

# Deforestation Free Supply Chains in Practice

Sharing experiences from the palm oil sector in Indonesia



Palm oil is a major driver of deforestation in Indonesia. In response to rising consumer concerns, an increasing number of palm oil companies are making public commitments to reduce or eliminate deforestation in their supply chains. However, effectively implementing these commitments on the ground is a major challenge.

SNV's global team of agriculture and forestry experts has developed an approach to establish deforestation-free supply chains. We engage with supply chain actors across the landscape to enhance smallholder livelihoods, create business benefits for companies, and mitigate deforestation and ecosystem degradation. Our approach is being implemented for the palm oil sector in Sumatra, Indonesia, through the Berbak Green Prosperity Partnership.

# The Berbak Green Prosperity Partnership

The Berbak landscape in Jambi, Sumatra, extends over 250,000 ha and is dominated by peatlands. The area consists of the internationally acclaimed Berbak National Park, a forested buffer zone, and neighboring Muaro Jambi district characterized by oil palm concessions. Oil palm expansion is a major driver of deforestation and peat drainage in the landscape, leading to peat subsidence by up to several meters. As a result, the area is regularly affected by floods as well as peat fires, which cause greenhouse gas emissions and incur significant costs to the local economy and public well-being.



## The Project

The Berbak Green Prosperity Partnership has been set up to deliver sustainable management of the Berbak landscape through a low-carbon, inclusive economic growth model. The three-year project is co-funded by MCA Indonesia and implemented by Euroconsult Mott MacDonald, SNV Netherlands Development Organisation, Deltares, several Indonesian Universities, and local civil society organisations.

## SNV's Role

Under the Berbak Green Prosperity Partnership, SNV focuses on enhancing the sustainability of the palm oil sector in Muaro Jambi district. Through close collaboration with supply chain actors, SNV aims to strengthen the livelihoods of 10,000 smallholder farmers, ensure a steady stream of sustainably produced palm oil to partnering companies, and preserve forests and peatlands across the landscape. To achieve these objectives, SNV works along three key components:

- 1 Landscape analysis to determine where palm oil can sustainably be sourced from.
- 2 An inclusive business training programme to support smallholder inclusion in sustainable palm oil supply chains.
- 3 A traceability and forest monitoring system to detect and halt deforestation.



# Landscape analysis

Zoning the landscape for sustainable palm oil expansion

A key challenge in developing deforestation-free commodity supply chains is ensuring that efforts to halt forest clearance in one location do not result in a displacement of deforestation to other areas. A thorough understanding of the landscape is required to guide sustainable agricultural expansion and design targeted interventions to avoid forest clearance in critical deforestation zones.

## Understanding the risks for sustainable sourcing

Under the Berbak Green Prosperity Partnership, SNV employs a variety of tools and methods to understand the risks for sustainable palm oil sourcing across the landscape. A broad suitability analysis has been conducted for Jambi province using the SNV Siting Tool, followed by more detailed risk analyses at the site level. Based on the outcomes, areas for project intervention have been identified.

## Assessing oil palm suitability using the Siting Tool

SNV has developed a Siting Tool which can be used to guide sustainable agricultural expansion within a landscape in support of responsible sourcing strategies. The tool has been applied to identify areas suitable for sustainable oil palm production in Jambi province, based on biophysical criteria and conservation criteria from leading sustainability initiatives (RSPO, ISCC, ISPO).

The suitability of an area depends on the likely risk of violating the criteria. We distinguish between four risk categories, which are represented in different colors in a risk indicator map (figure 1):

- Low risk:** No constraints are identified. These areas are suitable for sustainable oil palm expansion.
- Medium risk:** Minor constraints are identified, but manageable and criteria could be met.
- High risk:** Major constraints are identified. Managing them to meet the criteria is challenging.
- Unsuitable:** The area is unsuitable according to one or more of the criteria. This cannot be corrected through management.

