



TEEB for Agriculture and Food - Indonesia

(The Economics of Ecosystems and Biodiversity)

Report

Inception & scoping workshop

July 2019, Jakarta



Kementerian PPN/
Bappenas



NATURAL
CAPITAL
COALITION

TEEBAgriFood is being supported by a range of donors including the European Union, Germany (BMUB) and the Global Alliance for the Future of Food.

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“ There is a clear need for strong data on the multiple natural and social values associated to agroforestry in Indonesia. This evidence will feed into the national medium-term development plan, currently under development. As a result, appropriate resources can be allocated to agroforestry, across sectors and ministries. ”

Ir. R. Anang Noegroho Setyo Moeljono, M.E.M
Director, Food and Agricultural Development,
Ministry of National Development Planning
(BAPPENAS)

Executive Summary

The Indonesian Ministry of National Development Planning (BAPPENAS) convened a ‘TEEB for Agriculture & Food’ (TEEBAgriFood) workshop on 17 July 2019. The workshop objective was to identify how the TEEB for Agriculture & Food approach could inform policy interventions in agriculture and food systems in Indonesia, and agree on a way forward for the country project.

Participants discussed a number of opportunities for TEEBAgriFood to influence policies, financial and regulatory instruments, and tools at national and subnational level in order to better capture the multiple values of ecosystem services across agri-food chains. Toward determining the scope of the project, participants agreed to focus on the promotion of agroforestry systems as an alternative to the expansion of monoculture which may further threaten valuable ecosystem services, such as fresh water, soil erosion, pest control and climate stabilization. This would include capturing the economically *invisible* values of spices, indigenous commodities and other neglected and underutilized species (NUS). The analysis would provide recommendations on alternative legal frameworks, policies and financial incentives that could propagate the establishment of or improvement in market access and profitability of these commodities.

It was decided that the first priority of the TEEBAgriFood analysis would be to provide evidence to support the inclusion of agroforestry as a viable alternative to monocrops in the medium-term national development plan. As a second step, the TEEBAgriFood project would carry out a wider assessment to include pathways to reach these national development plan targets.

A TEEBAgriFood expert committee would be established and, by end 2019, the following activities/deliverables are proposed:

1. Review and socialization of approaches and tools for TEEBAgriFood Indonesia, including mapping of: (i) existing policies related to agroforestry, and (ii) key stakeholders and potential change agents. Synergies and opportunities are to be explored with World Bank WAVES Indonesia and UN Environment work on peatland externalities analysis;
2. Identification of critical agroforestry commodities, and development of a log frame to gather evidence to support the inclusion of agroforestry in the national medium-term development plan (RPJMN);
3. Report on qualitative target- and indicator-setting associated with the national medium-term development plan (RPJMN); and
4. Report on options for policy mainstreaming of TEEBAgriFood in Indonesia, including definition of the geographical scope of pilot analysis at watershed level. This includes further analysis on the opportunities and theory of change for a geographic focus on West Papua, as suggested by workshop participants.

1. Introduction the global TEEBAgriFood Initiative

Indonesia joins six other countries (Brazil, China, India, Malaysia, Mexico, and Thailand) in piloting the 'TEEB for Agriculture & Food' (TEEBAgriFood) approach to 'measuring what matters' in agriculture and food systems. TEEBAgriFood seeks to achieve positive human livelihood outcomes and biodiversity improvements through the application of an Evaluation Framework that is used to create holistic assessments of impacts and externalities (both positive and negative) associated with agriculture and food value chains. The analysis can be mainstreamed into public and private decision-making processes, and enable agri-business to place biodiversity and ecosystem services as a cornerstone of agriculture and food systems.

More concretely, Indonesia would apply the TEEBAgriFood approach to:

1. move beyond standard agriculture indicators (e.g. yield per hectare) to include more holistic, long term elements of agricultural economics and development;
2. identify intervention options that improve livelihoods and biodiversity outcomes;
3. identify, develop and catalyse the application of a mix of policies and tools (incentive programmes, certification and performance standards, etc.) that capture the multiple values of ecosystem services across the entire agri-food value chain; and
4. establish the enabling conditions for agri-business to build a sustainable economy and place biodiversity as a cornerstone of agriculture and food systems.

1 Workshop objectives

The workshop was held on 17 July 2019 and was attended by 28 participants representing 11 institutions. For a full list of participants and the workshop agenda, please refer to *Annex 1* and *Annex 2*.

The objectives of the inception and scoping workshop were to:

- a. officially launch the TEEBAgriFood project in Indonesia, and present the objectives, approach and work plan to a range of key stakeholders;
- b. identify, in consultation with national and local authorities and other relevant stakeholders, how this project would contribute to policy making, building on existing initiatives and programmes currently taking place in Indonesia;
- c. identify thematic and/or spatial priorities that may offer useful starting points for the project; and
- d. discuss the project management arrangements and the work programme for the project, including steering committee, project management, and technical partners to be involved during the project implementation.

