Impact Report

2022

TRADE, DEVELOPMENT &
THE ENVIRONMENT HUB


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The Trade, Development and Environment Hub (TRADE Hub)

Responding to the challenge of unsustainable trade

The TRADE Hub works to deliver benefits to developing countries by tackling environmental degradation, inequality and social deprivation associated with trade. We work in seven developing countries and with partners in the UK, Europe, and USA.

We study agricultural commodities associated with habitat loss and social change – oil palm, soy, coffee, cocoa, rubber, bamboo - and locally important commodities such as *Irvingia gabonensis* (bush mango) and *Ricinodendron heudelotti* (Djansang). We also work on wild meat and wildlife trades that directly impact wild populations and have associated impacts on humans, including through emergence of novel diseases such as COVID-19.

The project has already published 250 outputs on sustainable practices in agricultural commodity supply chains, and close to 50 outputs on wild meat and wildlife trades. A further 400 outputs are in development, ranging from scientific papers and reports, to websites, digital tools, presentations, and sets of metrics and indicators for use by nations and business.

This report is a follow up from the previous years impact report (found here). Here we summarise the progress made towards delivering outcomes and impact from the TRADE Hub in 2022. We use material from our Monitoring, Evaluation and Learning system (MEL), inputs from researchers around the world, and material gathered from workshops and outputs delivered during the year.

This report comprises four sections:

- Driving transformational change,
- Achieving impact in six outcome areas,

- Mechanisms to achieve impact,
- A brief outline of ongoing work on a roadmap to just and sustainable trade.

During 2023 and 2024, synthesis and communication work across the Hub will bring together the work of the Hub into a core set of impactful products and legacy materials embedded in long-lasting processes and organisational changes.

Theory of Change

The TRADE Hub worked to elaborate and adapt the Theory of Change in 2022, in line with our adaptive management approach. We have used an approach consistent with models of transformational change (e.g. Rudolf et al., 2020[1]), which highlight the need not only to recognise problems with the way current choices are made, but to challenge this, provide new competing approaches and to also change the cultural context / environment in which those choices are made.

The updated Theory of Change embeds the six 'Big Wins' we developed in 2021, with some updates, as the outcomes for the TRADE Hub (Figure 1, numbered green circles). These outcomes are underpinned by four supporting areas of work (Figure 1, yellow circles), and the package of work is aimed to lead to three impacts (Figure 1, blue circles).

The six "Big Wins / Outcomes" we are working towards are:

1. **Farmers, forest users and Indigenous Peoples** are empowered to shift to more sustainable practices and obtain fair economic returns for their traded products.
2. **Local to national regulation of nature and social impacts of trade** is strengthened to impact both upstream and downstream aspects of trade.
3. **Nature and social considerations** are more visible in the work of **business and finance companies** involved with trade.
4. **Multilateral environmental and development goals** linking nature, people and trade are strengthened.
5. **Nature and social factors** are better considered in **international trade agreements**.
6. **Wildlife trade systems and policies** are underpinned by better data and influenced at international, national and local levels.

Figure 1 TRADE Hubs six Outcome areas (centre, green), the main four mechanisms used to achieve them (left, yellow) and the transformational changes the TRADE Hub is aiming towards through these Outcomes (right, blue).

Driving transformational change: Progress towards impact

We work towards three transformational changes. Achieving these would make a significant contribution to addressing the challenge of delivering sustainable trade for nature and people.

1. **Trade and use of wildlife is kept within sustainable limits.** In 2022 we worked with the CITES secretariat to deliver new tools to help all Parties to the convention make better informed decisions to regulate legal wildlife trade. Impact from this work will be seen in future years. We have also worked with governments in Gabon, DR Congo, Tanzania and China to make changes to laws governing hunting of wild

animals, and trade in wild animals. Once these laws are finalised the countries will be in a better position to curb overextraction of wild populations.

2. **Agricultural commodity trading maintains healthy ecosystems & delivers inclusive development**. During the year we saw important policy decisions made at the Convention on Biological Diversity COP15 meeting in Montreal through the Kunming-Montreal Global Biodiversity Framework. The Framework includes targets and indicators for countries on sustainable trade, sustainable use of species, business responsibility for nature, and the needs for conservation and restoration. Elements of the TRADE Hub work are included in the targets for this framework and its associated monitoring framework. We also worked with the European Union and developing countries to influence elements of the EU deforestation free supply chains law. The FACT dialogue follows up on decisions at the UNFCCC COP26 in Glasgow, seeking to remove deforestation from trade systems around the world, and we have fed our work into that process. Similar interventions were also made in the World Trade Organization (WTO) through the project team based in Geneva, and on changes to agriculturally focused policies and laws in Indonesia and China. The impacts of these policy level changes will be seen in future years.

3. **Progress towards a whole economy transformation that takes into consideration the trade impacts on nature and people**. During the year significant progress has been made to provide business and finance organisations with guidance documents responding to a huge emerging need to include nature and social consideration in trade and business process. Two networks (SBTN and TNFD) are likely to deliver significant impact across many businesses when their guidance is taken up. TRADE Hub has played an active role in the development of the guidance materials and the ways that trade related targets and metrics can be included. We are also producing a roadmap for sustainable agricultural commodity trades (covering focal commodities of the Hub), wild meat and wildlife trades. These materials will include detailed lists of actions that need to be taken by trade actors from farmers, traders, governments, trade agreement bodies, to civil society and consumers. We will promote this roadmap through local, national and international networks – including using digital technology and outreach tools. The impact from this area of work is expected to take place from 2023 onwards.

Supporting policy delivery

The TRADE Hub has designed its work to help deliver on the 2030 Sustainable Development Goals (SDGs). Our focus is on SDGs 15 (life on land), 9 (zero hunger), 12 (responsible production and consumption), 7 (partnerships) and 6 (industry, innovation, and infrastructure). For example, work on trade policies for biodiversity under TRADE Hub Big Win 5 helps shifts towards more sustainable food production and resilient agricultural systems (SDG target 2.4). Responding to SDG target 3.3 on ending epidemics and neglected tropical diseases, the TRADE Hub's work in Central Africa focuses on understanding wild meat and wildlife trade and its consumption, aiming to influence a change in consumption behaviour and to identify policy instruments to promote their trade in a sustainable manner.

We also help shape and deliver the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) Kunming-Montreal Global Biodiversity Framework, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Furthermore, the work by TRADE Hub is informed by the environment and sustainable development related discussions at the World Trade Organisation (WTO), including the Trade and Environmental Sustainability Structured Discussions (TESSD). In addition, TRADE Hub has also been making inputs to government-to-government initiatives, such as the Forest, Agriculture and Commodity Trade (FACT) Dialogue, as well as high-level events such as the Stockholm+50 meeting.
Finally, we have tailored our work to address areas where the UK has committed to accelerate progress under seven priorities for Official Development Assistance (ODA) spending[2] with a focus on Climate & Biodiversity, Economic Development & Trade and Science & Technology.

Achieving the TRADE Hub Outcomes: An Impact Journey

In this section we present the TRADE Hub journey for each outcome from baseline, through discovery and beneficiary, through work done, to outcomes delivered, outcomes expected to be completed by project end. Impacts, where already delivered, are highlighted above.

Outcome 1: Farmers, forest users and Indigenous Peoples are empowered to shift to more sustainable practices and obtain fair economic returns for their traded products.

Who is the beneficiary:

Small holder farmers are key players in agricultural commodity trade systems in the developing world. Our research and impact pathways aim to enhance understanding and delivery of outcomes and impact for small holder farmers.

Baseline situation at start of the project:

The baseline for the TRADE Hub team was that the collective understanding of the impacts of agricultural trade on farmers and their environment was insufficient, and there was a weak link between research and policies being developed in the Global South and Global North.

What have we done?

We have engaged with farmers and forest users across various commodities (cocoa, oil palm, coffee, soy, bamboo, rubber, and regionally Non-Timber-Forest-Products (NTFPs)), supported by surveys, focus group discussions, evidence in scientific papers, capacity building workshops and reports led by work package 3 on social impacts, work package 2 on agricultural commodities, and the country teams in Cameroon, Brazil, China and Tanzania. We have looked at how certification schemes might help farmers move towards sustainability and the barriers for farmers to engage in such schemes (credit access, extension services), and the ways that deforestation free supply chains policies from the Global North might impact smallholders.

We have also looked at how trade impacts fall across gender and between groups of differing socio-economic status. We have also produced award winning films and organised policy and capacity building workshops in countries with relevant stakeholders, from farmers and forest users' groups, researchers to representatives of private sector companies, NGOs and policy makers (see below). We have also analysed the impact of falling global rubber prices on farmers' livelihood and government revenue has made knowledge accessible for policy makers at local level and for regions with similar rubber-driven economic patterns in southeast Asia.

Key insights

To deliver impact the Hub is supporting famers and other supply chain actors to:

- Better understand the multidimensional impacts of trade on smallholders. The Hub has developed a framework to understand impacts of agricultural trade on wellbeing and equity, showing that interventions should be assessed based on factors beyond income alone.
- Improve practices, technologies, and incentive: Increase adoption of sustainable practices /sustainable production technologies. Incentives need to provide short-term profits and reach the farmers.
- Improve access to policies and resources. Ensure the access to public policies such as finance/credit, rural technical assistance, capacity building, and the provision of a land/tenure security and property rights, to reduce power asymmetries. Guarantee market access and a market structure that includes farmers and respects their livelihoods, promoting diversity and justice.
- Undertake gender-specific interventions to empower women. This includes capacity building, amplifying specific supply chain activities, access to production input, women groups, and entrepreneurship.
- Better understand laws, rules, procedures, and regulations on sustainability to help people comply with and organisations to enforce.
- Take long term measures. To avoid deforestation Long-term land use planning is important giving insight into agrological suitability, economic profitability and social ability. Long-term support, follow-up, and incentives are needed for farmers to move into degraded areas rather than to deforest.

