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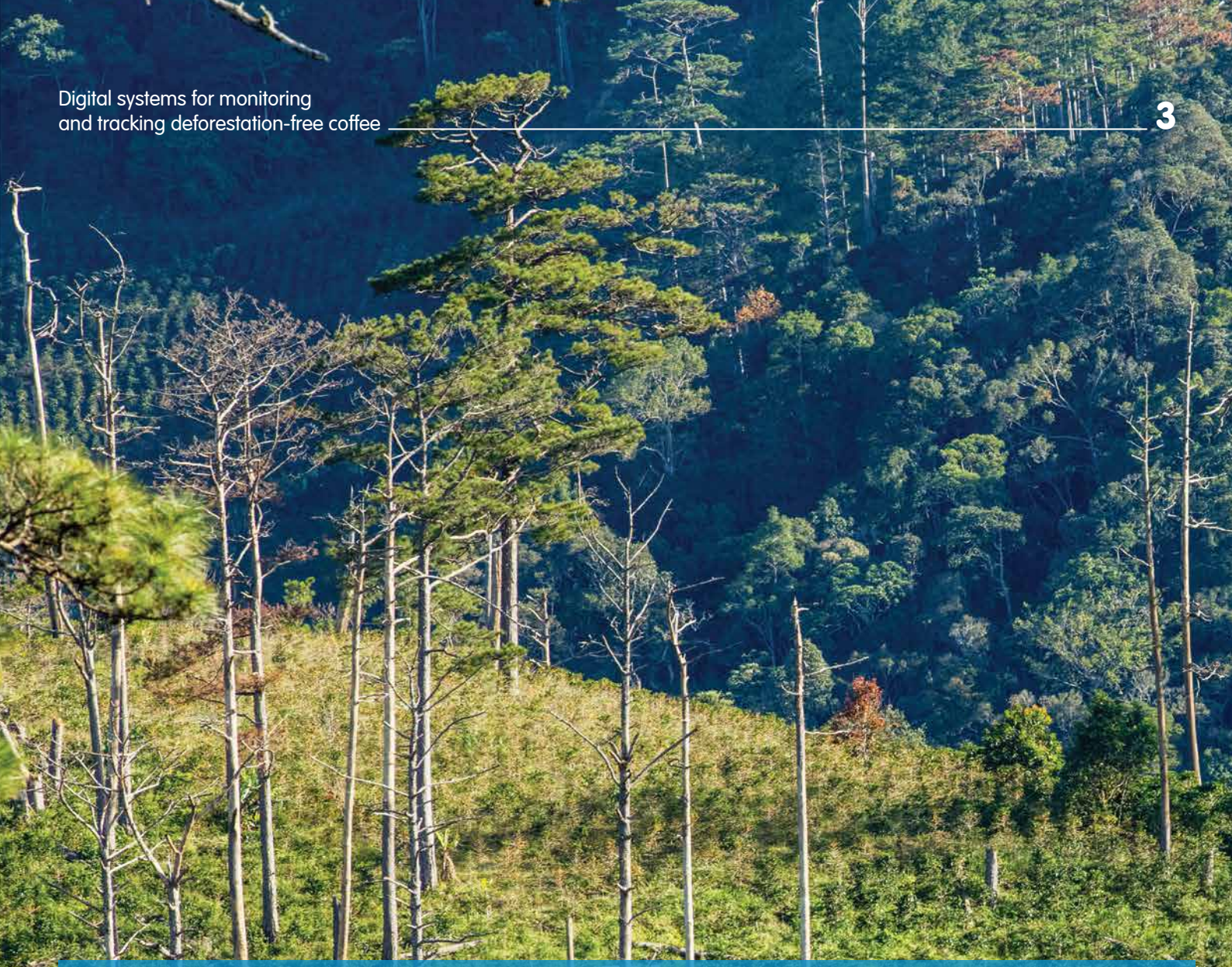
INTERNATIONAL CLIMATE INITIATIVE (IKI)

