Green Growth Consultants

FEASIBILITY STUDY FOR BALOCHISTAN CARBON OFFSET PROJECT

Project Risks and Options Analysis Report

JUNE 17, 2025

EXECUTIVE SUMMARY

This report assesses the viability of a Public-Private Partnership (PPP) framework to implement a Afforestation, Reforestation, and Revegetation (ARR) project across six coastal mangrove sites in Balochistan. The primary objective is to identify feasible PPP modalities that align with provincial capacities, carbon market mechanisms, and community co-benefits, ultimately supporting BPPPA in selecting an appropriate implementation pathway.

To achieve this, the report explores a range of PPP modalities including service contracts, Operations and Maintenance (O&M) contracts, Build-Transfer (BT) schemes and Build-Operate-Transfer (BOT) modality with its similar arrangements. These models are assessed based on their respective strengths and limitations and are supplemented with global case studies to provide practical insights for application in the provincial context.

The analysis then highlights implementation pathways, suggesting exploration of Build Operate Transfer (BOT), and its similar arrangements with the exclusion of a Design-Build (DB) approach since it does not qualify under the definition of a PPP. It further suggests the integration of revenue-sharing streams and substantiates the case with Delta Blue Carbon (DBC-I) as a reference case for project development.

A comprehensive risk assessment follows, covering operational, legal, regulatory, financial, environmental, and community-level. Additionally, comprehensive and corresponding mitigation strategies are outlined, along with an estimated budget to ensure risk minimization and project continuity.

In conclusion, the report lays out potential implementation options under the PPP modality, providing a detailed guide for BPPPA to decide and adopt a suitable pathway for launching the province's first nature-based carbon offset project.

CONTENTS

TABLES

FIGURES

ACRONYMS

ADB – Asian Development Bank

ARR – Afforestation, Reforestation, and Revegetation

BOO – Build Own Operate

BOT – Build Operate Transfer

BT – Build Transfer

BFCF – Balochistan Forest Carbon Fund

BPPPA – Balochistan Public Private Partnership Authority

DB – Design Build

DBF – Design, Build and Finance

DB – Design, Build and Maintain

DBFO – Design, Build, Finance and Operate

DBFOMT – Design, Build, Finance, Operation and Maintenance, Transfer

EIA – Environmental Impact Assessment

ELC – Economic Land Concession

ESMF – Environmental and Social Management Framework

FGRM – Feedback and Grievance Redress Mechanism

FIDIC – Fédération Internationale des Ingénieurs-Conseils

FREL – Forest Reference Emission Level

FWD – Forest & Wildlife Department (Balochistan)

GCF – Green Climate Fund

GEF – Global Environment Facility

IRR – Internal Rate of Return

MRV – Measurement, Reporting, and Verification

MoCC – Ministry of Climate Change (Federal)

NbS – Nature Based Solution

NDC – Nationally Determined Contribution

NGO – Non-Governmental Organization

NPV – Net Present Value

PDF – Project Development Facility (Provincial)

PES – Payment for Ecosystem Services

PPP – Public-Private Partnership

PRMC – Provincial REDD+ Management Committee

RBF – Results-Based Financing

REDD+ – Reducing Emissions from Deforestation and Forest Degradation

ROO – Rehabilitate Operate Own

SESA – Strategic Environmental and Social Assessment

SIS – Safeguard Information System

SLMS – Satellite Land Monitoring System

SPV – Special Purpose Vehicle (Concessionaire)

TAFF2 – Tropical Asia Forest Fund 2

VCS – Verified Carbon Standard (Verra)

VGF – Viability Gap Fund

VVB – Verification and Validation Body

1. INTRODUCTION

The Balochistan Carbon Offset project aims to develop a carbon market project on Afforestation, Reforestation and Revegetation (ARR) across mangrove sites on the coasts of Lasbela and Gwadar in Balochistan province of Pakistan. The potential area spans 34,351 ha across the sites Sonmiani Khor, Jiwani Khor, Kalmat Khor, Sawar Khor, Sahidi Khor, Shabi and Ankara Creeks. The project envisions the inculcation of environmental resilience and regeneration across mangrove ecosystems in the province, significantly contributing to socio-economic upliftment, and generating critical carbon finance through generation of carbon credits. The development of a viable ARR project as a carbon market project is critical for the province.

To do so, this report aims to identify and assess potential avenues, exploring the prospects of a Public Private Partnership (PPP) modality. Therefore, this report is prepared to explore innovative, financially viable, and legally sound implementation options for the planned project under. Its objectives include:

- Assess various implementation scopes and models under a Public-Private Partnership (PPP) framework and evaluate their feasibility under Balochistan's legal and regulatory landscape;
- Examine relevant global modalities for PPP-based carbon projects to provide an overview of international practices and key experiences to elevate the project design;
- Identify potential project risks, responsible actors, and propose practical mitigation strategies tailored to Balochistan.

