities; Ensure viable, long term economic operations that provide socio-economic benefits to all stakeholders, including stable employment and income earning opportunities, which are fairly distributed, offer social services to host communities and contribute to poverty alleviation”.  

Within the Long-Term National Development Plan (RPJP), the Long-Term National Tourism Development Plan (RIPPARNAS), and the Tourism Mid-Term Strategic Plan (RENSTRA), a clear vision on the importance of sustainable development is found. The Indonesian Government states that tourism development should focus on inclusive community-based sustainable tourism. The latter involves communities having access to markets and being involved in the planning process. However, this requires capacity-building so that communities can effectively be included in decision-making processes.

There are various laws and regulations that address the challenges towards a more sustainable tourism. For instance:

The Tourism Law of the Republic of Indonesia, no. 10 (2009), is the key reference regarding legislation on tourism at the national level. This law embraces internationally recognized concepts of sustainable tourism, such as the UNWTO endorsed Global Codes of Ethics for Tourism and implements this concept in national legislation. Among others the law:

- Defines Tourism Strategic Zones (elaborated in the the Ecotourism Regulation no. 36/2010 and Ecotourism Activity Regulation by the Ministry of Forestry Regulation no. P48/Menhut-II/2010);
- Stipulates a Master Plan for Provincial Tourism Development (reflected in the Ministry of Tourism and creative Economy Destinations Management Organization (DMO). The District Ecotourism development is regulated by the Ministry of Home Affairs Regulation no. 33/2010);
- Emphasises people’s welfare, environmental protection, cultural enhancement, and the promotion of a good national image;
- Gives a mandate to the government to create employment and eliminate underemployment, and to develop competencies and skills through training, standardization and certification (the competency development and industrial standards are regulated under the tourism certification institution regulation by the Ministry of Manpower and Transmigration Regulation no. 135/2004, the Ministry of Manpower and Transmigration Regulation no. 135/2004).


The UNWTO’s Global Codes of Ethics for Tourism are guidelines that can be used as a reference for the development of sustainable tourism. They include objectives such as the mutual respect between people and societies, rights of the workers and entrepreneurs in the tourism industry, and obligation of stakeholders in tourism development. Indonesia has agreed with this Codes of Ethics and they are mentioned on the MoTCE website.
Home Affairs’ regulation no.17/2007 is the basis for a village community training and empowerment program;

- Encourages employment at the community level through the creation of micro-enterprises and cooperatives.\(^{225}\)

Furthermore, the Presidential Instruction No. 16 of 2005 aimed to move all ministries involved in the sector to support culture and national tourism development. It emphasizes the improvement of tourism services and cultural awareness, and stresses the need to go towards better livelihood, eradication of poverty and increased cooperation between different ministries and district bodies. However, one of the main issues remains the lack of the coordination between provincial and national governments as well as within the district level.\(^{226}\)

In addition, in 2009 a Decree from the Ministry of Manpower and Transmigration was published as a guideline for capacity and skills development in the eco-tourism sector. It is based on government regulations and existing decrees from the Ministry of Manpower, as well as the Indonesia's National Work Competence Standards (SKKNI). SKKNI standards define the minimal skills competencies that workers need to have for their job in a particular sector. Competences at work are identified following a digit code classification; for each unit, the tasks and skills required are described in details. SKKNI guidelines for ecotourism include competencies units such as cooperation with colleagues and tourists (PAR.PE.01.001.01), development of knowledge on ecotourism (PAR.PE.02.002.01) and implementation of activities which minimize negative impacts against environment and social culture (PAR.PE.02.005.01). This Ministry decree details the competencies required to work in the tourism sector, and states that ecotourism should respect the principles of conservation, public participation and education.\(^{227}\)

Regarding the policy implementation of the legal framework the Ministry of Tourism and Creative Economy is the key institution that promotes environmentally sustainable tourism with green jobs which will raise awareness amongst civilians, generate quality and decent employment and revenue for the communities and increase peaceful relations and unity amongst nations.

The MoTCE states in its mission statement (2010-2014):

“Developing competitive and sustainable world class tourism, able to stimulate regional development; a quality approach in developing tourism and creative economy resources; creation of value added through creative industries, development of art and culture and moving toward responsive, transparent and accountable governance”

Since 2009 the MoTCE has been implementing a tourism support program for community empowerment called PNPM Mandiri, which aims at supporting an extended number of villages in all provinces in developing their sustainable tourism initiatives. The MoTCE has


\(^{226}\) MoTCE (2012): Strategic Plan for Sustainable Tourism and Green Jobs for Indonesia

\(^{227}\) Ministry Of Manpower And Transmigration (2009), Keputusan Menteri Tenaga Kerja Dan Transmigrasi, Tentang “Penetapan Standar Kompetensi Kerja Nasional Indonesia - Sektor Pariwisata Bidang Kepemanduan Ekowisata”; [http://www.indecon.or.id/learningcontent.php](http://www.indecon.or.id/learningcontent.php)
also initiated the preliminary steps for preparing a Manpower Development Strategy for Tourism taking into account green skills, hereby, linking with the Ministry of Manpower and Transmigration and the ILO.

Furthermore, the Ministry of Tourism and Creative Economy has created a Destination Management Organization (DMO) program, as part of its five-year Strategic Plan (RENSTRA 2010-2014) to further develop tourism destination areas. The DMO focuses on 15 new and existing tourism destinations to promote sustainable development and create new opportunities for green jobs.

Recently, in 2012 the Ministry of Tourism and Creative Economy, supported by the Ministry of Manpower and Transmigration, the Ministry of Environment and the ILO took a big step forward in creating the guiding framework for achieving sustainability in tourism with green jobs and decent work creation across Indonesia by developing the Strategic Plan for Sustainable Tourism and Green Jobs for Indonesia (Rencan Strategis untuk Pariwisata Berkelanjutan dan Green Jobs untuk Indonesia). The Strategic Plan for Sustainable Tourism and Green Jobs complements the MoTCE Mid Term Strategic Plan for Tourism (RENSTRA) and has been dispersed to all 34 provinces for reference and strategic guidance in the implementation of sustainable tourism at the provincial and local level. As a follow up the Ministry is planning to develop concrete guidelines and provincial action plans for Sustainable Tourism and Green Jobs in Indonesia.

With a large number of National Parks and protected areas, Indonesia also has significant potential for the development of Ecotourism. The concept of ecotourism goes further than sustainable tourism. Ecotourism is a form of responsible travel that provides local benefits, covering ecological, economic and cultural issues. It is usually delivered to small groups by small or local businesses, includes a learning experience, and stresses local ownership in rural areas.

Regulations on sustainable tourism remain relatively new and standards for ecotourism have not yet been developed. However, initiatives have been implemented in some parts of the country. Examples of early ecotourism ventures in Indonesia include Taman Nasional Tanjung Puting in Kalimantan. The Tanjung Putting National Park was a pioneering ecotourism attraction, developed between 1990 and 1997. The park was developed to attract tourists to see Orang-utans and Proboscis monkeys. The eight eco-lodges in the park source 80 per cent of their staff from local communities who get income from various activities such as boat rental, producing agricultural products, selling handicrafts and tour guiding. The involvement of local communities encourages the shift away from more environmentally harmful activities, such as logging, and raises awareness on forest conservation for local communities.228

In Bali, one of the most popular tourism destinations in Indonesia, mass tourism is a threat to the environment and on cultural diversity. Ecotourism has started to develop through local, community-based initiatives. The JED (Jaringan Ekowisata Desa – Village Ecotourism Network) was established in 2002 to support the development of ecotourism in four traditional villages: Kiadan Pelaga, Dukuh Sibetan, Tenganan Pegringsingan and Ceningan Island. JED aims to strengthen dialogue between local people and tourists, and to promote

environmental and cultural awareness. Tourism activities are planned and managed by the community in each village, and tourists are hosted by community members.\textsuperscript{229} Another example of sustainable tourism is the Pangandaran project, supported by the UNWTO, Indecon and the MoTCE. The project is part of the UNEP’s Tourism Development Supporting Biodiversity Conservation initiative and takes place in Pangandaran, a popular tourism destination in West Java. The first part of the project ran from 2008 to 2010, and it has been completed by another project running from 2010 to 2014 to implement the DMO program further. The objectives include:

- developing highly competitive sustainable tourism;
- conserving and rehabilitating the natural environment to support tourism development;
- increasing the capacity and awareness of the local community and other stakeholders of sustainable development to encourage participation;
- conducting “3-R” (reduce-reuse-recycle) campaign; and
- developing waste management\textsuperscript{230}.

Another DMO project has been implemented in Lake Toba (North Sumatra) running from 2010 to 2014. Forum discussions have been set up to involve stakeholders into the process of developing more sustainable tourism in Lake Toba.

Furthermore, the MoTCE has acknowledged the refinement of the national competency standards for eco-tour guides by incorporating decent work principles with technical assistance from the ILO. In 2012 within the Green Jobs in Asia Project, trainings of trainers for eco-tour guides were organized based on national competency standards in Bromo (East Java), Toba (North Sumatra), Tanjung Puting (Central Kalimantan) and Rinjani (NTB). Additionally, Rollout Trainings for beginner and experienced eco-tourguides took place in the same regions as well as assessor trainings and assessor certification for senior eco-tourguides, especially, in Bromo and Toba.

Regarding green homestays, the MoTCE has acknowledged the developed of competency and industrial standards under the technical guidance of the ILO. Trainings on green homestay competency standards were organized in Bromo within the Green Jobs in Asia Project in 2012.

\textsuperscript{229} Jaringan Ekowisata Desa, http://www.jed.or.id/index.html
Box 1: Training of Trainers and Roll out Training for Eco-tour guides.

When it comes to sustainable tourism and environmental awareness, tour guides have an important role to play. With a strong knowledge of the environment they work in, and frequent interaction with tourists, tour guides can help Indonesia to support sustainable tourism development. However, this requires higher qualifications and appropriate training, to ensure that these jobs are decent and can promote a shift to a green economy.

In February, 2012, the International Labour Organization (ILO) organised training for eco-tour guides in Lake Toba (North Sumatra), based on the National Standard Work Competency of Indonesia (Standar Kompetensi Kerja Nasional Indonesia - SKKNI) that defines capabilities, skills and aptitude for workers in different sectors of the economy. Fifty-seven selected participants were invited to participate to these training sessions. According to their previous experience and their training needs, they were divided into three groups: beginners, experienced tour guides, and trainers. The sessions were organised into various training modules including basic tourism guiding, introduction to ecotourism and the impact on tourism on the environment and culture, with debates and role-playing activities.

