

KUAMUT RAINFOREST CONSERVATION PROJECT (KRCP): SABAH AND MALAYSIA'S FIRST NATURE BASED CLIMATE PROJECT

Ivy Wong Abdullah
CEO Malaysia, Permian Global
Ivy.Wong@Permianglobal.com

ABSTRACT

The Kuamut Rainforest Conservation Project is a public-private partnership that is protecting and restoring 83,381 ha of tropical rainforest in Tongod and Kinabatangan district, Sabah. By preventing the emissions from logging that would have happened in the absence of the initiative, the project is making a significant contribution to global climate action. Through the protection of an important biodiverse ecosystem, the projects is sustaining the habitats of many threatened and endangered species. And with close collaboration and support of local communities, it is improving well-being and sustainable livelihood opportunities for people living near the protected forest area.

The project is a partnership between Sabah Forestry Department, Rakyat Berjaya, a subsidiary of Yayasan Sabah, and tropical forest project developer, Permian Global, with operational support from the South East Asia Rainforest Research Partnership (SEARRP) and the community-based organisation, PACOS Trust.

The design, operational activities, and impacts of the project have been validated against the science-based and globally recognised Verra Verified Carbon Standard (VCS) and the Climate, Community and Biodiversity (CCB) standard. It has been developed on a 30-year license, having first registered in 2016, with the option to renew for another 30 years, in 2045.

Project additionality is explicitly demonstrated by preventing continued commercial logging and instead, manage the area for protection. Had the project not intervened, the resulting carbon emissions over this period would have contributed 16,291,488.57 tonnes of carbon dioxide equivalent (tCO₂e) to the atmosphere in the period 2016 - 2045. Through a close public-private partnership, the project has been designed to be credible, transparent, and equitable to all stakeholders, especially the communities living outside, but adjacent to the project area. The voluntary carbon market increasingly demands high quality carbon credits that not only demonstrate verified climate benefits but also delivering impactful improvements to community wellbeing and safeguarding biodiversity.

Keywords: Carbon, partnership, climate

1. INTRODUCTION

The Kuamut Rainforest Conservation Project (Kuamut Project) is a public-private partnership that is working to protect and restore 83,381 ha of tropical rainforest in Tongod and Kinabatangan district, Sabah. The Kuamut project is operated by the Malaysian-based company Permian Malaysia Sdn. Bhd. (part of the Permian Global group), working in close partnership with the Sabah Forestry Department and Yayasan Sabah's wholly owned forest management company Rakyat Berjaya Sdn. Bhd. Operational activities in the field are supported by the project's local implementation partners, including the Southeast Asia Rainforest Research Partnership (SEARRP) and PACOS Trust, a community-based organisation dedicated towards supporting indigenous communities in Sabah.

Prior to the start of the project, the forest area has been designated as a production forest (Class II). The area had been repeatedly logged in the past and was designated for further commercial exploitation. The case for additionality has been demonstrated explicitly by preventing continued commercial logging and instead managing the area for protection. Through the project's intervention, the forest area was reclassified to Class I

Protection Forest, which was contingent on the conservation being commercially viable as a carbon project. Had this not happened, the resulting carbon emissions would have contributed 16,291,488.57 tonnes of carbon dioxide equivalent (tCO₂e) to the atmosphere in the period from 2016 – 2045. Emission reductions will be generated by the project through the avoided logging programme (AFOLU project category Improved Forest Management of VERRA Programme). These actions are expected to generate 16,291,488.57 t CO₂e in the period 2016 - 2045.

In addition to its contribution to preventing the release of greenhouse gas (GHG) emissions, the project is protecting an important biodiverse habitat. Despite its formerly logged state, the area is known to support very high populations of elephants, banteng, orangutan, and endangered bird species including Helmeted Hornbill, Bornean Peacock Pheasant and Storms Stork. The project will also improve the conditions for communities by improving access to water quality through the restoration of riparian reserves, generation of direct employment in project activities such as forest restoration, patrolling, etc.