The aim of this report is to guide the project proponents as they navigate the options that exist in the development a carbon market project, and ensure alignment with Pakistan and Balochistan's context, especially the legal and regulatory landscape and identify potential and viable ways forward. Additionally, it also aims to provide proponents with a holistic and comprehensive idea of potential risks, while identifying key responsible agents and mitigation measures to ensure effective project planning and design.

2. OPTIONS ANALYSIS

This section shall explore potential options that are viable under the Public Private Partnership (PPP) modality for project development. The discussion below lays the groundwork on understanding what PPPs are, why are they prioritized, and how they facilitate in project development.

2.1 OVERVIEW

An effective project mechanism and procurement method is essential for the success of a project. It is critical to identify viable way forward to ensure a smooth and successful project delivery. In this regard, options to be noted include traditional procurement, privatization and public-private partnership (PPP). A brief comparison is made below:

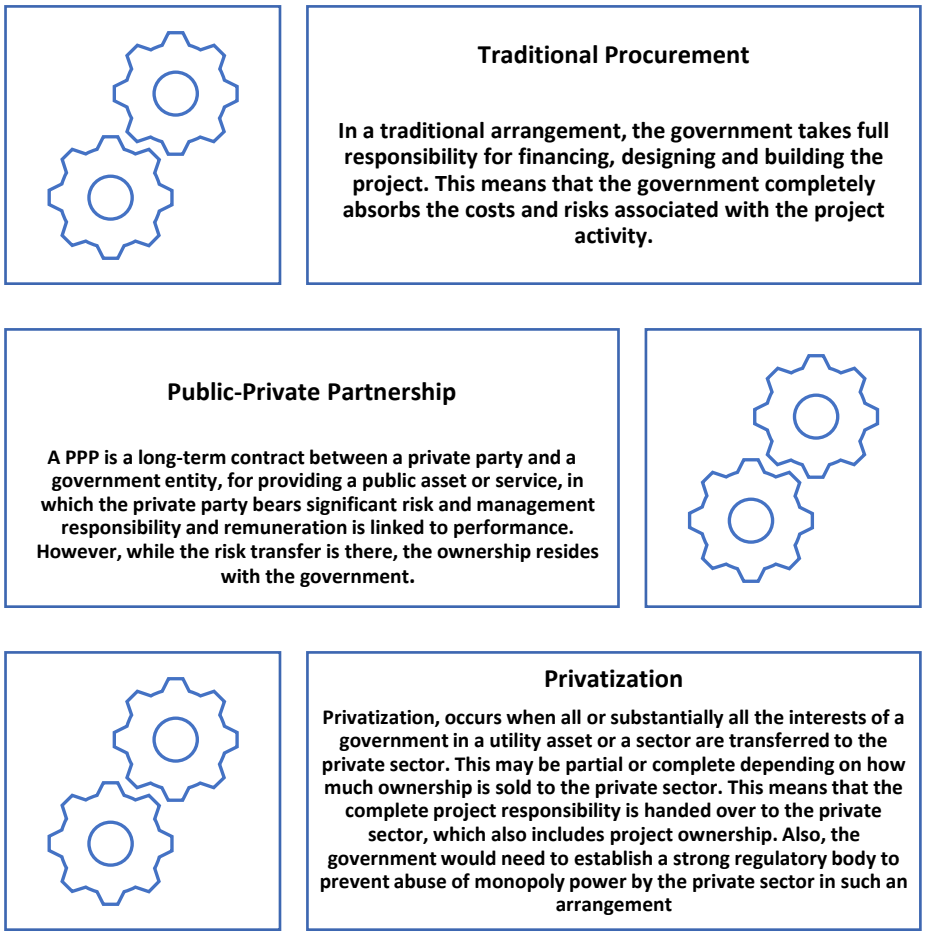

FIGURE 1: Procurement Options[1] [2] [3] [4]

[1] https://crocusoft.com/en/Blog/Details/public-private-partnership-1

[2] https://ppp.worldbank.org/public-private-partnership/what-ppp-defining-public-private-partnership

[3] https://ppp.worldbank.org/public-private-partnership/agreements/full-divestiture-privatization

[4] https://www.ppiaf.org/sites/ppiaf.org/files/documents/toolkits/highwaystoolkit/6/pdf-version/5-36.pdf

The preferred method for this project is the Public-Private Partnership (PPP) avenue. As per the Balochistan PPP Policy 2021[5], PPPs are avenues that typically involve the sharing of risk and management responsibilities and provision of assets and services that are traditionally provided by the Government. PPP contracts typically involve a long-term commitment to provide infrastructure or address service delivery gaps, either for new or existing assets and services that are traditionally provided by the government. Besides the duration of a contract and the type of asset or service involved, PPPs vary in several other dimensions as well. Notable aspects include but are not limited to the involvement of the private party, payment mechanism, and level of ownership of the asset involved. PPP contracts typically involve the sharing of risk and management responsibilities and provision of assets and services that are traditionally provided by the Government. PPP varies from traditional procurement as:

- PPP projects typically have a minimum level of commercial viability.
- Private sector generally mobilizes finances for PPP projects, especially in case of infrastructure projects.
- Risk allocation is more complex in PPP projects. Private party often bears major but pre-determined risks.
- PPP projects typically have longer tenures than normal procurement projects.
- PPP is not full privatization either. The later involves the transfer of ownership permanently to the private party and involves minimal regulatory role for government.

