

► How Palm Fruit Traceability Data Can Be Used to Assess Past Performance and Future Risk of FFB Suppliers

A Daemeter Brief on how to integrate backward-looking Deforestation Free performance measures with forward-looking risk assessment using the Risk Calibrated Approach (RCA)

1. The Problem

Since 2015, the palm oil industry has made tremendous strides toward placing sustainability at the core of its business model. This has been achieved through collaborative efforts by diverse stakeholder groups, but actions taken by companies themselves to produce and source palm oil more responsibly has been a major driver of progress. Buyers of palm oil working toward sourcing oil that is responsibly produced face three major challenges:

- How to collect TTP data at scale for mills in their supply chain
- How to report on deforestation free performance of their suppliers
- How to prioritize which suppliers to engage to support them in making progress

Daemeter offers an integrated solution for all three of these challenges. Together with a growing number of palm oil producers, buyers and other partners, since 2020 we've been implementing and adapting a tailored set of tools that streamline data collection and provide the knowledge base required by industry to know their supply base and report on sustainability progress. In this note, we describe our approach to helping clients address challenges related to analyzing their production supply base, prioritizing action and reporting on the deforestation performance of their suppliers. In a separate brief being published soon, we describe how Daemeter works with partners to identify origins of raw materials, through use of a secure, cloud-based Traceability Portal for entering, storing, managing and sharing palm fruit data.

2. The Risk- Calibrated Approach (RCA) – Our framework

In 2018, Daemeter and Neste began developing a new approach to trace the origins of palm fruit back to producers. Focused initially on Indonesia, the work was adapted and expanded to Malaysia in 2020 through partnership with Proforest. In 2018, the industry lacked practical tools for advancing traceability to plantation (TTP) at scale, especially for fruit produced by small farmers. Farmer-produced fruit presents a special challenge for traceability because of the hyper-dynamic supply chain connecting farmers to mills via middlemen/traders who sell to multiple mills, and because of the sheer number of farmers typically supplying mills that rely heavily on outside parties (often >5,000 farmers for a single mill).

The approach we developed is based on two principles: (1) that environmental risk varies spatially in ways that can be measured, and (2) that the level of effort placed into tracing fruit origins should be calibrated to the level of risk presented by the supplier. The method became known as the Risk Calibrated Approach (RCA) for Traceability to Plantation (TTP), or the RCA TTP.

The RCA also introduced the novel idea of tracing the origins of smallholder fruit back to village (or other administrative units), rather than to individual farmer. Traceability beyond village to the farmer can be pursued, but under the RCA this is recommended where local risk, engagement opportunities, market requirements (e.g. the recent EU regulation) or other factors justify the large resource investments required for such granular data collection. Implementing the RCA is thus achieved in three simple steps.

- First, we map risk across a sourcing region and then classify villages based on the prevalence of risk factors they present
- Second, we trace origins of farmer fruit to village (or other admin unit) and determine which fruit originates from areas potentially of concern (i.e. higher risk).

- Third, we set priorities for taking action that is calibrated to the risk level presented by each village.

Under the RCA, we classify farmer-produced fruit as “traceable to origin” once it is traced back to village. This is best described as a “semi dynamic approach” that creates a comprehensive picture of the location where all suppliers linked to a mill over a certain period (e.g. 6 - 12 months) are located, though not necessarily the specific individual producers. This picture is then regularly updated (e.g. every 6 - 12 months), capturing the dynamics of the supply chain at the village level.

Under the RCA, once fruit is traced to village, however, our work does not stop there. We then apply a risk classification and ask: What action should be taken next given the risk we see for certain suppliers? For example, where do we prioritize community engagement to set a pathway for deforestation free production? Or, in which villages do we carry out more granular traceability mapping to farmer? Or, where do we work with mills to implement purchase control systems as part of driving more sustainable production? Traceability to village does not fully meet requirements for farmer level traceability under current terms of the EU regulation, but it does provide a critical baseline for doing so by indicating in which villages supplying farmers are located. This vastly simplifies farmer level mapping, should a decision be taken to do so.

The aim of the RCA is to deepen understanding of risk, to prioritize action and to help inform reporting on supplier performance, including Deforestation Free production. It is not an approach for identifying suppliers to exclude, but rather to highlight suppliers that merit more immediate action to drive progress.