2. DESCRIPTION OF THE PROJECT

2.1. Location of the project

The Kuamut Project is located in the Tongod and Kinabatangan Districts of Sabah, Malaysia as shown in Figure 1. The project area, defined by the Sabah Forestry Department, encompasses 83,381 ha of land with a total perimeter of 244.99 km. The project area boundary delineates the area in which GHG emission reductions are quantified. The project area is located within these coordinates: 5° 18' 40.2"N 117° 11' 8.69"E; 5° 18' 40.2"N 117° 37' 58.51"E, 4° 55' 55.68"N 117° 37' 58.51"E, 4° 55' 55.68"N 117° 11' 8.69"E.

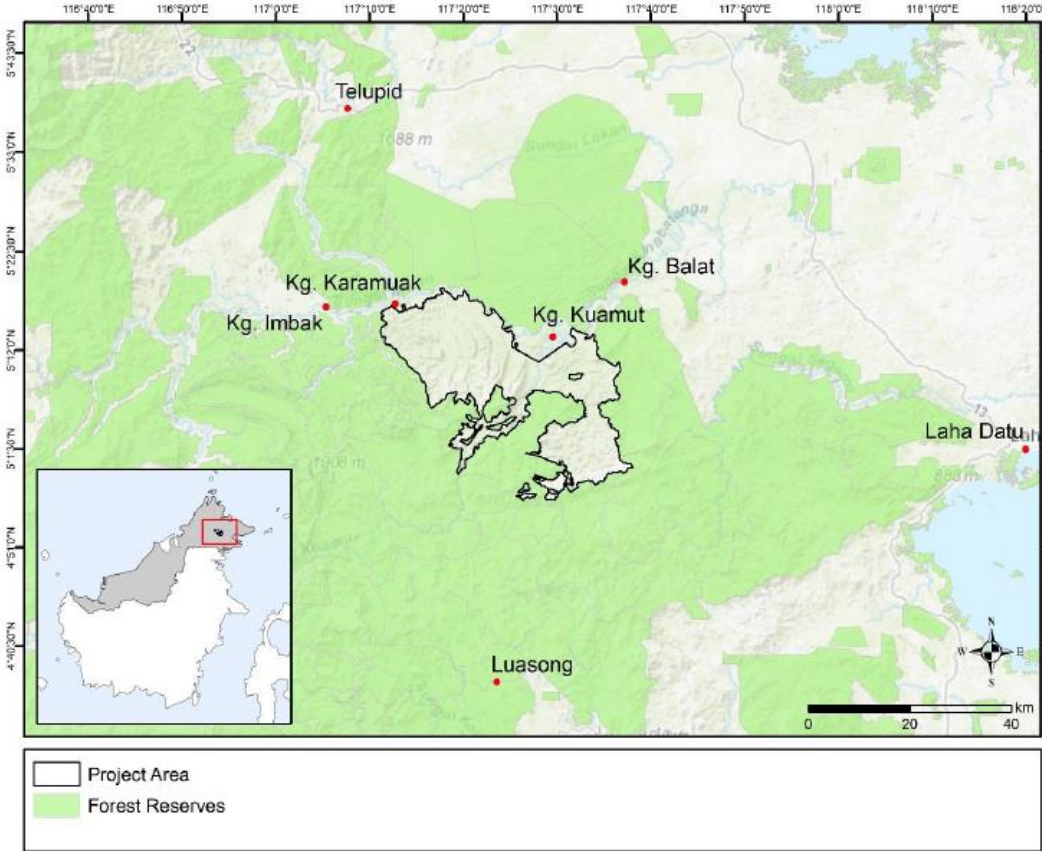


Figure 1: Location of the Project

2.2 Physical Parameters

In terms of topography, the Kuamut Project Area is generally very heterogeneous, with about 10% of the area lying above 500m above sea level. The lowest point in the area is about 16m above sea level, whilst the highest point is about 1,172m above sea level. The lowest lying area is concentrated in the northeast of the project area. About 60% of the area has slopes below 15°, while 29% of the area is between 15° and 25° and an estimated 10% of the area has slopes >25°. See Fig 2.