The opportunities for eco-tour guides in Indonesia are extensive and there is a great potential for the creation of green jobs in this sector. Therefore high quality training is essential for providing the necessary skills and knowledge to future tour guides. It can be argued that training for tour guides is even more important because these jobs have a strong link with the environment. Being an eco-tour guide means interacting with tourists – usually in small groups and with local populations. By transmitting their knowledge and raising environmental awareness, eco-tour guides contribute to the education of tourists and communities. The compliance with SKKNI standards provides these eco-tour guides with appropriate training and certification that will help to ensure that they can access jobs that are decent and sustainable.

Source: ILO, Training of Trainer and Roll Out Training for Ecotour Guide, Based on SKKNI.

At the regional level, Indonesia is also part of various agreements, such as the ASEAN Tourism Agreement signed in 2001\textsuperscript{231}, the APEC Tourism Working Group, the East Asian Growth Area (BIMP-EAGA) and the Indonesian – Malaysian – Thailand Growth Triangle (IMT-GT). Within the ASEAN framework several task forces such as the ASEAN Communication Team for Tourism, ASEAN Task Force on Tourism Investment, ASEAN Task Force on Tourism Manpower are working on policy preparation, which are also relevant for the development of national tourism policies. These partnerships provide guiding policies for sustainable and environmentally-friendly tourism.

10.4 Identified green sub-sectors

The Regulation 10/2009 defines thirteen (13) categories of tourism in Indonesia, including: tourism attractions, tourism areas, tourism transportation services, tourism travel bureau, food and beverages services, accommodation services, entertainment and recreation services.

\textsuperscript{231} ASEAN, ASEAN Tourism Agreement, \url{http://www.aseansec.org/13157.htm} [accessed on 9/05/2012]
meetings, incentive travels, conference, and exhibition services, tourism Information services, tourism consultation services, tourism guide, water services and spas.

Based on the above listing, green sub-sectors which are likely to provide environmentally sustainable employment were identified through a combination of desk reviews and focus group discussions (FGD) with stakeholders from the tourism sector. The main criteria used were the compliance with ASEAN Tourism Standards and the Government Regulation 36/2010 on Ecotourism. The green sub-sectors are outlined in the table below. These include sustainable accommodation services, sustainable tourism services, sustainable management of tourism destinations and green spas. Restaurants and other food and beverage services, entertainment and recreation activities administration and meeting/conferences were not considered to meet to criteria for being classified as a “green sub-sector”. Transport services associated with tourism have been included under the chapter on transport.

**Table 2: Green sub-sectors in tourism and the environmental screening criteria**

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Proposed screening criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable accommodation services</td>
<td><strong>Voluntary standard:</strong> ASEAN Standard No. 1 on Green Hotels and No. 4 on Green Homestays identify criteria and standards on sustainable accommodation services. Examples of criteria include the use of green products, introduction of waste management / energy saving techniques, and provision of environmentally-friendly activities.</td>
</tr>
<tr>
<td>Sustainable tourism services</td>
<td><strong>National regulation:</strong> Regulation 36/2010 on business tourism and culture, asylum in wildlife, national parks, forest botanical garden and Nature Parks. The Regulation guidelines on ecotourism business licensing and on the operation of businesses in conservation areas. In addition Indonesian Work Competency Standards (SKKNI) includes specific competencies on eco-tour guiding. They include environmental education, planning of activities that have low impact on the environment, and the use of appropriate occupational health and safety procedures. Finally, ASEAN standard No. 5 and No. 6 include criteria on visitor information centres, which should provide current information on the attraction and make availability for well-trained local guides.</td>
</tr>
<tr>
<td>Sustainable management of tourism destinations</td>
<td><strong>Voluntary standard:</strong> ASEAN Standard No. 5 provides a definition of ecotourism and the criteria to comply with this definition, including sustainable waste and energy management, staff training programmes, sensitivity towards local culture. ASEAN Standard No. 6 defines the good practices to preserve cultural and natural heritage, including the implementation of measures to prevent environmental degradation, and the existence of codes of conduct for people visiting the tourism site.</td>
</tr>
<tr>
<td>Green spas</td>
<td><strong>Activity based approach:</strong> Many commercial spas use products that are based on synthetic agents, artificial colorants and other chemicals that might be dangerous both for the human body and the environment. Green spas focus on using natural products to reduce the impact of their services on the environment. Green spas should also have good management of the waste and use energy-saving practices within their business.</td>
</tr>
</tbody>
</table>

*Source: Authors’ own data*
10.5  **Decent work in tourism**

It is estimated that tourism created 7.2 million direct and indirect jobs and provided IDR 75 trillion in wages to the Indonesian economy in 2008.\(^{232}\) It is estimated that approximately 80 per cent of the people employed in the tourism industry were working in the informal economy.

The National Tourism Satellite Account from 2008 that is provided by Statistics Indonesia measures the economic impact of tourism. It indicates that the growth of tourism contributed 4.70 per cent to GDP, 4.32 per cent to indirect tax revenue and 6.84 per cent to total national employment in 2008. Despite the fact that these figures are higher than those of the previous year, they are lower than those of the period from 2000 to 2005. This should act as a reminder that these figures only show an increase in international arrivals and domestic trips, as well as in expenditures, but do not provide a complete picture of the progress of tourism development. In this regard, the same tourism satellite account illustrates that the contribution of the tourism sector in terms of employment creation had decreased by 5.66 per cent during the period from 2000 to 2008. In addition, over 90 per cent of jobs created directly serve tourists. Investment-related and other activities, including marketing and promotions are less employment intensive.

The wholesale trade, retail trade, restaurant and hotel sector has the largest share of the tourism employment, followed by the community, social and personal services sector and then by the transportation, storage and communication sector. In the latter two classifications, only a very small proportion of employment in these sectors pertains to the tourism sector. A high percentage (59.37 per cent) of those employed in the trade and tourism sectors, according to a survey undertaken in 2010, are paid less than IDR 1 million per month.\(^{233}\) The case in rural areas is even worse with 76.26 per cent of rural persons compared to 52.86 per cent of urban persons receiving less than IDR 1 million per month in remuneration. It is also relevant to remark that there is a higher percentage of women (65.16 per cent) than men (52.86 per cent) engaged in low paid employment in this sector.

Statistic’s from Indonesia’s National Tourism Satellite Account show that those working in tourism related industries are predominantly high school graduates or less. Only 14.39 per cent have graduated from institutions of higher learning. At the provincial level, where there is a wider variation, these conditions may differ. In Central Sulawesi, for instance, the proportion of those with higher education is only 3.66 per cent, and more than 55 per cent of workers have primary school education as their highest level of educational attainment.

Innovative and skilled human resources are also needed for policy formulation and development planning for a sustainable tourism sector, which requires a population with more advanced education (higher education not only limited to the hospitality industry, but to other sectors among tourism’s multidimensional possibilities).

Data from the BPS on the Condition of the Labour Force also show that a significant proportion of those employed in the trade, restaurant and hotels sector are working more than 45 hours a week. Not only has the number of those working long hours increased from the

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year 2006 to 2010, but the proportion of those working long hours has also increased to over 60 per cent of the total trade and tourism workforce. In 2010, almost 30 per cent had worked over 60 hours during the previous week. This has important implications for the decency of work.

No comprehensive information could be identified on occupational health and safety in the tourism sector, although it is likely that some workers work in poor conditions that do not meet safety standards. For instance, many workers are required to work long hours and often do not receive appropriate provisions for breaks which can become a safety hazard. Given the low number of people that reported that they had been trained, risk of injury may be high given the use of cleaning, cooking and transportation equipment. Employment in the tourism sector can be dangerous due to its physically demanding nature, the routine exposure to climatic conditions and site conditions of tourism destinations. Moreover, some activities may involve exposure to chemicals or other dangerous substances (e.g. volcano tourism), that entail health risks.

Child and forced labour are still two issues of significant extent in the tourism sector in Indonesia. The trade, restaurants and hotel industry is in fact considered as the second biggest industry for child labour, accounting for 19 per cent of the total working children.\footnote{BPS and ILO (2009) Working Children in Indonesia 2009, BPS Catalogue: 2306003, Badan Pusat Statistik, Jakarta.} Child trafficking for prostitution is also another relevant issue in regard to the tourism sector, with more than 5,000 prostituted children estimated solely in Jakarta.\footnote{ILO (2004) Child trafficking for prostitution in Jakarta and West Java, ILO Country Office for Indonesia and Timor-leste, Jakarta.} Policy development on child labour elimination in the tourism supply chain sectors at national, provincial, and district level is therefore an imperative to achieving the goal of full eradication of child and forced labour in the tourism sectors.

Work in the tourism sector is typically short-term and is often undertaken by casual service workers on a daily basis. Subcontracting is common due to the demand driven nature of tourism work. Subcontracting also means that workers often work without formal contracts and have limited access to social protection and injury compensation mechanisms.

Even though the government has issued a law concerning minimum wages for labour, which apply to the tourism sector, it is still common, in smaller companies, that minimum wage legislation is not effective, especially for those with only high school diploma or less. In smaller companies with fewer employees, union membership is often low, although sometimes workers still receive social security through an existing system like Social Security for Labourers (Jaminan Sosial Tenaga Kerja - JAMSOSTEK). Many problems on the implementation of labourers’ rights and the empowerment of labour are reported at national level. Issues often relate to the temporary nature of employment, which may be due to the seasonal nature of employment in the industry. The diversity of the market segment for Indonesia, especially the domestic market where short school quarterly holidays, long weekends and multicultural holidays (related to different religions: Idul Fitri, Christmas, Nyepi and others) play in fact a crucial role in the tourism business demand.

The demand driven nature of the tourism sector, and its association with casual employment, can be a barrier to decent work as well as skills formation. Many workers in the tourism sector have not completed training courses that have provided them with certified skills.
However, significant efforts are underway to improve skills in the tourism sector, with new competency standards developed for green home stays and eco-tour guides.

Industrial relations and collective bargaining are traditionally weak in the tourism industry due to the high level of casual employment within the industry and the high turnover of workers. Many people have limited opportunities to join unions and engage in formal industrial bargaining processes.

In summary it was concluded that in the tourism sector it could be argued that for employment to meet criteria for decent work, it should provide remuneration above the minimum wage and provide workers with job security and access to health insurance and injury compensation mechanisms. Due to the demands that are placed on workers that are associated with provision of professional services, it was considered that workers and employers need to have skills training to ensure that competencies are adequate and that work place injuries can be minimised.

10.6 Estimating environment related employment

The number of jobs in each of the identified green sub-sectors has been estimated. These are shown in the table below, alongside a description of the source of the estimate. The total number of environmentally sustainable jobs estimated is 21,407, which is equivalent to less than one per cent of employment in tourism. The percentage is quite low as employment in tourism accounts for restaurants and hotels as well as tourism services. The green sub-sector with the highest number of environmentally sustainable jobs is sustainable management of tourism services followed by sustainable accommodation services. Less people were employed in sustainable tourism services and in green spas.