The map shows that the low risk areas for oil palm production are mainly located in the central part of Jambi province. Areas unsuitable for oil palm expansion are located along the Western, Northern and Eastern borders of the province. In these areas oil palm cultivation is either not possible due to biophysical constraints (i.e. steep slopes or high erosion risks) or not acceptable as it would conflict with important conservation values (protected areas, high conservation value forests, deep peat land).

Based on the outputs of the Siting Tool and a threat analysis for deforestation and peat development, a vulnerable forest frontier area in the east of the province was selected for project intervention. The selected Berbak landscape is comprised of part of the Berbak National Park, a buffer zone around the park, and neighbouring Muaro Jambi district which is dominated by oil palm concessions. To mitigate oil palm encroachment into the conservation areas it is critical to provide support to palm oil farmers in the low risk zones, and implement effective measures to detect and halt forest clearance at an early stage.

## Land cover classification of the supply shed

With the landscape for project intervention identified, a more detailed land cover classification of the palm oil supply shed was conducted, using global data sets and LANDSAT satellite imagery. The resulting land cover map (figure 2) facilitated demarcation of palm oil cooperative concessions and forest areas. The agriculture-forest frontiers are considered high risk areas for sustainable sourcing and should be prioritized for monitoring. Here land use change must be monitored frequently for early detection of any encroachment into the forest areas.