2 Summary of workshop discussions

2.1 Opening Remarks

The day began with opening remarks by Ir. R. Anang Noegroho Setyo Moeljono, M.E.M, Director of the Food and Agricultural Development Directorate at the Indonesian Ministry of National Development Planning (BAPPENAS). This was followed by a note of thanks by Dr. Salman Hussain, Head *a.i.* Ecosystem Services Economics Unit, UN Environment/TEEB coordinator.

2.2 Presentations and introductions

(Access to workshop powerpoint presentations:

<https://drive.google.com/open?id=1DazyZRQlg6zyynXTTO68b7TGZaUGlnI9>)

2.2.1 Introduction to TEEBAgriFood

Dr. Hussain introduced the TEEBAgriFood project in Indonesia, drawing from on-going and previous TEEB for Agriculture and Food studies. Below are some items highlighted:

- **What is TEEB:** TEEB is a global initiative that seeks to recognize, demonstrate and then capture the values of ecosystems and biodiversity in both monetary and non-monetary terms. It asks the question: What are the costs of Policy Inaction and the benefits of a with-policy intervention that conserve the biodiversity and the ecosystems that we depend on?
- **Why focus on agri-food systems:** The agricultural sector is a leading driver of ecosystem degradation, biodiversity loss, health externalities, and GHG emissions. Agriculture also provides positive benefits such as food for humans, feed for animals, fiber for artisanal and industrial production, raw material for fuels, employment and cultural cohesion. Many of the negative and positive impacts are economically invisible, hence unaccounted for in public and private decision-making. The TEEBAgriFood approach allows countries to value these invisible costs and benefits in agriculture and food systems to better manage risks and dependencies linked to degradation of manufactured, natural, social and human capital stocks.
- **How to undertake a TEEBAgriFood analysis:** The analysis will apply the TEEBAgriFood Evaluation Framework on *what* to value and *why*, and likely include the modelling of land use impacts, assessing subsequent changes in inter alia ecosystem service provisioning, and valuing them so they can be part of the economic calculus of policy makers. Additionally, the project will bring together farmers and agri-businesses that are receptive to looking at dependencies and impacts on biodiversity and ecosystem services (and influencing Key Performance Indicators).

After the presentation, participants highlighted the opportunity to identify synergies and build upon existing experiences, expertise and initiatives:

- The topic of biodiversity and ecosystem service valuation would ideally be part of the development of the national medium-term development plan.
- The need to align TEEBAgriFood analysis with Life Cycle Assessment (LCA), and Social Life Cycle Assessment (social LCA) processes ongoing in Indonesia. Dr. Hussain responded that that LCA and social LCA are compatible with the TEEBAgriFood Evaluation Framework (e.g. 'eutrophication potential' across the agri-food value chain). It was proposed to align TEEBAgriFood applications in Indonesia with national social LCA processes.
- Explore synergies with the project "*landscape application of livelihoods and natural capital knowledge to accelerate peat restoration in Indonesia*", in collaboration with UN Environment,

Wageningen University and Research center/Kemitraan. This would include externalities analysis and the development of a peatland account.

- Build upon World Bank WAVES work in Indonesia, with its stated objective being to inform the national medium-term development plan. TEEBAgriFood can potentially build upon the developed land and ecosystem accounts to *“examine trade-offs faced when making development decisions, between the gains achieved by transforming natural capital into productive assets, and the losses associated with a reduction in the ecosystem services that natural capital delivers”*¹. This would require TEEBAgriFood to conduct forward-looking scenario analysis, including modelling and monetary valuation of non-market ecosystem services. To guide further scoping, relevant natural capital data that has been synthesised and developed in collaboration with the World Bank WAVES Program is included in this report under Annex 3.

2.2.2 Agroforestry context setting

John Watts, on behalf of the Ministry of National Development Planning (BAPPENAS), presented on opportunities to apply TEEBAgriFood to induce policy change related to **agroforestry products in the outer islands of Indonesia**. The highlights of the presentation are presented below.

- **Why focus on agroforestry?** Agroforestry and forest garden products, particularly indigenous commodities, are undervalued in the market. Agroforestry systems provide many ecological benefits including more efficient water utilisation, enhancing in soil and nutrient cycling, improved pest management. Overall, the addition of agroforestry in agricultural landscapes improves the productivity and diversity of farming systems. These biologically diverse forest or garden farming systems are becoming increasingly rarer due to the expansion of monocultures of more lucrative cash crops such as palm oil.
- **Suggested TEEBAgriFood objective:** Examine the true value of agroforestry products such as spices and connect farmers to premium markets that are willing to pay for the true value of the products. More concretely, TEEBAgriFood would identify the invisible benefits and costs and quantify the trade-offs between agroforestry (and specifically spice production) and heavily cultivated monocrops, and provide evidence to support policy interventions aimed at correcting these externalities. This would also include capturing the invisible economic and nutritional value of spices. Spice production was historically a significant agricultural sub-sector in Indonesia for both smallholders and large scale producers.
- **Suggested pilot regions:** Southeast Sulawesi, Nusa Tenggara Timur, West Kalimantan and West Papua. Each of these islands and regions have their own unique biogeography.