Key outputs published in 2022:

Schaafsma, M., Dreoni, I., Ayompe, L. M., Egoh, B., Ekayana, D. P., Favareto, A., Mumbunan, S., Nakagawa, L., Ngouhouo-poufoun, J., Sassen, M., Uehara, T. K., & Matthews, Z. (2023). A framework to understand the social impacts of agricultural trade. Sustainable Development, 31(1), 138– 150. https://doi.org/10.1002/sd.2379

Dreoni, I., Matthews, Z., & Schaafsma, M. (2022). The impacts of soy production on multi-dimensional well-being and ecosystem services: A systematic review. Journal of Cleaner Production, 335, 130182–130182. https://doi.org/10.1016/J.JCLEPRO.2021.130182

Nakagawa, L., and de Souze Inakake, L. (2022) soy free of deforestation and human rights abuse: a roadmap for progress and transparency in the chain https://www.soyontrack.org/public/media/arquivos/1663959221-info_soja_no1_-_agosto_2022_-_ingles_-_final.pdf

Kadigi, R. M. J., Robinson, E., Szabo, S., Kangile, J., Mgeni, C. P., De Maria, M., Tsusaka, T., & Nhau, B. (2022). Revisiting the Solow-Swan model of income convergence in the context of coffee producing and re-exporting countries in the world. Sustainable Futures, 4, 100082.

Andrianto, A., and Komarudin, H. (2022) Independent oil palm smallholders are not homogeneous groups. https://www.cifor.org/knowledge/8639/

Case study 1: Cameroon

In Cameroon we have worked to increase adoption of sustainable practices /sustainable production technologies. Incentives need to provide short-term profits and reach the farmers. In addition, we have worked to improve access to policies and resources such as finance/credit, rural technical assistance, capacity building, and the provision of a land/tenure security and property rights, to reduce power asymmetries. Research has also looked at food security and land conflict in cocoa production basins at different points of the forest transition curve, at NTFP supply chains, and at gender-specific interventions to empower women. This includes capacity building, amplifying specific supply chain activities, access to production input, women groups, and entrepreneurship. Ongoing activities include assessing biodiversity impacts, ecosystem services and multidimensional wellbeing in cocoa production systems.

Work in Cameroon has also identified the challenges faced by cocoa farmers, oil palm growers and forest users and engage relevant stakeholders to discuss and commit for a joint strategy for a better impact in Cameroon. The challenges discussed include difficult and irregular access to and late delivery of quality inputs, pricing issues, lack of financial means, absence of proximate financial services, very high-interest rates, and health issues relating to chemical compounds. Some of these insights are summarised by smallholders themselves in the TRADE Hub documentary- A Smallholders Voice.

Sources of food security, including the contribution of biodiversity and cocoa production, were analysed along the forest transition in Cameroon using data from a survey with 206

households carried out in the cocoa production basins in Djoum and Mintom Divisions in the South Region of Cameroon, and in transition to Savannah (Mbangassina, Ngoro and Deuk Division in the Centre region). Food security is indicated by the number of months households have enough food. Three categories of household were identified, 16% and 10% represented not able to eat enough food for more than 7 months in Savannah and forest respectively. They were considered as “food insecure”. About 21% and 23% were identified as “relative food secure” in savannah and forest respectively and declared having enough food during 8 to 11 months per year. And 65% and 66% were identified as “food secure”, having enough food for 12 months in savannah and forest respectively.

A Multinomial Probit Model showed differences in contribution of cocoa production and biodiversity to food security along the forest transition curve. Indeed, in the forest zone, households classified as “food secure” experienced higher cocoa production compared to those classified as “relative food secure” and “insecure”. While in the transition to savannah production basins, cocoa production is not comparable across the three categories of food security. Yet, higher cocoa production is associated with higher living standard in savanna, as income from cocoa in most of the cases, is used to build decent houses, and to purchase physical assets and furniture. The contribution of biodiversity to Food security is significantly higher for households classified as “food insecure”, compared to those classified as “relatively food secured” and “security food”. Gender differences favouring men were found. Indeed, considering the overall sample, women were more likely to be found in the “food insecure” group. Agroforestry should be encouraged to diversify food sources. Capacity building and support toward women can help to reduce gender differences.

The effect of land conflicts on the agricultural development of cocoa farmers was investigated along the forest transition curve in Cameroon. The agricultural development was captured by two indicators: landholding by farmers and agricultural production. Multiple linear regression models showed that human-wildlife conflicts considerably reduce the amount of land owned by cocoa farmers. It also appeared that human-human conflicts reduce the agricultural productivity of cocoa farmers in the production basins of Center (savannah) and South (Forest) Cameroon. Among of the recommendations, actions to be taken by policy makers at national level and at decentralized level to promote sustainable practices and higher economic value include setting up mechanisms to regulate the recurrence of conflicts, developing a strategy to regulate land access and to facilitate land security and land titling. This recommendation is so important that due diligence and traceability mechanism in the framework of emerging regulation on deforestation free supply

chains is hard to play in the conditions where access to land, landholding, land tenure and land titling are not clear.

Finally, a complete assessment of the oil palm supply chain for the region needs to be carried out. In addition to the palm oil is extracted from the flesh or pulp of the fruit (the outer part), there is also the palm kernel oil, colloquially called Manyanga, Meyanga, Mayanga, extracted from the soft part of the seed (the inner part). There is a whole traditional extraction method for the palm kernel oil which is heavily consumed locally and believed to be excellent for the skin, and so good that it is used on premature babies. Once the kernel is extracted, the waste is used as a source of energy as well as the pruned branches. The chaffs from the palm oil are then dried and used as a lighter, replacing plastics with huge environmental implications.

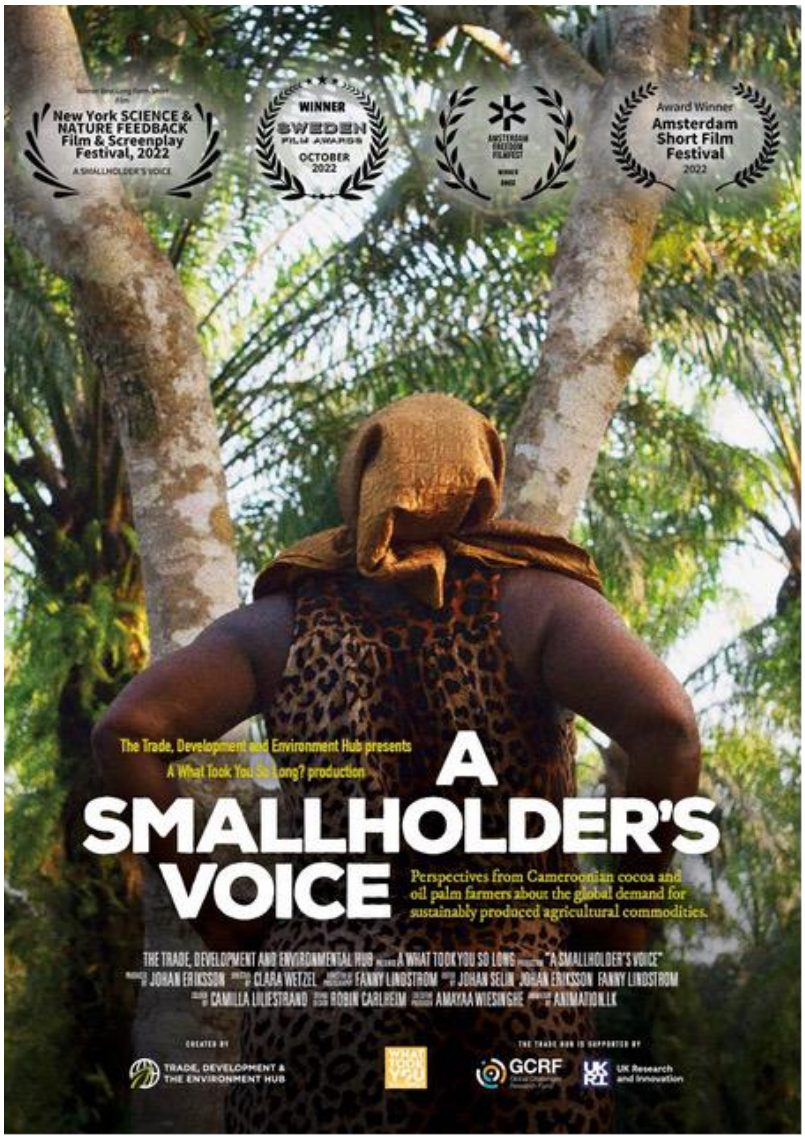

Figure 2. Documentary produced by TRADE Hub with >1900 views on YouTube and four film festival awards.

Figure 3 Smallholders focused workshop hosted in Cameroon and press coverage of event and documentary

Figure 4 Focus group discussions on challenges faced by cocoa farmers in Akom-Mintom Division Cameroon

Outcome 2: Local to national regulation of nature and social impacts of trade is strengthened.

Who is the beneficiary:

The local and national regulatory framework of trade (policies, laws and regulations) provides the underpinnings for how trade works in a country. This affects all people involved in trading systems and the wider economy. Poor regulatory frameworks can deliver bad outcomes for people and nature across the board or favour certain groups of people over others. Understanding, seeking to improve, and assessing impacts of national laws and policies is a key aspect of affecting change to deliver positive outcomes.

Baseline situation at start of the project:

At the start of the TRADE Hub, the overall team was not familiar with the local to national legal frameworks in the focal countries, especially as these related to managing the nature and social impacts of trade. Knowledge was held by individual researchers in the TRADE Hub team, but lessons were not shared, and synthesis was not available.

What have we done?