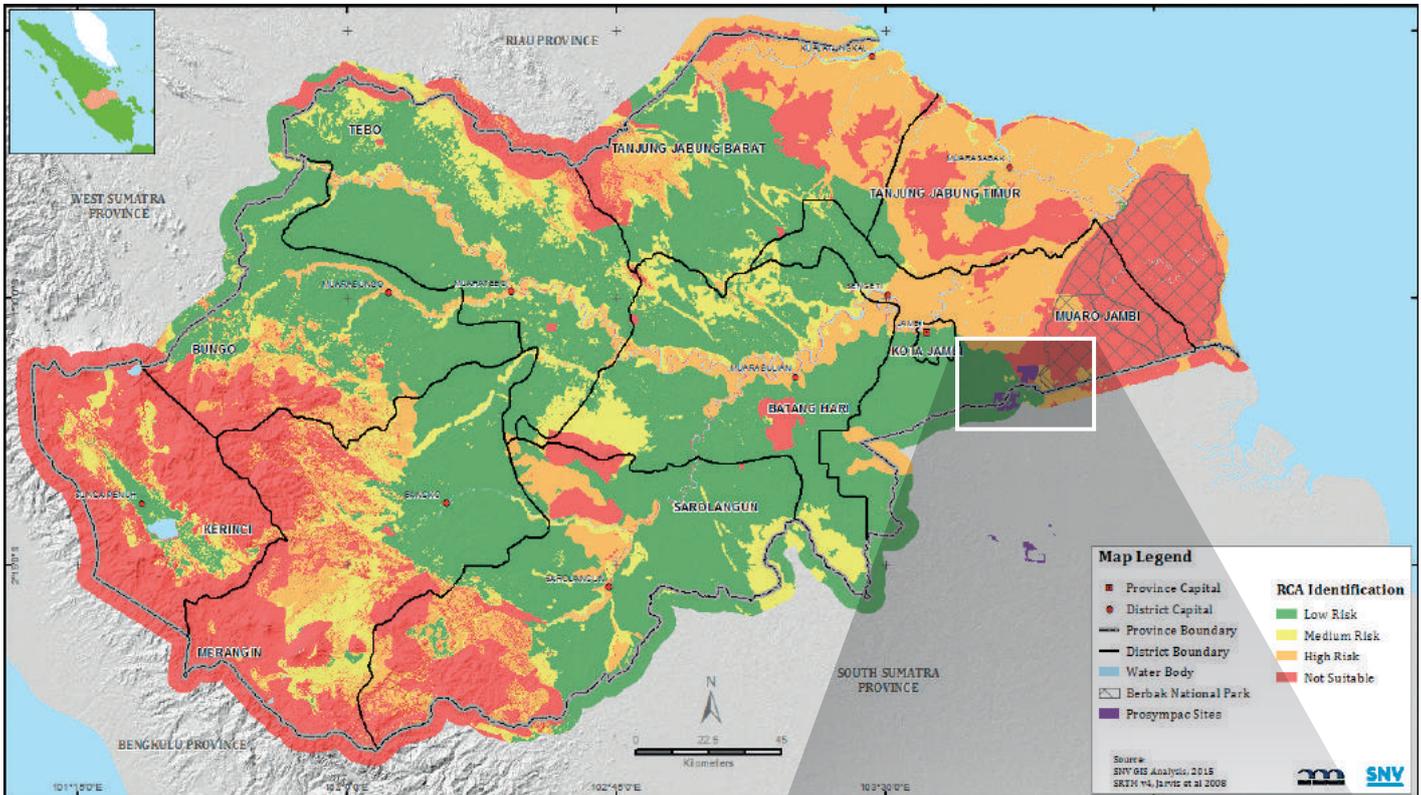


Figure 1: Risk indicator map for oil palm in Jambi province

### Detecting recent changes in forest cover

Once all the palm oil cooperative concessions in the Berbak landscape were identified, a land use change analysis was conducted for each. Together with Meo Carbon, the Global Risk Assessment Service (GRAS) tool was used to visualise land use change and the occurrence of deforestation from January 2008 to today. Gaining insight into this data is important, as the use of biofuels in Europe is governed by the Renewable Energy Directive which requires suppliers to comply with the deforestation cut-off date of January 2008. Although the land use change maps (figure 3) show some minor vegetation losses, no significant deforestation activity has been detected in any of the investigated areas.

The outputs of the GRAS tool also allow to visualise carbon stocks, forests and peat lands within and in close proximity to the palm oil concessions. These areas are at risk of palm oil expansion and require careful monitoring.

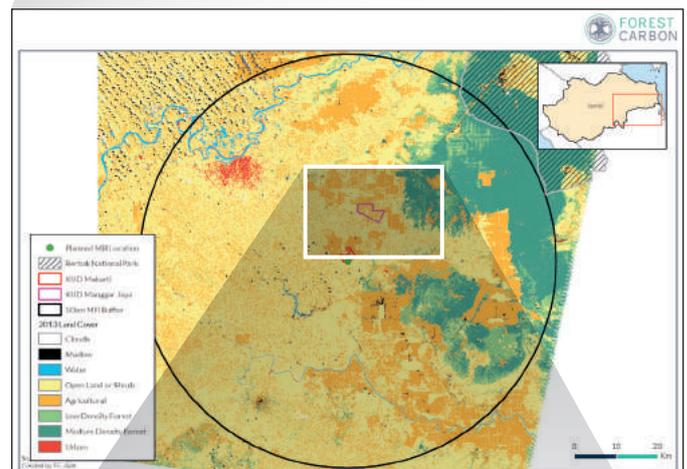


Figure 2: Land cover map of the palm oil supply shed

### Go or no-go?

The thorough landscape analysis, from the provincial down to the site level, provides an understanding of the risks for sourcing palm oil in line with the criteria of leading sustainability initiatives. The outcomes indicate that sustainable sourcing is possible from plantations in the Berbak landscape that have been developed prior to 2008, provided that targeted actions are taken to prevent encroachment into the national park and other forests and peat lands.

Based on these outcomes, SNV and partners have made the decision to proceed with project interventions to support sustainable palm oil production in the landscape. Interventions focus on improving yields in existing plantations, incorporating smallholders in sustainable supply chains, and implementing traceability and forest monitoring systems. This set of activities contributes to the establishment of deforestation-free palm oil supply chains.