Key issues and questions that came up in the discussions are further highlighted below:

- While potential **on-the-ground activities**, totaling USD 25 million, were proposed to implement TEEBAgriFood policy recommendations, the current TEEBAgriFood initiative has a project budget which is much smaller. Dr. Hussain suggested that UN Environment would look to upscale activities, but that this would be ultimately dependent on donor interest.
- The question was raised as to how to estimate the economic value of biodiversity itself. Dr. Hussain responded: while biodiversity has an intrinsic value, TEEB does not aim to put an estimate on this intrinsic value in monetary terms, but rather focus on the instrumental values of biodiversity by analyzing the changes in ecosystem services (including genetic diversity, but also services such as carbon sequestration and storage, fresh water flows, etc.).

¹ <https://www.wavespartnership.org/en/indonesia>; WB Waves supports a systematic approach to Natural Capital Accounting with a special focus on informing the national medium-term development plan, including i) the strengthening of an Indonesian System of Environmental-Economic Accounts (SISNERLING), ii) development of land cover accounts at national level, ecosystem extent accounts for Sumatra and Kalimantan; iii) piloting initial water accounts for the Citarum River Basin, iv) using natural capital accounts to inform different development processes, including the RPJMN, NDC strategic planning, and the country's long-term development vision

- Previous TEEBAgriFood agroforestry applications were presented by Dr. Hussain, and it was suggested that some of the methodologies can be applied to the Indonesian context. In this context, there is a need to *compare across scenarios* to determine marginal change in ecosystem service provisioning. The value of maintaining and extending sustainable agroforestry options is therefore also determined by *what the alternative is*. When we for example consider monoculture plantations as the alternative option, we should therefore include the negative externalities (market price > true economic value).

2.2.3 Policy perspectives on agroforestry

X, [include function], Biro Perencanaan / Ministry of Agriculture, highlighted the current challenges of the agriculture sector in Indonesia, including the long path towards implementing sustainable farming practices that respond to climate change challenges. She presented the agriculture and food elements integrated in the 2020-2024 National Medium-Term Development Plan (RPJMN), with the overall vision to realize a self-reliant agricultural society. Referring to a research funded by World Bank (2006), she highlighted the potential of agroforestry and the high farmer awareness towards conservation.

Ir. R. Anang Noegroho, Director of the Food and Agricultural Development Directorate at the Indonesian Ministry of National Development Planning (BAPPENAS), reiterated that progress was made on including commitments to sustainable development in the RPJMN. Crucial to reaching these commitments is the need to transform agriculture which has relied on expansion into new lands, leading to the loss of forests and reduced biodiversity. He expressed the need to include “healthy food from sustainable sources that is inclusive” throughout the next plan, to be finalized Q4 2019. He advocated for the inclusion of agroforestry in the target- and indicator setting associated to the development plan, so that the appropriate resources can be allocated cross-sectorally to scale-up sustainable agroforestry practices, but this requires evidence – which TEEBAgriFood might provide. He suggested that inter-institutional and inter-sectoral coordination on agroforestry is crucial, and linked to this the need for a regulative framework and incentives to promote sustainable agroforestry systems.

2.3 Group work on TEEBAgriFood policy scoping

Tomas Declercq, UN Environment, opened this half-day session on defining plausible future outcomes of policies and human activities linked to agroforestry products in Indonesia. This session guided participants through a process to define future policy scenarios that will impact biodiversity and ecosystem services. He presented ‘do’s and don’ts’ to select the right scenario approach, and discussed how an effective scenario can be designed to be relevant, participatory, legitimate, plausible, scientifically credible and comprehensive.

Participants formed two groups to investigate how different agroforestry scenarios can be matched to the needs of a particular policy or decision context. Participants evaluated scenarios and identified the ecosystem services associated with those scenarios.

Policy entry point identification

Participants identified existing policy targets that Indonesia has set that may contribute to maintaining biologically diverse systems and rehabilitating degraded landscapes and/or contribute to sustainable/traditional agroforestry systems. These include:

1. **Geographical Indication:** Indonesia Government partnership with EU to register Indonesian commodities in order to meet the requirements for them to be traded internationally, one of which links to biodiversity impacts.
2. **Social Forestry:** This policy allows people who live in the proximity of forests to plant or cultivate several species, such as nutmeg and others that are listed by the Ministry of Environment and Forestry.
3. The Directorate of Agriculture and Food of the Ministry of National Development Planning will, for the next five years, include a **focus on environmental development**, natural disaster mitigation (Climate Change Adaptation) by promoting sustainable agriculture, and developing water conservation systems and technology.

Participants also identified eco-labelling as a potential avenue to explore: the creation of incentives for products that are already certified, as well monitoring of product traceability based on labelling.

Scenario storyline development: drivers, spatial and temporal dimension

Participants highlighted the need to go beyond an agriculture production dimension, and frame a TEEBAgriFood storyline around food, referring to the Indonesian culinary and gastronomic heritage and traditions. Examples provided of potentially sustainable spices include nutmeg (Papua), vanilla (Flores) and black pepper (Kalimantan and Sulawesi).