Below we explain how risk and performance is measured under the RCA, and how companies use results to inform action and strengthen their reporting.

3. How we measure risk and performance under the RCA

The RCA assesses village risk and deforestation performance in a way that allows companies to prioritize action as well as to report on deforestation free production, including fruit that is produced by farmers. It also provides baseline information for companies to begin developing phased approaches for compliance with the new [EU regulation](#) on Deforestation Free Commodities & Products. We do this by applying a method built on simple, transparent indicators of (i) forward-looking future risk and (ii) backward-looking deforestation performance.

- The **forward-looking measure** combines three indicators of risk for future deforestation, peatland conversion and land illegality.
- The **backward-looking measure** quantifies total deforestation that took place in each village after a specified cut-off date.

These two measures can be used separately or in combination. For example, the forward-looking measure can be used alone to identify supplying villages that present higher risk for expansion of farms into forest, peatland or PAs. Or the backward-looking measure can be used alone to determine if a village meets criteria for Deforestation & Conversion Free (DCF) palm oil. Even more powerfully, the two can be combined to identify villages with significant forest, peatland



or PAs that face higher risk of loss due to local deforestation trends. Below, we explain more about (1) how each measure is computed, and (2) how they can be used to identify priorities, report on DCF and lay foundations for compliance with the upcoming EU regulation on deforestation.

3.1 Forward-looking Future Risk

In developing the RCA, we examined a variety of models and parameters to create a forward-looking indicator of environmental risk. Ultimately, we chose three parameters that reflect the main environmental risks for non-compliance with No Deforestation, No Peat, No Exploitation (NDPE) commitments common-place in the industry today. These parameters are the extent of:



Logged & intact forest



Uncultivated peat



Protected Areas

To map High Risk, the three data layers¹ are overlaid and merged into one layer – the RCA High Risk map. Accordingly, land which contains one or more of these attributes is considered High Risk. We mapped this originally for all of Indonesia and in 2020 expanded this to cover Malaysia via ongoing collaboration with Proforest on implementing the RCA.² The extent of High Risk land varies widely across Indonesia and Malaysia, among mills and across villages. By number, ~44% of villages across Indonesia contain <10% of land classified as High Risk (e.g. large areas of Sumatra), whereas ~25% of villages contain >50% of land area mapped as High Risk (e.g. in parts of Kalimantan and Papua).

To support decision making under the RCA, we use this High Risk map to subdivide villages into two classes: Low and High. Villages with <10% of land area mapped as High Risk are considered Low; all others are considered High. This forward-looking classification helps identify sourcing regions where risk of future impact on forest, peat or PAs is concentrated and other regions where such risk is low or absent. This helps companies decide where limited resources are better allocated.

Though simple, this Low vs High classification of risk under the RCA predicts village level performance on key performance variables extremely well. For example, forest loss was >10x lower and forest-related fires were >20x less frequent in villages classified as Low Risk compared to all others (Figure 1). This demonstrates that Low risk villages under the RCA are, indeed, low risk for future deforestation and fires. A further example of insights obtained from RCA maps is that as of 2019, >44% of planted oil palm in

¹ **Forest layer** as of Jan 2020. It's mapped at 0.1 ha resolution and derived from Hansen tree cover data, which is modified to better represent natural forest rather than tree cover. From this, known plantation areas including oil palm, fiber and rubber are removed. This layer is >85% accurate in mapping natural forest across Indonesia and Malaysia. **Peatland layer** derived from Government of Indonesia Ministry of Agriculture and, for Malaysia, Wetlands International. **Protected Area** layer combines multiple government sources for Indonesia and Malaysia.

² This High Risk layer could be expanded to other countries as well, including Africa and Central or South America.

Indonesia occurred in Low risk villages.³ This identifies large parts of the production base where intervention is less urgently needed, and where risk of non-compliance with EU requirements for no deforestation is much lower.

The RCA's forward-looking risk model has proven useful to mills and their buyers, by helping them understand risk in their supply chain and where to prioritize action. The approach complements Daemeter's backward-looking deforestation performance measure, described below.