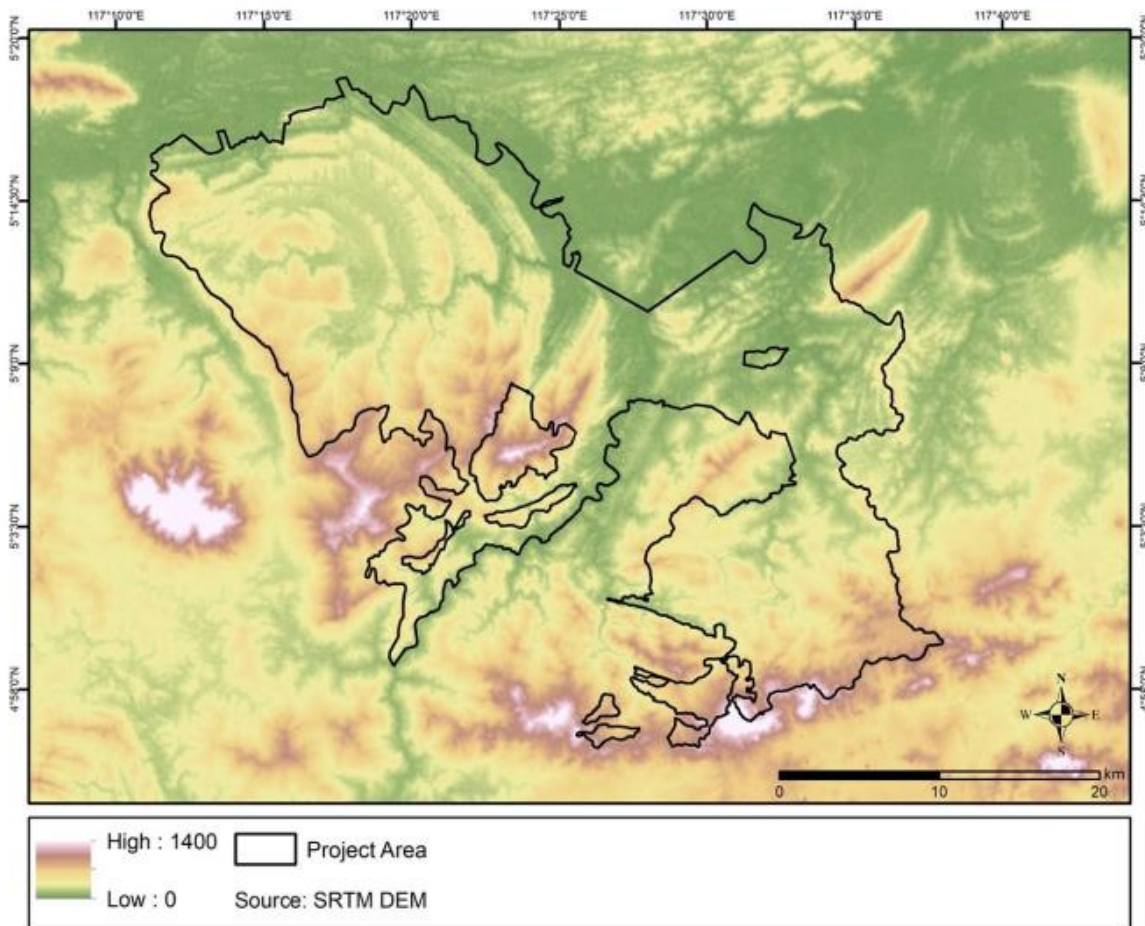


Figure 2: Topography of the Kuamut Project Area

As in many parts of the tropics, the dense vegetation and deeply weathered soils restrict the occurrence of rock outcrops and only the general geology of the area has been mapped. The main geological formations found within this area are Crystalline Basement and Chert-Spillite.

The mean annual rainfall for the period 2004-2017, recorded at the nearest weather station located at the Malua Field Station, is 3,401 mm. Although all months' average >200 mm of rainfall, March to July is relatively dry (an average 235 mm/month), while November to February are the wettest months (average 326 mm/month). The mean daily minimum temperature is about 23°C and the mean daily maximum 28°C. There is an extensive network of streams within the project area, most of them unnamed. Generally, these streams all drain into the Kuamut River, which flows through the centre of the project area.

The natural forests of central-eastern Sabah are dominated by dipterocarps, particularly *Parashorea malaanonan* and *P. tomentella* together with *Shorea johorensis* and other *Shorea* species of the *Rubroshorea* group. Between 80 and 90% of large canopy trees belong to the Dipterocarpaceae with the balance being accounted for mainly by *Koompassia*, *Diospyros* and *Durio* species.

