Malaysia: Assessing Net Positive Impact of a Nature-Based Solutions Project

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ABSTRACT

"Net positive impact" has become a defining promise of nature-based solutions (NbS), making its assessment and monitoring critically important. Conventional environmental and social impact assessments (ESIAs) capture baseline and immediate impacts, but rarely the long-term human and ecological trajectories that define a project's real legacy.

In Malaysia, SIAs are not a legal requirement while EIAs only apply to certain forestry and agricultural projects – not conservation. The Pahang Peatland Restoration Project (PPRP) — a 59-year initiative to restore and conserve tropical peat swamp forest in Malaysia — illustrates how NbS projects can institutionalize continuous impact assessment through adaptive management and participatory monitoring. Instead of outsourcing a one-off ESIA, the project invests in internal capacity to understand the landscape, engage communities, and apply iterative learning aligned with Verra's VCS and CCB Standards.

Through detailed monitoring, transparent reporting, and active community involvement, the project integrates free, prior, and informed consent, grievance redress mechanisms, and public comment protocols into daily operations. Each carbon credit issuance becomes a checkpoint of reassessing impact, ensuring accountability and continuous improvement.

By embedding IA into the project's governance, PPRP demonstrates that long-term NbS initiatives must evolve with the people and ecosystems they serve. Net positive impact, therefore, is not a static outcome — but a dynamic process sustained through transparency, inclusion, and adaptive management.

KEYWORDS

Nature-based solutions;
Net positive impact;
Free, prior and informed consent;
Participatory assessment;
Monitoring, reporting and verification;
Adaptive management

1. INTRODUCTION

While "do no harm" is the key principle in natural climate solutions or nature-based solutions (NbS), "net positive impact" to community and biodiversity has become a defining promise in this category of GHG emission reduction or removal programs.

Environmental and Social Impact Assessments (ESIAs) have historically served as the primary tool for measuring impact. However, they are limited by their static nature, typically executed as front-end compliance exercises that rarely capture the non-linear, multi-decadal trajectories of nature and social dynamics, or science, policy and financial evolutions [21]. For NbS projects with long duration to ensure permanence of carbon sequestration [16] – often spanning several human social generations – the paradigm must shift from a discrete regulatory procedure to a continuous, integrated process.

This paper examines the Pahang Peatland Restoration Project (PPRP) in Malaysia as a case study for institutionalising continuous impact assessment through participatory monitoring and adaptive management. It asks three questions: (1) how impact assessment can be redesigned as a continuous process for multi-decadal NbS projects; (2) how local communities can be involved in monitoring of impact, and (3) what safeguards keep internally generated monitoring data credible to communities, regulators and carbon markets alike. Section 2 reviews the literature on net positive outcomes, adaptive impact management, participatory monitoring and impact assessment regulations; Section 3 describes the case and methodological approach; Section 4 presents results and discusses these against the literature; and Section 5 concludes with recommendations.

2. LITERATURE REVIEW

The conservation science argues that biodiversity policy should move from targets focused narrowly on avoiding

losses toward processes that track net outcomes wherever human activity occurs, with losses and gains quantified within a single transparent framework [1]. The impact assessment literature echoes this, arguing that "enhancement" should be placed at the top of the mitigation hierarchy rather than as an option once avoidance, minimisation and compensation are exhausted. Conventional impact assessment lens has tended to focus on "controlled loss," in which offsetting neutralises damage rather than generating a genuine surplus for nature [19]. Net outcomes are difficult to operationalise without standardised measurement. Some researchers proposed that nature and ecosystem accounting such as the UN System of Environmental-Economic Accounting framework can record gains and losses to natural capital in physical or combined terms, scalable from a single protected area to an entire country, without forcing all indicators into one contested metric [3]. Other assessment frameworks proposed in the literature for NbS include Strategic Environmental Assessment (SEA) [21], Lifecycle Assessment and Cost-Benefit Analysis, although these are primarily positioned as ex-ante evaluation tools [5].

Often, impact assessment and the follow-up monitoring fail to inform project implementation and management. Researchers working on adaptive social impact management (ASIM) propose a four-stage cycle of profiling, learning, planning and implementing, noting that organisations frequently collect data without a clear rationale for how it should influence management decisions [15]. This motivates embedding impact assessment within recurring operational cycles, such as Monitoring, Reporting and Verification (MRV) systems underlying voluntary carbon markets [2], rather than a discrete compliance exercise.