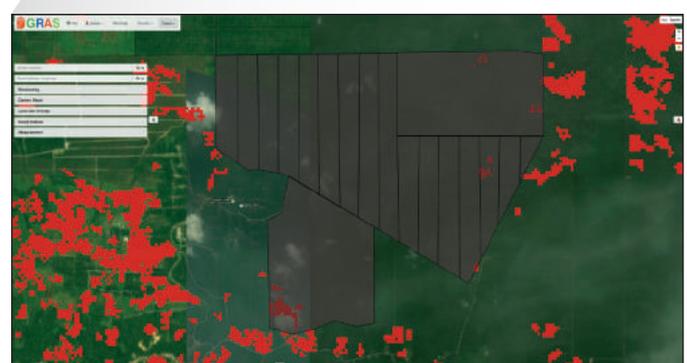


Figure 3: Land use change map of a palm oil cooperative concession



# Inclusive Business Trainings

Supporting smallholder inclusion in sustainable palm oil supply chains

Companies around the world have adopted voluntary agricultural certification as a mechanism of assurance to demonstrate that supply chains are deforestation-free. However, smallholders typically struggle to achieve certification because they lack the capacity and capital to meet the complex requirements of these schemes. As a result, companies committed to sourcing certified products might effectively be forced to exclude smallholders from their supply chain.

## Building inclusive and sustainable supply chains

In moving towards environmentally and socially sustainable palm oil supply chains, exclusion of smallholders is not an option. The sector provides a livelihood to 1.5 million smallholders in Indonesia, who manage around 40% of the land under palm oil production in the country.

To support the inclusion of smallholders, SNV implements the Responsible Sourcing from Smallholder (RSS) framework, which has been developed by the Smallholder Acceleration through Responsible Production and Sourcing (SHARP) partnership. Applying the framework is a first step towards full certification.

## Responsible Sourcing from Smallholders

RSS helps companies engage with smallholders in their supply base. The framework includes a smallholder risk and needs assessment, a pathway to improved and responsible production, and a reporting process. RSS can be a common point of reference for companies to demonstrate progress in meeting responsible sourcing commitments and a way for smallholders to improve their livelihoods.

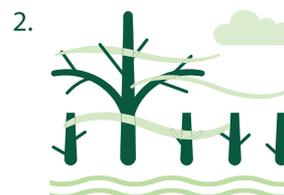
The RSS framework consists of two pillars:

- **Pillar 1** sets out core issues which smallholders must address to meet common sustainable sourcing commitments of companies.
- **Pillar 2** requires companies to support smallholders in improving their yields through better agricultural practices and building robust smallholder institutions.

Pillar 1:  
Minimum Core Issues



LAND RIGHTS AND CONFLICTS



DEFORESTATION AND LAND CONVERSION



LABOUR RIGHTS AND WORKING CONDITIONS

Pillar 2:  
Support for Smallholders



BETTER YIELDS AND FOOD SECURITY



IMPROVED LIVELIHOODS AND INSTITUTIONS



BETTER AGRICULTURAL PRACTICES

The two pillars of the RSS framework

Under the Berbak Green Prosperity Partnership, SNV works with 10.000 palm oil smallholders and associated cooperatives in Muaro Jambi to implement the RSS framework. This is done through training programmes on better management practices, raising environmental awareness, cooperative development and facilitating access to finance.

### Better Management Practices trainings

In order to provide support and incentives to palm oil smallholders to make a transition to more sustainable production systems, SNV and Wageningen University collaborated to develop a Better Management Practices (BMP) training programme. The trainings focus on strengthening smallholder knowledge and capacity to increase yields in existing plantations, while minimizing deforestation and other environmental impacts. We aim to increase palm oil yields by at least 20 percent two years after intervention.

Through active learning methods participants receive training on agronomy, institutional development, environmental management and using agricultural waste for energy production. Throughout the training, we work to enhance farmer awareness on their environmental impact and the value of ecosystem services. We use a training of trainers approach to achieve impacts at scale.