SNV

DIGITAL SYSTEMS FOR MONITORING AND TRACKING DEFORESTATION-FREE COFFEE

Through our Café-REDD project, SNV is supporting coffee farmers and companies to adopt more sustainable and resilient farming practices, supporting the restoration and conservation of surrounding forest landscapes. Designing and establishing digital monitoring and traceability systems are key activities in strengthening the market for high quality and deforestation-free coffee from the area. SNV has identified, designed and implemented innovative ways to map and monitor changes in the areas of forest and coffee, and linked this to practical tools owned and operated by coffee farmers and companies. Such systems are helping companies meet and demonstrate their sustainable sourcing commitments and institutionalise sustainable farming practices.



1. About Café-REDD

The objective of the project is to reduce deforestation and forest degradation and promote forest landscape restoration. It targets one of Vietnam's most important forested landscapes - the Lang Biang Biosphere Reserve, comprising of Bi Doup Nui Ba National Park and its buffer zone in Lac Duong district.

The promotion of sustainable and deforestation free agriculture is an innovative part of REDD+ strategies in Viet Nam at both national and sub-national level (provincial). Historically coffee and the agriculture sector has contributed to >70% of forest loss. Given the predominance of coffee farming in the project area, and the unique opportunities to coffee production here, the government's vision is to maximise the value of coffee to people and the landscape, and to better market it to capture and monetise this value it is creating.

As result, the project was initiated in November 2018 with the support of the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) with the aim of establishing a public-private-producer partnership (4Ps) for forest landscape conservation and restoration. The project employs a delivery effective model which is unique to this landscape and the coffee sector but has been successfully used by SNV in other contexts. It consists of three outputs:

1. Strengthening public sector coordination and capacity for Integrated Climate Smart Landscape Planning and Governance
2. Improving forest monitoring and traceability systems in partnership with the coffee companies.
3. Supporting smallholder farmers to improved and more resilient yields and livelihoods through sustainable agroforestry models.

This project brief focusses on output 2, explaining the background, design, and progress of Café-REDD+ work on traceability tools.

2. Background to traceability systems

The role of coffee companies in REDD+?

Working with coffee companies is a critical part of the project design, and many leading companies place similar importance on a more sustainable and resilient coffee sector in the district. In August 2019, several coffee companies joined SNV in signing a Memorandum of Understanding with the Peoples' Committee of Lac Duong, and other public, private and non-governmental stakeholders. This outlined our shared vision for a "deforestation-free development pathway based on green growth and sustainability for the district".

The companies are motivated to engage in the project by a range of interlinked factors depending on their operations and business models. These include: securing higher quality coffee, securing reliable supply, improved and more direct relationships with farmers, increasing margins, preserving landscape and cultural heritage, and positive association with socially and environmentally responsible practices.

SNV is working closely with companies committed to deforestation-free sourcing to determine their needs and support them. We aim to demonstrate to farmers the benefits of collaborating directly with companies, demonstrate to companies that farmers in this landscape can meet high quality and sustainability standards, and to the government that stricter enforcement of environmental regulation need not hinder private sector activity or development of the local economy.

Beyond certification

To ensure accountability to the commitments they have made, a transparent system needs to be in place to determine where agricultural products are sourced from and what their impact is on forest areas. Typically, companies across the world have relied on certification schemes or private and voluntary standards, such as 4Cs or Rainforest Alliance/UTZ, to provide this accountability. Indeed, some of the companies sourcing from within the project area have certified some of their supply in other parts of the country, and 40% of the coffee area of Lam Dong is certified[1].

However, certification is ineffective at a landscape level unless all producers adopt them and there is (near) real time monitoring of deforestation[2]. We also know, including from SNV's own experience, that due to the costs and capacity required to achieve voluntary certification, it tends to exclude smallholders[3]. For example, our baseline study in the project area found that only 48.75% of coffee farmers had the correct land tenure over their farmland (colloquially known in Viet Nam as a 'red book') - a key eligibility criteria for certification. Market demand for certified coffee is lower than Viet Nam's supply, resulting in insignificant premiums and increasing desire by all sectors to reconsider its role in the promotion of sustainable coffee production.