A study presented evidence that monitoring data collected by the communities can be as reliable as externally collected data while costing less, generating positive outcomes for participants such as knowledge co-production and trust-building [6]. Recent synthesis work cautions that these benefits depend on how the relationship is structured: participatory monitoring is only meaningful when genuinely co-designed that feeds into co-management, and poorly designed schemes risk becoming little more than an exercise in extracting data from communities [23]. Relatedly, the wider social impact assessment literature finds that even peer-reviewed studies rarely disaggregate findings by social group or let communities influence which impacts are assessed, and disproportionately focus on economic outcomes over political, cultural and governance dimensions of well-being [7].

Proponents of citizen science and internal capacity-building argue it empowers local communities and lowers costs relative to external consultancy [4]. However, critics warn of the conflict of interest in self-monitoring, which can lead to “carbon-washing” or “green-washing” when companies selectively report data in the absence of a mandatory external framework [13]; this is sharpened by evidence that corporate carbon credit claims are not always clearly defined [24], and that voluntary carbon markets carry structural flaws of their own [18].

Comparative regulatory scholarship situates Malaysia's ESIA regime against more integrated models. Canada's *Impact Assessment Act* mandates consideration of both positive and negative impacts [12]; Indonesia's Ecosystem Restoration Concessions require long-term management plans and continuous monitoring under a National Registry System [17]; and the EU's *Nature Restoration Law* binds member states to continuous monitoring of recovered ecosystems [8].

3. METHODOLOGY

This paper uses a single, in-depth case study design to examine how impact assessment can be institutionalised as a continuous process within a large-scale NbS project: the Pahang Peatland Restoration Project (PPRP), a 59-year initiative (2024–2083) conserving and restoring tropical peat swamp forests in Peninsular Malaysia. The project’s zone of influence covers approximately 125,641 ha, comprising a Use Permit Area (UPA) of 96,569 ha of permanent reserved forest, which includes an Initial Project Area of 74,772 ha dedicated to generating carbon credits. The landscape is home to approximately 6,600 Indigenous Orang Asli Jakun people across eleven villages, and supports 29 rare, threatened, and endangered flora and fauna species, including four critically endangered, 11 endangered, and 14 vulnerable species. The project is in the process of certification under the Verra Verified Carbon Standard (VCS) and Climate, Community & Biodiversity (CCB) Standards [10].

Data were drawn from primary project documentation, including the Project Description Document prepared for Verra VCS and CCB validation [10] and the Monitoring Reporting prepared for verification [9], supplemented by secondary academic and regulatory literature on net positive outcomes, adaptive impact management, participatory monitoring, and comparative environmental law. The analysis proceeds in three steps: examining the project's negative-impact identification and mitigation systems (high conservation values screening, stakeholder consultation and grievance redress mechanism); its positive-impact and co-benefit design (how interventions map against explicit counterfactual baselines; community

development and biodiversity management programs); and its community consent and participatory monitoring architecture. Each dimension is read against the literature in Section 2 and against Malaysia's domestic legal framework. This comparative reading is the primary analytical method: rather than statistically testing outcomes, the paper triangulates project documentation against published theory and comparative law to evaluate institutional design.

4. RESULTS AND DISCUSSION

4.1 Continuous rather than one-off assessment. Carbon credit production involves multiple steps: feasibility study, securing of management rights, stakeholder engagement and obtaining free, prior, informed consent (FPIC), project design, validation audit and registration; then a recurring loop of monitoring, public comment, verification audit and credit issuance. A carbon project has to embed assessment of net positive impact within its MRV cycle rather than a one-off ex-ante compliance exercise [10]. Unlike a conventional ESIA, this cycle repeats ex-post before every credit issuance. This is consistent with the ASIM literature's call for monitoring data to be fed back into management [15]: each credit issuance forces a structured return to baseline data, requiring the project management to ask whether net outcomes have been genuinely positive since the last reporting period. Rather than relying solely on external consultants, the PPRP trains employees to conduct daily monitoring, with every credit issuance acting as a checkpoint verified by independent auditors from a Verra-accredited validation and verification body [10]. See Appendix for PPRP's impact assessment and monitoring plan.