Supporting  
**10.000 palm oil smallholders in Muaro Jambi**

### Cooperative development

Organizing smallholders in well-functioning cooperatives is essential to improve their efficiency and create economies of scale. To build and strengthen palm oil cooperatives, SNV provides specialized management skills trainings on collective financial and organizational management. Through cooperative development we encourage improved collaboration between smallholders, value chain companies and input suppliers. It also enables more effective communication on certification standards, operating procedures and impacts of operations.

### Access to Finance

The yields of palm oil smallholder in Indonesia are on average 35 percent lower than those on private sector plantations. Although better management practices can help to partly address the yield gap, the biggest wins can be made through replanting at higher density (from around 126 to 146 trees per hectare), using high yield varieties. It is estimated that through replanting and subsequent better management practices, the smallholders in Muaro Jambi could potentially increase their average yields from 15 to 25 tons fresh fruit bunches per hectare per year.



Farmers receive hands-on training in the field

Significant funds are required to invest in replanting and bridge the first three years in which the replanted land will remain unproductive. However, financial institutions are generally hesitant to provide long-term credit to smallholder farmers due to the perceived high risks.

Financial Access and Simbuka have developed a flexible credit risk scoring tool to estimate the impact of several financial, household and production variables on the cash flows of palm oil farmers. The tool provides insight into future capability to repay loans, thereby greatly reducing credit risk.

In collaboration with Akvo and Forest Carbon, SNV plans to collect the required data and rate the bankability of 2000 palm oil smallholders. Data collection will be done using the Akvo Flow traceability system and drone aerial survey technology. A portfolio of bankable farmers in need of long-term credit will be presented to banks and investors, enabling them to reduce transaction costs and offer more affordable interest rates. The outcomes will be combined with data on deforestation to ensure the loans support farmers who adhere to environmentally friendly practices. The information will also be used to design targeted interventions for non-bankable farmers, for example creating additional income streams.

### Certification

From the total group of 10.000 farmers, 2000 will be certified during the project. Together with the International Sustainability & Carbon Certification (ISCC), Roundtable on Sustainable Palm Oil (RSPO) and Indonesia Sustainable Palm Oil system (ISPO), SNV together with Meo Carbon, is designing and improving group certification systems for palm oil smallholders. Internal control systems will be set up at the cooperative level to teach farmers about the principles and criteria of the certification schemes and monitor compliance. This way, the farmers are adequately prepared for the auditing process. Achieving certification will support the smallholders through access to stable markets and longer-term security.



**SNV**

# Traceability and Forest Monitoring

Tracing palm oil to the source to detect deforestation

Companies in the palm oil sector are increasingly making public commitments to purchase products that do not cause deforestation. To ensure accountability, a transparent system needs to be in place to determine where agricultural products are sourced from and what their impact is on forest areas. This can become a very complex and costly exercise, as palm oil products are often mixed on several occasions along the supply chain before the final product reaches the end user.

## SNV's traceability and forest monitoring system

SNV, in collaboration with Akvo and Forest Carbon, has developed an effective, low-cost traceability and forest monitoring system, consisting of the Akvo Flow traceability tool combined with methods for collecting and analyzing high resolution aerial imagery. This system can be used as an add-on to existing certification schemes or in a stand-alone manner. It is currently being implemented in Jambi, Indonesia, to trace oil palm fresh fruit bunches back to the farm level and monitor forest cover around plantations.

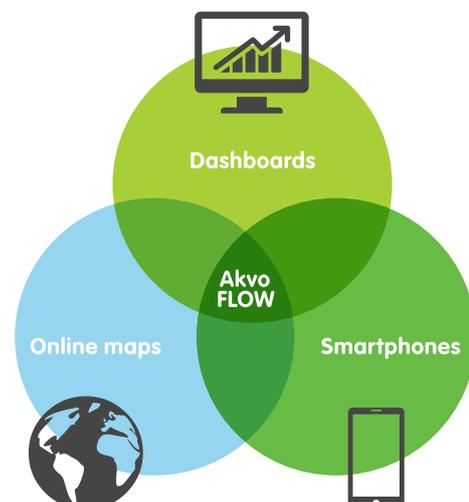
### Akvo Flow

Akvo Flow is a geo-traceability system for collecting, evaluating and displaying geographically referenced data on yields, inputs and management. The system consists of a user-friendly smart phone application that enables local staff to conduct surveys directly on their phones. The data is automatically transferred to an online system, DASH, which can be used to manage data and create surveys. The results can be combined with interactive maps for visualising and sharing results.