As a result of all these factors, very little coffee within the project area itself has been certified and there is little appetite by companies to invest in rapidly increasing the adoption of certification in this area.

Digital monitoring and traceability systems - SNV's deforestation free 'toolkit'

Traceability is used in different supply chains to prevent fakes, to allow product recall in case of defect or food safety concerns, and to verify sustainability claims. All these are roles that the Café-REDD system will perform. It will demonstrate to other stakeholders that companies are meeting their deforestation free commitments. In case of issues related to forest encroachment or other trade concerns (such as chemical residues or unsafe working conditions[4]), it will allow companies and public agencies to track down farmers who are not complying with laws and standards. And it will allow the customers of these companies to know that their coffee is truly sustainable and supportive of local economic development.

Traceability systems are easier to implement when supported by a contract between processors and producers, which is very rarely the case in Viet Nam's coffee sector. So, in the absence of this we support the coffee companies to develop better relationships and loyalty with farmers - a core motivation for them both, anyway including through provision of training and extension services. This benefits farmers and companies alike and are more impactful for farmer livelihoods than the low, or non-existent, premiums from certification.

The project's approach also includes support to Integrated Climate Smart Landscape Planning and Governance, ensuring alignment with locally led planning processes. As part of this, we work with local forestry and agriculture experts to map and identify management techniques appropriate to different local conditions, and with village leaders to asses the pros and cons of different options and investments.

In this way, traceability and forest monitoring are part of SNV's 'toolkit' that we are using to deliver the deforestation free development pathway, based on green growth and sustainability, in the district of Lac Duong.

