

Economic Analysis

I. Introduction

1. The economic and financial feasibility of the GCF Project involves combining market and non-market estimates of the value of the forest. This methodology estimates both the carbon benefits of REDD+ achieved in previous years but also activities that the results-based payments will be used to fund in the future. This analysis presents the economic appraisal based on the carbon and non-carbon benefits and sustainable development potential of the investment.
2. The Government of Indonesia wishes to use the REDD+ results-based payments (RBPs) to:
 - **Continue updating, building and strengthening its REDD+ architecture**, as well as further strengthen government capacity to coordinate and implement REDD+ nationally.
 - **Further extend and enhance social forestry and FMU operationalization**, as two ambitious and innovative priority programmes of, which contribute strongly to the double objective of sustainable forest management and rehabilitation, as well as community empowerment and poverty alleviation.

Overview: Rationale for Social Forestry:

3. To alleviate poverty in Indonesia, Government of Indonesia committed to increase areas managed by communities from only 1% of the total forest in Indonesia as at 2016 to 12.7 million ha (30%). Between 2016 and 2018, 1.25 million hectares of land has been allocated to communities to involve in forest management and recognized in economic cycle of Indonesia.
4. Ministerial Decree of Forestry Number 83 of 2016 defines Social Forestry as a system of forest management enforced inside or around safe forest/forest rights/customary forest by local community/customary people as main actor to improve prosperity, environmental balance and social-culture dynamics through Community Forest, Village Forest, Forest People Plantation, Customary Forest, Private Forestry, and Forestry Partnership.
5. The indicators from investing in social forestry that will be important to understand the benefit of this project include increase in Gross Margin of Community/household, Employment, Economic Growth in Local Area and Gini Ratio with the goal of alleviating poverty, increasing employment, reducing social conflict and sustainable forest management.
6. The analysis of the project was carried out in accordance with the Guidelines for the Economic Analysis of Projects of United Nations Development Program (UNDP 2015). The economic desirability of the investments was determined by computing the EIRR and NPV and comparing the EIRR with the assumed 10% discount rate (as recommended in UNDP 2015). ***Discounted fund flows period is assumed to be 15 years to be conservative and based on stream of income without additional operating and maintenance cost from the project.*** We assume that the benefits from the project become zero after 15 years.

II. Estimated cost

7. The estimated capital cost of the project is presented in the table below with equal distribution over the first 4 years of project implementation.

Table 1: Estimate capital cost of project

Output	Indicative cost (USD)	GCF proceeds	Co-financing (if any)	
		Amount	Amount	Source
Output 1: Implementation/ Strengthening of REDD+ coordination and implementation	8.46 million	8.46 million	0	-
Output 2: Implementation/ Strengthening of decentralized sustainable forest governance	90 million	90 million	0	-
Project Management	1.54 million	1.54 million	0	-
Indicative total cost and currency (USD or EUR)	100 million	100 million	0	

8. Cost of **Output 2** is further split into Social Forestry (SF) and Forest Management Unit cost. \$51 million is allocated to the social forestry which include the cost of licensing and the cost of supporting the community to implement the social forestry effectively.

Total budget SF	44.63
Licensing (incl community development plan + safeguards)	10.00
Investments	34.63

III. Estimation of Benefits

9. For all interventions, costs and benefits are estimated by comparing the with-project and without-project scenarios. The overall standard conversion factor for adjusting market prices to shadow prices is set at 0.95. The shadow exchange rate is 1. The without-project scenario represents a continuation of the existing situation with continual degradation and slow growth of social forestry, while the with-project scenario represents the project investment scenario. This is presented in the Government of Indonesia's submission to UNFCCC.
10. The most relevant benefits are: i) biodiversity; ii) regulation of water resources; iii) provision of Non-Timber Forest Products (NTFP); iv) improvement of governance systems for natural resources; v) support for maintaining ancestral culture/identity; and vi) contribution to socioeconomic development and poverty reduction.
11. In this context, the project identified two economic benefits that have been quantified for economic evaluation:
- GHG reduction (direct benefit)
 - Poverty and inequality reduction (co-benefits)

Methodology for valuation of each of those benefits is described below.