Under the Berbak Green Prosperity Partnership, SNV works closely with palm oil mills in Muaro Jambi district to determine their needs, set up a tailored traceability scheme, and train surveyors to collect data in the field. The aim is to collect data on 10,000 smallholders.

The information that is captured through the survey includes the location and size of the plot of each farmer supplying to a mill, their production in tons of fresh fruit bunches per hectare per year, and the inputs used.

Once it is clear where the mill is sourcing from, forests around those areas need to be monitored to detect deforestation and identify areas for support.



## Forest Monitoring

With rapid increases in technological capacity and declining prices, drones are emerging as an affordable tool to monitor forest cover. While commonly used satellite imagery has 30m resolution, cameras on drones can produce imagery with a resolution of 6cm, thereby filling a data gap between satellites and ground surveying.

SNV and Forest Carbon are collaborating to map out 4000 hectares of palm oil production area in Muaro Jambi using drone technology. The drones are programmed to fly a path determined by GPS points and take a photo every 3 seconds. Using imagery software, the images are then mosaicked together to create a single image that will allow for subsequent analysis.

After an initial scoping mission to map the forests in detail, quarterly monitoring will be undertaken following a 2-staged approach. The satellite-based Global Risk Assessment Service (GRAS) tool will be used to detect land use change irregularities and perform a first evaluation of the causes. In case of land use change indication, drone flights and personal inspection will be deployed as timely follow up for more detailed analysis.

When deforestation is detected, SNV assists companies in developing and implementing measures to halt forest clearance or ensure that products from these areas do not enter the supply chain. Such measures typically include providing support and incentives to producers operating in deforestation zones to enhance the sustainability of their farm management practices and reduce their impact on forest areas.

Monitoring  
4000 hectares  
of palm oil  
production areas  
using drones



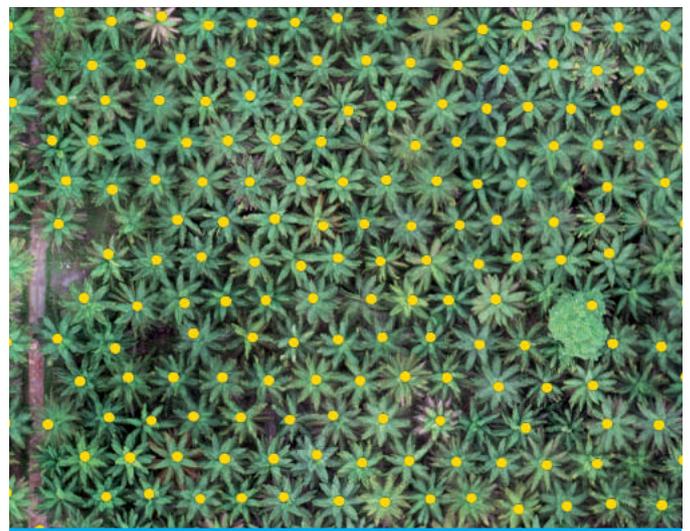
SNV uses drones for monitoring forest cover