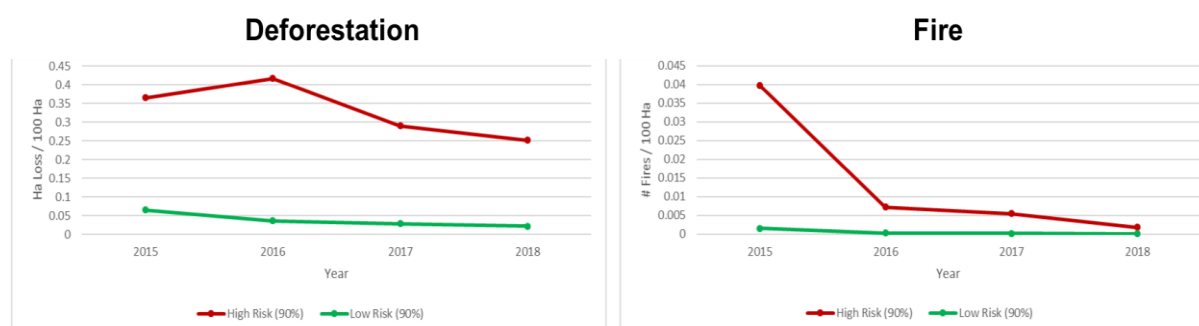


Figure 1. Comparison of forest loss (left panel) and forest-associated fires (right panel) in villages classified as Low vs High risk under the RCA's forward-looking risk measure.

3.2 Backward-looking deforestation performance

Daemeter's backward-looking deforestation performance measure is a tally of cumulative forest loss occurring from January 2016 onward. Daemeter updates its deforestation map once annually across the entirety of Indonesia and Malaysia. We map forest at a granularity of ~0.1 ha, and tabulate deforestation for any forest loss event that exceeds 1ha in size over the measurement period. As a default we compute aggregate deforestation over the period 2016-2020, inclusive, but this can be customized to other time periods.⁴

To assess village level deforestation performance, we quantify total deforestation in each village, then classify villages as No, Low or Higher deforestation, based on the following criteria:

No deforestation	Low deforestation	Higher deforestation
Zero observed forest loss over the period	Villages that, as a group, comprise <5% of total deforestation observed across Indonesia	All other villages

³ Including both corporate plantations and smallholder farms

⁴ Companies face two sets of expectations for quantifying and reporting on DCF performance. One is NDPE with a 31 Dec 2015 cutoff, the other is the forthcoming EU regulation on Deforestation Free Production, with a cut-off date of 31 Dec 2020. Both can be accommodated in our approach.

Membership in the Low deforestation class is determined by ranking all villages from lowest to highest deforestation and then, moving from low to high, adding villages to the Low Deforestation class up to a point where the cumulative deforestation of villages in the group reaches 5% of total deforestation observed across the country (Figure 2).

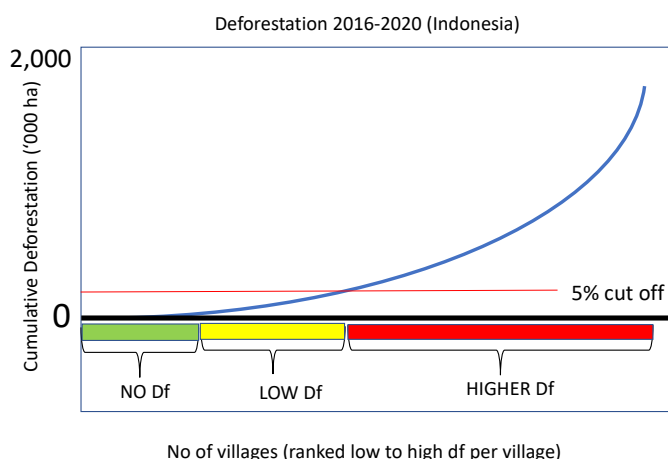


Figure 2. Graphical illustration of how villages are classified as No, Low or Higher Deforestation. Together, Low Deforestation villages account for 5% of total deforestation observed across Indonesia.

Based on our data for 2016-20, a total of ~59,000 villages across Indonesia showed zero deforestation, and a further ~16,000 were classified as Low. On average, villages in the Low Deforestation group experienced approximately six (6) hectares of deforestation during 2016-20, or just over one hectare per annum. The ~9,000 villages in Indonesia classified as Higher deforestation account for 95% of deforestation across the country. They averaged 218 hectare forest loss over 2016-20, >35x more than villages we classify as Low.