Emissions Reduction

12. Indonesia reported in the BUR technical annex the results of the implementation of the activities reducing emissions from deforestation and reducing emissions from forest degradation for 2013–2017, calculated against the FREL, which amount to emission reductions of 48,978,427 t CO₂ eq annually (average of annual emissions) and 244,892,137 t CO₂ eq as the total for 2013–2017. Given that 2013 results are not eligible for the RBP programme, and 2017 results have been negotiated as part of the Indonesia/Norway Partnership, only the period 2014–2016 was considered for determining volume to be offered.
13. **REDD+ results paid by the GCF:** Indonesia will *retire* 27MtCO₂e upon receipt of payment by the GCF. Indonesia considers retirement of emission reductions a measure of high environmental integrity. Retirement prevents any further use, for offsetting or other purposes, and therefore preempts any possibility for double counting or double claiming. This information will also be published in the Lima Information Hub once payment is received from GCF.
14. Based on this volume offered to the GCF and valued at international prices under a conservative scenario of USD 5 per TCO₂ eq. It would be expected that the economic benefits are the following:

Table 2: Expected benefits from emissions reduction

Year	REDD+ results (tCO ₂ e/ year) offered to the pilot programme in this proposal	USD
2014	9,000,000.00	45,000,000.00
2015	9,000,000.00	45,000,000.00
2016	9,000,000.00	45,000,000.00

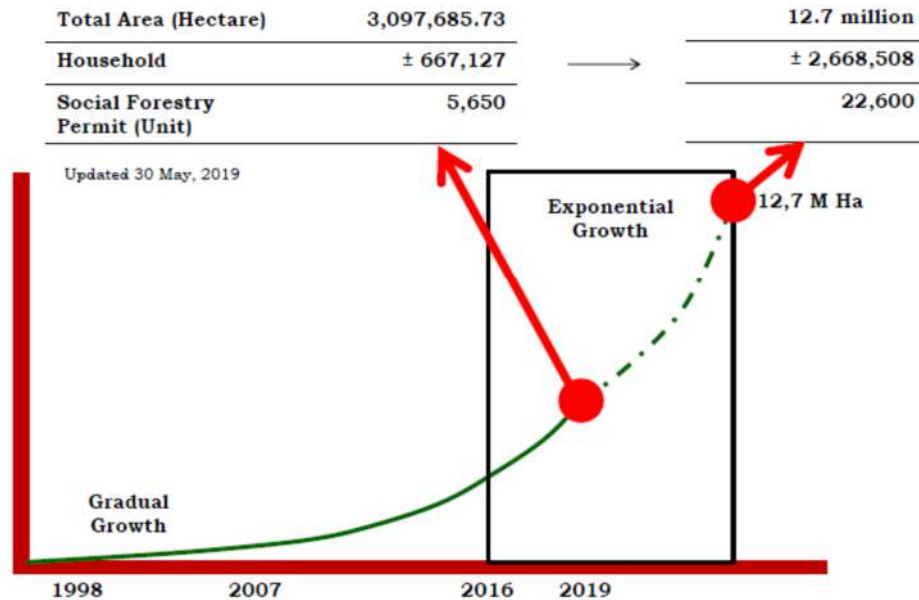
15. **Potential direct and indirect finance contribution to the achievement of REDD+ results in period 2014 to 2016:** It is impossible to attribute specific REDD+ results achieved in different years to specific sources of finance. A variety of finance sources, both national: central, province, district and village level public budgets, NGOs, private sector, and international: donor countries, multilateral organizations, non-governmental organizations, private sector, have contributed directly and indirectly to the government of Indonesia's efforts to reduce deforestation.

Poverty and inequality reduction (co-benefits)

16. The indicators from investing in social forestry that will be important to understand the benefit of this project include increase in Gross Margin of Community/household, Employment, Economic Growth in Local Area and Gini Ratio with the goal of alleviating poverty, increasing employment, reducing social conflict and sustainable forest management.
17. According to Dede Purwansyah, director of Sampan Kalimantan, an NGO, which currently assists 50 villages in the province of West Kalimantan, agreed that communicating objectives of social forestry to local communities is important, work in the villages he oversees has shown success. **After one year the average annual income of each village leapt from IDR 2.5 million (\$170) to more than IDR 40 million (\$2,730)**, from the development and production of crabs, honey, and coconut shell charcoal. For this economic analysis, to be conservative, we will use a 50% increase from current level – that is an increase from \$170 to \$1365. This is a net increase of \$1195.

18. The diagram below is taken from a presentation named “Lesson Learned of Social Forestry in ASEAN Countries ‘Smart Social Forestry’”, by the Ministry of Environment and Forestry at the Asia-Pacific Forestry Week 2019 on 18 June 2019.