We have worked in Brazil, Gabon, Cameroon, Democratic Republic of Congo, Republic of Congo, Tanzania, Indonesia, China, the UK and the EU to gather a detailed understanding of their legal frameworks in relation to agricultural commodity, and wildlife and wild meat trades. We have then worked with country teams to advance dialogue and promote the required changes in policies and laws to enhance the sustainability of trade systems. The Cameroon and Indonesian teams, for example, participated in political dialogues involving the European Union, government agencies and strategic stakeholders. These dialogues enabled the governments in these countries to consider existing conflicts/ inconsistencies between emerging regulation on free-deforestation commodities (whether deforestation is lawful or unlawful). We have also provided global market risk evidence locally and internationally to private sectors, governments, state farms, natural rubber industry associations for industry planning and other decision making.

Key insights

TRADE Hub work to date focus on three spheres - biodiversity, commodities and policy. These insights evidenced largely on the research of work package 2 (agricultural commodities), work package 4 (trade policies), work package 5 (trade modelling) and the Brazil country team. A recent flagship output published was a 'sustainable soybean policy toolbox'. Some of our findings include:

- Biodiversity metrics are complex and need more attention from policy makers beyond deforestation to support sustainable trade.
- Environmental protection is key to long-term profitability of agricultural commodities and wildlife.
- The same policy tool can have different impacts on different communities within supply chains. Effective governance of complex socio-economic and environmental systems requires polycentric institutions. Reduce deforestation via monitoring, traceability, transparency & standards, with engagement from public actors.

These findings are communicated with stakeholders to influence:

- The environmental consequences of interventions in supply chains and landscapes are understood, ensuring commodity risk assessments and sustainable development policy is informed by priority risk area mapping, simplification and use of multiple biodiversity metrics when examining supply chain risk.
- Profitability of farming alongside ensuring environmental protection, providing horizontal and vertical supply chain support to farmers in developing countries, and policy change to encourage sustainable wildlife harvesting.
- A new agenda to increase legitimacy of low/ middle income countries, ensuring greater transparency and traceability and monitoring certification efforts.

Key outputs published in 2022:

Pendrill, F., Gardner, T. A., Meyfroidt, P., Persson, U. M., Adams, J., Azevedo, T., Bastos Lima, M. G., Baumann, M., Curtis, P. G., De Sy, V., Garrett, R., Godar, J., Goldman, E. D., Hansen, M. C., Heilmayr, R., Herold, M., Kuemmerle, T., Lathuillière, M. J., Ribeiro, V., … West, C. (2022). Disentangling the numbers behind agriculture-driven tropical deforestation. Science, 377(6611), eabm9267. https://doi.org/10.1126/science.abm9267

Marcello De Maria, Zanello, G., Louise Nakagawa, Sigles Robert, Julie, Visentin, J. C., Pavani, B., Branco, P. D., Fendrich, A., Barreto, A. G. de O. P., Rocha, A. B., & Ranieri, S. B. L. (2022). Moving Towards a Sustainable Soybean Supply Chain – A Sustainable Policy Toolbox for Brazilian Stakeholders and Other Global Actors.

http://www.unep.org/pt-br/resources/infografico/avancando-para-uma-cadeia-de-soja-sustentavel

Case study 2: China

Trade knowledge and policy work in China

For soybeans, the China team has been working on a report review which summarises the experiences and history of China's trade and related policies on soybean. This topic has not been systematically researched. The reports provide the rationale regarding China's development process and relevant policy background, supporting the understanding on why and how the soybean trade in China has reached its current situation. The knowledge generated via these reports will support the identification of policy entry points and options for engaging soybean trade decision makers to drive for sustainable soybean trade.

For rubber, the research team in China has used high-resolution satellite imageries for rubber mapping. Our study produced the first high-resolution rubber map for the entire Southeast Asia and updated the geographical extent of mature rubber plantations. Along with the analysis of land use change since 1993, this geodatabase filled the knowledge gap of current rubber plantation distribution and land use history, where 90% of global natural rubber production is located. The map of rubber distribution in Southeast Asia is accessible for governments at different levels and private sectors for decision making and to support industrial planning. This technical work was conducted in support of the policy recommendation for EU deforestation regulations. In addition, the work helped mobilize other project resources, such as the project "Degradation and improvement of rubber tree germplasm resources in Yunnan" led by Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences.

In addition to agricultural commodities, work in China has also focused on wildlife trade, with live birds as an example for in-depth study. This stream of work generates policy impacts in various aspects, including (i) Providing bird market survey data and analysis to government agencies, which helps enhance their capacity for wildlife protection and trade related law enforcement, (ii) Making targeted policy recommendations on traceability technology improvement and inclusion of parrot species that can be legally bred and traded to the Measures for the Management of Special Identification for National Priority Wild Animals and their Products (Draft for Public Review) and the First Scope of Special Identification,

released by National Forestry and Grassland Administration in May 2022 for public comments. Recommendations were well incorporated in updated policy documents, (iii) Making policy recommendation on the need to continuously improve management of local captive breeding industry, which can generate positive conservation results as well as multiple economic and social benefits, e.g. improvement of local livelihoods, poverty alleviation and promoting the implementation of the rural revitalization strategy. This recommendation has been taken forward by China's revised Wildlife Protection Law that will come into effect from May 2023.

Trade as business solution in tackling plastics crisis - bamboo and rattan work in China

INBAR, the TRADE Hub partner in China working on Bamboo, has developed a report (to be published in 2023) on bamboo plastic substitution and analysed international trade of bamboo plastic substitutes. This is the first systematic approach to integrate the information and knowledge on the trade, production, market demand and challenges of bamboo's potential to replace plastics and other environmentally harmful materials.

The team has also drafted the "Global Action Plan of Bamboo as a Substitute for Plastic Initiative" and will be in consultation with key stakeholders in year 2023. This will pave ways for all INBAR member states, non- INBAR member states, and stakeholders to set up their roadmaps, actions, and resources to address plastic pollution in using of bamboo.

Through these efforts we have been able to contribute directly to the international efforts in tackling plastic pollution crisis via launching the 'Bamboo as a Substitute for Plastic Initiative' and advancing its implementation plan as well as partnerships both in China and internationally. Selected, notable high-profile dialogues in which we engaged directly in advocating the 'Bamboo as a Substitute for Plastic Initiative' include: the High-level Dialogue on Global Development held on the margins of the 14th BRICS Summit (June 2022); the Ministerial Meeting of the Group of Friends of the Global Development Initiative was held in New York (September 2022); the 2nd Global Bamboo and Rattan Congress (BARC 2022) in Beijing (November 2022); the first session of Intergovernmental Negotiating Committee (INC) to develop a legally binding instrument on plastic pollution control (November 2022); as well as two informal discussions on plastics pollution and environmentally sustainable plastics trade organized by the World Trade Organization (November & December 2022).

Through these high-profile dialogues and informal sessions, we engaged directly with the governments of the UK, Ecuador, the Philippines and China to mobilise their interest in the development of favorable policy to support bamboo plastic substitutes. At the end of November 2022, China's National Development and Reform Committee (NDRC) submitted information and policy recommendation on Substitution of Bamboo for Plastic to the State Council.

Through organising seminars on the pathways and mechanisms to mainstream bamboo products as viable alternatives to plastics, we managed to reach out to target audience includes government policy makers (such as National Development and Reform Commission, Ministry of Environment Protection, National Forestry and Grassland Administration, Central Administration of Customs) at both central government and local government scales as well as businesses, academics and NGOs working in relevant field and raised their capacity on this topic.

Outcome 3: Nature and social considerations are more visible in the work of business and finance companies.

Who is the beneficiary:

The beneficiaries of this work are the whole of society that consumes agricultural commodities and the companies that are involved with these supply chains.

Baseline situation at start of the project:

Climate issues were being considered by business and finance bodies, with some attention also to modern slavery and other social issues. But nature and social impacts on the ground of trade systems were little considered. This has been rapidly changing over the course of the TRADE Hub, supported by positive engagement by companies in global meetings and processes for development (SDGs), climate (UNFCCC COP26) and nature (CBD COP15 and to a lesser extent CITES COP 19), with a much greater sense of nature and social impacts being an important part of the business and finance worlds activities.

What have we done?

TRADE Hub has been working with partners and networks to support the ongoing change in business, especially the insatiable demand for systems, tools, metrics, websites, guidance to

help business and finance sector understand their impacts, understand the “risk” in their business and supply chains and take appropriate corrective actions to reduce (or even eliminate) their impacts. This now entails work with agricultural production, supply chain, retail companies, banks, ratings agencies, business-facing networks (Science Based Targets Network (SBTN), Taskforce on Nature-related Financial Disclosures (TNFD) and Fashion Pact), and commodity-specific advisory bodies.

We have developed metrics, tools and platforms - backed up by detailed science. The insights gathered from TRADE Hub work in developing countries, and companies in the Global South, in relation to the focal commodities has also facilitated delivery of work that is both applicable for northern and southern business settings. We have been involved in the local commercial work especially in Guangxi Province, China to better consider the impacts of international trade, inward Foreign Direct Investment and outward direct investment on biodiversity. Through this engagement, we helped build the capacity of relevant enterprises on biodiversity related requirements when they are about to re-establish connections with international stakeholders post pandemic.

What outcomes have been delivered?

Our pathway to impact requires that many 1000s of companies etc to make a change. And if we can get above about 20% of supply chains then we start to see a greater impact than achieved so far by certification schemes and roundtables.

We have seen companies changing their ways of working over the course of the TRADE Hub project, with contact made and facilitated by the team resulting in spin off work with fashion companies, trading companies, food and agriculture supply chain companies, and supermarkets.

Work with SBTN, TNFD, commodity-specific platforms and NGO partners such as WWF are leveraging access to many companies globally, and providing guidance to change supply chain practices. In the Hub countries, similar work is occurring with companies in Brazil, Indonesia, China, and Cameroon – with potential to deliver significant impact.

Key insights:

- Requirements for sustainability need to be coupled with incentives for small-holder farmers to enable compliance.