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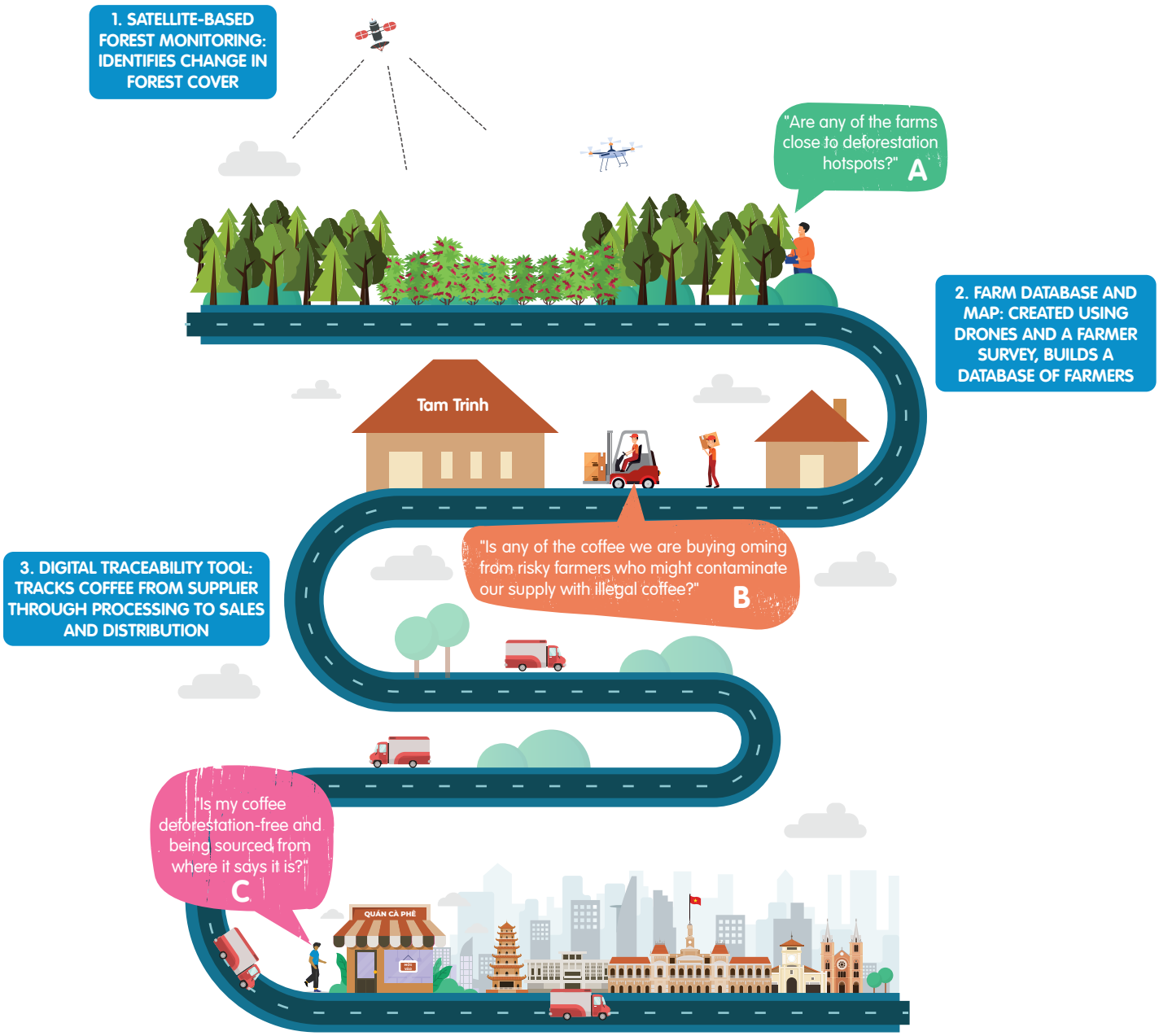
[1] 75,400 of 173,000 ha.
[2] Garrett et al (2019) https://doi.org/10.1016/j.gloenvcha.2018.11.003
[3] Smit et al (2015) Implementing Deforestation-Free Supply Chains – Certification and Beyond. SNV
[4] JDE's Supplier Initiative for Viet Nam highlights deforestation; inadequate pesticide selection, application, usage and disposal; and unsafe working conditions as the three biggest supply chain risks.

3. Designing the system



Three different tools and systems are being put in place that, when used together, allow participating companies to verify that coffee they source from Lac Duong is deforestation free.

1. A **satellite-based forest monitoring tool** managed by the forest protection institutions. This identifies change in forests and land use and alerts stakeholders to any issues. SNV worked with terra-i, who provide similar services to other coffee landscapes in Viet Nam, to provide alerts of forest change every 12 days – in 'near' real time.

2. A **farm database and map** created using drones, handheld GPS and through surveying farmers. This builds a geospatial record of coffee farm locations and allows collection of important household and farm data (for example on varieties, soil quality, management practices, and yields) that can help to tailor training programmes for farmers.

3. A **digital traceability tool** provided to each company. This tracks coffee purchases and transactions from different farmers and collectors, through different processing techniques, sales and distribution to customers. SNV is working with TraceVerified, a pioneer in digital traceability in Vietnam, to design and implement the system in collaboration with the coffee companies.

When used together, these tools answer 3 questions about the sustainability of the supply chain:

A. By comparing the forest monitoring data with the farm mapping, it can be identified **whether any of the farms are associated with, or physically close to, deforestation.**

B. Once it is clear where the company is sourcing from, those areas can be compared with the forest monitoring and the company can identify **whether they have been buying coffee from any farmers 'at risk' of violating the commitment to zero-deforestation and 'infecting' their supply chain.**

C. By regulating and enforcing the terms of use of brands and using digital tools such as QR codes to make data transparent, it can be ensured **that coffee being sold is coming from companies that deliver on the claims they are making.**