Prior to establishing the project, research on the forests of Kuamut has been limited, but given their broadly similar topography, elevation, underlying geology, and soils, much information can be derived from the adjacent and much better described Danum Valley Conservation Area (DVCA), the western and north-western flanks of which are fully contiguous with the Kuamut Forest Reserve.

The knowledge of the flora of DVCA is based on general botanical collecting in the vicinity of the Danum Valley Field Centre including a number of WWF expeditions during the 1970s and subsequent much more detailed but localised enumeration studies. The higher-plant checklist compiled to date comprises more than 1,300 species in 562 genera of 139 families. Although this list is far from complete, it already represents close to 15% of the approximately 10,000 species of higher plants recorded for Sabah. There is no reason to assume that floral composition of the Kuamut Forest Reserve would differ substantively from the DVCA.

The lowland forest in the Kuamut/Danum Valley area is of outstanding importance for biodiversity. The area is home to over 120 species of mammal, including Orangutan, Banteng, Gibbons, Tarsier, Asian Elephant, Sun Bear, Sumatran Rhino, Clouded leopard, Bearded Pig and several species of Deer. It is also home to over 340 species of bird, many of which are endemic to Borneo, including the Spectacled Flowerpecker, which has been recorded nowhere else. In addition, over 60 species of Amphibians have been recorded, including the rare Wallace's flying frog, harlequin and emerald tree frogs and the Bornean horned frog; 75 species of reptiles including hard and soft-shelled turtles, agamid lizards, skinks, monitors, geckos and a number of snakes including pythons, vipers, cobras and coral snakes; 40 species of fish including several new species records. Invertebrate fauna is exceptionally diverse and likely comprises many tens of thousands of species. The population of orangutan estimated for the Kuamut Forest Reserve is likely to exceed 700, while the area is likely to support over 500 elephants.

2.3 Social Parameters

The Kuamut Project Area has no permanent human settlements, while the region surrounding it is only sparsely populated. There are only eight principal indigenous and local communities distributed along the banks of the Kinabatangan River, to the north of the Project Area. These communities form two principal groupings: four communities to the north-west of the project area and a further four to the north-east i.e. the "Karamuak cluster" and "Kuamut cluster", respectively (see Figure 3). These villages support 2,826 people (average per village is 350 people, min 10, max 750) living in 381 households (average per village is 48 people, min 4, max 84).

Majority of the residents of the communities belong to the indigenous ethnic group known as Orang Sungai – one of the chief Dusunic ethnic groups in Sabah. Each community is typically composed of a mixture of varying subgroupings of Orang Sungai, including the Sinabu, Kelabuan, Makiang, Kuamut, and Sukang peoples. This reflects the diverse historical migratory patterns of each group, many of whom have transitioned from their traditionally nomadic lifestyles to more sedentary modes of agricultural production in permanent settlements at various stages since the early 20th century. Almost all community members rely heavily on agricultural smallholdings for economic contributions to livelihoods (principally cash crops such as oil palm, rubber and cocoa), although river and forest resources remain extremely important for subsistence.

The two community clusters are broadly similar in terms of cultural history and traditional livelihood practices, but at present exhibit some marked differences in terms of accessibility. Whilst Karamuak is relatively accessible, there is currently no reliable road access to the Kuamut cluster, which constitutes a sizeable constraint on contemporary livelihood opportunities since residents of this area are generally unable to sell produce to outside markets. Both clusters face similar challenges in terms of the availability of lands for future agricultural production, and the tenurial insecurity of lands currently used for production.