- Despite improvements in sustainability standards, there is lack of enforcement and compliance with mandatory standards.
- Market demand for sustainable commodities is not global; traders are a pinch point in the system but global market for change and regulation needed.
- Performance metrics and indicators are needed for companies and investors to enable investment to flow to and reward more sustainable production systems. There is a need to meet changing company "paradigms" and objectives such as climate smart, regenerative agriculture, and agroforestry.
- Financial instruments can direct finance towards sustainable production system and facilitate the transition.
- Transparency in the supply chain matters. This goes beyond physical flow, products traceability and include a need of financial and value traceability to identify bottleneck impeaching profit to flow to farmers.
- There is a need for a level playing field, supporting efforts to build capacity for compliance.

We will continue to apply these insights to:

- Further research on performance metrics and integrated monitoring frameworks for business to assess the impact of (sustainability) interventions on biodiversity and people and their interactions.
- Development of practical tools for monitoring of and reporting on impacts of sustainability interventions.
- Clarify the different perspectives, risk and opportunities for investing in crops that are seen as high risk but can potentially have great socio-economic benefits, whilst limiting impacts on nature.
- Raise awareness of companies and financial institutions on the risks associated with unsustainable production systems and trade.
- Help companies to engage in landscape level partnerships to provide support for farmer centric solutions that support small holder livelihoods to aid their transition to sustainable production systems.

Key outputs published in 2022:

Brooks, S., Nicholas, H., West, C., De Maria, M., & Komarrudin, H. (2022). Taking responsibility for supply chain impacts: Who, why and how? Chatham House, UNEP-WCMC. https://tradehub.earth/wp-content/uploads/2022/03/FAQ6-3-003.pdf

De Maria, M., West, C., Dreoni, I., Antoni, E., Brooks, S., Zanello, G., & Uehara, T. H. K. (2022). How do we link local and national level measures with international policy and private initiatives on sustainable trade for agricultural commodities? (p. 4). Chatham House, UNEP-WCNC. https://tradehub.earth/wp-content/uploads/2022/10/FAQ7-finalcopy.pdf

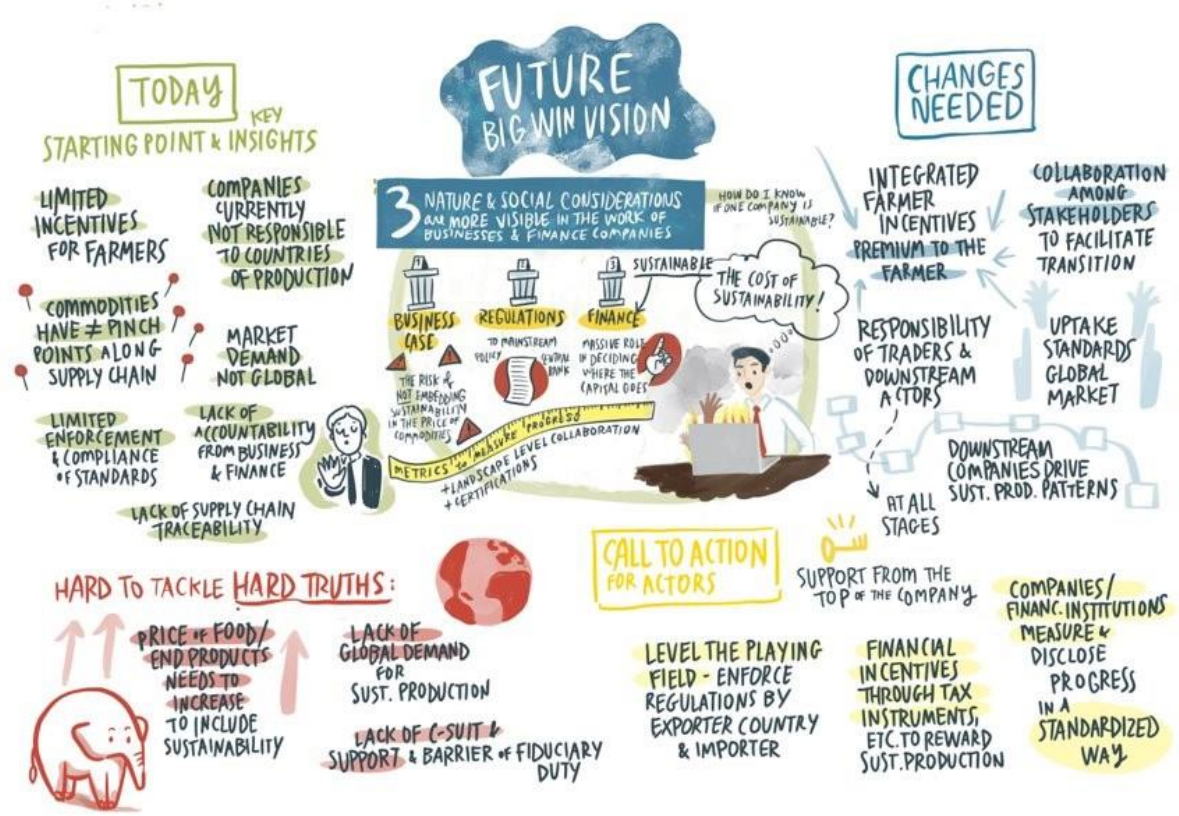

Figure 5 Graphic recording of discussions at the October 2022 All Hands Meeting around the role of private sector.

Case Study 3: Brazil

Soybean production and trade are driving forces in the Brazilian economy and land dynamics, as soybean is the main commodity exported from Brazil. TRADE Hub Brazilian partners have collaborated to further understand the qualitative aspect of the soybean trade, especially regarding the social and environmental consequences of the land dynamics involved in the soybean production. Furthermore, the team has produced outputs aiming to provide the directions for trade to have positive outcomes for nature and people.

The Cerrado biome is the world's most diverse tropical savannah, and one of the fast-changing landscapes in Brazil. This dynamics territory is increasingly the most important

region for soybean and agricultural production, and many private and public investments in infrastructure, agricultural production technologies have been made to increase trade volumes, generating many impacts on the local economy, urban and rural populations, and native ecosystems.

The TRADE-hub partners have produced and launched during a webinar with broad participation from academia and civil society the "*Champions in productions, champions in development? An analysis of socioeconomic indicators in soy production territories in Brazil*" report. This report elucidates the socioeconomic trajectories occurring in the municipalities located in the Cerrado. The report explores the heterogenous characteristics of the municipalities, analysing soybean expansion and production data compared to socio-economic indicators such as poverty, income, and infant mortality. From the socioeconomic perspective alone, the effects of soy in the producing regions do not sustain the narrative that negative impacts would be offset by positive effects on economic and social indicators.

The scenario presented is heterogeneous considering the major regions of Brazil in terms of indicators such as income, poverty and infant mortality, when separately analysed. Besides that, there is a group of indicators for which the results observed are inconclusive, for instance inequality, HDI, occupation/employment, GDP and number of years in school. When the indicators are combined in the soy-producing municipalities, an intermediate situation predominates: 46% of municipalities present a better performance than the average in the state in approximately half of the indicators analysed, but worse in the other half. The group of municipalities that have lower performance, than the average, in at least two-thirds of the indicators analysed, which covers 33% of the soy-producing municipalities. And finally, only 21% of producing municipalities have above-average performance in at least two-thirds of the indicators.

The situation is repeated on the subset of municipalities with higher-than-average soy production municipalities with higher-than-average soy production, the situation is repeated. There is a greater concentration of locations with intermediate performance; 54.6% of the municipalities now present better results for approximately half of the indicators analysed, but worse than the average in the state for the other half. Next comes the group of municipalities with performance below at least two-thirds of the indicators analysed, with 26.7% of the municipalities in that group; and only 18.5% of the municipalities have a higher performance in at least two-thirds of the indicators. If we consider only the twenty "champion" municipalities of 2020 in Brazilian agribusiness (elected according to their value of agricultural production in 2020), almost all of them focused on soy production, the pattern

is once again repeated. Only three of them have a higher-than-average performance in two-thirds or more of the indicators analysed; four municipalities are at the other extreme, with below average performance inferior in two-thirds or more of the indicators analysed. The great majority (13 municipalities) are in an intermediate situation, with a superior performance in approximately half of the indicators, lower performance inferior for the other half.

By conducting a thorough analysis of the socio-environmental impacts of soy production in various locations, the study sheds light on the heterogeneity of the outcomes and the trade-offs involved in this industry, challenging the dominant narrative that the impact of soybean is unequivocally positive. Overall, the study's main contribution is to enrich the understanding of the social and environmental impacts of soy production and to provide a more nuanced and comprehensive perspective on this complex issue.

Furthermore, with the objective of producing directions on how agricultural trade can improve the positive impacts for society and nature. the partner teams have collaborated on the “Moving towards a sustainable supply chain: A sustainable policy toolbox for Brazilian stakeholders and global actors” report and the “Transformative trade: three guiding principles for inducing positive change towards sustainability” policy brief.

The toolbox report identifies the main sustainability measures adopted by the sector and highlights three key considerations. The first is the recognition that the impacts of a given tool or intervention can vary significantly across different communities, regions and ecosystems. The second consideration is the observation there is still limited integration and harmonisation among the sustainability measures adopted by the sector. The third consideration is that the measures currently in place typically focus on specific dimensions of the social and environmental sustainability spectrum, rather than taking a holistic and integrated approach.

The transformative trade policy brief is aimed at influencing the discussions regarding the EU legislation on imported deforestation. The brief underlines the importance of considering all natural ecosystems, including non-forest ecosystems, in the legislation. It also highlights the importance of addressing human rights issues, especially regarding indigenous people and local communities, and the legislation should implement a transparent mechanism for traceability, and reporting.

Outcome 4: Multilateral environmental and development goals linking nature and trade are strengthened.

Who is the beneficiary.

We have focused work on three MEA processes, which have membership from almost all countries on earth, a) CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora, 184 Parties) in relation to the legal international trade in wildlife, b) CBD (Convention on Biological Diversity ,196 Parties) in relation to the development of the post-2020 global biodiversity framework and the associated indicator framework in relation to targets on sustainable use of wildlife, the role of business and nations in reducing biodiversity loss, and c) the UNFCCC (United Nations Framework Convention on Climate Change, 198 Parties) in relation to climate related commitments and supply chains. We also align the work to the SDGs, where 191 UN members have signed up to be part of the delivery mechanism.