Table: Environmentally sustainable employment in tourism, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Employment estimate</th>
<th>Source / Method of calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable accommodation services</td>
<td>8,589</td>
<td>Estimate from Sakernas 2008 KBLI codes 55111, 55112, 55140, 55150, based on interviews with key informants on from the tourism industry that suggest that 5% of 4 &amp; 5 star hotels and 20% of homestays and camping grounds could be sustainable.</td>
</tr>
<tr>
<td>Sustainable tourism services</td>
<td>67</td>
<td>Estimate from Sakernas 2008 KBLI code 63460, 63470 based on interviews with key informants from the tourism sector that suggest that 10% of tourism consulting and information services are providing sustainable services.</td>
</tr>
<tr>
<td>Sustainable management of tourism destinations</td>
<td>12,413</td>
<td>Estimate from Sakernas 2008 KBLI codes 92331, 92332, 92333, 92334, 92335, 92336, 92422, 92431, 93432, 93433 based on interviews with key informants on from the tourism industry that at least 90% related to gardens, national parks, agrotourism.</td>
</tr>
</tbody>
</table>
Green sub-sector | Employment estimate | Source / Method of calculation
--- | --- | ---
Green spas | 337 | Estimate from Sakernas 2008 KBLI code 80923, based on interviews with key informants on from the tourism industry that suggest that 10% of "spa" services could be sustainable.

| Total “environment core” jobs | 21,407 | |

Source: Authors' own data

10.7 Estimating green jobs

By combining both qualitative insights from key informants on employment conditions in the tourism sector and quantitative information on from the labour force survey, green jobs in the tourism sector have been estimated.

Table: Green job estimates for the tourism sector, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable accommodation services</td>
<td>4,783</td>
</tr>
<tr>
<td>Sustainable tourism services</td>
<td>67</td>
</tr>
<tr>
<td>Sustainable management of tourism destinations</td>
<td>5,586</td>
</tr>
<tr>
<td>Green spas</td>
<td>229</td>
</tr>
<tr>
<td><strong>Total green jobs</strong></td>
<td><strong>10,665</strong></td>
</tr>
</tbody>
</table>

Most green jobs are found in the sustainable management of tourism destinations (such as National Parks, Natural and Wildlife Reserves, Forests, Zoo and Gardens) and among sustainable accommodation services. The total number of green jobs in the sustainable management of tourism destinations is estimated at 5,586, followed by green jobs in sustainable accommodation services which are estimated at 4,783. Even though these sub-sectors have a higher number of green jobs, the proportions of green jobs to sustainable jobs are fairly low, indicating a need for initiatives to promote job quality within these sub-sectors.

Green jobs in the sustainable tourism services and green spas - respectively estimated at 67 and 229 - remain low. However, all jobs in sustainable tourism services were considered to be both sustainable and decent, so that key to expanding green jobs in this sub-sector relates to the growth in demand and supply for sustainable tourism services.

Table: Green jobs as a proportion of environmentally sustainable jobs in tourism, 2008

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Per cent of environmentally sustainable jobs that are green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable accommodation services</td>
<td>56%</td>
</tr>
<tr>
<td>Sustainable tourism services</td>
<td>100%</td>
</tr>
<tr>
<td>Sustainable management of tourism destinations</td>
<td>45%</td>
</tr>
<tr>
<td>Green spas</td>
<td>68%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50%</strong></td>
</tr>
</tbody>
</table>

Source: Authors’ estimates based on BPS Sakernas
The tourism industry tends to be labour intensive and includes workers with wide ranging profiles, from well trained professionals, to a large number of workers with limited education and no formal training.

Working hours in the tourism industry can be long, with the average person in tourism working 49 hours a week. Moreover, according to the Indonesia Employers Association (APINDO) the informal economy associated with tourism is approximately 70 to 80 per cent of the sector. Promotion of green tourism could be a strategy to support the formalization of the sector and for an improvement of the working conditions within it.

Sustainable accommodation services and sustainable management of tourism destinations play a crucial role in leading the greening process of the fast growing Indonesian tourism sector. However, these activities can only be effective at supporting a transition to a green economy if they are socially and environmentally sustainable. Only 56 per cent of the jobs mentioned in this sub-sector meet the criteria that would allow them to be considered as both socially and environmentally sustainable. Hours regulation, casualization and certification of workers skills may help to improve employment quality. The Government may also consider various policy options that provide incentives in order to support the development of environmentally sustainable practices in the accommodation sub-sector. In this regard, five star hotels – with only five per cent of them currently considered sustainable - could also be requested to meet specific “environmental friendliness” criteria at the national level in order to maintain their “luxury” status. Applications of tools to support environmental management efforts and environmental monitoring efforts (UPL/UKL) could be used to support a certification framework on sustainability within accommodation services.

Accessibility of key sustainability tools, such as green jobs and accommodations guidelines (e.g. ILO’s Training Manuals for Ecotourism Guide and Green Homestay) as well as eco-labeling and certifications, is necessary to promote green jobs in these sub-sectors.

It would be important to have the involvement of local communities in order to limit environmental exploitation as well as to promote sustainable tourism. The involvement of local communities in tourism might encourage the shift away from environmentally harmful activities, such as logging, and raise awareness on forest conservation. Therefore developing associations and cooperatives that support eco-tourism in areas surrounding tourism destinations may be key in moving towards more sustainable tourism practices, while also opening up the market for green jobs.

On a smaller scale, only ten per cent of spas as well as tourism consulting and information services appear to be sustainable, thus requiring a concerted effort in order to grow green employment and opportunities in these sub-sectors. Improved visibility for sustainable tourism services and green spas, by further assisting these tourism businesses to better communicate their green credentials, would be a key element in fostering development of these sub-sectors. Eco-labeling of spas and green tourism services, along with a broader marketing of green tourism, might represent an effective strategy to grow these sectors. Certification and standards for green spas are therefore needed. In order to be effective, such standards should link with green value chains and improved tourism education.

On a broader level, it might be useful for a public or private agency to build a framework, enriched by a reliable database and access to business development services, which aims to create a coherent network among all the relevant stakeholders in the sector in order to make it
easier for entrepreneurs to start or develop sustainable tourism activities and for patrons to access these services. Such a framework could strengthen public-private cooperation which could further benefit from a strategic collaboration with eco-tourism distribution channel players (e.g. travel agencies, specialized websites) in order to expand the green tourism sector offerings from Indonesia.
Chapter 11: Green jobs in solid waste management

Indonesia’s economic growth, population growth, rapid urbanization and change in production and consumption patterns is increasing waste production. Current waste generation is estimated at 2-3 kg/capita/day and is expected to continue increasing in the next few decades. The waste sector is the main source of methane (65%) and if LULUCF is not considered, it contributes about 28.3% of CO\textsubscript{2} emissions according to Indonesia’s Second National Communication under the UNFCCC. To examine the challenges and opportunities in the solid waste sector, the discussion will start with a brief overview then delve into its linkages between the environment and employment. Of importance is the contribution of the informal sector in the discussion on the decency of work associated with jobs generated in the sector.

11.1 Overview of the solid waste sector

Municipal solid waste (MSW\textsuperscript{238}) generation nationwide is about 176,000 tons daily. The composition by source is shown below.\textsuperscript{239} The high percentage of organic waste is caused by household waste. The local government could not collect the total amount of household waste for treatment purposes such as landfill, composting, recycling or incineration, so several waste handling systems are done by the community.\textsuperscript{240}

**Figure 1: MSW composition by source**

![MSW composition by source](source)

**Source:** XXX

Compostable organic waste dominate the MSW composition however this trend is decreasing while plastic and paper waste are increasing as shown in the comparison of waste

\textsuperscript{236} Country Analysis Report. 2011. Presented at the 3\textsuperscript{rd} Meeting on the 3R Regional Forum in Asia in Singapore, 5-7 October 2011.


\textsuperscript{238} Municipal Solid Waste is defined as the remnant of human daily activities and/or natural processes in the solid form as per Article 1 Law No.18 Year 2008. The Scope of Municipal Solid Waste in Indonesia includes household waste derived from household daily activities, excluding feces and specific waste; household-like waste derived from commercial areas, industrial area, special areas, social facilities, public facilities and/or other facilities; specific waste includes waste containing hazardous and toxic materials, waste derived from disaster, construction and demolition waste, waste that cannot be processed due to the unavailability of technology; and waste which does not periodically occur. (Ministry of Environment, 2008)

\textsuperscript{239} Based on latest data available in 2010 as mentioned in the paper on “Implementation of 3R in Indonesia” presented at the 2\textsuperscript{nd} Meeting of the 3R Regional Forum in Asia in Kuala Lumpur on 4-6 October 2010.

\textsuperscript{240} Ministry of Enviroment. 2008.
composition between 1989 and 2006 in table 1. Some types of waste (e.g. plastics, metal, etc.) are generally recycled for re-utilization.

**Table 3: Waste composition in 1989 and 2006**

<table>
<thead>
<tr>
<th>Year</th>
<th>Waste generation (kg/cap/day)</th>
<th>Composition (% wet weight basis)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Organic</td>
</tr>
<tr>
<td>1989*</td>
<td>0.4</td>
<td>87</td>
</tr>
<tr>
<td>2006**</td>
<td>1.12</td>
<td>62</td>
</tr>
</tbody>
</table>

*Source: *UNDP (1987), Lee (1992), **MoE (2008)*

In Indonesia, information-related measures on the technical aspects and on the volume of municipal solid waste (MSW) generated/handled/disposed at landfill sites, including MSW composition (limited to a few cities), amount and condition of MSW handling facilities and all other activities are implemented by the local government. Key stakeholders involved in the collection, segregation, treatment and disposal in municipalities in Indonesia include the local authorities, private sector and the community.

About 69 per cent of municipal waste is collected, 10 per cent buried, 7 per cent composted and recycled, 5 per cent are open burned and 10 per cent are unmanaged. Basically, waste is produced as the result of natural resource consumption, thus the ways to cope with this issue are focused on reducing its amount, recycling and reusing it as much as possible. There is now a changing paradigm from collect-transfer-dump into reduce at source and resource recycle as illustrated below.