## Other uses

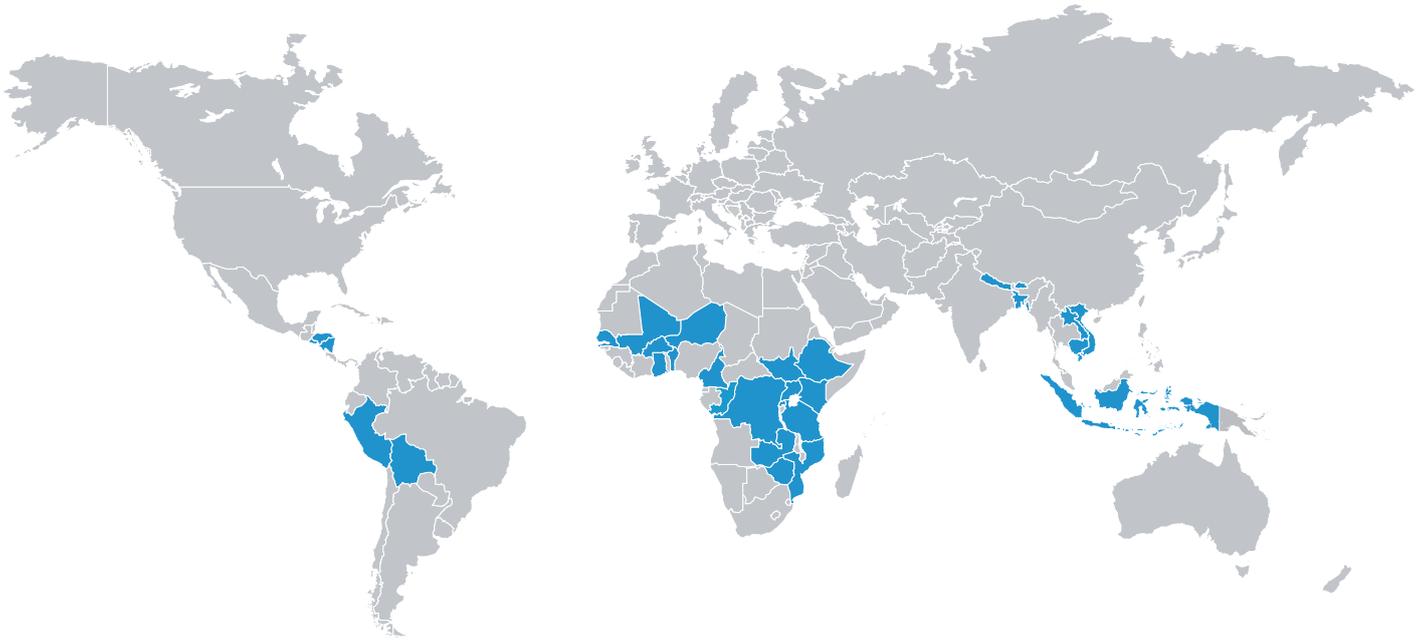
Next to forest cover monitoring, drones can be used for many other applications to increase the sustainability of the palm oil sector. A major application is agricultural enhancement through precision-agriculture. With high-resolution imagery, individual trees in palm oil concessions can be counted and their health can be assessed, allowing to forecast production levels, optimize fertilization and water management, and monitor plantation and crop development. This information can help to tailor better management practices training programmes to the specific local conditions in order to enhance yields and lower costs.

This production data is also extremely important for ensuring that mills are only sourcing from smallholders within their registered networks and that they are not obtaining supply from undocumented sources.

Furthermore, the forecasted and current data on yields, inputs and management practices can be used to calculate future cash flows for each farmer. A portfolio of bankable farmers can then be created and presented to a bank or investor, to facilitate smallholder access to low-interest loans.



Drone imagery can be used for semi-automated tree counting



SNV is a not-for-profit international development organisation, working in Agriculture, Renewable Energy, and Water, Sanitation & Hygiene. Founded in the Netherlands 50 years ago, we have built a long-term, local presence in 38 of the poorest countries in Asia, Africa and Latin America. Our global team of local and international advisors works with local partners to equip communities, businesses and organisations with the tools, knowledge and connections they need to increase their incomes and gain access to basic services – empowering them to break the cycle of poverty and guide their own development.

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