Bioenergy 2026 Methodology

Methodology

All analyses and mapping were conducted in QGIS. The metrics and data presented in this document represent the best estimates based on available information and methodologies used during the analysis.

Chip/Pulp Mills

21 total chip and pulp mills are in the database, but only 20 are geolocated. A 100 km buffer is placed around each point and is clipped with global land boundaries. Protected areas were excluded from the haul zones.

Indigenous Territories

The Indigenous territories layer from AMAN was intersected with the haul zone buffer to calculate the area under threat of chip mills. This area does not include indicative Indigenous territories. This map was made by AMAN in collaboration with Earth Insight.

Key Biodiversity Areas

The overlap between the Key Biodiversity Areas and the chip mill buffer zones was calculated by running an intersection between the layers and summing the overlapping areas. The number of Key Biodiversity Areas was calculated by counting the unique number of KBAs across the overlapping geometries.

Protected Area Data

The protected areas data used in this analysis are from the World Database of Protected Areas (UNEP-WCMC and IUCN, April 2026). The database identifies a range of classes which reflects their primary management objectives (Dudley 2008).

- Ia - Strict nature reserve
- Ib - Wilderness area
- II - National park
- III - National monument or feature
- IV - Habitat and species management area
- V - Protected landscape or seascape.
- VI - Protected area with sustainable use of natural resources
- Not applicable/no classification

Onshore Protected Areas

Protected areas with IUCN categories I - IV were selected based on IUCN recommendations that no oil and gas extraction should occur in these protected areas. Protected areas that did not have a IUCN category but were designated “National Parks” were recategorized as IUCN category II to account for the gaps in reported attribute data. Duplicate and overlapping protected area features were removed before running the area-based analysis. This layer was overlaid with the haul zone layer to exclude Protected Areas within haul zones.

Tropical Moist Forest Cover

The forest cover area within the chip mill buffer zones was calculated by intersecting the JRC Tropical Moist Forest cover raster (Bourgoin et al., 2025) with the chip mill buffer layers, then summarizing the number of pixels within the buffers.

References

Chip Mills, Hutan Tanaman Energy Forests: Auriga, 2026.

Indigenous Territories: BRWA/AMAN, 2025.

Key Biodiversity Areas: BirdLife International (2025) World Database of Key Biodiversity Areas. Developed by the KBA Partnership: BirdLife International, International Union for the Conservation of Nature, American Bird Conservancy, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, Re:Wild (formerly Global Wildlife Conservation), NatureServe, Rainforest Trust, Royal Society for the Protection of Birds, Wildlife Conservation Society, and World Wildlife Fund. September 2025 version. Available at http://keybiodiversityareas.org/kba-data/request.

Tropical Moist Forest: European Commission (Undisturbed and degraded tropical moist forest 1982-2025) Available at: https://forobs.jrc.ec.europa.eu/TMF.

Satellite Imagery (Basemap): Esri. “World Imagery” basemap. Esri, Maxar, Earthstar Geographics, and the GIS User Community.

Satellite Imagery (PT Gorontalo Lestari): Planet Labs PBC. (June 2026). Tropical Normalized Analytic Monthly Mosaic, June 2026. Tropical Forest Observatory.

World Database of Protected Areas: UNEP-WCMC and IUCN (2026), Protected Planet: The World Database on Protected Areas (WDPA) [Online], April 2026, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net.