**Figure 2: Mainstreaming of 3Rs in Municipal Solid Waste Management**

*Source: XXX*

The level of services of SWM in Indonesia is 56 per cent. In urban areas, almost 60 per cent of waste is taken to solid waste disposal sites while only 30 per cent in rural or smaller

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242 Adopted from the Implementation of 3R in Indonesia. 2010. Presented at the 2nd Meeting of the 3R Regional Forum in Asia in Kuala Lumpur, 4-6 October 2010.
In general, waste is transported to the disposal site. The solid waste disposal sites in most big cities are considered to be unmanaged and are simply considered as open dumping sites. Currently, incinerators for municipal solid waste are generally not used in Indonesia. Although several statistical data indicate that incineration is already used for eliminating municipal solid waste, in reality, the so-called ‘incinerator’ is actually an ‘open burning’ system.

Indonesia’s municipal solid waste management is mired with many problems including the poor site selection process, limited infrastructure and equipment in the landfill site (e.g. leachate treatment facilities, gas collection system, soil recovery and heavy equipment, etc.), poor maintenance and operation of landfill (i.e., as open dumps), limited budget, lack of awareness of the 3R programme, lenience to law enforcement and lack of political support. To address some of these problems, in 2007, the 3R programme in communal scale was initiated in 33 provinces with pilot projects on segregation, composting and recycling. The programme is implemented in about 300 locations in 2010 with the target of covering 250 cities in 2014. It is expected that the amount of waste disposed to landfills will be reduced by 20 per cent upon implementation of the 3R concepts.

As of 2010, Indonesia has the following municipal waste facilities – 20 treatment factories, 80 MRFs, 400 open dumpsites, 70 controlled landfill sites and 10 sanitary landfill sites. The cost of waste disposal in Indonesia is maybe only USD 10 per ton in Jakarta and USD 3 to USD 5 per ton outside of the capital. The recycling rate is low with less than 7 per cent of recyclable materials recycled in Jakarta which needs better methods for waste disposal. Improvement of solid waste management in Indonesia is critical to ensure a good quality of life for people as well as in maintaining a good environment that is appealing to domestic and foreign investors. It is one of the priority areas considered by the government under its Public Private Partnership (PPP) Infrastructure Project Pipeline which is expected to need about USD 220 million in investments.247

11.2  Importance of the sector to the environment

Waste is a major source of pollution and environmental degradation when handled and treated inappropriately. Improper disposal of waste could potentially harm the soil, water sources and air which could lead to adverse effects on the people and environment. The waste sector is the main source of methane and a significant contributor of carbon dioxide emissions. By source, the major source is from wastewater treatment and discharge.

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244 Indonesian Statistical Data on Environment; BPS, 2007.
246 This is considered low compared to other international cities where operation costs for final disposal are about USD 20-25 per ton. More discussion in http://www.thejakartapost.com/news/2011/02/13/drowning-waste.html
In Indonesia, where the dominant method of disposal is open dumping, emission reductions from solid waste could be achieved by converting an open dump site to a more managed solid waste handling system like a sanitary landfill equipped with gas flaring or utilization systems. It is fundamental to reduce the amount of waste at source. Further, measures to minimize the amount of waste going to landfill such as enhanced 3R programmes and the utilization of waste as a source of energy are being explored.

11.3 Key trends towards sustainability

Up until 2007, there was no national waste policy. The existing waste laws then covered environmental management, hazardous waste management, waste recycling, pollution control, health and sanitation and imported waste but did not specifically control solid waste management.

In Indonesia there are two laws that regulate waste management namely Waste Management Law No. 18/2008 concerning Solid Waste Management and Law No. 32/2009 concerning Environment Protection Management. Law No. 18/2008 regulates solid waste management that mainly focuses on municipal solid waste management while Law No. 32/2009 regulates industrial waste and hazardous waste.

The core idea of solid waste management is based on the 3R principle of reduce, reuse and recycle. Following the 3R principle, the law stipulated that solid waste management will consist of two major activities – waste minimization and waste handling. Waste minimization is elaborated in to the following activities: reduction of waste at source, reuse of waste at source, and recycling of waste at source. Waste handling activities consist of the following: separation, collection, transportation, treatment, and final processing at final disposal. The implementation of municipal solid waste is the responsibility of the local government (city and regency). Both central and provincial government is responsible for formulating policy and regulation, providing standards and criteria, as well as guidelines. Importation of municipal solid waste is prohibited by law and the criminal code will be imposed should there be violations of the rules. The law also aims to convert open dump systems at final disposal to better systems (e.g. controlled landfills and sanitary landfills) by 2013.
Complementary programmes to promote solid waste management have been promoted by the government such as:

- **Clean City Program / “ADIPURA”**, is an award system that provides incentives and disincentives to cities by measuring the performance of the city and regency in urban environmental management;
- **Program Adipura Kencana**, a programme that encourages the city and regency to develop a sustainable city;
- **Promotion and Implementation of 3Rs**, a programme that develops 3R implementation both community-based 3Rs and city-scale 3Rs;
- **Bank Sampah or Waste Bank**, a programme that educates people to reduce their waste by conducting waste separation and waste saving for recycling purposes.
- **Tax exemption** for the importation of MSW technologies.
- **Subsidies** (DAK: Special Allocation Budget and others); National/Provincial/ District Government Budget.

There has been considerable progress in the implementation of the 3R programme in Indonesia. Through segregation, a 16 per cent reduction of MSW in Surabaya City has been achieved. A survey showed that in Bandung City, 19 per cent of domestic waste from hospital was reduced. The government set a target, especially for municipal solid waste recycling, of a minimum 7 per cent recycling rate by 2014.

Some of the joint projects related to municipal waste in Indonesia include:

- Pilot/demo project on implementing 3R of municipal waste between Central and local Government and the community.
- Western Java Environmental Management Project (WJEMP) on composting implemented by Ministry of Public Works and MOE.
- Pilot project for developing sanitary landfills (Ministry of Public Works, BPPT and Districts).
- Debt for nature swap (Cooperation programme with Germany) on municipal waste management for gas.
- CDM programme at Bantar Gebang landfill site in cooperation with Japan, Suwung Bali and Balikpapan (East Kalimantan).

### 11.4 Identified green sub-sectors

The following green sub-sectors and screening criteria are outlined below based on the discussion of trends and the enabling environment in the solid waste sector.

<table>
<thead>
<tr>
<th>Green sub-sector</th>
<th>Proposed screening criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycling</td>
<td>Compliance to Waste Management Law No. 18/2008 Benchmark: amount of recycled municipal solid waste</td>
</tr>
<tr>
<td>Waste disposal</td>
<td>Compliance to Waste Management Law No. 18/2008</td>
</tr>
</tbody>
</table>

Benchmark: amount of municipal solid waste diverted to landfill

Waste treatment Compliance to waste Management Law No. 18/2008
Benchmark: amount of waste to generate energy

Source: Authors’ own data

11.5 Decent work in the solid waste sector

There are formal and informal jobs generated in solid waste management. The informal sector such as waste pickers at the dump sites, itinerant buyers and those working at junkshops who augment the formal sector to reduce the remaining waste by sorting them for recycling remain unprotected and vulnerable to health risks while sorting waste at open dump sites.

In Indonesia, waste picking by scavengers is an evident element of waste management. There are about 6,000 scavengers in the Province of Jakarta, including those at the dump site. Itinerant buyers and junkshops also abound. In Bandung City, the city can handle around 54 per cent of generated waste according to the Statistical Bureau of Bandung. The remaining waste of 46 per cent is left at temporary dumping stations (TPS) and assumed to be recycled by informal sector recycling. Previous predominant occupations of waste pickers in Bandung are seller (51.2 per cent) and farmer (16.3 per cent) while the rest of the proportion is distributed evenly among house servants, factory workers, etc., which accounted for about 30 per cent. Some migrants who found difficulty to find a job or are unsatisfied with their previous jobs engage in waste picking because it gives them freedom, stable income, while no investment and no skills are required. The average income of waste pickers in Bandung is Rp 830,882 which is competitive compared to the minimum wage for industrial workers which is Rp 860,565 and is almost twice as much compared to government contract municipal waste workers who earn Rp 450,000 per month. The income generated from waste picking is a strong incentive in spite of the poor working conditions which could not be considered as decent.

11.6 Estimating environment related employment

It is estimated that the total number of employees involved in the waste management authority is 73,462 persons. The nature of their jobs is presented in the graph below.

Figure 4: Employees involved in waste management by per cent

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249 Ibid.
The estimate does not include informal workers as national data is not available.

11.7 Estimating green jobs

It is assumed that employees captured in the government statistics working in waste management comply with the requirements of decent work. Thus, green jobs in the solid waste sector could be roughly estimated as the total number of employees in waste management which is 73,462 employees. This figure could increase if measures to shift informal to formal recycling are put in place, noting that waste recycling has a big potential for livelihood opportunities and environmental benefits if only the processes could be properly regulated and conducted in a safely manner.
Chapter 12: Conclusions

This chapter provides a concluding discussion of the main findings and messages arising from the Indonesian green jobs mapping study. The Green Jobs mapping study was undertaken to identify key economic sectors with environment related activities that are creating green jobs in Indonesia and offer some suggestions on how to move forward. The following sections highlight the numbers of core environment related jobs and decent green jobs found in each of the economic sectors analysed. Included are recommendations for further actions to promote green jobs within the green sub-sectors identified in the study. The discussions are presented in the following 3 sections:

- Main findings;
- Policy considerations;
- Methodological issues for estimating green jobs.

12.1. Main findings

The study estimated that there were approximately 8.8 million jobs in Indonesia that were considered to be core environment related jobs and among them it was estimated that approximately 4 million jobs were assessed to be green jobs by adhering to decent work principles. The sector with the highest potential for further green job creation was agriculture, followed by manufacturing and transport, as well as significant potential also found in forestry, fisheries and construction if appropriate policies are implemented to promote environmentally friendly activities and address the decent work deficits in the sectors.

The key environment related sectors identified by the study can be seen in the table below alongside the green jobs estimates.

Table 1: Estimated core environment related jobs and green jobs in Indonesia.