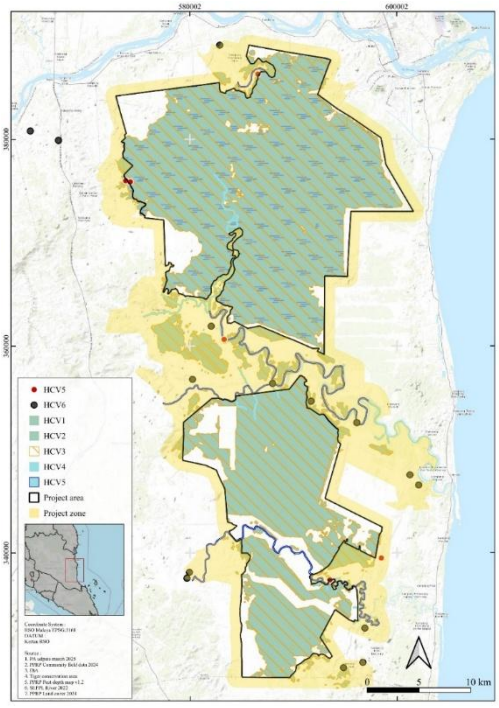

Figure 1: HCV Assessment of Pahang Peatland Restoration Project (subject to Verra validation)

4.2 Negative-impact identification and mitigation. The PPRP applies high conservation value (HCV) approach as an ex-ante ESIA screening tools, identifying 63,901 ha of natural forest under HCV1 species diversity criteria, 41,168 ha of landscape-level ecosystem under HCV2, and 82% of the UPA qualifying as habitat for rare, threatened or endangered species under HCV3. Most of the UPA (the peat swamp forest and the rivers) is identified as HCV4, providing ecosystem services to local communities and global citizens, whereas selected areas are identified jointly with the local communities as HCV5 with resources to meet community needs and HCV6 as areas with cultural values [10] (See Figure 1).

Exploratory assessment of risks, costs and benefits were conducted after project activities were explained to the local communities in public consultations events where stakeholders of the project are identified; this is phase 1 of the FPIC process. Detailed participatory impact assessment with individuals or community groups affected is phase 2 of the FPIC process. For those assessed to be negatively impacted by project activities, phase 3 FPIC which involve formal consent with benefit-sharing to compensate for the impact will be conducted before any project activity is implemented. (See Figure 2.) The PPRP employs a negative-impact-avoidance-first principle in project design, with modification of project activities as a mitigation option at each phase of FPIC. Negative impacts are also identified and addressed through a three-stage grievance redress mechanism with escalation from direct resolution with the complainant to third-party mediation to legal action [10]. This staged, time-bound system guards against the "green colonialism" that has historically accompanied conservation enclosures [8].

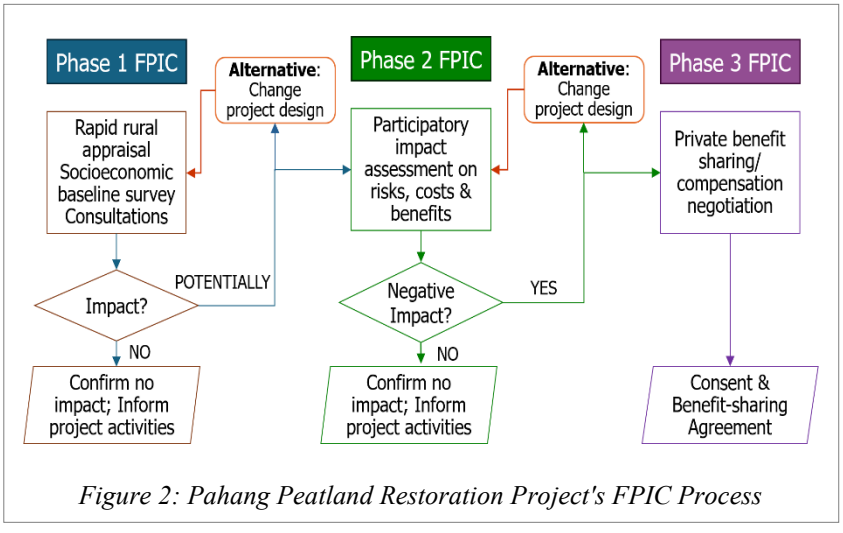

Figure 2: Pahang Peatland Restoration Project's FPIC Process

4.3 Positive-impact design against explicit counterfactuals. Net Positive Impact is achieved by embedding co-benefits into the project's theory of change, linked to the UN Sustainable Development Goals [5], and comparing outcomes against an explicit "without-project" baseline for each domain. On climate impact, interventions including canal blocking and fire-hotspot monitoring are designed to avoid an estimated 174 million tCO_2e cumulatively, remove a further 11.8 million tCO2e through reforestation, thus achieving an annual average reduction of 3.1 million tCO2e against a counterfactual of continued logging-driven biomass loss that also leads to drainage of peatland and conversion of forest to agriculture. On community impact, livelihood assistance and learning hubs address declining forest-based income, monitored every five years; on biodiversity, secured use rights and anti-poaching patrols address habitat loss, monitored through transect surveys, and camera trapping [10]. This design is consistent with calls for frameworks that compare interventions against a defined baseline rather than reporting outcomes in isolation [1], and its granularity is broadly compatible with the disaggregated, multi-account approach proposed in the nature capital accounting literature [3] and the IUCN Global Standard for Nature-based Solutions [14].