Suggested **drivers** to be explicitly considered in the analysis include: i) economic drivers such as subsidy policy, ii) political drivers such as land use planning regulations; iii) social and demographic drivers such as change in dietary patterns, cooking technology and innovation, and population growth; and iv) environmental drivers such as climate change, and both air and water pollution. As Indonesia is a diverse archipelago nation of more than 300 ethnic groups, drivers may be highly dependent on location.

Participants discussed defining factors and opportunities for change of each of the **four pre-identified provinces**: Southeast Sulawesi, Nusa Tenggara Timur, West Kalimantan, and West Papua. Although TEEBAgriFood would be informing policies at national scale, such as the medium-term development plan, West Papua was highlighted for having the widest primary forest in Indonesia that can still be preserved. As well as being a nationally recognized biodiversity hotspot, indigenous culture is still strong in West Papua, especially related to land management/ownership. Challenges include the distance from the capital, the lack of infrastructure, low product quality, and potential lack of support from local government.

Five-year steps over a 20-year period were suggested as a **time dimension for the scenario analysis**, following the national development plan.

Participants listed the following **stakeholders** to be involved in the scenario development and the implementation of the above policy priorities: central government (BAPPENAS, Agriculture, Environment and Forestry, Trade, Industry, public works (PUPR), transportation), local governments, farmers, indigenous communities, private and industrial associations, CSOs, and heads of religious organisations. Participants argued for specific consideration to be given to how a change in policy is likely to impact indigenous communities and local governments.

Concluding remarks

At the conclusion of the group exercise, Pak Noegroho and Dr. Hussain summarized the workshop results and referred to the need to provide policy evidence on those agroforestry systems which reduce trade-offs and increase synergies in terms of ecosystem service delivery. Pak Noegroho pointed out the opportunity to feed into the national medium-term development, and how agroforestry systems can be included as an alternative to the expansion of monoculture.

2.4 Next steps

A TEEBAgriFood expert group will be established and, by end 2019, the following products are proposed:

1. Review and socialization of approaches and tools for TEEBAgriFood Indonesia, including mapping of: (i) existing policies related to agroforestry, and (ii) key stakeholders and potential change agents. Synergies and opportunities are to be explored with World Bank WAVES Indonesia and UN Environment work on peatland externalities analysis;
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3 ANNEX 1 - List of Participants

Name		Gender	Title/Organization
Government authorities			
1	Ir. R. Anang Noegroho Setyo Moeljono, M.E.M	M	Director of the Food and Agricultural Development, Ministry of National Development Planning (BAPPENAS)
2	Semi		Directorate of Food and Agricultural, Ministry of National Development Planning (BAPPENAS)
3	M. Al Faatih		Directorate of Food and Agricultural, Ministry of National Development Planning (BAPPENAS)
4	Ihsan		Directorate of Food and Agricultural, Ministry of National Development Planning (BAPPENAS)
5	Prajogo		Team Policy Lab for Inclusive Food and Agriculture
6	Dian Sukmayani		Team Policy Lab for Inclusive Food and Agriculture
7	Isabelle Andrian	F	Advisor to BAPPENAS
8	Indra Muhammad		Directorate of Trade, Economy and International Trade, BAPPENAS
9	Dena Drajat		Directorate of Statistics for Food Crops, Horticulture and Plantation, Central Agency of Statistics (BPS)
10	Muhammad Adnan	M	Directorate of Statistics for Farming, Fisheries and Forestry, Central Agency of Statistics
11	Elisabeth Ardiastuti	F	Ministry of Trade
12	I Made Tasma		Office of Research and Development on Biotechnology and Genetics for Agriculture, Ministry of Agriculture
13	Redy Prasetyo		Coordinating Ministry of Economic Affairs
14	Sudarsono		Waibi
15	Ronny M		Bureau of Planning, Ministry of Agriculture
16	A Tri Koning		Bureau of Planning, Ministry of Agriculture
17	Joko Tri		Agency for Counselling and Human Resources Development, Ministry of Agriculture
18	Bayu Wicaksono		Ministry of Trade
19	Budi Yoko		Directorate of Environment, BAPPENAS
20	Nofriadi		Team Policy Lab for Inclusive Food and Agriculture

Name		Gender	Title/Organization
National NGOs, International Organisations, and individual consultants			
21	Jessica Hanafi	F	Founder, PT. Life Cycle Indonesia
22	John Watts	M	Director of Strategic Initiatives, Inovasi Bumi (INOBU)
23	Katryn Pasaribu	F	INOBU
24	Alfa Simarangkir	F	Programme Officer, FAO
25	Johannes Kieft	M	Senior Programme Management Officer, UN Environment
26	Barlev Nico Marhehe	M	Programme Management Officer, UN Environment
27	Salman Hussain	M	TEEB Coordinator, UN Environment
28	Tomas Declercq	M	Associate Programme Management Officer, UN Environment

4 ANNEX 2 – Workshop Agenda

Morning session, 08.30-12.30

High-level segment: Introduce the project; identify food system issues that may be informed by a wider assessment of ecosystem services; engage stakeholders