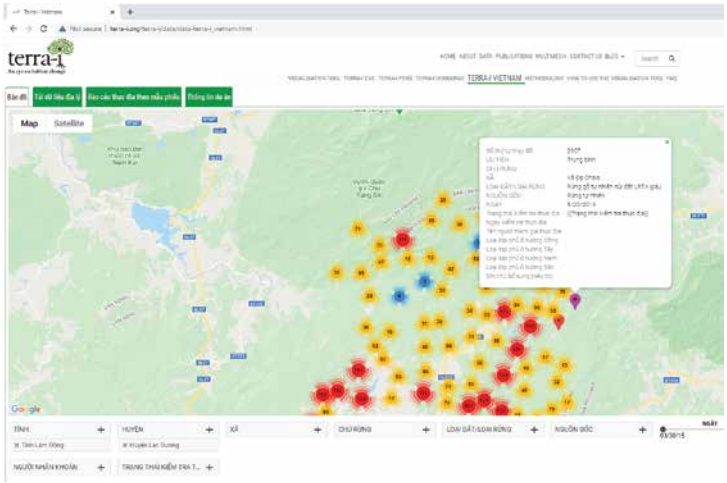
"Near-real time" satellite forest monitoring

The project deployed Terra-i as a forest monitoring tool in Lac Duong district. This fully automated software, based on satellite imagery, enables public agencies responsible for forest protection to swiftly respond to land use change. They can easily monitor hotspots without conducting regular field inspection because the system will alert them to changes in forest cover automatically, without them waiting years for publication of official government maps and databases. To do this, Terra-i has:

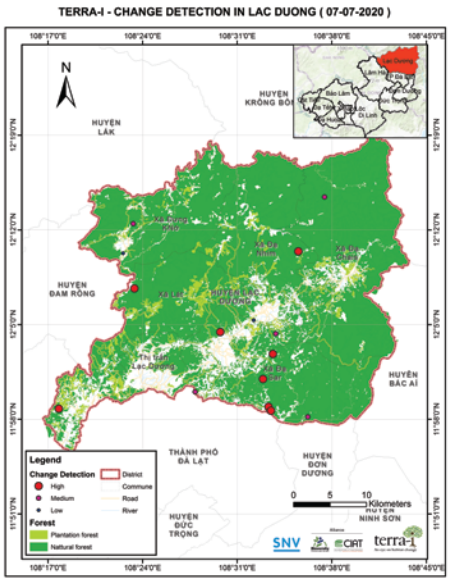
1. Developed and calibrated maps of the district, releasing the first batch of land use change detections in February 2020 with time series satellite imagery dated from March 2015 to January 2020.

2. After data validation and model calibration, through field visits and drone images, from July 2020 the latest change detections were updated in the web-platform will be updated continuously every 12 days. The data, containing detailed information of the detections including locations, forest cover types, forest owners, level of priority, date of detection etc. are available in the Terra-i Vietnam web-platform[5].

3. Trained provincial officers from the Forest Protection Department (FPD) of Lam Dong province, Lac Duong district, Bi Doup Nui Ba National Park and Da Nhim Forest Management Board on the operation and use of Terra-i. This included: a) 10-day intensive training covering all the steps to operate Terra-i (installation, project management, satellite image download, pre-processing, multi-image analysis for detecting changes, to interpreting results), b) a 5-day follow up training after the officers had been using the system for 3 months, c) 3-day training on the practical use of this data to identify new changes and in planning for site and enforcement visits to collect field data and d) 3-day training on the use of drone for field validation including flight design with Terra-i detections and interpretation of results.



Change detections visualised in Terra-i web-platform



Map showing Terra-i change detections of the period from June 26 to July 7, 2020

[5] terra-i.org/terra-i/data/data-terra-i_vietnam.html

Detected forest loss areas are ranked in terms of priority: low, medium, and high, based on the size of the detections and forest origin.