4.4 Participatory assessment and internal monitoring. The PPRP's three-phase FPIC process is an iterative process that requires an ongoing relationship across its communities. Participatory impact assessment records not only real but also perceived impacts. It also monitors unintentional risks caused by project activities as the ecosystem recovers and human-nature relationship evolves. The PPRP builds internal capacity to carry out this continuous monitoring tasks, verified externally only at credit issuance. While this hybrid model lowers cost and builds local capacity [4], it shares the vulnerability the carbon-washing literature identifies: verification occurs periodically rather than continuously.

4.5 Regulatory fit. Malaysia's *Environmental Quality (Prescribed Activities) (EIA) Order 2015* makes EIAs mandatory for logging and agriculture but exempts nature conservation and restoration, and SIAs are not a general legal requirement outside sector-specific guidance [11]. This contrasts with Canada, Indonesia and the EU, where statutory frameworks mandate continuous or long-term monitoring [12, 17, 8]. By voluntarily adopting Verra and CCB standards, the PPRP fills this domestic "regulatory blind spot", but its assessment obligations rest on private contractual commitments to a carbon registry rather than statutory law. A government-led Integrated Management Plan put in place in 2007 is akin to a landscape-level SEA [21], but it requires updating to reflect the shift in land use from logging to conservation and restoration, and to assess impacts under this new trajectory.

5. CONCLUSION

The Pahang Peatland Restoration Project demonstrates that Net Positive Impact is not a static scorecard but a dynamic, living process [1]. By embedding impact assessment within its MRV cycle, comparing outcomes against explicit counterfactuals followed by adaptive management, and sustaining FPIC across the project lifecycle, the PPRP moves substantially beyond the one-off compliance model conventional ESIAs represent [19].

It is thus recommended that regulatory reform should expand Malaysia's ESIA framework to include large-scale NbS projects, utilising innovative approach such as landscape-level SEA and continuous monitoring. This should also include social and biodiversity indicators, drawing on suitable environmental-economic monitoring or accounting standards to track net positive impact over multi-decadal timelines.

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Appendix: Simplified PPRP Impact Assessment & Monitoring Plan

Baseline	Without Project Scenario	Intervention	Impact Assessment & Monitoring
Climate Impact			
Intact peat swamp forest	Logging impact projected from historical biomass loss after similar logging	Secure use rights for carbon project, replace revenue from logging	Deforestation monitoring with earth observation technology, ground patrol conducted daily.
Degraded peat swamp forest	Various rates of regeneration affected by peat subsidence & fire	Reforestation	Natural regeneration and actively replanted area monitored monthly.
	Encroachment for agriculture purpose	Patrol to prevent encroachment	Ground patrol conducted daily; ongoing social fencing.
Drained peatland	Susceptible to peat and forest fire	Canal blocking to rewet peatland	Hydrology and weather pattern monitoring to assess fire risk and monitor impact of rewetting.
		Fire prevention and suppression	Fire hotspot monitoring with earth observation technology, ground patrol conducted daily. Burnt scar measurement.
Community Impacts			
Indigenous peoples living in poverty	Reduced income source from forest	Capacity building & livelihood assistance programmes	Outcome monitoring of capacity building and livelihood initiatives; Quantitative survey for long-term well-being indicators every 5 years.
Low education level	School dropout	Community learning hub Education assistance	
Poor well-being	Social ills	Healthy pastimes e.g. sports, handicraft	
	Disappearing culture	Cultural festivals & events	
Unintentional risks: • Noise, air, water pollution from patrolling, fire suppression, biodiversity monitoring and canal-blocking operations • Altered hydrology on agriculture land • Economic impact due to stoppage of logging			Participatory assessment and joint monitoring; Accessible grievance mechanism
Biodiversity Impact			
Intact & degraded peat swamp forest	Logging, fire, destruction of habitat	Secure use rights for carbon project, replace revenue from logging	Deforestation monitoring with earth observation technology, ground patrol conducted daily.
Rivers & forests as habitat for flora & fauna	Over-fishing & hunting & NTFP gathering	Awareness campaign for indigenous users; Patrolling & enforcement for anti-poaching	Biodiversity monitoring with fixed-transect visual encounter survey, camera trapping, fish biodiversity monitoring pre- and post-intervention.
Unintentional risks: • Offsite biodiversity impact			Participatory assessment and joint monitoring; Accessible grievance mechanism