Baseline situation at start of the project.

At the start of the project there was an incipient discussion around the next framework for the Convention on Biological Diversity, with limited understanding and focus on the role trade and trade-related policies play across the delivery of biodiversity goals and targets. Moreover, there were no existing targets or indicators in CBD discussions related to impacts of trade systems, wildlife or wild meat trades. As for the UNFCCC, limited attention was given to trade related considerations in general, including the role of international commodity trade in maintaining unsustainable agricultural practices and causing deforestation globally. As for CITES, the Convention made decisions on wildlife trade without access to a tool that showed trade flows globally or an idea of whether trade quotas were sustainable (which would impact nature and people) and wild meat information systems were weak. The SDGs were well established since 2015 with a renewal cycle set to start in 2023, however with limited explicit links to sustainable trade as means to deliver SDGs.

What have we done?

TRADE Hub worked to influence the decisions made at CBD COP15, CITES COP19, UNFCCC COP27 (held at the end of 2022), highlighting the role nature-positive trade can play in delivering the global biodiversity, climate and wildlife trade objectives. For CBD COP15 we supported the process to develop an indicator framework with an online tool, technical work to develop information papers to support the negotiations, and publication of scientific papers targeted at the trade related targets. We believe these interventions assisted the successful outcome of COP15, and the agreed process to further elaborate the monitoring framework up to COP16. For CITES COP 19 our package of tools was well received and taken up by Parties to the convention and observers from NGOs and other civil society. For UNFCCC COP27 our work mainly supports the FACT dialogue, seeking to remove deforestation from trade systems around the world.

We have also assessed our contributions to the delivery of the SDGs. To deliver change we have built tools, written papers to provide the evidence base, engaged researchers from the global south and the north in the relevant discussions, and attended relevant meetings to directly discuss TRADE Hub work with parties and observers.

Key insights from TRADE research to date are around metrics, scenario modelling and systemic change:

- Our models show the extensive degradation of biodiversity, climate and human wellbeing caused by trade. However, more work is needed to inspect local solutions with multiple values considered. New metrics allow comparable measurements of impacts of land use and emissions on biodiversity, and the impact of supply-side activities on multiple facets of ecosystems.
- Impacts of global trade scenarios on environmental and socioeconomic indicators have been considered in tandem for the first time. At the global level, positive impacts from trade were not detected outside of a highly multilateral "greening" scenario.
- International Partnerships for the SGDs (SDG17) have contributed to trade expansion and economic growth (SDG 8) but not been effective to deliver on environmental goals. When considering impact on people, all the SDGs link to trade in some respect. There are trade-offs and synergies between all development goals.
- The Kunming-Montreal GBF contains targets 5 and 9 on sustainable use of species, and targets 15 and 16 on business and state responsibilities linked to trade, with TRADE Hub having added contributions to the debate from the trade angle.

Indicators have also been proposed for each target, with several of the proposed indicators being directly taken from science work undertaken by the TRADE Hub.

- Deforestation has become more integral to UNFCCC discussions, with continued focus on these topics at the COP27. In 2022, TRADE Hub initiated dialogue with the FACT Dialogue on how our work can support their government-to-government cooperation on sustainable forest and agricultural commodity trade in the upcoming two years.
- The TRADE Hub has also built key tools for CITES parties to illustrate wildlife trade flows to better manage sustainable wildlife trade, which were showcased at CITES COP19. It has highlighted the need to better understand the linkages between the Red Lists of Threatened Species and the CITES Appendices, and to use wildlife trade databases appropriately when making inferences about the effects of trade on species.

These findings are being further developed to deliver work on:

- Models and metrics that inform development goals; metrics, models, and planning should support and influence policymaking and business to make trade more sustainable and fair.
- Proactive policy informed by scenarios; for trade to support biodiversity goals, trade greening must be combined with comprehensive conservation & food systems transformation. Trade liberalization should not occur in isolation; care must be taken that demand-side measures do not disrupt trade and value chains.
- Interconnected development goals; new development goals should integrate new knowledge, e.g. the greatest biodiversity footprints can be from areas that also contribute most highly to employment Goals should avoid focusing on single outcomes to avoid conflicting solutions.
- Rethinking the role and position of CITES in international MEAs as it celebrates 50 years in operation.

Key outputs published in 2022:

Laumann, F., Kügelgen, J. von, Uehara, T. H. K., & Barahona, M. (2022). Complex interlinkages, key objectives, and nexuses among the Sustainable Development Goals and climate change: A network analysis. The Lancet Planetary Health, 6(5), e422–e430.

Maney, C., Sassen, M., & Hill, S. L. L. (2022). Modelling biodiversity responses to land use in areas of cocoa cultivation. Agriculture, Ecosystems & Environment, 324, 107712–107712. https://doi.org/10.1016/J.AGEE.2021.107712

TRADE Hub. (2022). Trade, Development and the Environment Hub: Our Relevance and Contribution to Attaining the Sustainable Development Goals (SDGs) (p. 20). UNEP-WCMC. https://tradehub.earth/wp-content/uploads/2022/07/SDG-Online-copy-1.pdf

Hill, S. L. L., Fajardo, J., Maney, C., Harfoot, M., Harrison, M., Guaras, D., Jones, M., Oliva, M. J., Danks, F., Hughes, J., & Burgess, N. D. (2022). The Ecosystem Integrity Index: A novel measure of terrestrial ecosystem integrity with global coverage (p. 2022.08.21.504707). bioRxiv. https://doi.org/10.1101/2022.08.21.504707

Case Study 4: Indonesia

During 2022, the research team in Indonesia progressed its research activities, as well as public and policy engagement.

CIFOR in Indonesia conducted a study on political-economy and trade factors for sustainable trade in Indonesia that highlights that indeed sustainable trade and green market behaviour influence oil palm sector sustainability in the country. The team is also progressing its study on the impacts and opportunities on global green trade initiatives e.g. for the palm oil sector at landscape level. Policy simulation in the study highlights that implementation of global green trade initiatives (e.g., deforestation-free supply chain regulation, certification) along with incentive mechanisms, such as premium price and payment for ecosystem services, potentially contribute to reducing the trade-off between economic development and environmental protection by oil palm development in the landscape.

These two main findings were disseminated to key policy makers and stakeholders in Indonesia through several events while also linked with the current policy momentum such as Indonesia's presidency at G20 and national climate change mitigation strategy (FOLU Net Sink 2030). CIFOR, IPB University and RCCC UI implemented two high level policy dialogue during 2022 to bring together government, business, academia, practitioners, and civil society to discuss the opportunity and challenges for implementation of global sustainable palm oil trade initiatives in Indonesia from the policy point of view. These policy dialogues engaged more than 500 national and international audiences.

Additionally, a multi-stakeholder roundtable discussion on deforestation-free supply chain was hosted to discuss its potential impacts, key challenges, and opportunities for palm oil sector in Indonesia to be able to improve existing efforts in sustainable oil palm development, halting deforestation, as well as contribute to addressing climate crisis. The

roundtable was attended by 79 active participants from 55 different institutions in Indonesia including government, international organization, foreign government, consulting firm, private sector, civil society and non-government organization, private sector, smallholder association and academia. Key takeaways were the Indonesian stakeholders seeing the potential integration of the global green trade initiatives with the existing national policies related to sustainable palm oil and climate change mitigation, although they also identified potential challenges especially for smallholder farmers. The next step of policy engagements in Indonesia will be to develop a national roadmap together with policy makers and key stakeholders for the sustainable palm oil trade, linking with roadmap work at global level led by UNEP-WCMC. This roadmap hopefully can contribute to existing national discourse on how global trade initiative and national efforts can be hand in hand for the good aim, environment, economic and social sustainability.

At the end of 2022, CIFOR research team was starting on-the ground activities that focus on capacity building and facilitation for independent palm oil farmers in Segati Village, Riau Province, Sumatra to improve their business model and implement sustainable practices. This activity is collaborating with a local NGO consortium and in coordination with local government. Hopefully by end of the project, the research team are able to monitor capacity improvement and behaviour change from the farmers as well as see the impact for the farmers.

IPB University, in collaboration with CIFOR, continues the science capacity building activities for practitioners and academia in Indonesia, especially on the application of methodologies, approaches, and software to support research related to sustainable commodity trade and development in Indonesia.

CIFOR, IPB University and RCCC UI have given opportunities for early career researchers and students to participate in the research activities through consultancy, joint research, and internships. The research team also provided a special briefing session for media and journalist that aims to improve their science-based understanding on the palm oil trade issues in Indonesia.

For coffee, the Indonesia research team has actively participated in key activities with the government of Indonesia to disseminate and deliver the research findings e.g., through participating in national coffee exhibition and organising a talk show during the government’s event.

Figure 6 Sessions from policy dialogue event in Indonesia that put government, civil society, private sector and smallholders, certification body and academician in the same panel.

Figure 7 Participants from the roundtable of deforestation-free palm oil supply chain in Indonesia

Figure 8 Science-based knowledge building activities for media

Figure 9 Participation in exhibition and talk show session at national main coffee exhibition by the Government of Indonesia

Outcome 5: Nature and social factors better considered in international trade agreements.

Who is the beneficiary:

The direct beneficiaries of the work are actors engaged in trade-related decision-making at different levels. But the ultimate beneficiaries of the global trade system are billions of people on earth. However, the trade system can deliver adverse outcomes for nature (loss) and people (inequity in distribution of benefits). Trade systems are operationalised through trade agreements between nations, nations and trading blocs like the EU, and the overall trade system rules managed by the WTO.

Baseline situation at start of the project:

Traditionally the WTO has had limited focus on nature and benefits linked to the sustainable management of natural capital. Similarly, most regional trade agreements also failed to adequately identify and address their impacts on biodiversity, including the EU and UK as major trading partners. At the start of the project, there were no deforestation-free supply chain laws in place in consumer countries.