08.00 – 08.30	Registration and Tea/Coffee
08.30- 09.00	Welcoming remarks and Introductions – facilitated by Ministry of Planning
09.00– 10.15	The Economics of Ecosystems and Biodiversity – TEEB for Agriculture and Food - Salman Hussain, TEEB Coordinator Q&A
10:15 – 10.30	Coffee Break
10.30 – 11:30	Proposals tabled by Ministry of Planning – presentation and responses by Salman Husain (as a discussant) and by Line Ministries
11.30 – 12.30	The policy priorities for the Ministry of Planning, the Ministry of Agriculture, the Ministry of Environment, Ministry of Home Affairs and rural development Q&A
12.30 – 13.30	Lunch

Afternoon session, 13.30-17.00

Technical planning segment: Identify specific policies or initiatives that may be informed by a wider assessment of ecosystem services; evaluate study option topics, sectors, or regions

13.30-14.15	Applying the TEEBAgriFood Evaluation Framework – non case-study-specific steps:
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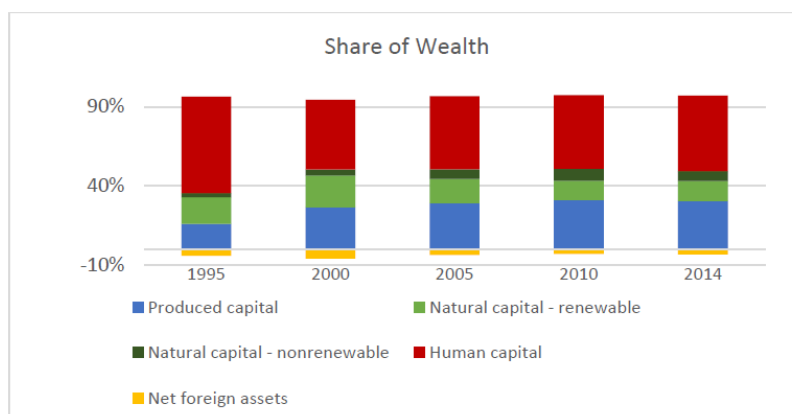
	(i) developing scenarios; (ii) modelling changes in capital stocks and impacts; (iii) dealing with incommensurability; Q&A Salman Hussain and Tomas Declercq (TEEB Office)
14.15 – 15.15	Making it specific: How should we take this forward given options discussed in the morning session (and any alternatives) This session: <i>Defining the policy scenarios</i>
15.15 – 15.30	Coffee Break
15.30 – 16.30	Making it specific This session: <i>data sources, modelling expertise, links across Ministries</i>
16.30 – 17.00	Next steps: <i>Steering committee, technical committee</i>
17.00 – 17.15	Closing remarks

5 ANNEX 3 – Natural Capital of Indonesia in 7 figures

The below data is entirely based on i) World Bank publication 'Natural Capital Accounts and Policy in Indonesia', developed in the context of the program *Wealth Accounting and the Valuation of Ecosystem Services (Waves)* in Indonesia, and ii) *Kemen G Austin et al. 2019 'What causes deforestation in Indonesia?' Environ. Res. Lett. 14 024007*

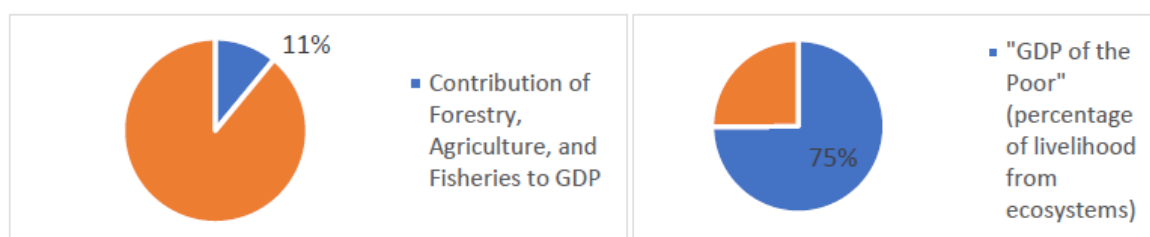
Development in Indonesia has resulted in reduced poverty but has been accompanied by significant pressure on natural capital, which is likely to threaten future prospects of wealth. Indonesia's wealth per capita expanded 42% between 1995 and 2014. Measuring changes in wealth allows to monitor the sustainability of development. For example, when a country exploits its minerals the revenue from this is reflected in GDP, while the wealth accounts would show a decline in the value of natural capital. In terms of shares of wealth in Indonesia, non-renewable natural capital shares increased from 3% to 7% of total wealth, and renewable natural capital declined from 18% to 13%, offsetting the total share on natural capital at a 1% decline in this 20-year period.

Figure 1: Shares of Wealth in Indonesia (period 1995 to 2014; percent of the total)



Indonesia's high economic growth relies largely on natural resources, with agriculture, forestry and fishing contributing 11.4% to GDP in 2005². TEEB, in the below figure, estimated that rural communities in Indonesia rely on ecosystem services for 75% of their income. This dependence on natural resources, defined as "GDP of the poor", can be examined through the lenses of livelihoods, distribution, vulnerability and causality.