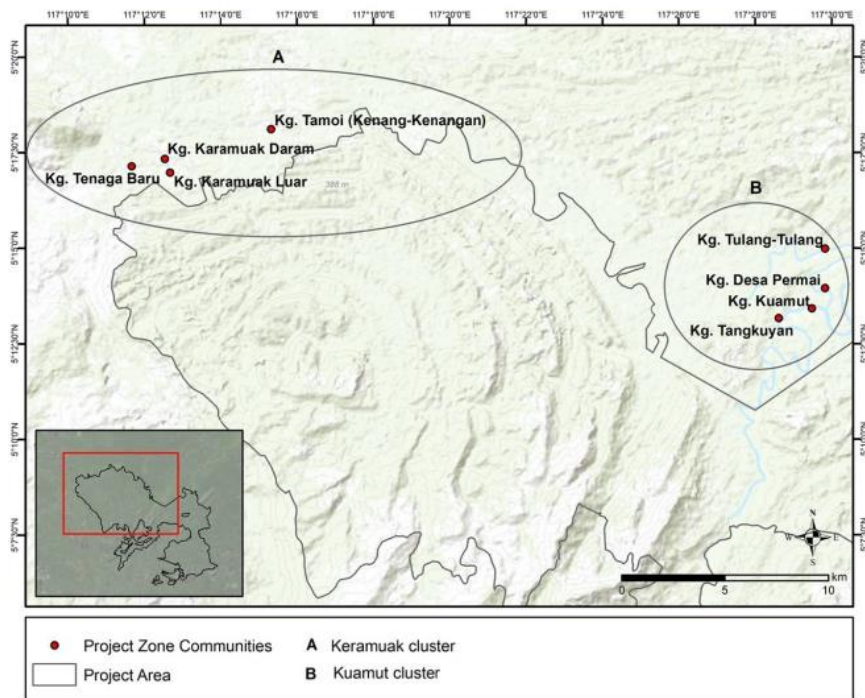


Figure 3: Location of the Local Communities clusters in the Project Area

3.0 PROJECT GOALS AND IMPACT MEASUREMENT

3.1 The Kuamut Project Goals

The overall goal of the Kuamut project is to develop and implement sustainable land use model through forest conservation, promoting natural regeneration and enabling better livelihood opportunities for local communities surrounding the project. The project is designed to achieve this through a series of objectives and track through its deliverables via outcomes and outputs that are to be achieved.

The climate objectives are to;

- To deliver credible GHG emission reductions through avoided deforestation and forest degradation;
- To enhance ecological values at the landscape scale.

The community objective of the project includes;

- To enhance the quality of life and reduce poverty of the project-zone communities by creating sustainable livelihoods options and economic opportunities and generate new employment opportunities during the project implementation.
- To maintain and enhance ecosystem services for the overall well-being of the project zone communities through ecosystem restoration; and
- To improve access to health services and education attainment of community members.

The biodiversity Objectives of the project includes;

- To eliminate drivers of deforestation and forest degradation and to stabilize and maintain healthy populations of faunal and floral species in the project zone through biodiversity conservation and protection;
- To maintain natural habitats and ecological integrity through ecosystem restoration and To conduct research and development (R&D) activities as to implement the latest science, research and management practices.

3.2 The Kuamut Project Activities and Impact Assessment

In terms of activities of the project, this involves forest protection through the installation of guard posts at major access points and supplemented by routine patrolling, combined with on-going biodiversity and carbon monitoring. In addition to the guard posts, the community development program is being implemented to encourage community participation, collaboration, and employment in the site protection work and patrolling. In terms of patrolling, routine monitoring along major road and river access routes by car/motorbike and boat are conducted. Where possible, routine or periodic patrolling are combined with biodiversity and carbon survey work for cost-effectiveness. The Kuamut Project is making extensive use of remote surveillance technology to enhance protection measures. This includes almost daily access to high resolution satellite imagery, capable of detecting disturbances such as illegal logging or clearance within 1-2 days of its occurrence.

By protecting degraded forests, the project will support natural regeneration within the project area. Currently the project area is a very complex mosaic of forest in a variety of conditions; ranging from almost entirely intact, to almost completely degraded. In between these extremes can be found a complete gradation of intermediate conditions, including areas dominated by pioneer tree species, climbers, scrub and grasses. The protected, over-logged forests of the project area have the potential to regenerate naturally – particularly in areas where the residual stand comprises a reasonable density of large trees. The team is monitoring natural regeneration using a combination of forest plots (forest structure and the natural recruitment of tree seedlings is being monitored) and high-resolution remotely sensed data.

The Kuamut Project has a very high number of animals living within with regionally significant populations of several important and threatened species, including Orangutan, Banteng, Elephant, Clouded Leopard, Sun Bear, and bird species including Helmeted Hornbill, Storms Stork, Bornean Peacock Pheasant. The project team is currently assessing and monitoring the biodiversity in the area through camera traps plots spread out across the whole area. The work is being implemented by the project partners on the ground, SEARRP and involving local communities. In addition, the Kuamut Project has begun establishing a network of research partnerships with other interested parties, including local academic institutions and research centres to collaborate on future research of the area.