What have we done?

We have developed and launched the concept of "nature-positive trade for sustainable development" and used it to engage with the relevant WTO processes and actors, such as the Trade and Environmental Sustainability Structured Discussions (TESSD) and its WTO Member countries, to identify and actively create opportunities to integrate nature, forests, and the broader environment in the discussions on international trade rules and their implementation. We have also successfully facilitated information flow from and dialogue between key actors such as the WTO and CBD Secretariats, UN Conference on Trade and Development (UNCTAD) and International Trade Centre (ITC), including cooperation on a series of nature-positive trade webinars and events in 2022. We have also explored with WWF colleagues the concept of a *Codex Planetarius* for the WTO that would provide a basis for a global standard on nature within the international trading systems.

At national levels, we have actively engaged in the discussions informing the development and future implementation of the UK and EU deforestation free supply chains laws. We have assisted through technical reports, attending panels and expert meetings, inputting to consultations, providing evidence from the field, made the links between countries like Indonesia and the EU proposed legislation, and helped countries, farmers, and traders understand how these proposals might impact them positively and negatively. Insights generated by TRADE Hub are regularly being used to inform discussions and decision-making, directly or through active engagement with networks and working groups such as EU Green Trade Network and ITC Deforestation Roundtables. We are aware that data from the UK 'Global Environmental Impacts of Consumption' indicator has been fed into discussions linked to the environmental risk assessment for UK Free Trade Agreements and continues to provide support to the UK Government (and other European governments) linked to the monitoring of incoming 'due diligence' regulations.

Work from the Royal Botanic Gardens Edinburgh and SEI York has also directly influenced the European legislation on deforestation-free commodities, with their research mapping rubber plantations in SE Asia from satellite imagining resulting in the inclusion of rubber on the commodity list of products that now need to have deforestation-free supply chains (see to China case study above). We conducted research that contributes to the policy recommendation for EU deforestation regulations based on the findings--the mapping of rubber in southeast Asia and the impacts of rubber expansion on deforestation. (China, soybean). We have been involved in the Free Trade Agreements negotiation of China-New Zealand, China-Australia, China-Switzerland, etc and on-going FTAs with the countries in Latin America, West Asia. In supporting the negotiation process, we supported the relevant officials in China to better consider biodiversity.

What outcomes have been delivered?

Raising the profile of nature in the context of sustainable trade at the WTO through the concept of nature-positive trade while reinforcing old and facilitating new partnerships between key actors (e.g., WTO and CBD), with a view to amplify impact and pave the way for improved cooperation in the context of the Kunming-Montreal Global Biodiversity Framework from 2023 onwards. In terms of EU and UK legislation, the emergence of deforestation free supply chains laws and rules is a major development with TRADE Hub work on various commodities, but especially rubber, having influenced the negotiations on the EU Regulation. In parallel to the negotiations, we have also improved understanding on the possible trade-related implications of these new laws in Indonesia, Cameroon and Brazil.

What outcomes remain to be delivered?

Translation of discussions at WTO into tangible changes (initiatives, partnership etc.) aimed at supporting the implementation of global and/or national biodiversity targets through nature-positive trade. Informing and influencing the upcoming measures to implement the EU and UK deforestation free legislations in practice, such as programmes to support producer countries. Creating a vision and a narrative for long-term transformative change to sustainable and just trade and trading system, for example around our ‘roadmap to sustainable trade’.

How might outcomes translate to impact?

Change in the way that international trade, or trade from regional bodies like the EU or consumer nations like the UK, impacts people and ecosystems. The key challenge is to ensure this impact is net positive.

Key insights:

- Trade-related policies can support the delivery of the Kunming-Montreal GBF across all of its targets; however, this potential is currently being under-utilised. Better understanding of the biodiversity-trade policy interface enables to find synergies between the two agendas. This is better achieved through the provision of robust and evidence-based information in support of the decision-making processes, including identifying concrete trade-related measures and tools that can be used to make trade nature-positive.
- We need better trade impact assessments, including improved multi-disciplinary of social, environmental, and financial impacts of trade along the value chain, and improved understanding of trade-offs emerging from (new) trade agreements and measures to help compensate them.
- Free trade agreements need to address the risks to biodiversity, ensuring they include biodiversity-related provisions that look at the full range of relevant issues and are sufficiently enforceable.

These insights are enabling supporting stakeholders with:

- Integration of biodiversity, ecosystems and ecosystem services issues into high impact trade sectors, identification of concrete trade-related policy measures that could be integrated into National Biodiversity Strategies and Action Plans, and increasing the focus on biodiversity and ecosystem services in the discussions on sustainable trade at WTO.
- Supporting transitions to greener trade agreements through robust integrated landscape management, transparency and accountability in supply chains, stronger multi-stakeholder engagement and strengthening the resilience of countries to tackle the planetary crisis on nature.
- Building a dataset containing estimates of impacts related to production, exports, imports and consumption of agricultural commodities, building better tools to help

bridge the gaps between trade and biodiversity and improve understanding of trade-offs from (new) trade agreements.

Key outputs published in 2022:

International Institute for Sustainability - IIS. (2022). Policy Brief: The European Union-Mercosur Trade Agreement: a solution for trade-related habitat loss in Brazil? IIS. Retrieved from https://www.iis-rio.org/en/publications/policy-brief-the-european-union-mercosur-trade-agreement-a-solution-for-trade-related-habitat-loss-in-brazil/

Milner-Gulland, E.J. (2022). Don't dilute the term Nature Positive. Nature Ecology & Evolution volume 6, pages1243–1244. https://www.nature.com/articles/s41559-022-01845-5

Figure 10 Deforestation free supply chains

Case Study 5: Focus on Tanzania

The TRADE Hub Tanzania work focused on increasing the economic returns of smallholder soybean and coffee farmers in Tanzania. This has been accomplished by exploring the sources of inefficiency in producing and marketing these commodities. The research that has been conducted shows inefficiency in the production, marketing, and export of these commodities. However, the commodities have been found to have an income inequality-reducing effect hence having a high impact on inclusive economic development, poverty reduction, and indirectly improving food security and the general livelihood of the farming households in the country. In addition, the work in Tanzania has contributed to policy recommendations, especially on supporting export diversification, value addition of

commodities and ways of empowerment. These include easing access to land, credit, and trade facilitation services that empower smallholder farmers and other trade participants.

Figure 11 Interviews and discussions with smallholder farmers during data collection activities in Tanzania

Efficiency and sustainability of the agricultural commodities trade require good environmental practices, given that a natural environment is a factor of production and a means by which farmers derive their income. Therefore, research on environmental conservation awareness and practices has been undertaken. The study has suggested ways of increasing the awareness of environmental conservation practices, including integrating environmental conservation practices in good agricultural practices (GAPs) manuals used by agricultural extension agents in the country. The outreach and engagement activities have indicated the need for incentives for farmers as they shift to more sustainable production practices. The research has also suggested ways of leveraging the gains from various preferential agreements such as Everything But Arms (EBA).

The work in Tanzania has shown how poor trade and environmental governance lead to the misalignment of trade policies. It affects the sustainability of the agricultural commodities supply chains. It has thus engaged about 139 stakeholders from the public and private sectors and discussed the proper ways of implementing trade policies in the country. It included a commitment to transparency in trade policy administration, such as providing prior information on policy changes, such as export/import restrictions or price controls, to enable forward contracting and support investment. Additionally, the study “The Law that Governs Nature: Insights from the Evolution of the Environmental Legal Framework in Tanzania since Independence” has revealed an increase in the volume of environmental laws, mainly on biodiversity & ecosystem and has suggested continued efforts on environmental governance and other aspects of the legal frameworks in Tanzania.

Figure 12 The deputy minister for industries and trade (second seated from right) in a group photo with other stakeholders during the stakeholder engagement workshop.

The research in Tanzania has also contributed to the review of the “wildlife conservation (resident hunting) regulations, 2021” to the level of producing new regulations “wildlife conservation (resident hunting) regulations, 2022”. This is the result of the research on bushmeat and hunting that involved 145 stakeholders from 40 districts within 17 regions in Tanzania, outreach, technical support, especially training and education of “Economic valuation of ecosystem goods and services” and engagement with stakeholders, including the Ministry of Natural Resources and Tourism, Tanzania Wildlife Management Authority (TAWA), Tanzania Wildlife Research Institute (TAWIRI), Tanzania Wildlife Farmers and Game Meat Suppliers Association (TAWIFAGAMSA), the Wildlife Trade Monitoring Network Initiatives-TRAFFIC-Tanzania, the Tanzania National Parks (TANAPA), and other stakeholders.

Figure 13 Capacity building on economic valuation of ecosystem goods and services

In addition, the work has evaluated the regulatory performance suggesting the areas that need further changes for sustainable utilization of wildlife resources. A similar study has revealed the most illegally hunted species for the conservation authorities to focus on. Additionally, the work in Tanzania has supported the consultations regarding the ban of live wildlife resources export in the country through engagement and a study that looked at the impact of the ban that was found to have contributed to over 70% reduction in the incomes of communities engaged in the exportation of live wildlife species, thus suggesting lifting the ban for non-threatened species - such as beetles and butterflies.

Outcome 6: Understanding and influencing wildlife trade systems and policies at international, national, and local level.

Who is the beneficiary?

In many developing countries hunting wild meat is a major source of protein, and in some cases this trade is heavily commercialised. The beneficiaries of this work have included governments aiming to ensure that their wildlife is sustainably used, hunters whose living or food security depends on wildlife, those eating the wild-caught meat, and those seeking to

provide alternative sources of protein for people in developing countries still dependent on wild meat.

Baseline situation at start of the project.

The baseline situation in Central Africa was that wild meat systems were only partially understood, the laws were old and not effectively applied, and there was a strong interest in eating wild animals, including in urban areas, and few livelihood alternatives for local hunters. Some of the same factors were also true in Tanzania and Indonesia.

