University of Nottingham
Rights Lab

Using satellite data to identify and address modern slavery in the palm oil supply chain

Issues in palm oil supply

Palm oil is present in approximately 50% of global commodities, ranging from fast foods and cosmetics to biofuels and pure cooking oil. [1]

Indonesia and Malaysia are the leading producers of oil palm, responsible for 57% and 26% of global production respectively as of 2023/24.[2]

It is estimated that over 2 million individuals are subjected to modern slavery in Indonesia and Malaysia[3] with a number employed in the oil palm sector.

The agricultural production of oil palm has been linked to labour rights abuses, including forced labour, and environmentally harmful practices. Evidence indicates risks in the recruitment and working conditions of plantation workers,[4] as well as the displacement of local communities[5] and the degradation of ecologically significant areas.

In response to these issues, international governments have begun to act. The United States has enforced Customs and Border Protection (CBP) Withhold Release Orders (WROs) against major oil palm producers [6] [7], and the European Union has voted to ban the use of palm oil in biofuel production within the region.[8]

Use of Earth Observation

The Rights Lab 'Slavery from Space' initiative employs Earth observation (EO) technologies and analyses to evaluate and tackle slavery. We now estimate that more than a third of the world's slavery is visible from space. Working with satellite EO data providers, imagery analysts and geoAI experts, we are harnessing satellite data for anti-slavery action: analysing imagery to locate and infer the locations of high slavery-prevalence industries and hotspots.

EO can identify areas that may be socially and ecologically irresponsible that would overwise be difficult to assess on the ground. In this context, EO can locate remote oil palm plantations and mills, allowing otherwise hidden sites of modern slavery to be uncovered.

Such identification is beneficial for monitoring and provision of data required in ESG and CSR reporting. This reporting will become increasingly important as new combined legislation is introduced in key import markets, such as the European Union[9] [10] [8][9], and as other regions implement economic sanctions under existing modern slavery legislation, such as the United States' use of WROs.

Additionally, EO provides a method for monitoring the environmental and social compliance of the oil palm sector in line with certification body requirements, such as those of the Roundtable on Sustainable Palm Oil (RSPO): https://rspo.org/. This can be applied at multiple scales, from plantations and mills to refineries and export ports.

EO applications

- **Contextual analysis:** Understanding the current extent of operations and the overlap with areas of ecological importance (e.g. peatlands, wetlands, and forests).
- **Monitoring deforestation:** Plantations are regularly criticised for issues related to land grabbing and conversion of ecological significant zones. Tracking such change is possible using satellite EO data to measure forest loss or degradation.
- **Tracking crop clearing:** Tracking of burned areas of forest (slash-and-burn crop clearing) through thermal anomaly (fire) data can be used to identify areas not compliant with

RSPO and national certification schemes. Operations not compliant with environmental aspects of certification schemes are more likely to have operations using exploitative labour.

- **Precision monitoring:** In cases where there are concerns at plantations and mills, the assessment of high-spatial resolution can be used to identify immediate changes that may affect workers and the supply chains of corporations.

Image shows progressive development of an oil palm mill and surrounding plantations in Sarawak, Malaysia (Island of Borneo) with a temporal analysis over almost 20 years.

How Business can apply EO

Example case: A large multi-national company seeks to monitor risk within its palm oil supply chain to support its ESG activities and enhance the auditing process for its suppliers.

Client requirements:

- Comprehensive monitoring of the entire supply chain of oil palm suppliers from whom they procure raw and processed materials
- Tracking of potential social-ecological risks to workers and the environment within the supply chain.
- Assessment of the potential risks to decent working conditions for plantation workers within the supply chain.

EO application for client:

- Detection algorithms can identify and alert the client to new oil palm plantation developments and refineries, and track areas where these developments overlap with tree loss and existing concessions to assess the legality of the operations.
- Monitoring changes over time can ensure supplier compliance before, during, and after audit processes This tracking can also identify irregularities, prompting adjustments to the supply chain.
- Modelling potential risks from heat, extreme weather, and flooding, EO and associated geospatial modelling can help identify areas of potential risk for plantation workers, such as heat stress. This can support in the development of mitigation and adaptive intervention to ensure decent working conditions for labourers.

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