A fundamental objective of the project is to continue building its community development programs and activities, in close consultation and collaboration with all members of the communities, with the aim of delivering long-term social improvements and economic opportunities. These benefits include support with livelihood opportunities, greater access to health, education and other well-being indicators, whilst also working to safeguard traditional knowledge and cultural practices. Through the community engagement activities carried out so far, core aspirations include developing eco-tourism related activities, focusing on bio-cultural significance, and producing local products from non-timber forest products such as rattans and bamboos. A smaller group within the larger community has expressed interest in improvement to subsistence farming.

A key part of the benefit sharing mechanism of the Kuamut Project includes building the social mobility of the local communities, and these include building capacity and capability through setting up of a village development fund, social assistance programme and micro-financing program as means to support the collective interests of the communities. The Kuamut Project will also work towards facilitating the local communities access to government-backed financing schemes and grants. . The microfinance development program will bring about community specific benefits by empowering women, encouraging effective and transparent financial management, and nourishing entrepreneurship among the project-zone communities.

4.0 LINKAGES TO UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

The Kuamut Project supports the achievement of the UN SDGs that is aligned to the national agenda. The Kuamut Project is committed to provide demonstrable positive livelihood benefits to all surrounding communities and direct employment of local people, and support for local enterprises leading to contributing to SDG 1 (No poverty) and SDG 8 (Decent work and economic growth); while at the same time, working towards a sustainable farming agenda to allow for agroforestry and agriculture to be realised amongst the villagers, contributing to SDG 12 (Responsible consumption and production). On its overall goal of the Kuamut Project, which is to avoid an anticipated average emission of over 800,000 tonnes of CO₂ equivalent annually from the project area, this will lead to a contribution toward the SDG 13 (Climate action) achievement. In terms of achieving SDG 15 (Life on land), the Kuamut Project is protecting and allowing for natural regeneration of the project area, allowing for biodiversity to thrive.

5.0 ACHIEVEMENTS OF THE PROJECT TO DATE

The Kuamut Project is based on a 30-year initial licence agreement and is extendable for a further 30 years. Project benefits are expected to extend beyond the licence agreement. The effective protection status of the natural forest is anticipated to be maintained and extended, either through further licenses or enhanced legal protection from the state as the global importance of the stored carbon stocks and biodiversity are fully recognised as a result of the project. In parallel, the actions of the project to allow for natural restoration of degraded areas which will result in the Project Area becoming a more resilient ecosystem and a long-term habitat for biodiversity to thrive. Similarly, activities targeting community benefits are all designed to be managed in the future by the local communities themselves, without the need for further external interventions. Finally, the project itself is anticipated to set an example of sustainable land use management in the region, leading to wider adoption of the practices it is pioneering. In this way the Kuamut Rainforest Conservation Project will contribute to wider region managed more sustainably with respect to carbon emissions, biodiversity conservation, and equitable development of local communities.

5.1 Social development

The success of any social community development programs is largely dependent on participation, transparent decision-making processes that are based on mutual trust, and proper management of the project activities. The Kuamut Project has worked hard to deliver a robust, participatory and mutual benefit development program for the communities in the Kuamut and Karamuat clusters.

Since the project started, several of the youth community members representing the indigenous and local community from Kuamut and Karamuak have been hired by the Kuamut Project as Community Organisers and Biodiversity Field Staff. The staff have undergone several training workshops and sessions organised by both PACOS and SEARRP, in serving their community and also contributing to the Kuamut Project.

Prior to the commencement of the Kuamut Project, the team from PACOS Trust performed an extensive engagement with the eight villages to present the plans and objectives of the project and carried out detailed discussions to ensure that *free, prior, and informed consent* (FPIC) was established. During the development of the project in 2022, only seven out of the eight villages agreed to participate. Nevertheless, the Kuamut Project team endeavoured to keep the absenting communities informed of the progress and activities and invited them to participate in joint programs that were conducted. In 2024, the remaining village, Kpg Tenaga Baru, came on board.

With no prior access to fresh water, a gravity fed clean water system, which is connected to each house in the villages of Kuamut and Tangkuyan in the Kuamut cluster, has been provided by the Kuamut Project. This is a start of a series of clean water systems that are being provided through the project to the communities living in the Kuamut and Karamuak cluster.