The alerts help equip local forest monitoring and governance stakeholders (e.g. forest owners, local residents, community and authorities, forest protection officers, Provincial Department of Agriculture and Rural Development, etc.) with timely information on land-use change and forest loss, to implement proper and timely responses.

Intensive training for forest protection agencies

About terra-i

Terra-i is a near real time monitoring system based on satellite imagery for natural vegetation loss detection, first implemented in Latin America and under development in Asia and Africa. Since June 2012, Terra-i data have been available free of charge for download on www.terra-i.org.

Terra-i integrates data sources from satellites of the European Space Agency (ESA) including radar data from Sentinel 1A-1B and optical data from Sentinel 2A-2B. The spatial resolution of the satellite images are 10m and every 12 days a composite image is produced.

Farm mapping and database creation

With the support of local technical specialists and the project's network of village leaders, drones and field visits with handheld GPS and smartphones were used in combination to conduct farm mapping.

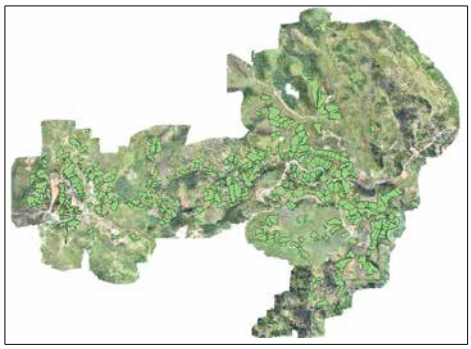
Creation of a farm mapping database allow users to obtain information regarding ownership, boundaries, area and vegetation cover including crop types and age. It can support coffee companies to source deforestation-free coffee or policy makers to make decisions on interventions, crop switching needs, or where to increase the planting of intercropping trees. This created the first comprehensive database of coffee farms and farmers in the district, a vital resource for public agencies and the private sector.

In 2019 a total of 139 drone flight flights were conducted, covering 601 km. This resulted in a total of 16,026 single images taken by the drone. Pix4D software was used to combine these into 35 master images of coffee growing areas across 10 villages.

The on-the-ground mapping was then finalised in March 2020, conducted in partnership with community groups using the MapTiler mobile phone application as a GPS tool.

The project adopted and supported its partners in implementing these digital tools, allow various groups of users to monitor, inspect and verify forest and coffee areas, which supports coffee company to promote their sustainable and deforestation-free coffee sourcing.

The following images of Đa Chais commune show a) surveyed areas and flight itineraries, b) final hi-resolution imagery following processing by Pix4D and c) superimposed farm boundaries (in light green) as collected by on-the ground survey



Digital traceability tool

The project worked with Trace Verified, a leading provider of digital traceability systems in Vietnam across many different commodities in partnership with retailers and public authorities. The project has designed and delivered a bespoke supply chain traceability system for four small and medium-sized coffee companies that signed the Letter of Intent, allowing them to verify and demonstrate the origins and sustainability of their coffee.

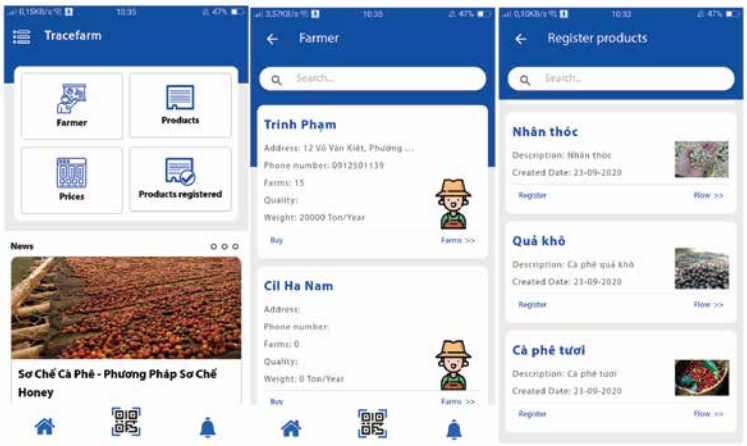
This system was created following survey and consultation with the companies and supply chain actors, coding and design of a system, testing with a small group of farmers, and rolling out the system to companies, farmer groups and farmers themselves with comprehensive training. This final stage was conducted in October 2020 before the start of the 2020/2021 harvest season.