We advise clients to treat fruit originating from No and Low deforestation villages as meeting requirements for DCF sources, whereas those classified as Higher do not.⁵ Alternative decision rules can be applied, but we believe this cutoff offers a reasonable compromise between stringency and tolerance for small scale deforestation potentially unrelated to oil palm. Moving forward, we will be extending this deforestation analysis to measure forest loss during time periods tailored to the EU regulation (post 31 Dec 2020), both independently and in collaboration with third-party deforestation monitoring providers.

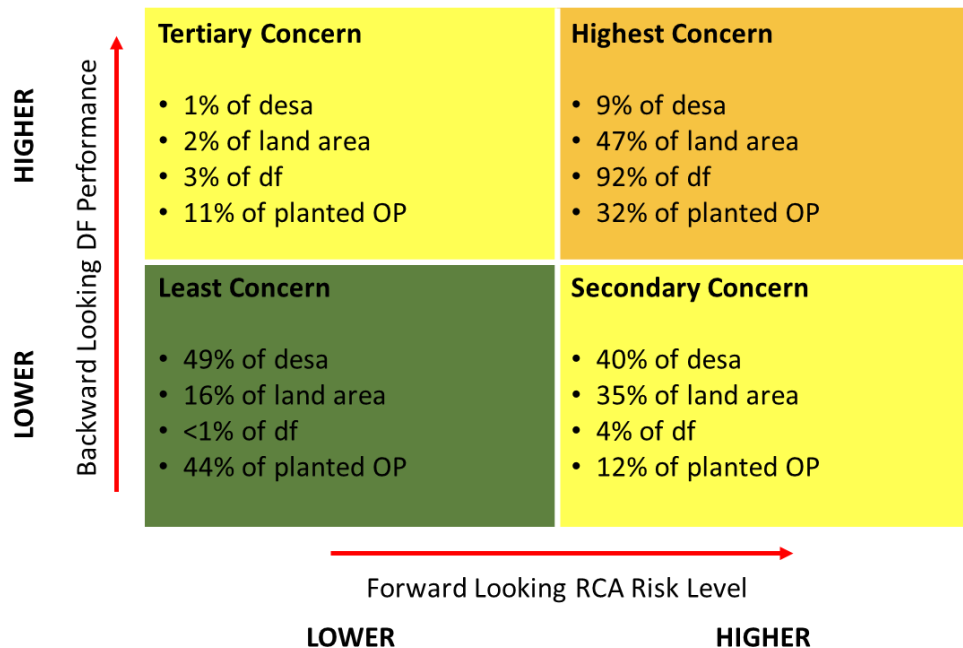
4. Combining Forward- and Backward-looking Measures Under the RCA

While the RCA's forward- and backward-looking measures can be used separately, they can also be combined into one analysis that offers more refined action planning and reporting on DCF.

The approach is easy to apply. Villages are classified as Low vs High under the Forward-looking measure and as Low vs High under the Backward-looking measure. This places each village into one of four groups in a 2x2 matrix (see inset). In this matrix, villages that are Low for both measures (lower left) are DCF compliant and present the lowest risk of future impact, while villages which are Higher for both (upper right) are non-DCF and present the highest level of risk for future impacts. Villages which are Low for one or the other present a medium level of risk to be monitored and addressed over time.