What have we done?

In Central Africa, research has focused on understanding the drivers of wild meat consumption and gathering the evidence base for how wild meat trade systems work in different national contexts. This has included research exploring motivations for consuming and selling wild meat, the gendered aspects of these trade chains, and an assessment of the political economy of wild meat sales. This research is feeding into two key types of government-led interventions within the Central African region – the update of existing laws and the implementation of demand-reduction initiatives in urban areas.

The TRADE Hub has supported the DRC government in the implementation of a positive social marketing campaign that celebrates the consumption alternative Congolese cuisine to reduce the consumption of wild meat that is linked to disease transmission (for example Ebola, but in other parts of the world – COVID-19). We have worked to understand how COVID-19 has affected wildlife users in Cameroon and other parts of Central Africa, and how the general public feel about wildmeat and its links to disease. Case studies of wildlife trade in other Hub countries (China (birds), Indonesia (birds and reptiles), Tanzania (chameleons) have helped understanding of local wildlife trades. In Indonesia we have gained a better understanding of the wildlife trade and its impacts on wildlife populations, while in Tanzania we have been working to understand the motivations and compliance of local farmers and hunters with wildlife rules.

In China, our work mainly focus on China's legal bird trade and its related policies from different perspectives, including analysis on China's import and export trade of bird study based on CITES-listed live birds (2010-2019); China's import and export trade of parrot (1981-2019); China's parrot captive breeding industry, physical bird markets and public attitude towards consumption and conservation of birds; comparative study of China and

international parrot captive breeding industries; as well as review of China wildlife import and export trade policies. The results of the China bird trade related studies reflect the status quo, trends, and existing challenges of legal trade of wild animals in China and provide relevant policy recommendations for better management of China's wildlife import and export trade.

Our work in China contributes directly to various policy processes, including measures for the Management of Special Identification for National Priority Wild Animals and their Products (Draft for Public Review) and the First Scope of Special Identification through its official website for public comments – released by China's wildlife management authority, the National Forestry and Grassland Administration (NFGA) (May 2022). The purpose of formulating these management measures is to implement the relevant provisions of the Wildlife Protection Law.

Our targeted policy recommendations on traceability and how improving the regulation of captive breeding industry can help promote the balance between conservation and community livelihood have been well incorporated in the Measures for the Management of Special Identification for National Priority Wild Animals and their Products (Draft for Public Review) and the first scope of special identification issued by China's National Forestry and Grassland Administration (NFGA). Our conclusions and recommendations of the research report have served as a demonstration for the revision of the Wildlife Protection Law and are well reflected in the revised Wildlife Protection Law. China's Wildlife Protection Law was amended for the second time on December 30th, 2022 by the 38th Session of the Standing Committee of the 13th National People's Congress, and the newly amended Wildlife Protection Law (2022 Amendment) will take into effective on May 1st, 2023.

Our work in China also includes developing an understanding of the discourse around wildlife trade and consumption before, during and after COVID-19. Other work in China provided information and key findings to support the capacity building of wildlife related law enforcement agencies and improve the effectiveness and relevance of law enforcement. For example, our online survey on public consumption behaviour and attitude towards bird in China also reflects that breeding, trading and viewing birds are part of historical and traditional culture in the country. While the public demand for birds as companion animal have been increasing in recent years, there exists a certain demand for bird consumption among the public. Meanwhile, according to the survey, most of the public are also willing to breed and consume birds legally and sustainably within the scope of the law.

Key insights from TRADE research to date includes the need for:

- International convention decisions supported by global data; informed and evidence-based decision-making requires greater access to trade and conservation data, including key analyses, indicators, tools and guidance.
- National wildlife legislation reform-; the wildlife laws across Central Africa and in Tanzania are outdated and impractical to enforce, and often not perceived as legitimate. There is a need for national level legal and policy change that aligns with African perspectives and considers the best available evidence.
- Policies and practice need to be supported by the knowledge of the motivations and actions of local wildlife users and the drivers which they face, requiring an in-depth understanding of individual behaviours of wildlife trade actors such as consumers, traders, and hunters and the institutional and social contexts within which they operate.

These TRADE Hub findings are and will feed into international agreements, national policy, and local practice:

- International databases such as those relating to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES trade database and Species+), the International Union for Conservation of Nature (IUCN) Red List and the WILDMEAT research can inform potential biodiversity indicators and process of the Convention on Biological Diversity (CBD), and proposals to amend CITES Appendices systematically. Data from these databases are more reliable due to TRADE Hub work and can be accessible for monitoring and informing decisions.
- As part of a collaboration, TRADE is working with the governments of the Democratic Republic of the Congo, Cameroon and Gabon on reviewing and reforming their wildmeat strategies and legislation, informed by predictive scenario-based approaches. In Gabon, for example research from the TRADE Hub is contributing with the national list of threatened and protected species, a breakthrough in the country's conservation and sustainable use of biodiversity that has not been seen in a long period of time.
- Conservation practice needs to be informed by social research to find messages and policies that resonate with local people. These intervention strategies need to be designed, implemented, and evaluated using a transparent evidence-based approach with lessons learnt collated and shared.

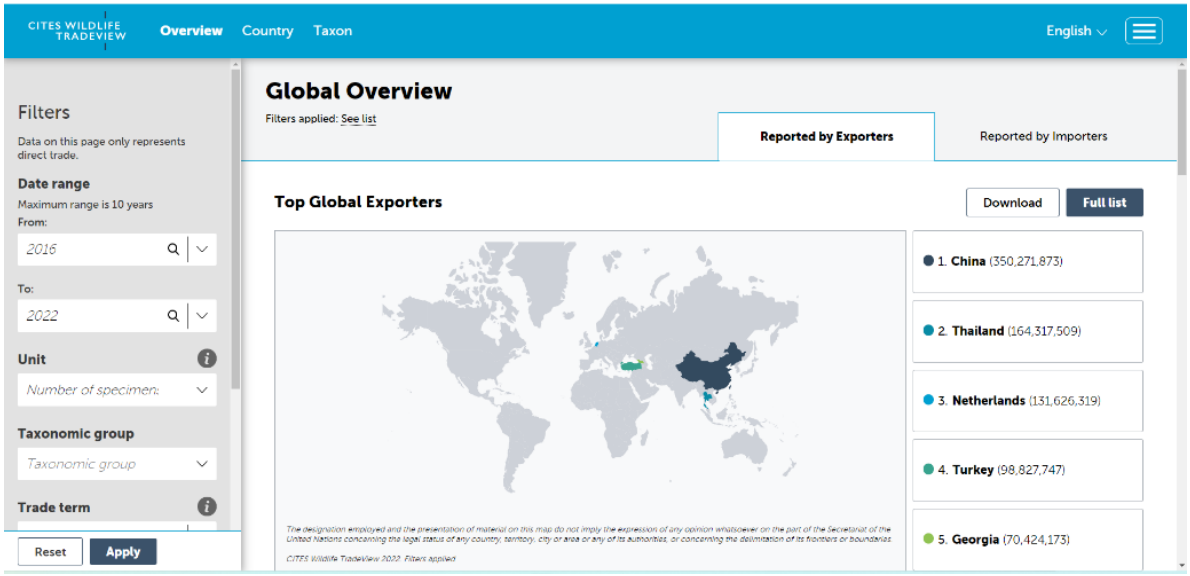

Figure 14 CITES Wildlife Trade View launched in 2022.

Key outputs published in 2022:

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Mechanisms to achieve TRADE Hub Outcomes

Our overarching framework of impact for the project recognises the key role of underpinning technical and field work. These are categorised in a series of 4 mechanisms.

Improving the knowledge base

Over the past four years we have gathered new field data on agricultural commodities, wild meat trade and wildlife trade in our focal eight developing countries where we are working. In addition to data collection in the field, we also have active programmes of work to gather and synthesise data from existing databases.

The TRADE Hubs has created a number of new datasets which are available online *https://airtable.com/apprdSTdawTK4kajx/tblmh1gUDrBb2gHIK/viwctrDIX6lKk6zSy?blocks=hide and https://airtable.com/appBimNWdqbBny8s6/tblVcQiZresslsFOh/viwh3af0FHLyylHnb?blocks=hide*

Developing and synthesising metrics and tools

Wild meat and wildlife trades

Based on a global overview of available tools and metrics to support the delivery of sustainable trade, TRADE Hub has funded or contributed expertise to develop new tools and indicators.

For **wildlife trade**, we have developed tools related to legal wildlife trade managed through the CITES convention and its 183 Parties (Wildlife TradeView). We are now working to develop a Sustainability assessment tool that can help CITES Parties with 'non-detriment findings'. Work to develop wildlife trade sustainability indicators has also been undertaken but has proven challenging. Two papers published using the IUCN red list of threatened species and the Living Planet Index, provide some insights on the sustainability of use of wild species (but not only in international trade). We also attended CITES COP19 and showcased the wildlife trade view tool and gathered further input for the design of the sustainability assessment tool. Many countries are already using TRADE Hub outputs to enhance the sustainability of wildlife trade in their countries.

For **wildmeat trade**, we have worked with others to bring wildmeat data together (WILDMEAT database), and this is being expanded to deliver a wild meat data viewer in 2023. Work with the Collaborative Partnership on Sustainable Wildlife (CPW) and the EU Sustainable Wildlife Management project (EU-SWM) has proposed wild meat indicators relevant to Targets 5 and 8 of the CBD Kunming-Montreal targets.

Agricultural commodities

We have produced a comprehensive repository of the available tools related to trade, Trade Tools Navigator. This tool aims to synthesise available tools relevant to trade, impacts of trade, and commodity supply chains.

The **social impacts** of various commodities, for example for soy beans, has also been a focus of some of the Hubs work. This commodity specific work has fed into a synthesis paper on how to measure the social impacts of trade systems (see farmers section above).