Figure 2: "GDP of the Poor": TEEB analysis on the dependence of the poor on ecosystems in Indonesia



² World Bank (2019): Synthesis report: natural capital accounts and policy in Indonesia; Originally TEEB - The Economics of Ecosystems and Biodiversity for National and international Policy Makers (Brink, et al., 2009)

The highest rate of land use change is forest cover. Indonesia lost about 22 million ha of its natural forests between 1990 and 2014, with an average annual rate of 1.5 million ha. The highest rate of change took place from 1996 to 2000, mainly due to the expansion of perennial crops. Land cover change varied in different island groups. For example in Papua, conversion of forest increased sharply from 1996 to 2000, slowing down after 2006.

Figure 3: Forest cover loss by island (million ha) and relative to island size (%) since 1990

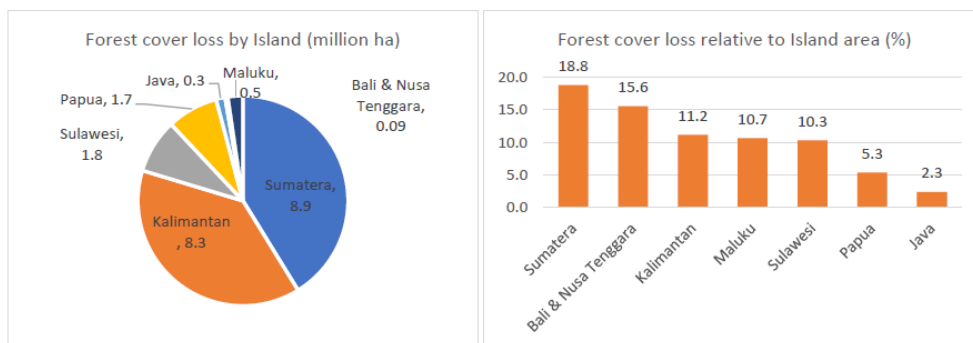


Figure 4: Forest cover loss by period (million ha)

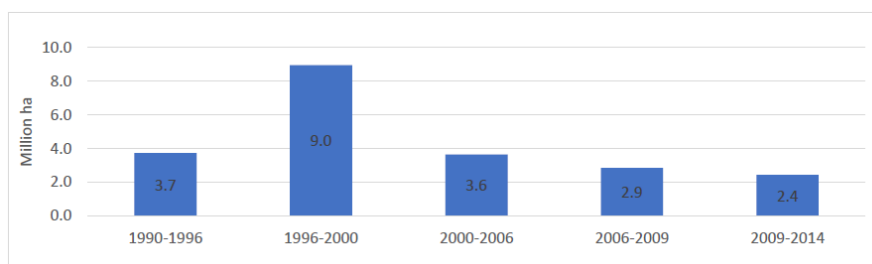
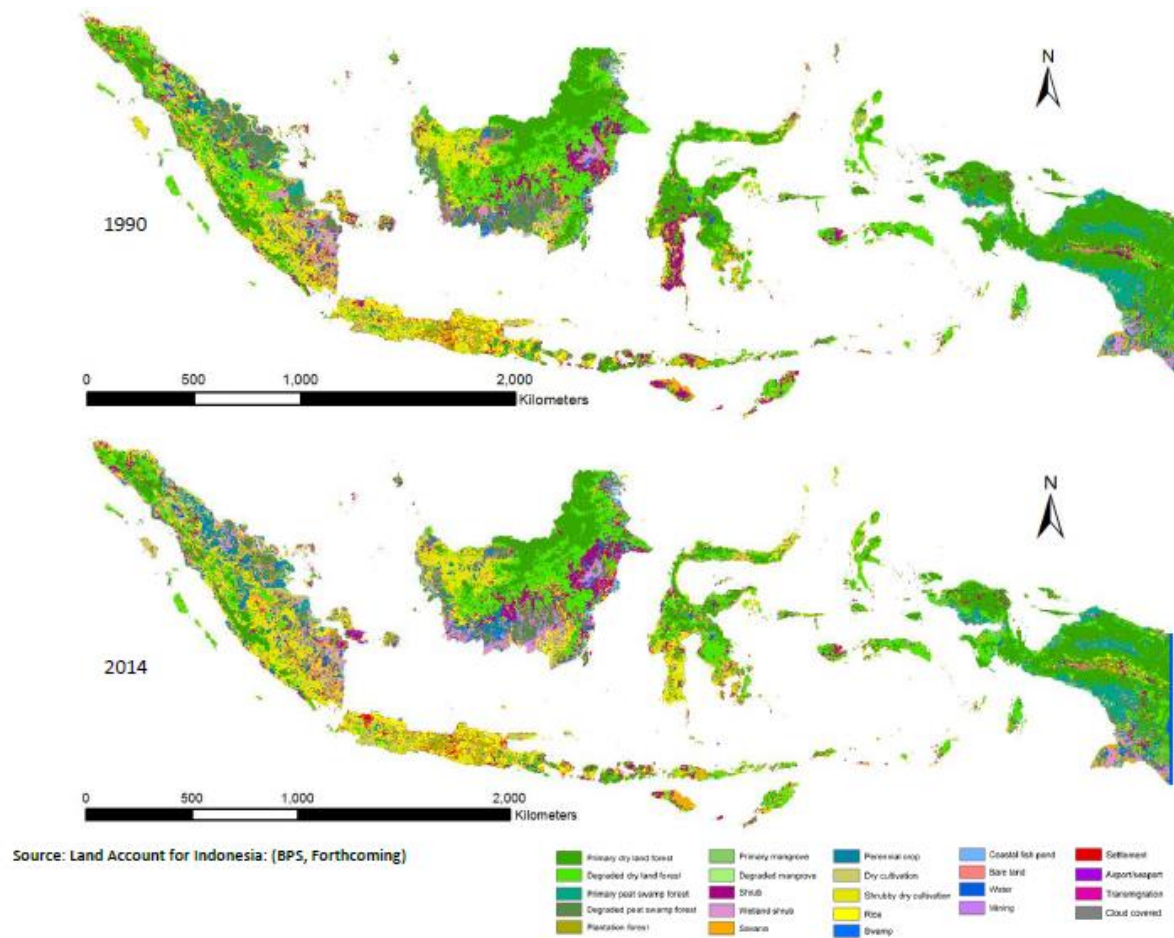
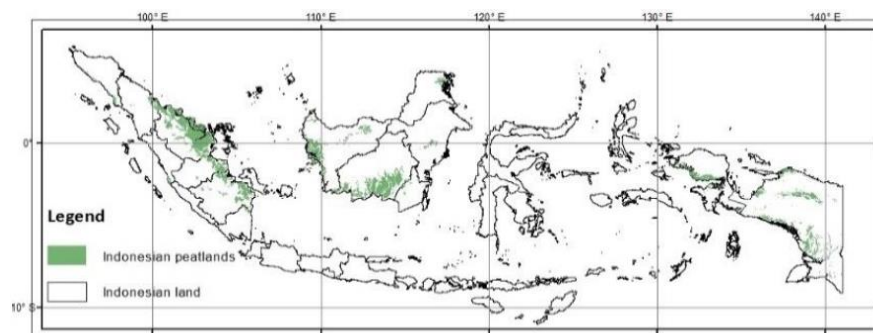