Using QR codes, coffee is traced throughout the supply chain from harvest until point-of-sale. Because each farmer in the communes has been mapped previously coffee can be followed, via many different stages of processing, to packing and sale by the coffee companies.

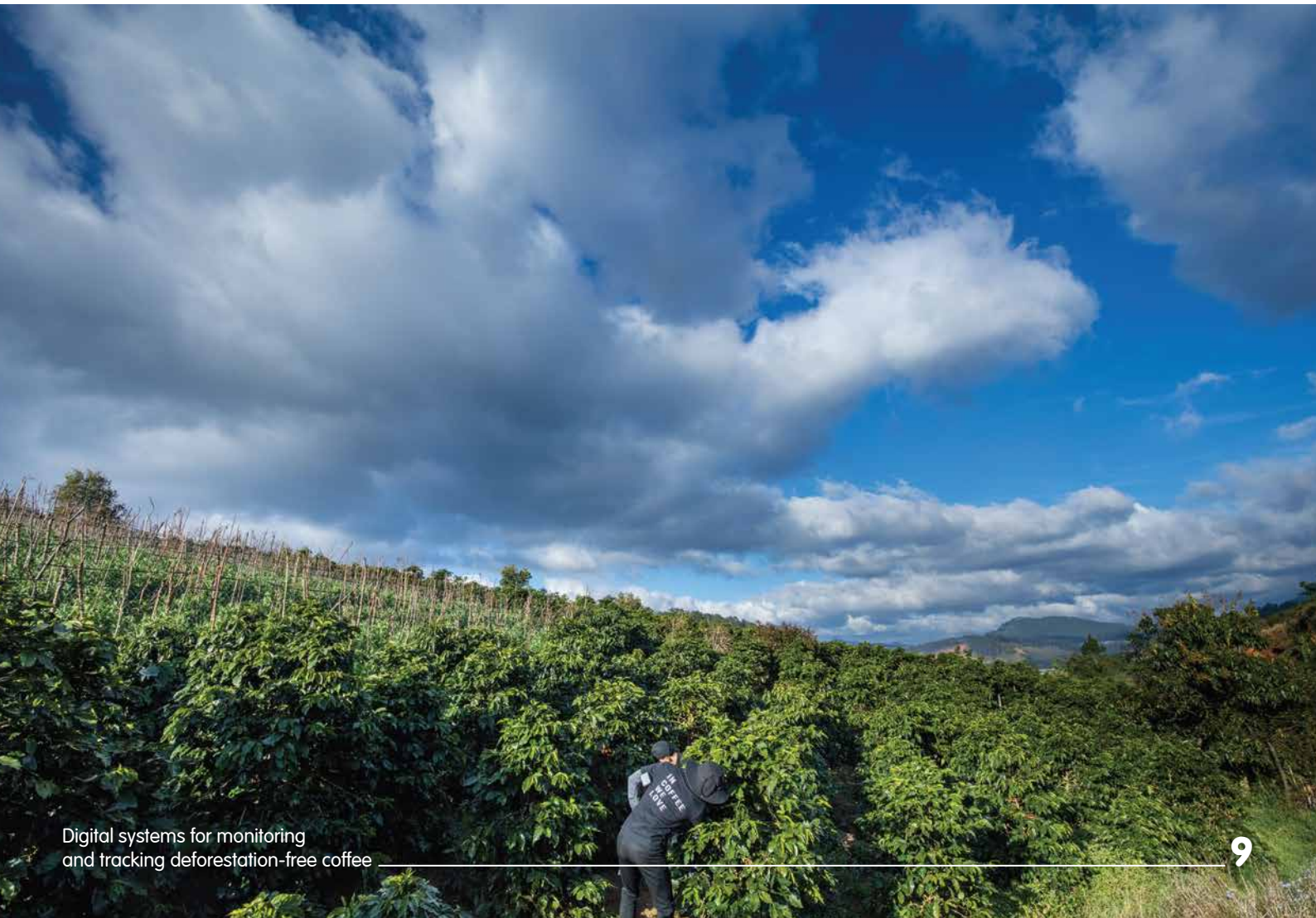
The software combines data from the Terra-I platform with the farm mapping