Legal Access Distribution



Based on the target of 12.7 million hectares, an average of 22,600 social forestry unit (SFU) will earn an increase in income of about \$1195 if only one village is in the SFU. This implies an increase in income of \$27,007,000 per annum. However, from this project, about 700,000 hectares is assumed under the SFU with average of 1244 SFU's. **This will be about \$1.48 million benefit per annum.**

19. The main benefit that this economic analysis uses is based on the indirect impacts by influencing tree planting and other land investments, as highlighted in the impact assessment of the SFU in Indonesia - Impacts of the Hutan Kamasyarakatan (HKm) Social Forestry Program in the Sumberjaya Watershed, West Lampung District of Sumatra, Indonesia. *They found that the stock of multipurpose trees has a positive impact on profits. Because we found earlier that HKm contributes to planting of multipurpose trees, this provides evidence of indirect positive impacts of HKm on profitability. They showed that based on the propensity matching technique, an HKm permit results in households planting an estimated 473 more multipurpose trees per hectare than on comparable plots without HKm permits and the additional trees increase profits by an estimated 1,270 Rupiah per additional tree (1,120 Rupiah per tree in the median regression), so the estimated additional profit resulting from additional multipurpose trees as a result of an HKm permit is about 600,000 Rupiah per hectare (530,000 Rupiah per hectare using the median regression results). This represents a significant increase in farmers' incomes resulting from an HKm permit.*

20. The 600,000 Rupiah per hectare in 2008 when the paper was written is currently about 1.05 million Rupiah per hectare in 2019.¹ **This is an equivalent of about \$74.66 per hectare per annum.**
21. At 700,000 hectares, assuming multipurpose trees are planted in addition, benefits of SFU will lead to about \$52.26 million per annum. However, benefits will not accrue until the fifth year of the SFU license given that they plant trees like avocado and rubber. The number of hectares per annum over the 4 years is however distributed as follows:

Total ('000)	Y1	Y2	Y3	Y4
700	50	100	250	300
	7%	14%	36%	43%

IV. Net present value and sensitivity analysis.

22. The carbon benefit of the project has been shown to be significant even at a carbon price of \$5 and a presentation of the IRR and NPV is not done here. Also given the nature of this project this estimation is not necessary.
23. However, an economic analysis capturing only the social forestry aspect of the project shows significant benefit to the people of Indonesia. Given the above estimates, the net present value of the project is about \$107.25 million using a 10% discount rate, with an internal rate of return of 33%. This is assuming all the cost of the project only has a co-benefit from social forestry by increasing income of the communities.
24. Three sensitivity test cases were examined: (i) total cost increased by 15%; and (ii) total benefits decreased by 15%; and (iii) total cost increased by 15% and total benefits simultaneously decreased by 15%. The project has IRR higher than the 10% discount rate in all cases except when both cost and benefits increase simultaneously. Results are presented below.

Table 3: Net present value (million USD)

	Income	Changes in Income IRR
Base case	\$107.25M	33%
Cost +15%	\$102.27M	31%
Benefits – 15%	\$86.18M	30%
Cost +15% and benefit -15%	\$81.20M	28%

25. We should note that there are other benefits not fully estimated in this proposal because the location of the investment is not fully known yet. These co-benefits include
- Hydrological regulation (co-benefits)

¹ The inflation rate in Indonesia between 2008 and today has been 74.64%, which translates into a total increase of Rp447,867.78. This means that 600,000 rupiah in 2008 are equivalent to 1,047,867.78 rupiah in 2019. In other words, the purchasing power of Rp600,000 in 2008 equals Rp1,047,867.78 today. The average annual inflation rate has been 4.76%.

- Biodiversity (co-benefits)
26. These two benefits have been shown to have significant benefits. For example, United Nations Office for REDD Coordination in Indonesia (UNORCID); United Nations Environment Programme (2015) showed that forestry regulating services are vital for the socio-economic well-being of many of Indonesia's provinces. For example, in Central Sulawesi, the forest ecosystem valuation study shows that one hectare of forest prevents soil erosion equivalent to 6,538 kg/ha/year, which, also considering soil nutrient loss due to surface run-off, translates to an avoided cost of approximately USD 30 per hectare of forest in a year. This 'avoided cost' provides a significant argument in favour of increasing investments in forest protection, as failing to do so will diminish soil quality and considerably reduce agricultural yields.
27. The implication of ignoring these additional benefits is that the estimates of the economic IRR and NPV will be the lower bound and provide conservative estimates of the value of the project.