Figure 4: Land cover map of Indonesia in (a) 1990 and (b) 2014



The expansion of agriculture occurred mainly in peatlands. It is estimated that the tropical peatlands in Indonesia are one of the world's largest carbon pools, storing around 13.6 to 40.5 Gt of carbon (50-145 Gt on CO₂), which is equivalent to 1.3 to 4 years of global emissions of CO₂ from fossil fuel sources. Peatlands cover approximately 8% of Indonesia's land surface (15 Mha) and are mainly found in the three biggest islands of Sumatra (43%), Kalimantan (32%), and Papua (25%).

Figure 5: Distribution map of Indonesian peatlands



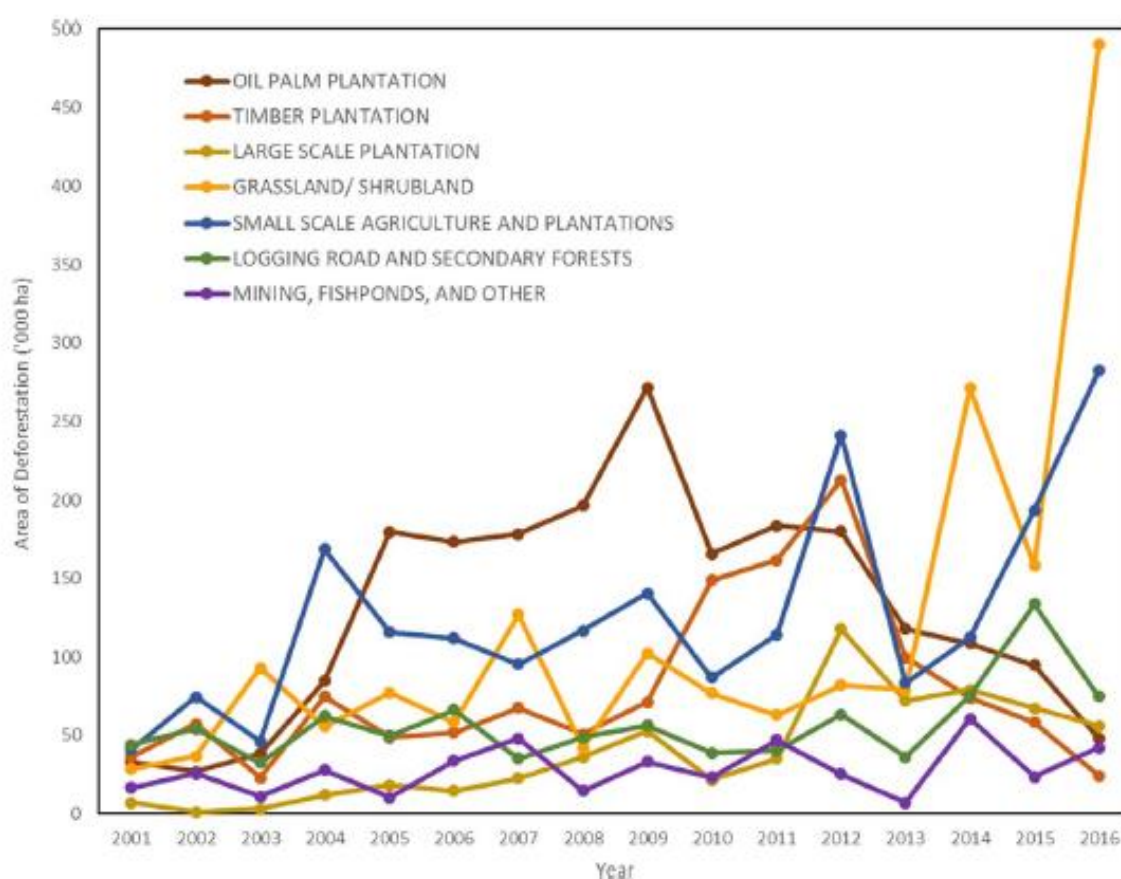
Source: Ecosystem account for peatlands Indonesia: (BPS, Forthcoming)