<table>
<thead>
<tr>
<th>Key sectors</th>
<th>Core environment related jobs</th>
<th>Green jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>4,809,584</td>
<td>2,434,667</td>
</tr>
<tr>
<td>Forestry</td>
<td>213,620</td>
<td>97,630</td>
</tr>
<tr>
<td>Fisheries</td>
<td>549,012</td>
<td>241,739</td>
</tr>
<tr>
<td>Mining &amp; Energy</td>
<td>6,780</td>
<td>4,820</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1,062,761</td>
<td>331,538</td>
</tr>
<tr>
<td>Construction</td>
<td>414,780</td>
<td>187,752</td>
</tr>
<tr>
<td>Transportation</td>
<td>1,659,606</td>
<td>603,593</td>
</tr>
<tr>
<td>Tourism</td>
<td>21,407</td>
<td>10,665</td>
</tr>
<tr>
<td>Waste</td>
<td>73,462</td>
<td>73,462</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,811,012</strong></td>
<td><strong>3,985,866</strong></td>
</tr>
</tbody>
</table>
The agriculture sector in Indonesia is dominated by informal employment. Out of the 39 million people working in the sector it was estimated that 95.1 per cent were employed informally making it difficult to estimate the decency of work in the sector. Almost 50 per cent of the 4,809,584 core environment related jobs in the agriculture sector were found to be green jobs (2.4 million jobs) due to the importance of green sub sectors such as organic and low impact crops cultivation and smallholder rubber production. It was estimated that 6.24 per cent of jobs in the agriculture sector could be considered to be green jobs. In order to increase the number of green jobs in agriculture it would be important to promote the certification of organic activities through the OKPO and certification bodies accredited by the Ministry of Agriculture as well as supporting the sustainable palm oil initiative at both the national and local levels. The demand for organic food has been increasing over recent years thus the promotion of organic agriculture can benefit farmers as well as the environment, as products sold at premium market prices means higher revenues which can be reinvested in health services, nutrition or farming technologies. To promote green jobs in low impact poultry and combination farming, employment conditions and the bargaining power of these workers throughout the value chain needs improvement. Diversification strategies and trainings may also support improvements in livelihoods and value chain development for rural farmers. It is important to ensure that agricultural enterprises are members of employers’ organizations and those workers have the right to freedom of association and collective bargaining.

Of the 549,012 core environment related jobs found in the fisheries sector it was estimated that just under half of them or 241,739 were green jobs. Most of the green jobs are in good practice aquaculture, followed by sustainable fishing in the formal economy for export. In order to increase the number of green jobs in the fisheries sector in Indonesia it would be important to support the implementation and enforcement of regulations to ensure catching quotas and international treaties on fishing are adhered to and to improve employment quality and conditions for people employed in the sector. Programmes may be developed to provide fisherman with better access to training programmes on value chain activities to increase the producer’s share of the border price and help raise incomes. In the meantime, fisheries inspection services should continue to work to provide services related to sustainable catch management and provide employers and workers with training opportunities. Aquaculture could also become an important green sub-sector for green jobs as it is predominantly export oriented and follows good labour practices. The seaweed sub-sector also offers a lot of potential for further green job creation as it provides opportunities for fishing communities to diversify and raise their incomes and improve the reliability of their income in a sustainable way. Moreover, seaweed is considered to be environmentally sustainable as it can reduce pressure on fish stocks and is growing in popularity in global health food markets.

There is often little security or certainty of income for people working in the fisheries sector because much of the work is in the informal economy. In addition, many fishing activities take place out at sea, so working conditions can be difficult to monitor. Policies that promote social protection and better working conditions including in disaster prone areas would help to increase the decent work element in the sector. Furthermore, it would also be important to ensure that the Maritime Labour Convention is ratified so that employers and workers can engage formally in matters regarding industrial relations.

The forestry sector also has important implications for the development of green jobs and a green economy due to the critical role played by forests in mitigating climate change and providing livelihoods for local people. Green jobs may be increased in forestry by:
supporting policies which promote value chain development and diversification; promoting access to competitive markets; providing access to finance, and by providing education about processing that adds value to commodities. Sustainable natural forest concessions through certification and inspections from the Eco-Labelling Institute (Forestry Stewardship Council) and the Ministry of Forestry can also spur further growth in the sector. Green Jobs may also be generated through climate change mitigation activities such as UN-REDD that reduce deforestation, such as jobs in forest rehabilitation and conservation, fire prevention, community outreach and forestry mapping and monitoring. There is huge potential in Indonesia to help raise incomes for workers and forest communities by producing and selling carbon credits in the global carbon markets. This revenue could be used to improve rural infrastructure and access to services for forest communities while creating green jobs in conservation, monitoring and evaluation as well as green finance and carbon trading. Forests are also tourist destinations and the promotion of sustainable tourism can be a good way to support biodiversity conservation while also creating employment opportunities for local people.

If decent work deficits were addressed in the sector, such as the low levels of remuneration and lack of worker representation then almost half of the core environment related jobs in forestry could be upgraded to green jobs. Decent work deficits may be addressed through livelihood diversification, better access to local and national markets, greater organized worker’s representation, and a focus on improving the employment conditions and bargaining power of these workers which would help contribute to social progress. Forest enterprises may also become members of employers’ organizations and workers should have the right to freedom of association and collective bargaining.

In the mining and energy sector, a first estimate could find 6,780 core environment related jobs only. Over the past few years the share of renewables in the energy mix has been steadily increasing although still very low in absolute terms. As many of the jobs in renewables are highly skilled and are in a well regulated sector it was estimated that approximately 71 per cent or 4,820 of the core environment related jobs in the mining and energy sector would be green jobs. In order to expand the number of green jobs in the mining and energy sector there is a need to better utilise the untapped potential in Indonesia and to rapidly expand the development of the geothermal, biomass and renewable energy (solar, wind and hydro-power) sub-sectors. Indonesia is estimated to hold 40 per cent of the world's feasible geothermal reserves holding great potential for green employment creation if these renewable sources of energy can be harnessed. Government can use market based instruments to promote the use of energy from these sustainable sources where possible and commit to research and development activities that allow use of energy from these sources to become more accessible and affordable to industry and households. To ensure that work is both sustainable and decent in the sector it would also be important to ensure that enterprises are members of employers’ organizations and that the workers have the right to freedom of association and collective bargaining as well as adequate training.

In the manufacturing sector it will be important for industries that emit high levels of GHGs to identify strategies to reduce emissions by examining energy sources and how to use energy throughout the production cycle. Solutions for mitigating GHGs may include switching to renewable sources, converting waste into energy sources, or adopting green technologies that are more energy and resource efficient. The total number of core environment related jobs was estimated at 1,062,761, which is equivalent to 8.5 per cent of all the jobs in manufacturing in 2008 and of these 331,538 (2.6 per cent) can be classified as green jobs.
Rattan and bamboo manufacturing offer the most potential for further green jobs growth through the production of green goods. In order to promote green jobs in the manufacturing sector it is important to promote initiatives that focus on increasing the overall sustainability of the sector and supply chains, as well as initiatives to support improvements in employment quality. In some cases, minor policy interventions can improve the environmental sustainability of activities that are supporting jobs in the supply chain. In particular, green agro-processing, rattan and bamboo manufacturing, producing organic fertilizers, sustainable essential oils and recycling activities can play an important role in supporting the economy to become more environmentally sustainable.

Within the construction sector there exists huge potential for the development of green jobs if decent work deficits can be overcome. Of the 414,780 environment related jobs found in the sector approximately 187,752 were classified as green jobs. Also, green buildings, labour intensive transport infrastructure, irrigation and water management provide huge opportunities for green job creation should further green investments be made in these areas. The majority of jobs in the construction sector involve the building of commercial and residential buildings and the construction of roads. Therefore, instruments and good practices such as green procurement and green certification would contribute to environmental sustainability through the use of recycled materials and inputs as well as through adopting environmentally sound management practices. Contractors may be encouraged to participate in the green building certification processes and adopt green procurement standards in their projects. One concrete recommendation for improving employment quality would be to consider the endorsement of the International Organization for Standardization's Standard 10845 on procurement in the construction sector, which includes specifications for key performance indicators that measure factors such as use of local contractors, local resources and local labour, in order to establish a target level for a contractor performance. Many of those working in irrigation, particularly community based irrigation, would benefit from receiving support to adopt appropriate technologies and structures to assist in the maintenance of irrigation systems.

By providing remuneration above the minimum wage and providing workers with access to health insurance and injury compensation mechanisms more green jobs can be created in construction. Workers and employers also need to have skills training to ensure that competencies are adequate and that risks associated with construction works are reduced. In addition, the study also highlighted the important scope for improvement in working conditions and productivity and the need for higher OSH compliant practices.

It is estimated that 603,593 or 9.8 per cent of these jobs in the transport sector could be considered to be green jobs. Green jobs could be generated in larger numbers should more investments be made in low carbon transportation systems, such as the expansion of the rail network and mass public transport on roads. Initiatives should also focus on improving the quality of current transport options to support an increase in demand, while also investing in infrastructure to increase the supply of rail and public transport options. Furthermore, it would also be important to ensure that enterprises in the transport sector are members of employers’ organizations and that the workers have the right to freedom of association and collective bargaining.

In the tourism sector the estimated number of core environment related jobs was 21,407, which is equivalent to less than 1 per cent of the jobs found in the tourism sector. The number of green jobs is almost half as much at 10,665. The percentage is quite low as employment in
tourism accounts for restaurants and hotels as well as tourism services. In Indonesia tourism activities, such as eco-tourism and forest-based tourism, are growing rapidly. If both forest eco-systems are well maintained and tour guides are well informed on sustainable tourism practices such economic activities can support sustainable development objectives. Efforts to promote green hotels, green homestays, green spas and the sustainable management of tourism destinations can engage local people, creating more green businesses and green employment opportunities.

The waste sector in Indonesia is characterised by under-funding, lack of skills, and local organization of the waste collection. Much of the work is undertaken on an informal basis so green job estimates of 73,462 working in the sector were quite low in relation to the numbers of people involved. Further development and implementation of the 3R programme in Indonesia would significantly increase the numbers of green jobs in the sector. Also targeting waste pickers and providing them with trainings on occupational safety and health, access to health insurance and social protection services as well as basic environmental awareness can help reduce decent work deficits in the sector.

12.2 Policy considerations

The research findings of the mapping study demonstrate the important potential that exists in Indonesia for further green job creation at the sectoral level.

A comprehensive research and analysis programme on green jobs is planned for Indonesia with three core objectives to:

- iv. Better understand where green jobs are found across the economy and in which sectors and to identify the existing barriers to transform existing environment related jobs into decent green jobs.
- v. Assess the potential for creating new jobs including green jobs by transitioning to a low-carbon, environmentally friendly economy.
- vi. Collect the necessary elements for the development of a strategy on skills for green jobs that can fully reap the benefits of a greener economy.

The Green Jobs mapping study was developed under phase 1 of the programme and aimed to address the first objective. It is envisioned that the results and recommendations from the study will feed in to an Indonesian Green Jobs Road Map developed by a national task force on Green Jobs (consisting of ILO constituents and other relevant stakeholders). The Road Map will provide guidance to policy makers on the creation and promotion of green jobs both at the national and local level that will be in line with existing government development plans and poverty reduction programmes.