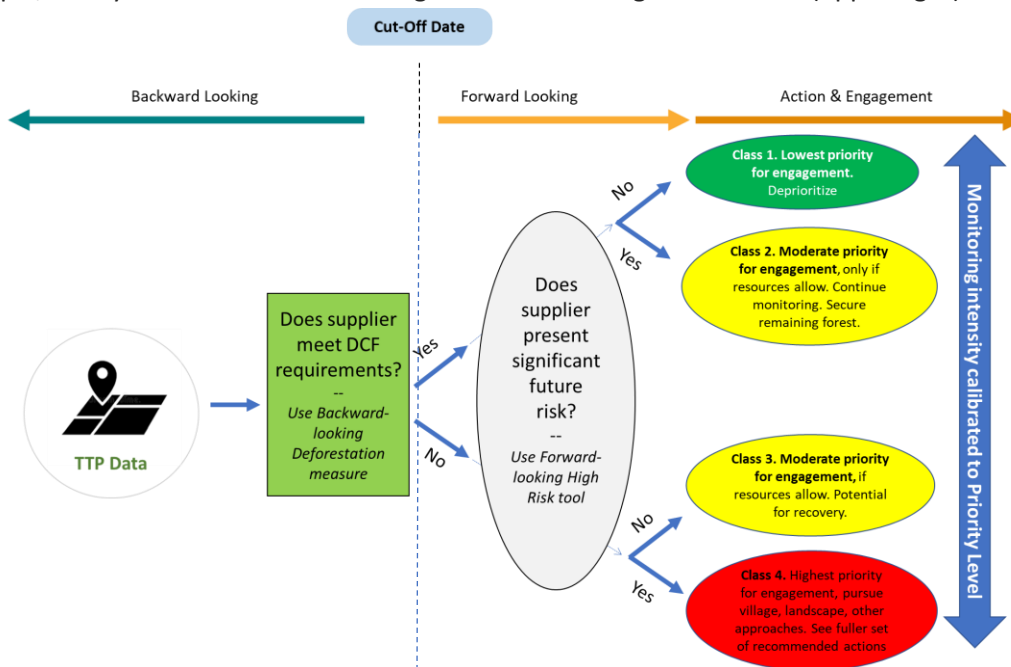
⁵ Under the RCA, it is possible to extend the DCF analysis to individual farmers, even in villages that fall short of meeting DCF requirements. This requires geocoordinate and/or boundary data for individual farmers.

Villages in the upper right merit urgent attention. They number ~7,700 villages as a group (9% of the total) but account for 92% of total deforestation. These villages are large, and they support the majority of remaining forest and uncultivated peat, as well as roughly one-third of planted oil palm across Indonesia. Those in the lower left are lowest priority. They are numerous (~42,000), present very low risk of future deforestation, and can be viewed as strong candidates for meeting EU definitions of “negligible risk” sourcing regions at the sub-national level.



This approach can also be represented as a decision-tree flowchart, as in the inset below.

This combined analysis under the RCA also helps to identify regions where action should be prioritized. For example, nearly 46% of land area in villages classified as Highest Concern (upper right) occurs in



Kalimantan. These same villages accounted for 51% of total deforestation across Indonesia during 2016-20, making them high priority to address not only DCF and EU compliance, but also Indonesia's own national targets for reducing deforestation and land-based emissions (e.g. [FOLU Net Sink 2030](#)).