The construction of the mini hydro dam in Sg Naping, situated about 8 km from the village of Tangkuyan, connecting the pipes to its reservoir tanks and the laying of the water pipes to the villages

was carried out by the local community members themselves, supervised by team members from the PACOS Trust. The current gravity fed system in Karamuak will be improved on for quality and reliability with contributions from the Kuamut project.

A boat, serving as an ambulance for the villagers in the Kuamut cluster has been delivered on site by the Kuamut Project and is currently under the care of a local community member. The running and maintenance of the ambulance boat will be managed by a group of community members. The team of six individuals have undergone boat driving classes and have taken their exams and passed as licensed to operate the boat by Jabatan Laut Malaysia. The communities in Kuamut themselves have agreed collectively that to access the boat for health purposes, it needs to be validated by the local Medical Officer (MO) that it is an emergency and that the rural clinic in the village is not able to provide. In addition to being an ambulance boat, the Kuamut communities has agreed collectively to utilise the boat to send their children to boarding school at the beginning and end of school semester, where the secondary school is situated near Bukit Garam, which is 5 hours downriver by boat. The services of the boat driver will be reimbursed through a small fund collected from the parents of the school children.

5.2 Biodiversity Monitoring

Throughout the lifetime of the project, natural regeneration in currently degraded forest areas will result in an increase in the total area of suitable habitat for forest specialist species and will contribute to rebuilding the complexity of community trophic interactions typical of lowland dipterocarp forests of central Borneo. The project will confer immediate biodiversity benefits via protection of key habitats and functioning ecosystems and, by extension, the protection of flora and fauna species themselves. Given that the forest in the Project Area is contiguous with much larger areas of protected primary forests to the south and east, the project will also provide a buffer area and ultimately an expansion – as forests recover – of suitable habitats for Rare Threatened and Endangered (RTE) species in central Sabah.

There is a total of 34 RTE tree species within the project, which includes six critically endangered (CR), five endangered (EN) and twenty-three vulnerable (VU) species. This is measured from 46 carbon plots established in the Project Area. Camera traps have been deployed at 36 sites within the Project Area. The data processed to date has recorded sixty-one species, including 36 RTE species (11 birds, 23 mammals and 2 reptiles). This included two species listed as CR (Bornean Orangutan and Sunda Pangolin) and six listed as EN (Asian Elephant, Banteng, Borneo Bay Cat, Long-tailed Macaque, Otter Civet, and Southern Pig-tailed Macaque).

5.3 Carbon Monitoring and Measurement

The Kuamut Project has maintained the protection status of the forest from the start of the project in 2016. This ensures that the Project Area remains safe from commercial exploitation, thereby preserving its carbon sequestration capacity. The project utilizes a combination of field surveys and remote sensing technologies to measure and monitor forest regrowth. This approach helps in assessing the health and recovery of the forest, ensuring it becomes more resilient to environmental threats such as fires.

To quantify ongoing forest growth in the project scenario and to accurately estimate any emissions from illegal deforestation or degradation, the project has developed a multi-temporal modelling approach to estimate the spatial variability and distribution of aboveground biomass. The modelling approach adopted a machine learning workflow that uses the following data sources: aerial LiDAR scan (ALS) data from 2016 describing canopy height, optical (Landsat 8) and Synthetic Aperture Radar (SAR) (Sentinel 1) satellite imagery and forest plot data. LiDAR data was collected in 2016, forest plot data in 2016 and 2021/2022 and satellite remote sensing data for the years 2015-2023.

The combination of remote-sensing data sources is used to produce an updated wall-to-wall Top of Canopy Height (TCH) map – broadly similar to the process described for the baseline, where the TCH map was produced predominantly with LiDAR; this TCH model is then used to predict annual biomass maps in combination with plot and satellite data. It is important to note that while the forest growth

monitoring process utilises both remote sensing and field measurements, it is very much supported by the field plot measurements, and it is possible to accurately model the regrowth without measuring the field plots every monitoring period. All S1 image pre-processing was carried out using the Google Earth Engine and the {rgee} package. The Copernicus GLO 30m global digital elevation model (DEM) was used to derive terrain data for the area of interest including: slope, aspect, minimal curvature and mean curvature. All the bands from the imagery discussed above were combined into a data cube, comprising a total of forty-one bands.