What causes deforestation in Indonesia?³ Large-scale oil palm and timber plantations together contributed more than two-fifths of nationwide deforestation between 2001 and 2016. Conversion of

³ <https://iopscience.iop.org/article/10.1088/1748-9326/aaf6db/pdf>

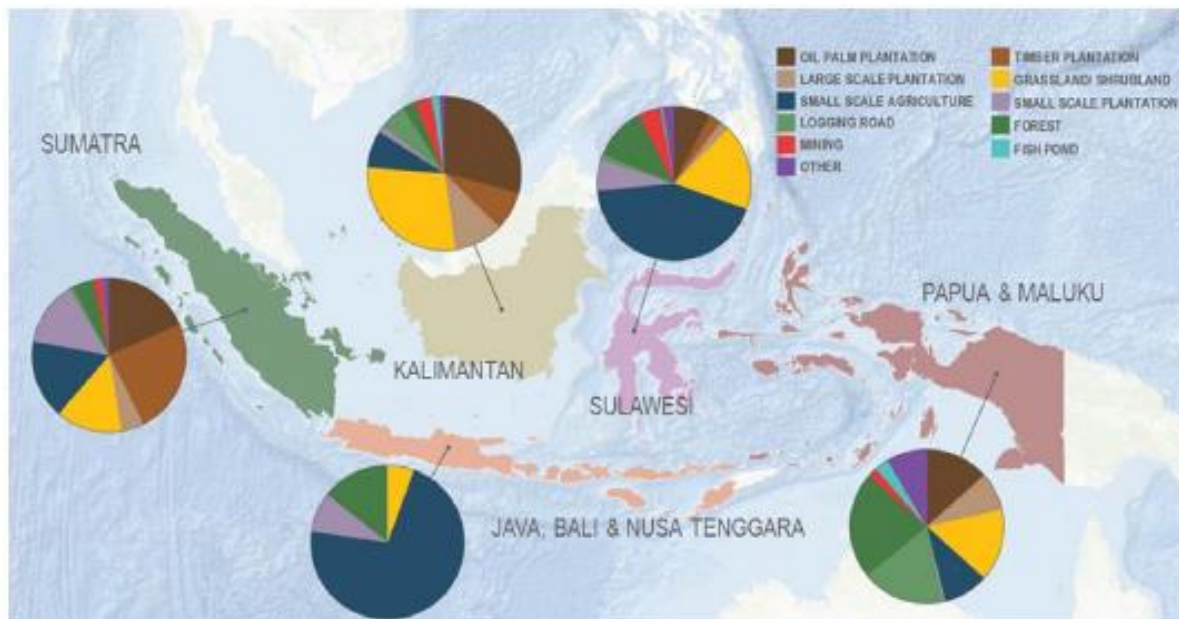
forests to grasslands, which comprised an average of one-fifth of national deforestation, rose sharply in dominance in years following periods of considerable fire activity, particularly in 2016. Small-scale agriculture and small-scale plantations also contributed one-fifth of nationwide forest loss and were the dominant drivers of loss outside the major islands of Indonesia. Given that compliance with emerging sustainability standards may be less enforceable and more challenging for small-scale plantation managers, this could lead to a larger proportion of deforestation driven by small-scale plantations in future. On the other hand, there may also be a window of opportunity to facilitate small holder compliance with sustainability standards and reduce deforestation, by leveraging extension services and informal information networks.

Figure 6: The area ('000 ha) of deforestation in Indonesia, annually 2001–2016, by driver category



Direct drivers of deforestation in Indonesia are also spatially and temporally dynamic, suggesting the need for forest conservation policy responses tailored at the subnational level.

Figure 7: proportion of deforestation 2001-2016 caused by each driver category, by major region of Indonesia



6 ANNEX 4 – Additional resources

Powerpoint presentations:

<https://drive.google.com/open?id=1DazyZRQlg6zyynXTTO68b7TGZaUGlnI9>

TEEBAgriFood Interim report available in Bahasa: http://img.teebweb.org/wp-content/uploads/2016/03/TEEBAgFood_Interim_Report_2015_Bahasa_HQ.pdf



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