It is important to consider that not all environment-related jobs in traditional economic sectors are necessarily decent jobs. This leaves scope for not only creating new green jobs in green sub-sectors but also by improving the sustainability of existing jobs (greening) across the whole economy much more green employment may be created. Policies enacted for greater economy-wide sustainability are expected to drive the growth of both new green economic sectors as well as more traditional ones. The key to this transformation would be to support small and micro size enterprises to become more sustainable in their business operations as well as creating the conditions in the economy for the large scale production, labelling and marketing of economically and socially sustainable green products and services.
The decent work analysis undertaken by the study identified serious decent work deficits, found specifically in green segments of the economy where issues such as low occupational health and safety, income insecurity and low productivity are common features such as in forestry, fisheries, and waste recycling. In addition, it was found that some of the most important social and labour issues found across all sectors of the economy are no different in environment related jobs.

Much work in Indonesia is often undertaken on an informal basis, thus this kind of work cannot be classified as decent by definition. Issues such as low remuneration, lack of enforcement of labour regulations and ensuring workers have the right to freedom of association and collective bargaining have all contributed to decent work deficits across the labour market. In many cases, it’s mostly the non-compliance with existing labour standards or their inadequate enforcement that raises barriers to labelling jobs as ‘green’. Interventions to progressively ‘formalize’ informal-economy activities improve the sustainability of enterprises and enforce labour standards can contribute significantly to improving decent work aspects transforming these types of informal jobs in to genuine green jobs.

The discussion on how best to promote green jobs in Indonesia is on-going. The results of the mapping study have laid the groundwork for further analysis of the labour market. In particular, it will be important to ascertain the proportion of growth in green jobs when compared to the overall employment growth rate and whether green jobs have actually exceeded that growth. It would also be useful to further examine what proportion of jobs created by environment related activities and investments in climate resilience may be considered to be green and whether these new jobs adhere to decent work principles allowing them to be classed as green jobs.

It is also important to strengthen the role of social partners (Employers and Trade Unions) in the decision making process by including them in national consultative mechanisms on climate change and green jobs. Social partners can provide effective services, trainings and information about green jobs to their members as well as promoting green jobs in their action plans for the next five years.

The green jobs mapping study under phase 1 of the programme in Indonesia may be supplemented by further analytical research. The government may establish programmes to enhance the capacity for research and analysis on green jobs. In fact, the government is currently working with the ILO to develop a new computer modeling tool called a Dynamic Social Accounting Matrix (DySAM) to better model the impacts of environment related policies and green investments on the labour market and how indirect jobs and other economic sectors may be affected. It is important that further research should also attempt to address the skills component for green jobs in an integrated methodology.

The Indonesia Climate Change Sectoral Roadmap (ICCSR) which seeks to integrate economic development with environmental sustainability may be further integrated with labour and social related policies to encourage more green jobs and the greening of existing jobs. Developing national framework legislation on green jobs and incorporating further environmental considerations into economic development plans such as the Medium-Term Development Plan 2010-2014 and Long Term Development Action Plan (2005-2025) will be critical in the coming years to effectively mainstream the green jobs policies into the national development process.
There is a need to take a more synergetic approach under the Climate Change Road Map and to assess the employment and skills demand dimensions of the low-carbon, environmentally friendly policies introduced in different key sectors of the economy. The Green Jobs Mapping study completed under phase 1 was the first step in a process to better integrate social and labour considerations with the environment pillar of national sustainable development policy in Indonesia.

12.3 Methodological issues related to estimating green jobs

The various green jobs mapping studies which have already been undertaken in the Asia and Pacific region in Bangladesh, Malaysia and the Philippines have found similar gaps in terms of the availability of official data. However, they have brought comparable results in terms of the relative importance of green jobs in the labour market and have identified the sectors where these are concentrated. Although not covered in a systematic manner in all countries, the research activities have been able to demonstrate the importance of climate adaptation related activities for employment and decent work. Countries could learn from each other and exchange best practices for promoting environmentally sustainable decent work as well as gaps in terms of information and planning tools.

The green jobs estimations for each sector in Indonesia were derived using a combination of insights collected from focus group discussions for each sector and data from the labour force survey (Sakkernas, see Annex 1). However, there were a number of issues related to the methodology which were identified and which may be addressed to further refine the mapping process.

There was a noticeable difference in understanding amongst the interviewees and the interviewers on the definition of a ‘green’ job. Many respondents viewed green jobs as all jobs created by environment related activities and by using green technologies and processes, irrespective of their sustainability or adherence to decent work principles. This raises the issue of how to define green jobs in Indonesia and how to communicate that definition to constituents, relevant stakeholders and the public as a whole.

It was found that face to face interviews were often a more effective means of drawing out information and generating discussions than correspondence via email or telephone. Email responses tended to be cursory and lack the sophistication or insights required. Therefore, in countries such as Indonesia who are just starting to institute environmental sustainability into economic planning, the best approach to this type of mapping study is to conduct as many face-to-face interviews as possible. This method is more time consuming and costly, but is the best way of ensuring reliable results.

Quantifying green jobs is not a straightforward process, particularly in regards to using indicators to ascertain if they adhere to decent work principles and environmental sustainability standards in the informal economy. Information on working conditions, wages or other indicators are not yet comprehensively measured or collected. Moreover, identifying direct environment related jobs is not a straightforward process in the absence of official figures. Even when environment related jobs can be identified, understanding the quality of these jobs can often be challenging.
### Annex: Estimates for green jobs