The growth rate was calculated across multiple years for the entire Kuamut Project Area using the Aboveground Carbon Density (ACD) maps for the years 2016-2023. These maps are developed using a multi-temporal modelling approach to estimate the spatial variability and distribution of aboveground biomass. The modelling approach adopted a machine learning workflow that uses the following data sources: aerial LiDAR scanning (ALS) data from 2016 describing canopy height, optical (Landsat 8) and Synthetic Aperture Radar (SAR) satellite imagery and forest plot data.

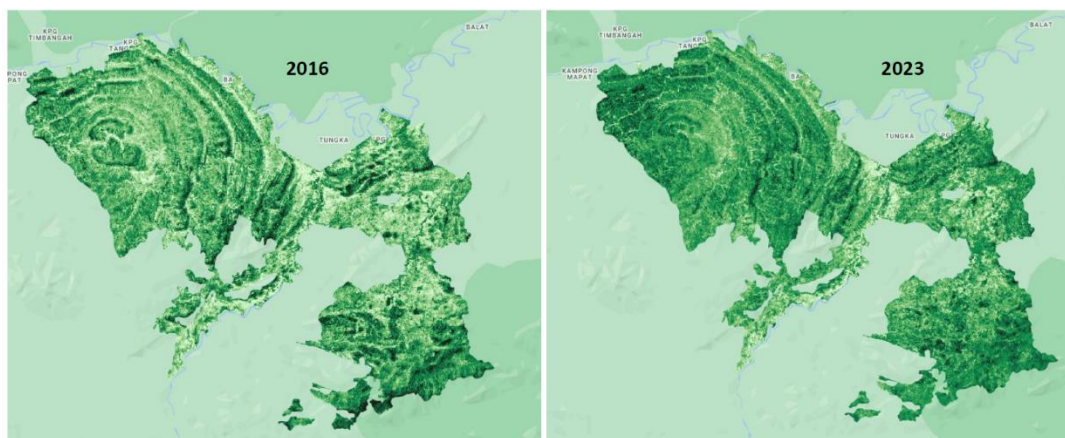


Figure 4: Above ground biomass growth

5.4 Communicating about the project

The Kuamut Project uses various communication channels to engage with its stakeholders. For clients and external stakeholders, we provide verified technical documents and stories about the team's work on the ground.

To communicate and maintain a regular dialogue with local communities, the project has produced various materials in the local Malay, including project summaries, updates, FAQs and monitoring reports. In collaboration with the PACOS Trust, the communications team has launched a quarterly newsletter that is accompanied by voice notes, in community WhatsApp groups. This enables regular updates covering project news, visits to the area, and providing an opportunity for community members to share their news. Additionally, an updateable community page/notice board on the Permian Global website has been created to share information about the project and ongoing activities, facilitating two-way communication between the community and the Kuamut Project team.

With telecommunication services available in the villages, social media platforms like Instagram and LinkedIn are actively used to communicate about the Kuamut Project with local communities.

6.0 WHAT'S NEXT?

The Kuamut Project is undergoing its second Monitoring Report for the years 2021-2022. The project is assessed against the science-based and globally recognised Verra Verified Carbon Standard (VCS) and the Climate, Community and Biodiversity (CCB) standard. This process helps demonstrate the scientific rigour unpinning its project activities and allows it to generate income from Verified Carbon Units (VCUs).

These accomplishments, combined with the project's robust conservation and climate actions, underscore its success in meeting and exceeding the stringent criteria for VCS and CCB certification, demonstrating a profound commitment to fostering sustainable development and enhancing the quality of life for the communities involved. Therefore, the project serves as a model for sustainable development in the face of climate change. Scaling up these strategies across Sabah and incorporating key elements like stakeholder engagement, particularly with farmers in the project zone, and robust monitoring, can amplify these benefits and contribute to a more sustainable and resilient future for the region.

REFERENCES

Project Design Document

https://registry.verra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=88408&IDKEY=3lksjoiuwqowrnoiuomnckjashoufifmln902309ksdfiku098r121914632

Monitoring Report 2016-2021

https://registry.verra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=110243&IDKEY=f097809fdslkjf09rndasfufd098asodfjlkduf09nm23mrn87m152025097