PLAN VIVO

PV Nature

Requirements for Approval of Data Analytic Providers

Version 1.0

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1 About Plan Vivo

1.1 Plan Vivo

Plan Vivo is a registered UK charity, based in Edinburgh, that supports vulnerable rural communities across the world to develop innovative nature-based solutions to reduce poverty, conserve important ecosystems and tackle climate change - through our stewardship of the Plan Vivo Standards.

1.2 The Plan Vivo Biodiversity Standard (PV Nature)

The Plan Vivo Biodiversity Standard (PV Nature) is a stand-alone certification which is a core set of social, environmental and governance requirements that projects must meet to become certified under PV Nature. PV Nature is aimed at generating high-integrity Plan Vivo Biodiversity Certificates (PVBCs) that deliver robust and credible benefits for nature but also deliver both social and climate benefits. PV Nature is fully aligned with the high-integrity principles developed by Plan Vivo, Fauna & Flora and Carbon Tanzania- ensuring holistic impact (for nature, climate and communities)[1]. Through a transparent and participatory approach ensuring equitable benefit-sharing for communities involved. Projects certified under PV Nature will generate PVBCs using the PV Nature Methodology. These are in line with the Nature Positive movement and buyers cannot use them as offsets.

Plan Vivo and in-country partners support communities and smallholders to pass the rigorous certification process. We thereby enable access to finance from ecosystems services and nature-based solutions, supporting community-led conservation and restoration to deliver impact for climate, communities and nature.

1.3 Certification route

To become certified against PV Nature, a project must submit a Project Design Document (PDD) that describes all elements of the project's design, including the biodiversity benefits that the project will achieve from its selected project interventions. To evaluate the outcomes they achieve for biodiversity, projects must apply the PV Nature Methodology using approved methodological tools for specific plant and animal groups and habitats.

[1] High level integrity principles for Biodiversity Markets

To ensure that best practice is followed, projects must either select tools for monitoring biodiversity from a pre-approved list or submit new tools for approval. All new, proposed methodological tools for application under the PV Nature Methodology, and their application by projects, must be reviewed by the Plan Vivo Technical Review Panel (TRP) and the Plan Vivo Secretariat for approval. This review process may add delays to the overall process.

1.4 The PV Nature Methodology

The PV Nature Methodology is the biodiversity quantification methodology for PV Nature, by which PVBCs are quantified, quality checked and assured. It sets minimum standards on (for example) biodiversity data quality and sampling protocols, and it defines the metrics via which biodiversity data is converted into numbers of PVBCs.

The PV Nature Methodology is founded on the principle that PVBCs will only be issued where there is high quality, auditable data that provides evidence of biodiversity outcomes. In other words, PVBCs are issued only where there is evidence that species and habitats have benefited.

Under the PV Nature Methodology, projects must collect and report data on a number of broad species groups, across a range of trophic levels (for example on birds, plants, amphibians, bats, and so on). It is not, for example, possible to issue certificates based on numbers of one iconic species or on simple measures like area of habitat, because these types of very simple indicators do not reliably represent ecosystem health.

The objective of the PV Nature Methodology is to assess change over time in a subset of site-level biodiversity that represents the overall trend in the health of the ecosystem. The purpose is to obtain a robust measure of change in biodiversity over time, rather than (for example) to take a complete census of every living thing on a site, or to categorically prove the presence or absence of a particular species or group. Biodiversity trends give us an indication of the health of ecosystems within a site: as biodiversity improves, so do the functionality, productivity and overall health of the ecosystem.

The PV Nature Methodology makes a number of design choices that aim to support the following objectives of PV Nature:

- To set a high standard in the emerging biodiversity market.
- To minimise subjective choices and therefore the potential for gaming in certificate calculation.
- To make nature markets as accessible as possible to different people, groups and projects, including Indigenous Peoples and local communities (IPLCs), by enabling high-quality monitoring that is affordable and feasible and does not necessarily require access to on-site ecologists.
- To be applicable across a broad range of ecosystem types and geographies.

2 Requirements for Data Analytics Providers

2.1 General requirements

Data Analytics Providers must demonstrate the expertise, capacity, and willingness to:

- Understand and comply with the latest version of the latest version of the PV Nature Methodology and Data Protocol.
- Measure biodiversity of within-system change (no use of reference sites or counterfactuals).
- Calculate year-on-year percentage change for each biodiversity metric known as *Pillar Metrics* (See section 2.3).
- Calculate year-on-year percentage change for *Pillar Metrics* 1-3 (See section 2.3) for a minimum of four broad taxonomic groups known as *Target Groups* , for terrestrial projects, either through internal processes or through third-party partners that adhere to these requirements.
- Process satellite imagery and remote sensing data to calculate year-on-year change *For Pillar Metrics* 4 and 5 (See section 2.3), either through internal processes or through approved third-party partners.
- Calculate the cumulative sum of the year-on-year percentage changes in the *Pillar Metrics* known as the *Multimetric* for restoration and conservation.
- Utilize open-source tools (primarily R packages) and ensure transparency in analytical processes.
- Collaborate with project teams to design appropriate monitoring approaches and provide project support to data collection and deployment if needed.

- Have the data, models, processes and the application of the *PV Nature Methodology* audited by an approved *Validation and Verification Body (VVB)* or *Independent Expert (IE)* (NDAs can be signed where necessary).