<table>
<thead>
<tr>
<th>Sector</th>
<th>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</th>
<th>Proportion of activities that are sustainable for each green sub-sector</th>
<th>Sustainable Job estimate</th>
<th>Proportion of sustainable jobs that could be green jobs</th>
<th>Green Job estimate</th>
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</thead>
<tbody>
<tr>
<td><strong>Agriculture</strong></td>
<td>National law: Ministry of Agriculture’s Decree No. 432/Kpts/OT.130/9/2003, which created the Authority for Organic Agriculture Competencies (Otoritas Kompeten Pangan Organik - OKPO). The OKPO accredited seven certification bodies (Sucofinco, MAL, Indofice, Persada, Sumatera Barat, leSOS and BIOcert) for organic production. National Standard SNI 01-6729-2002 for organic food production, revised in 2010, also serves as a guideline for accreditation of organic products.</td>
<td>Estimate from Sakernas 2008, proportion of KBLI codes 1111, 1112, 1121, 1122, 1125, 1131 and 1132 based on Indonesian Organic Alliance estimates that 10 per cent of land area is certified organic.</td>
<td>2295258</td>
<td>~46%</td>
<td>1065569</td>
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<tr>
<td><strong>Low impact crops cultivation</strong></td>
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<tr>
<td><strong>Smallholder rubber</strong></td>
<td>Activity based approach: The technique used by smallholders for rubber cultivation, called jungle rubber, is considered as sustainable. Rubber trees are planted amongst other forest trees and fruit trees, creating a forest rich in biodiversity and less prone to fire hazard.</td>
<td>Estimate from Sakernas 2008, KBLI code 1115, based on quantitative data from Sakernas where 55 per cent of the workers in the rubber plantations are smallholders.</td>
<td>2030923</td>
<td>~56%</td>
<td>1138858</td>
</tr>
<tr>
<td><strong>Sustainable Palm Oil</strong></td>
<td>Voluntary standard: the RSPO (Round table on Sustainable Palm Oil) is an internationally-recognised organization bringing together palm oil growers, retailers, NGOs and other stakeholders involved in the Palm Oil industry, to promote standards for a sustainable growth and use of palm oil products. Companies in Indonesia can become members</td>
<td>Estimate from Sakernas 2008, KBLI code 1134, based on data from RSPO. Total certified area is 453,786 hectares, which represents 9 per</td>
<td>134156</td>
<td>~60%</td>
<td>81087</td>
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<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
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<td>Sustainable Job estimate</td>
<td>Proportion of sustainable jobs that could be green jobs</td>
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<td>Organic plantations for beverages</td>
<td>on a voluntary basis.</td>
<td>cent of the palm oil area. Therefore it could be assumed that 9 per cent of jobs in the sector are environmentally sustainable.</td>
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<td>%</td>
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<td>4%</td>
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<tr>
<td>34172 hectares of tea, coffee and cocoa organic land, which represents 1.75 per cent of total tea, coffee and cocoa plantation area. Therefore it could be assumed that 1.75 per cent of jobs in the sector are environmentally sustainable.</td>
<td>43663</td>
<td>~43%</td>
<td>18845</td>
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<tr>
<td>Low impact poultry</td>
<td>Activity-based approach: chicken and poultry from the community villages, known as ‘kampung’ chicken, are raised in a way that minimizes the impact on the environment.</td>
<td>Estimate from Sakernas 2008, KBLI code 1223, considering that 100 per cent of native chicken</td>
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<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
<td>Proportion of activities that are sustainable for each green sub-sector</td>
<td>Sustainable Job estimate</td>
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<tr>
<td>Combination farming</td>
<td>Activity based approach: the circle production (combined use of livestock and crops, and the reutilization of biomass for other productive activities) ensures a more optimal use of the resources, and minimizes the waste.</td>
<td>are raised in a low impact manner.</td>
<td>241012</td>
<td>~44%</td>
<td>106427</td>
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<tr>
<td>Total</td>
<td></td>
<td></td>
<td>4809584</td>
<td></td>
<td>2434667</td>
</tr>
<tr>
<td>Forestry</td>
<td>National law: Government regulations, including Forest Management Act No.41/1999; Presidential Instruction No.4 on Eradication of Illegal Logging in Forest Area and Circulation to promote low impact logging practices; Forest Strategic Plan (Renstra). There are several types of different production forests in Indonesia, including those that are managed by the Ministry of Forestry through state owned enterprises, those that are managed by communities and those that are associated with private sector companies such as APP and APRIL. National law: Government regulations, including Forest Management Act No.41/1999; Presidential Instruction No.4 on Eradication of Illegal Logging in Forest Area and Circulation to promote low impact logging practices; Forest Strategic Plan (Renstra). Estimate from Sakernas 2008, proportion of KBLI codes 2011-2019 based on qualitative information from key informants indicating that the majority of government, community based and formal private sector natural production forests follow SFM law.</td>
<td></td>
<td>88262</td>
<td>~44%</td>
<td>38759</td>
</tr>
<tr>
<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
<td>Proportion of activities that are sustainable for each green sub-sector</td>
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<td>There are several types of different production forests in Indonesia, including those that are managed by the Ministry of Forestry through state owned enterprises, those that are managed by communities and those that are associated with private sector companies such as APP and APRIL.</td>
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<tr>
<td>Sustainable natural forest concessions</td>
<td>Voluntary standard: Certification is conducted by the Indonesian Ecolabelling Institute (LEI-Lembaga Ekolabel Indonesia) and the Forest Stewardship Council (FSC). Certification is based on sustainable forest management, including ecosystem stability and the management of endangered species, the sustainability of the resources and yield. The standards prescribe assessment and mitigation of environmental impacts and maintenance of critical forest areas, as well as the implementation of management plans, effective monitoring and assessment. Certification also requires compliance with relevant laws, including tenure and use rights. Tenure, social cohesion within communities and conflict resolution mechanisms are included in the social criteria. Certified forests should therefore be more resource efficient and have fewer negative impacts on the environment.</td>
<td>Estimate from Sakernas 2008, proportion of KBLI code 2020 based on Ministry of Forestry estimates that 48% of natural forests concessions have applied the principles of sustainability in their operations.</td>
<td>~63%</td>
<td>4841</td>
<td></td>
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<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
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<td>Sector</td>
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<tr>
<td>Rattan</td>
<td>environment than conventional farms, as well as providing better work for employees. Presence of a management plan should ensure the sustainable management of the protected area, including reducing the environmental impacts of associated activities.</td>
<td>Estimate from Sakernas 2008, KBLI code 2031 based on qualitative information that rattan farming/harvesting is all low impact.</td>
<td>27154</td>
<td>~54%</td>
<td>14659</td>
</tr>
<tr>
<td>Non timber forest products</td>
<td>National law: Rattan is a non-timber forest product (NTFP) where there is a law that regulates on the collection, cultivation, harvesting (Government Decree PP.6/2007 Jo No.3/2008 and the Ministerial Decree P. 36/Menhut-II/2008 on Utilization License Non-Timber Forest Products in Natural Forest (IUPHHK-HA) or in Planted Production Forests (IUPHHBK-HT). There are several types of environments where rattan is extracted, including those that are managed by communities and those that are associated with private sector companies.</td>
<td>Estimate from Sakernas 2008, KBLI code 2032, 2033, 2035, 2039 based on qualitative information that non-timber forest products include resins and oils extracted from plants.</td>
<td>20284</td>
<td>~31%</td>
<td>6328</td>
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<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
<td>Proportion of activities that are sustainable for each green sub-sector</td>
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<td>There are several types of environments where non timber forest products are extracted, including those that are managed by the Ministry of Forestry through state owned enterprises, those that are managed by communities and those that are associated with private sector companies.</td>
<td>timber forest product farming/harvesting is all low impact.</td>
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<tr>
<td>Forest services, protection and conservation</td>
<td>Activity based approach: The forestry sector is subject to inspection of both labour and environmental conditions to ensure that environmental and labour standards are being upheld. Forest services, protection and conservation include activities associated with the Forest Protection Agency deals as well as NGOs that provide services. The main activities include • Forest inspection and land classification; • Forest protection and nature conservation; • Reforestation and rehabilitation.</td>
<td>Estimate from Sakernas 2008, KBLI codes 2041, 2042, 2043, 2049 based on qualitative information that all services support forest conservation and protection.</td>
<td>70235</td>
<td>~47%</td>
<td>33043</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>213620</td>
<td>97630</td>
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<tr>
<td>Fisheries</td>
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<tr>
<td>Sustainable fishing in the formal economy for export</td>
<td>National Law: Law on Fishery No. 31/2004, which stipulates provisions on utilization of fish resources, either for fish catching or fish breeding, in Indonesian according to the international conditions, to ensure their preservation and the protection of the environment. Under this law, the Ministry for Marine Affairs and Fisheries is to regulate fishing gear, allowable catch, fish breeding, prevention of pollution and protection fish. The law was revised in 2009</td>
<td>Estimate from Sakernas 2008 KBLI code 5011 based on the assumption that 19% of workers in the fishery sector are in the formal sector.</td>
<td>209690</td>
<td>~39%</td>
<td>82614</td>
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<tr>
<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
<td>Proportion of activities that are sustainable for each green sub-sector</td>
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<tr>
<td>Seaweed farming</td>
<td>(No. 45/2009) to cover various issues including management and conservation of fish resources and aquaculture.</td>
<td>Estimate from Sakernas 2008 KBLI code 5014 based on information from key informants that all seaweed farming is low impact.</td>
<td>~35%</td>
<td>15787</td>
<td></td>
</tr>
<tr>
<td>Good practices in aquaculture</td>
<td>Activity based approach: Seaweed can be identified as a green sub-sector as it can provide alternative activities for fishing villages to improve their economic conditions and to reduce pressure on fishing stocks. Seaweed farming can be beneficial for the environment through increasing production of herbivorous fishes and shellfish, however, the establishment of seaweed farms requires timber and this needs to be well managed.</td>
<td>Estimate from Sakernas 2008 KBLI codes 5031, 5032, 5041, 5042, 5043, 5044 based on information from key informants that most of hatcheries are low impact and that approximately half of activities in fish cultivation are consistent with best practices in aquaculture.</td>
<td>~50%</td>
<td>143338</td>
<td></td>
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<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
<td>Proportion of activities that are sustainable for each green sub-sector</td>
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<td>Proportion of sustainable jobs that could be green jobs</td>
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<tr>
<td>Total</td>
<td></td>
<td></td>
<td>549012</td>
<td>241539</td>
<td></td>
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<tr>
<td>Energy/Mining</td>
<td></td>
<td></td>
<td>Sustainable Job</td>
<td>Green Job</td>
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<tr>
<td>Geothermal</td>
<td>and aquaculture. A ministerial decree (No. KEP. 02/MEN/2007) on good practices in aquaculture has also been prepared.</td>
<td></td>
<td>Sakernas data code 11102 (Exploitation of Geothermal Energy) considering that 100 per cent of jobs in the sector are environmentally sustainable.</td>
<td>288</td>
<td>~100%</td>
</tr>
<tr>
<td>Renewable energy</td>
<td>National law: Presidential Decree no. 5/2006 stating that 4.3 per cent of the energy mix come from renewable energy and biomass (2008). Renewable energy reduces CO2 per output, improves resource efficiency and increases sustainability (e.g. reduced emissions, environmental impact) in comparison to over conventional (fossil fuel) energy production. Renewable energy includes installed energy capacity from solar, wind and hydro power.</td>
<td>Sakernas data code 40101-40104, considering that 4.3 per cent of the jobs are environmentally sustainable (Presidential Decree no. 5/2006).</td>
<td>5778</td>
<td>~68%</td>
<td>3949</td>
</tr>
<tr>
<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
<td>Proportion of activities that are sustainable for each green sub-sector</td>
<td>Sustainable Job estimate</td>
<td>Proportion of sustainable jobs that could be green jobs</td>
<td>Green Job estimate</td>
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<tr>
<td>Biogas</td>
<td>National law: Presidential Decree no. 5/2006 stating that 4.3 per cent of the energy mix come from renewable energy and biomass (2008).</td>
<td>Sakernas data code 40201, 40202 and 24119, considering that 4.3 per cent of the jobs are environmentally sustainable (Presidential Decree no. 5/2006).</td>
<td>714</td>
<td>~82%</td>
<td>583</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td>Estimate from Sakernas 2008, KBLI code 15143-15145 based on an assumption that approximately 10% of firms have adopted good practices in waste management and energy consumption, which was determined from key informant interviews and literature review.</td>
<td>6737</td>
<td>~65%</td>
<td>4360</td>
</tr>
<tr>
<td>Sustainable edible oils</td>
<td>Activity based approach: Effective management of waste products from the processing of the tree leaves is implemented in the majority of factories, making the sub-sector environmental sustainable.</td>
<td>Estimate from Sakernas 2008, KBLI code 15311-15317 based on an assumption that approximately 10% of firms have adopted good practices in waste management and energy consumption, which was determined from key informant interviews and literature review.</td>