TRADE Hub research has developed **biodiversity metrics** to assess the change due to pressures such as habitat conversion to grow agricultural commodities (e.g Duran et al. 2020, Green et al. 2020; Maney et al. 2022), including two metrics being developed for global use by business. One of these focuses on species importance – the Species Threat Abatement and Recovery (STAR) metric, and the other focuses on ecosystem integrity – the Ecosystem Integrity Index. For tools, we have made input to a commodity-specific traceability tool - https://www.trase.earth/, the ENCORE natural capital dependency tool for the finance sector, the Sector Materiality Tool being developed by the SBTN for many companies. For indicators, we are helping to standardise and drive uptake of the various indicator approaches that help the private sector measure, mitigate and reduce their supply chain impacts, including those relevant to Targets 15 and 16 of the post-2020 global biodiversity framework.

Sustainable trade policies

The **Kunming-Montreal Global Biodiversity Framework** that was agreed in December 2022 contains a number of Targets (targets 5, 8, 10, 15 and 16) which are relevant to the sustainable use of wildlife and wild meat and trade in agricultural commodities, and by nations and business. TRADE Hub has undertaken considerable work to develop relevant

indicators for these targets and funded an online tool for post-2020 indicators. In addition, the Hub has made a minor input to a spatial data platform (UN Biodiversity Lab) that contains data layers to help countries implement the post-2020 framework. These tools will allow all 196 CBD Parties to develop spatial plans and monitor progress to implement the post-2020 agreement.

TRADE Hub has been working with the **UK Government** and the **EU**, and some countries in Europe, on aspects of their **trade agreements policy and implementation process**, mainly around the considerations of nature and social factors in these agreements. We have contributed to the development of biodiversity and deforestation risk monitoring tool called the UK overseas impact indicator), built together with UK Joint Nature Conservation Committee. This indicator was included as a 'component' indicator in the CBD post-2020 monitoring framework. We have also developed a dashboard that provides estimates of global environmental impacts and risks driven by consumption and production activities. This tool uses production and selected environmental impacts and risks of over 160 agricultural commodities across 240 producer countries / territories are 'embedded' within domestic and international supply chains. For the European Union we have input to free-trade-agreement (FTA) risk assessment. This aims to provide a tool kit to help those developing trade agreements between the EU and nations around the world. And we have made input to the deforestation-free supply chains regulation, where TRADE Hub work, in particular the inclusion of rubber in the list of deforestation linked commodities. The SEI Trase team has also continued to support Belgium and France, including the French government's 'National Strategy to Combat Imported Deforestation' data platform

During the year we brought together TRADE Hub team and external partners working on **supply chains**, including those developing tools and metrics. While at the meeting we worked to improve our Trade Tools Navigator, a system that brings together all available tools relating to trade and how to enhance its sustainability.

Scenarios and Modelling

Modelling and scenarios of future trade:

Examining the biodiversity impacts of different global trade and conservation policy scenarios is a key element of the TRADE Hub's modelling work. The conclusions from the bending the curve analysis were communicated broadly to the general public via WWF's

Living Planet Report 2022. They were also influential in the framing of the Kunming-Montreal Global Biodiversity Framework that was agreed in December 2022.

For Targets 1 (spatial planning) and Target 2 (restoration) of the new Kunming-Montreal Global Biodiversity Framework, we funded a new spatial analysis platform, PLANGEA, that maps the impacts on biodiversity and nature's contributions to people in different scenarios. This tool can help countries make decisions about restoration, conservation and conversion activities to help plan delivery of these Targets.

Global and regional modelling.

Trade systems focused on agriculture. We have developed existing global scenarios and models to investigate the impacts on nature and people of changes in policy (for example global agreements around trade, nature, climate), and use agreed biodiversity and social-response metrics to assess what potential global or regional futures could look like. The team in IIASA (Austria) has developed the 'bending the curve' model to include considerations of trade systems. The team in UCL (UK) has worked to include climate change within existing models of biodiversity change that were largely driven by land use change. The team in IIS (Brazil) has worked to model the outcomes of the Kunming-Montreal Global Biodiversity Framework. And the team in UNEP-WCMC (UK) has worked to model the future of wildlife trade demand according to development scenarios. The team in UNEP-WCMC (UK) has also produced specific models to estimate the context-specific impact of cocoa production on local biodiversity, which have then informed discussions at international conferences, as well as local workshops involving technical officers and local researchers in cocoa production. We have also undertaken research into improving feedbacks in scenarios through improved understanding of ecosystem services in agricultural commodity production, beginning with a review of 8 major commodity crops. This has laid the groundwork for linking models of biodiversity change and ecosystem services in agricultural commodity production areas.

At the more local scale, we are also produced regional maps (e.g. for West Africa, the Congo Basin, SE Asia) where we assess current and potential future risks to biodiversity and people from cocoa, oil palm and rubber. These maps have been used to engage with regional and national stakeholders in Africa, China and with bodies like the EU on deforestation free trade.

Trade systems focused on wildlife and wildmeat.

For wildlife trade, we have developed models connecting socioeconomic variables to demand for trade in wild CITES-listed species, developing a best-practice method for working with the CITES database and investigating future scenarios of trade demand.

For wild meat, we have undertaken regional modelling of wild meat hunting offtakes and consumption for Central Africa, using data collated in the WILDMEAT database. This work facilities an understanding of levels of national and regional use and trade, and predictions of future use under different economic and social scenarios.

Undertaking targeted capacity building

Capacity building has targeted smallholder farmers and hunters in a number of developing countries. In October 2022 a 'Farmer Focus' workshop was hosted in Cameroon where capacity building, financial support and market access was discussed by over 50 smallholders, researchers and the minister of Agriculture and Rural Development (MINADER). In December 2022, over 70 stakeholders participated at the event organised in Indonesia focused on the impacts of the deforestation-free regulations on the palm oil sector.

UNEP-WCMC and the Cameroon project partners also led development of a documentary exploring the challenges faced by cocoa and oil palm smallholders, particularly considering increasing global demand for sustainably sourced commodities. Other forest users that the Hub targets are those involved in wildlife trade supply chains, for example the Hub supported a government behaviour change campaign to reduce wildmeat demand in DR Congo and outline viable protein alternatives for local people.

Other stakeholders are reached through online webinars and meetings. These webinars included the five-part series 'Trade and Nature: Trade-offs and Solutions' covering the relationship between trade, biodiversity and climate change, World Trade Organization initiatives to drive sustainable development, the metrics and tools available to support evidence-based trade decisions and the leverage points within international trade policy. Collectively, these webinars reached 542 live participants and have received over 600 YouTube views since the live sessions.

In person meetings also became possible as we emerged from COVID-19 restrictions. In April 2022, the Hub hosted 94 people (online and in person) at a three-day workshop 'Enhancing agricultural commodity supply chain sustainability: Methodologies, tools and metrics for measuring the biodiversity costs of agricultural commodity supply chains' which brought together perspectives from various Hub members across country and work package teams, private sector representatives, trade modelling experts, and influential figures involved in policy at World Trade Organization and national levels. At the September All Hands meeting, there were 87 Hub members in attendance online and in person, as well as external stakeholders representing business and policy sectors to discuss solutions for just and sustainable trade at the global level and in four countries where the Hub works.

Three TRADE Biodiversity Fellows have spent time at Oxford University working on projects linked to TRADE's work on agricultural commodities in Kenya (Alice Karuri), demand reduction in Congo/DRC (Lude Kinzonzi), and understanding wildmeat markets (Krossy Makavala). This Biodiversity Fellowship programme is a key part of building capacity and networks, and has led to Lude Kinzonzi being offered a place on the University of Oxford's Diploma in Wildlife Management, and Alice Karuri starting a collaborative project with Hestia.Earth on improving the environmental sustainability of maize in Kenya. Four more Biodiversity Fellows working with the TRADE wildmeat team were selected to come to Oxford in 2023. Our Central African wildmeat trade researchers collaborated to write a seminal piece on how African researchers' voices were not being heard in the international discourse around wildmeat, and how this was distorting the policy prescriptions being promoted.

Building knowledge, networks and connectivity to reach the right people

A series of virtual webinars, organised by the TRADE Hub each with a specific theme, is helping disseminate the project's key findings to the relevant audiences. The first webinar on "Biodiversity and International Trade Policy: Issues, Opportunities and Challenges" saw 160 participants and 285 registrants, with participation from UK Government (DEFRA, JNCC), as well as WTO representatives and the private sector (finance sector, extractives etc.). A 'Trade, Biodiversity and Climate Change' webinar on November 23 was also well attended.

Our newsletter targets stakeholders from a range of sectors including: academia, the World Trade Organisation, think tanks, NGOs and sustainability consulting, with a total of 456 subscribers.
The growth in experience and expertise within the TRADE Hub post-doc cohort can be seen from the fact that they are now regularly called upon by national governments, and international bodies to provide talks and to sit on expert panels addressing trade issues. This trend is also seen in the senior researchers who are now more regularly involved in high level policy dialogues than before and helping to steer the course of events in trade policy.

Through TRADE Hub work, we also made good use of the seminars and thematic meetings to exchange the findings and considerations for this research with researchers in other countries and work packages. Through the discussion and exchanges, we build connection with other country teams, work package teams and relevant stakeholders and our research largely benefit from idea exchanges.

Roadmap to sustainable trade - Synthesis plans

The TRADE Hub is entering its final year and the work ahead has been informed by the All Hands Meeting in September 2022, our collective set of outputs, country level work with farmers and hunters, international and national policy, and the needs of business and finance sectors. Roadmap to sustainable agricultural trade.

The TRADE Hub team aims to synthesise the work into three synthetic products:

1. A roadmap to sustainable agricultural trade,
2. A synthesis and roadmap towards a more sustainable trade in wild meat,
3. A synthesis of the work on wildlife trade and the tools that are developed to help countries implement the CITES agreements.

We are also designing a legacy website that will be a mechanism to promote the roadmaps to sustainable agricultural and wildlife/wild meat trades and be a permanent repository for the TRADE Hub outputs. And a permanent home for a variety of communication and outreach materials developed by the Hub.