The system digitises and keeps a record of the origin of all coffee, including if and when it is mixed with other coffee during the harvest, collection, transport, processing, roasting and distribution stages of the supply chain. Through this record keeping, important characteristics about the coffee, such as its origin, whether it is certified, or deforestation-free, can be accessed at any stage until the point of consumption. These digital systems can other purposes built into them. The system developed by Trace Verified allows two-way communication between buyers and farmers, regarding topics such as pricing and farm management practices. This increases transparency and information flow and builds stronger relationships between farmers and the companies.

Images from the farmer leaders' app showing how the software can be used for sharing price information and recording transactions



Indeed, large multi-national companies, or those dealing with markets where traceability has long been a critical issue, such as certification where segregation and tracking is critical, often have bespoke systems already developed and in use. Now, such systems are available to all and the companies can demonstrate the origins of all their coffee.



Timeline and next steps

The Café-REDD project runs until October 2021. The following activities are being implemented to finalise the implementation and adoption of these digital systems for monitoring and tracking deforestation-free coffee:

- The Terra-i system went live in Lac Duong in February 2020 and all stakeholders were trained on how to use the information for their respective duties. It is expected that the authorities will monitor the information and are already seeing public budgets to scale up the system across the whole province.

- Trace Verified completed design of the tool and training in October 2020 before the 2020/2021 harvest season. They will continue to work on data quality and integrating use of the system into company and farmer practices throughout the season and review and make recommendations for long-term use of the system in early 2021.

In addition to the design and implementation of the traceability system, SNV is also supporting the project stakeholders to build a stronger brand awareness for Lac Duong and Lang Biang coffee, as well as other non-coffee products that support sustainable development in the district. This will include activities such as capacity building and coaching for companies on their brand awareness, marketing and sales strategies, supporting the local government to promote and create content regarding coffee form this origins, and engaging buyers through coffee 'cupping', domestic and international trade fairs. This will result in strengthened markets and prices for farmers and companies, accelerating the adoption of sustainable farm practices, direct-sourcing and 'inclusive business' arrangements between companies and farmers, and continue momentum and investment in delivering verifiable deforestation-free commitments.

The combined focus on traceability and branding creates trust between company and consumer that drives awareness and creates value to the companies for using these labels. Combined, the digital tools and system described in this brief contribute to an effective system for monitoring the production, processing and marketing deforestation-free coffee from Lac Duong.

Endnote

SNV is a partner in the Sustainable Coffee Challenge, committing to make coffee the world's first sustainable agricultural project. See this article for how SNV is joining 125 partners to tackle four key challenges in the sector: sustainable sourcing, rehabilitation and replanting of farms, improved labour conditions, and mapping and monitoring of coffee and forest areas.

Read more: *snv.org/update/snv-becomes-partner-sustainable-coffee-challenge*

Contact:

Pham Thanh Nam (Mr.), Project Manager, nphamthanh@snv.org
Richard Rastall (Mr.), Agricultural Sector Leader, Vietnam, rrastall@snv.org

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INTERNATIONAL CLIMATE INITIATIVE (IKI)

SNV Netherlands Development Organisation | Vietnam

Level 3, Building D, La Thanh Hotel, 218 Doi Can Street, Ba Dinh District, Hanoi, Vietnam

+84 (24) 3846 3791

www.snv.org/country/vietnam

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