<td>31979</td>
<td>~33%</td>
<td>10455</td>
</tr>
<tr>
<td>Green agro-processing</td>
<td>Activity based approach: The processing of agricultural products can be considered green if the manufacturers have good management of the waste and use energy-saving practices in order to reduce the impact on the environment.</td>
<td>Estimate from Sakernas 2008, KBLI code 15311-15317 based on an assumption that approximately 10% of firms have adopted good practices in waste management and energy consumption, which was determined from key informant interviews and literature review.</td>
<td>31979</td>
<td>~33%</td>
<td>10455</td>
</tr>
<tr>
<td>Sector</td>
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<tr>
<td>Lean manufacturing of garments</td>
<td>Activity based approach: Lean manufacturing is an operational strategy oriented towards achieving the shortest possible cycle time by eliminating waste and reducing incidental work. It therefore leads to better environmental performances, due to strengthened waste management systems and energy saving strategies.</td>
<td>firms have adopted good practices in waste management and energy consumption, which was determined from key informant interviews and literature review.</td>
<td>Estimate from Sakernas 2008, KBLI code 17301, 17302, 17303, 17304, 17400. Lean manufacturing approaches have been implemented by the majority of foreign owned firms, which comprise 13% of the market.</td>
<td>~100%</td>
<td>13774</td>
</tr>
<tr>
<td>Rattan and bamboo manufacturing</td>
<td>Activity based approach: Rattan and bamboo are non-timber forest products (NTFP) and there are laws that regulate their the collection, cultivation, harvesting (Government Decree PP.6/2007 Jo No.3/2008 and the Ministerial Decree P. 36/Menhut-II/2008 on Utilization License Non-Timber Forest Products in Natural Forest (IUPHHK-HA) or in Planted Production Forests (IUPHHBK-HT). Rattan and bamboo manufacturing is</td>
<td></td>
<td>Estimate from Sakernas 2008, KBLI code 20103, 20104, 20291, 20292, 20293, 20294, 20299, 36102 based on an assumption that all rattan and bamboo furniture making is low</td>
<td>~29%</td>
<td>274152</td>
</tr>
<tr>
<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
<td>Proportion of activities that are sustainable for each green sub-sector</td>
<td>Sustainable Job estimate</td>
<td>Proportion of sustainable jobs that could be green jobs</td>
<td>Green Job estimate</td>
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<tr>
<td></td>
<td>labour intensive and involves sanding, sulphuring and drying, after which the materials are then woven into various products.</td>
<td>impact.</td>
<td></td>
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</tr>
<tr>
<td>Manufacturing of materials that promote sustainability</td>
<td>Activity based approach: The manufacturing of materials, such as publications and videos, that raise awareness on the environment is likely to be considered a sustainable sub-sector, since it promotes environmental sustainability among the public opinion.</td>
<td>Estimate from Sakernas 2008, KBLI code 22302, based on an assumption that approximately 5% of publications and other media raise awareness on sustainability issues.</td>
<td>170</td>
<td>~51%</td>
<td>86</td>
</tr>
<tr>
<td>Production of organic chemicals and fertilisers</td>
<td>Activity based approach: The use of organic fertilisers and other natural products have lower environmental impacts in comparison with chemical fertilizers, including improved soil condition, slow-release plant nutrients, retention of soil moisture and the reduction of run-off.</td>
<td>Estimate from Sakernas 2008, KBLI code 24121 based on an assumption that all organic fertiliser is low impact.</td>
<td>3626</td>
<td>~16%</td>
<td>578</td>
</tr>
<tr>
<td>Organic soaps</td>
<td>Activity based approach: Most commercially produced soap contain synthetic lathering agents, artificial colorants and other several chemicals that might be dangerous both for the human body and the environment. Organic soaps, instead, can be considered a green sub-sector, since they use natural sources and reduce the impact on the environment.</td>
<td>Estimate from Sakernas 2008, KBLI code 24241, based on an assumption that approximately 10% of soaps are low impact.</td>
<td>4518</td>
<td>~64%</td>
<td>2899</td>
</tr>
<tr>
<td>Sector</td>
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<tr>
<td>Sustainable essential oils</td>
<td>Activity based approach: Effective management of waste products from the processing of the tree leaves is implemented in the majority of factories, making the sub-sector environmental sustainable.</td>
<td>Estimate from Sakernas 2008, KBLI code 24924 based on an assumption that approximately 50% of firms have adopted good practices in waste management and energy consumption, which was determined from key informant interviews and literature review.</td>
<td>2822</td>
<td>~38%</td>
<td>1072</td>
</tr>
<tr>
<td>Green cement</td>
<td>Activity based approach: While making traditional cement requires fossil fuels and produces large carbon emissions, green cement cuts the emissions through using energy efficiency strategies and good waste management.</td>
<td>Estimate from Sakernas 2008, KBLI code 26411 based on information that 38% of the market has adopted reforms to reduce carbon emissions.</td>
<td>11123</td>
<td>~38%</td>
<td>7045</td>
</tr>
<tr>
<td>Manufacturing of machinery for steam, turbine and windmills</td>
<td>Activity based approach: Renewable energy production has fewer emissions and environmental impacts compared to conventional (fossil fuel) energy production.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Energy efficiency initiatives</td>
<td>Voluntary standard: Production of energy saving lights (CFL) which are certified with a 3-star label are more environmentally friendly (i.e. best light intensity/watt).</td>
<td>Estimate from Sakernas 2008, KBLI code 35921-35922 based on the</td>
<td>6351</td>
<td>~90%</td>
<td>5708</td>
</tr>
<tr>
<td>Sector</td>
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<tr>
<td>Manufacturing of pedicabs and bicycles</td>
<td>Activity based approach: Pedicabs and bicycles can be considered to be a green sub-sector as they provide sustainable transport options.</td>
<td>assumption that all energy efficient initiatives are low impact.</td>
<td>Estimate from Sakernas 2008, KBLI code 31501 based on the assumption that all pedicab and bicycle manufacturing promotes sustainable development.</td>
<td>7968</td>
<td>~42%</td>
</tr>
<tr>
<td>Recycling</td>
<td>Activity based approach: Recycling prevents waste of potentially useful materials, processing them into new products. Consequently, it reduces the use of new raw materials, decreasing also the consumption of energy and the air pollution.</td>
<td></td>
<td>Estimate from Sakernas 2008, KBLI code 37100, 37200 based on the assumption that all recycling is low impact.</td>
<td>22204</td>
<td>~36%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1062761</td>
<td>331538</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Green buildings</td>
<td>Voluntary standard: The Government has recently established a green building rating tool, a voluntary environmental rating system that evaluates the environmental design and construction of buildings. The rating tool covers the sustainability of the site, energy, water and waste management, material resources, indoor quality, innovation, transportation and social economy. These are divided into credits, and points are awarded in</td>
<td></td>
<td>Estimate from Sakernas 2008, proportion of KBLI codes 45100-45219 based on qualitative information from key informants.</td>
<td>241476</td>
<td>~43%</td>
</tr>
<tr>
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<tr>
<td>Labour intensive transport infrastructure</td>
<td>Each credit. New building construction and existing office buildings were prioritised for assessment. For new buildings, an energy saving standard of between 10 and 40 per cent of the Indonesian National Standards’ [SNI] building energy standard has been set.</td>
<td>Estimate from Sakernas 2008, proportion of KBLI code 45221 and 45222 based on estimates that 57% of people working in road construction live in rural areas.</td>
<td>116928</td>
<td>~50%</td>
<td>58573</td>
</tr>
<tr>
<td>Irrigation and water management</td>
<td>Activity based approach: Irrigation and water management are important investments for climate proofing agricultural areas and ensuring effective management of potable and waste water.</td>
<td>Estimate from Sakernas 2008, 100% of KBLI codes 45224 and 45225</td>
<td>53195</td>
<td>~42%</td>
<td>22333</td>
</tr>
<tr>
<td>Installation of renewables</td>
<td>Activity based approach: Installation of renewables results in fewer emissions and environmental impacts compared to installation of conventional (fossil fuel) technologies.</td>
<td>Estimate from Sakernas 2008, 4.3% of KBLI 45312 and 45314, considering that 4.3 per cent of the energy sources came from renewables in 2008 (Presidential Decree no. 3182)</td>
<td>3182</td>
<td>~72%</td>
<td>2297</td>
</tr>
<tr>
<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
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<tr>
<td>Total</td>
<td></td>
<td>414780</td>
<td>187752</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td>5/2006)</td>
<td></td>
<td></td>
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<tr>
<td>Rail, river and sea transport</td>
<td>Activity based approach: Rail, river and sea transportation is typically less carbon intensive and tends to have reduced environmental impacts when compared to air or motorised road transport.</td>
<td>Estimate from Sakernas 2008, proportion of KBLI codes 60110, 60120, 60139, 61111-61222 based on qualitative information from key informants that indicates that rail 100% and between 50-70% of sea and river transport could be considered sustainable.</td>
<td>150667</td>
<td>~47%</td>
<td>110168</td>
</tr>
<tr>
<td>Mass public transport on roads</td>
<td>Activity based approach: The use of mass public transport can reduce emissions, while also reducing traffic congestion, improve air quality and bring public health benefits.</td>
<td>Estimate from Sakernas 2008, 100% of KBLI codes 60214, 60215, 61224 and 61226 based on qualitative information from key informants.</td>
<td>809690</td>
<td>~16%</td>
<td>379089</td>
</tr>
<tr>
<td>Non-motorised transport</td>
<td>Activity based approach: The use of non-motorised transport (pedicabs and bicycles) avoids the emission of</td>
<td>Estimate from Sakernas 2008, 100% of KBLI codes 60110, 60120, 60139, 61111-61222 based on qualitative information from key informants.</td>
<td>699249</td>
<td>~73%</td>
<td>114336</td>
</tr>
<tr>
<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
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<tr>
<td></td>
<td>gases that would have been emitted if a motorised vehicle were used instead.</td>
<td>code 60224 and 60233.</td>
<td>Total 1659606</td>
<td>603593</td>
<td></td>
</tr>
<tr>
<td>Tourism</td>
<td>Voluntary standard: ASEAN Standard No. 1 on Green Hotels and No. 4 on Green Homestays identify criteria and standards on sustainable accommodation services. Examples of criteria include the use of green products, introduction of waste management / energy saving techniques, and provision of environmentally-friendly activities.</td>
<td>Estimate from Sakernas 2008 KBLI codes 55111, 55112, 55140, 55150, based on interviews with key informants on from the tourism industry that suggest that 5% of 4 &amp; 5 star hotels and 20% of homestays and camping grounds could be sustainable.</td>
<td>8589</td>
<td>~56%</td>
<td>4783</td>
</tr>
<tr>
<td>Sustainable accommodation services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable tourism services</td>
<td>National regulation: Regulation 36/2010 on business tourism and culture, asylum in wildlife, national parks, forest botanical garden and Nature Parks. The Regulation guidelines on ecotourism business licensing and on the operation of businesses in conservation areas. In addition Indonesian Work Competency Standards (SKKNI) include specific competencies on eco-tour guiding. They include environmental education, planning of activities that have low impact on the environment, and the use of appropriate occupational health and Safety procedures. Finally,</td>
<td>Estimate from Sakernas 2008 KBLI code 63460, 63470 based on an interviews with key informants from the tourism sector that suggest that 10% of tourism consulting and information services are providing sustainable</td>
<td>67</td>
<td>~100%</td>
<td>67</td>
</tr>
<tr>
<td>Sector</td>
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<tr>
<td>ASEAN standards No. 5 and No. 6 include criteria on visitor information centres, which should provide current information on the attraction and make availability well-trained local guides.</td>
<td>Estimate from Sakernas 2008 KBLI codes 92331, 92332, 92333, 92334, 92335, 92336, 92422, 92431, 93432, 93433 based on interviews with key informants on from the tourism industry that suggest that 10% of gardens, national parks, agrotourism destinations and that at least 60% of nature holidays are managed sustainably.</td>
<td>12413</td>
<td>~45%</td>
<td>5586</td>
<td></td>
</tr>
<tr>
<td>Voluntary standard: ASEAN Standard No. 5 provides a definition of ecotourism and the criteria to comply with this definition, including sustainable waste and energy management, staff training programme, sensitivity towards local culture. ASEAN Standard No. 6 defines the good practices to preserve cultural and natural heritage, including the implementation of measures to prevent environmental degradation, and the existence of codes of conduct for people visiting the tourism site.</td>
<td>Green spas</td>
<td>Activity based approach: Many commercially spas use products that are based on synthetic agents, artificial colorants and other chemicals that might be dangerous both for the human body and the environment. Green spas focus on using natural products to reduce the impact of their services on the environment. Green spas should also have</td>
<td>Estimate from Sakernas 2008 KBLI code 80923, based on interviews with key informants on from the tourism industry that suggest that 10% of</td>
<td>337</td>
<td>~68%</td>
</tr>
<tr>
<td>Sector</td>
<td>Rational for identifying a sub-sector as a &quot;green sub-sector&quot;</td>
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<td>good management of the waste and use energy-saving practices within their business.</td>
<td>&quot;spa&quot; services could be sustainable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>21407</td>
<td></td>
<td>10665</td>
<td></td>
</tr>
<tr>
<td>Grand total</td>
<td></td>
<td>8737550</td>
<td></td>
<td>3912204</td>
<td></td>
</tr>
<tr>
<td>Total Labour force 2008</td>
<td></td>
<td>10252750</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of labour force</td>
<td></td>
<td>8.52%</td>
<td></td>
<td>3.81%</td>
<td></td>
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</tbody>
</table>
The main purpose of the research is to propose a conceptual framework for the characterization of green jobs in Indonesia and the selection of technical indicators in the environmental and labor fields respectively that are to be used for this process. The report shall bring an initial estimation of direct green jobs at the country level as well as a review of the decent work challenges that may be linked to green jobs. The ILO methodology for the mapping of green jobs will be followed.