2.2 Sample Design

Data Analytics Providers must demonstrate the expertise, capacity, and willingness to:

- Generate habitat-stratified, randomized annual sampling plans for PV Nature projects in line with the requirements of the *PV Nature Methodology* including proportional representation including transition areas and avoiding edge effects.
- Ensure sampling plans support repeatability, spatial independence, and sufficient sample coverage.
- Produce species accumulation curves for each target group to track sampling effort.
- Integrate local knowledge into sampling plans and ensure field accessibility, safety and geographic constraints. Include sample point flexibility allowing a 100m tolerance for placement adjustments and updates for inaccessible locations.

2.3 Metric Calculation

Data Analytics Providers must be able to demonstrate expertise, capacity and willingness to compute the biodiversity metrics known as *Pillar Metrics* as described in the latest version of the PV Nature Methodology:

- **Species Richness (Pillar 1)**: Calculated using the Hill number (q=0) (Hill 1973) using the *iNEXT* function from the iNEXT package in R (Hsieh et al 2016).

- **Species Diversity (Pillar 2)**: Calculated using the Hill number (q=1) (Hill 1973), using the *iNEXT* function from the iNEXT package in R. Calculated separately per *Target Group* and then produce the summed results (Hsieh et al 2016).

- **Taxonomic Dissimilarity (Pillar 3)**: Calculate within-group (Delta*) and between-group (Delta+) dissimilarities using the *taxa2dist* function and the final metric with the *taxondive* function, both from the vegan package in R (Oksanen et al 2022). Global Biodiversity Information Facility (GBIF) should be used as the taxonomic backbone for species classification (GBIF Secretariat 2022).

- **Habitat Health (Pillar 4)**:

    - Terrestrial: Calculate from NDVI data using freely available Sentinel-2 Level-2A multispectural instrument data to estimate the NDVI values across the project area, and use freely available the Sentinel-2: Cloud Probability dataset to mask

out pixels with a high probability of cloud cover. Construct a mosaic using the median NDVI value for each pixel (corresponding to 100m2) of the site, where the median is calculated over a three-month period. Calculate the surface bearing index (SBI) using the *geodiv* package in R (Smith et al 2021).

- **Habitat Spatial Structure (Pillar 5)**:
    - Terrestrial: Calculate this metric at baseline and every 5 years thereafter. Use freely available Sentinel-2 satellite imagery to verify a polygon habitat map, classified by high or low intensity human use (see full PV Nature Methodology for classification information). Then convert the polygon habitat map into a raster at resolution of $10m^2$. Finally, calculate connectivity using CPLAND index using the *lsm_c_cpland* function from the *landscapemetrics* package in R (Hesselbarth et al 2019).
- ***Multimetric*** **:** Calculate the cumulative sum of the year-on-year percentage change in each of the pillar metrics described above for both restoration and conservation certificates in line with the latest version of the *PV Nature Methodology*.

2.4 Data Processing

Data Analytics Providers must have the expertise, capacity, and willingness to create processes for data processing that uses external experts to perform model training and quality control checks on the models:

- **Data Labelling**
    - If data labelling is required prior to processing through machine-learning models, data labelling should be performed by human experts with knowledge of the species present in the project area/ecosystem, preferably with the option for project's to put forward local experts.
    - If pre-existing models are used, then provider's should have the ability to explain whether it has been improved or adapted to suit the needs of the project.
- **Data Quality Control**
    - After processing through machine-learning models, the data output should undergo quality control through which those labels or tags are checked for accuracy. This quality control approach must be reported and ideally performed by human experts who do not have an conflict of interest with the project, however where possible from local experts with knowledge on the project area.

2.5 Data Ownership and Usage

Data Analytics Providers must demonstrate the expertise, capacity, and willingness to ensure that:

- Project raw data remains ownership of the project and/or local community.
- Project raw data containing human information should be removed prior to data analysis.
- Project raw data is not used for machine learning algorithm development and training without written permission from the project.
- No data in either raw or processed form even in anonymised or aggregated form can be sold or made available to third parties without written permission from the project unless for the sole purpose of delivering the services of [credit calculation].
- Where applicable (and possible), all data will be managed in adherence to local, national or international law.
- If when given written notice, the Project no longer want to proceed, they have the ability to terminate the data analysis agreement. In which case, no rights would be assigned, transferred, charged, subcontracted, declared a trust over or dealt with in any other manner other than what is required for termination.

3 Data Analytics Providers Approval Process

Data Analytic Providers must be approved by the Plan Vivo Secretariat prior to the start of any data analysis for the calculation of a biodiversity baseline or calculation of Plan Vivo Biodiversity Certificates (PVBCs) for certified PV Nature projects. Data Analytic Providers may apply at any time to conduct data analysis for PV Nature projects. The application form can be found on the Plan Vivo website and should be submitted to biodiversity@planvivofoundation.org.

During the application process, Plan Vivo may request the approved data analytic providers to develop a sample report to showcase their ability to calculate the *Pillar Metrics* and *Multimetrics* using a test or simulated dataset to produce a report.

4 Conflicts of interest

Data Analytic Providers must disclose any potential conflicts of interest that could affect their ability to independently calculate biodiversity baselines or PVBCs for PV Nature certified projects before providing services to a PV Nature project for the first time.

Additionally, Data Analytic Providers will need to sign a conflict of interest form with Plan Vivo to make this declaration.

5 References

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