5. Recommended Actions

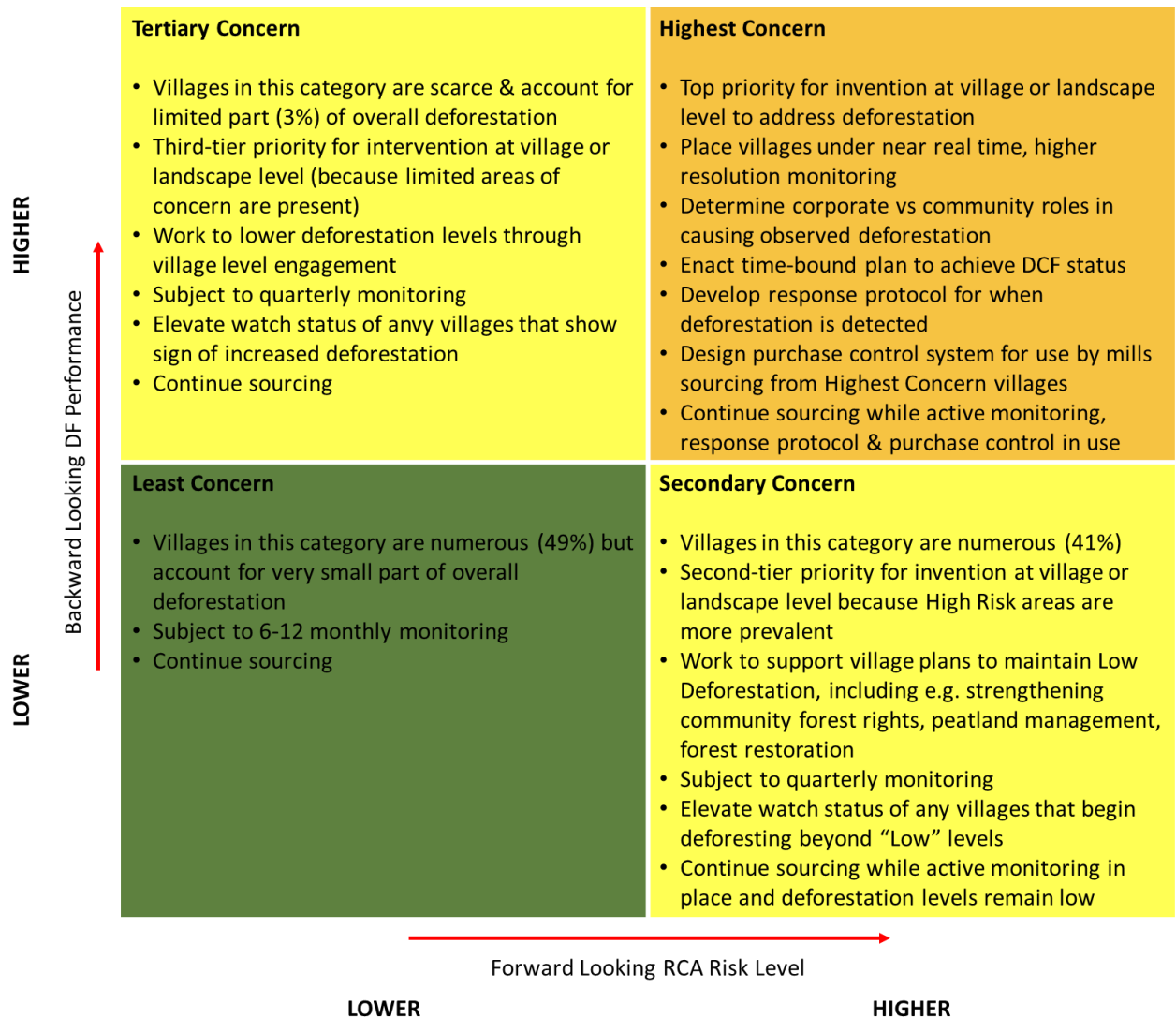
Finally, the RCA also provides companies with a framework to prioritize future action based on the risk level presented by each village in the combined analysis (see next page). The driving principles behind these recommendations are **inclusion** and **action**. That is, we aim to **avoid** excluding suppliers, except where engagement efforts fail or illegality is involved (e.g. encroachment into PAs), and instead **encourage** action to improve performance and mitigate future risk. It follows logically from the RCA framework that recommendations are most intensive for villages in Highest Concern category, with villages that present lower risk subjected to fewer recommendations. Accordingly, we differentiate four sets of recommendations for villages of Highest, Secondary, Tertiary and Least Concern.

Recommended actions center on five types of intervention: (i) placing villages under deforestation monitoring; (ii) further data collection on the ground, where needed; (iii) village and/or landscape engagement to develop time-bound plans to mitigate risk & strengthen local institutions, where needed; (iv) development of a response protocol to address deforestation when detected; and (v) cooperation to implement purchase control procedures at the mill gate, where appropriate.

Ideally, some combination of all these measures should be pursued in villages of Highest Concern, whereas a much lighter set of actions is acceptable in villages of Least Concern, provided monitoring shows they maintain strong performance. Adaptive management based on results of ongoing monitoring must be prioritized, at time steps tailored to the risk level presented by each village.

Conclusion

The RCA offers a practical set of tools for measuring risk and deforestation performance of raw materials produced by small farmers. The approach requires farmer-produced fruit to be traced back to the village, at a minimum, and can accommodate individual farmer level data when required by the market and/or desired for engagement purposes. The approach offers tools to measure forward-looking risk, backward-looking deforestation performance, or a combination of both. This allows for prioritizing action, reporting on DCF and laying foundations for future compliance with the upcoming EU regulation on deforestation free products. Details of the deforestation analytics offered under the RCA can be tailored to alternative time periods, data inputs, or cut-off dates required by users, all with the aim of providing data to inform decisions and prioritize actions. We welcome questions, inputs or requests for further information at traceability@daemeter.org or gary.paoli@daemeter.org





Daemeter is a leading independent consulting firm promoting sustainable development through responsible and equitable management of natural resources, particularly in Asia's emerging economies. With offices in Indonesia and USA, we offer a wide range of professional services to support clients and partners in achieving their social and environmental objectives.

For further information please contact:

traceability@daemeter.org