Since the project activity is anticipated to be developed on government owned land, has significant risks and is capital intensive, a desire would be for sharing the project risks, pooling in capital and retaining project ownership. For such metrics, the PPP modality proves to be the most viable option amongst the three.

2.2 PPP LANDSCAPE AND PROVINCIAL DYNAMICS

The Balochistan Public Private Partnership Act, 2021[6] and the Public-Private Partnership Policy 2021 are the legal instruments, providing the legal basis for facilitating PPP projects and efforts. Its objective is to create an enabling environment for private sector participation in the

[5] https://bpppa.gob.pk/wp-content/uploads/2023/12/Balochistan_PPP_Policy_2021.pdf
[6] https://bpppa.gob.pk/wp-content/uploads/2023/12/2021-12-10_09_04_31_c2b20.pdf

provision of infrastructure projects and delivery of related services in Balochistan through public private partnership projects. The act defines PPP as a commercial transaction between the Implementing Agency, meaning the government agency, and a concessionaire, meaning the successful bidder that will enter into PPP Agreement with the Implementing Agency through a formal arrangement and will undertake the project.

The act comments on the role of the government in the project activities citing that they are responsible for providing various forms of support for PPP projects, including administrative assistance in obtaining licenses and clearances, provision of utility connections and land acquisition, asset-based support through use of public assets, government equity contributions, compensation for government-controlled actions, guarantees to enhance creditworthiness, financial assistance via the Viability Gap Fund (VGF), which is direct financial assistance for projects which are economically and socially viable but may not be viable financially, availability-based annuity payments, risk guarantees (e.g., force majeure, demand, off-take risks), and potential tax exemptions, all subject to applicable approvals and conditions, and clearly indicated in the bidding documents and draft PPP Agreement. Discussing financing streams, the act recognizes multiple sources to pool in project capital, such as grants from the Government, grants and donations from the international donor agencies, revenue share and income from PPP Projects etc.

Referring to the structural arrangement under this modality, the act cites *"The arrangement may take the form of a 'Special Purpose Vehicle' or any other arrangement as the case maybe. The Concessionaire sponsors shall be required to maintain their respective shareholding in a PPP project. The specific conditions under which a change in shareholding may be allowed shall be prescribed in the PPP Rules made under this Act".* Figure 2 below explains how this structure works under a PPP modality.

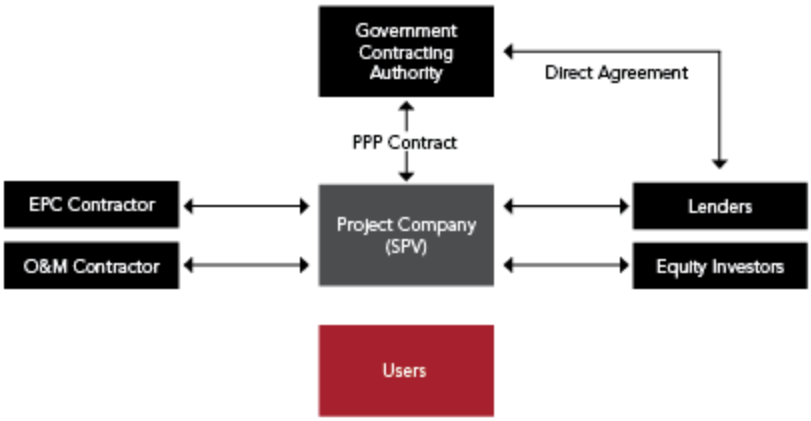

Figure 2: Typical PPP Project Structure[7].

This infographic illustrates the typical contractual relationships within a Public-Private Partnership (PPP) project. At the core, a Project Company (often a Special Purpose Vehicle or SPV) enters into a PPP Contract with a Government Contracting Authority. This Project Company is funded by both Lenders (providing debt) and Equity Investors (providing equity). The Project Company then contracts with an EPC (Engineering, Procurement, and Construction) Contractor for the construction phase and an O&M (Operations and Maintenance) Contractor for the operational phase. The government's primary contractual relationship is with the project company. This may be complemented by a direct agreement between contracting authority and lenders thereby providing comfort and step-in rights to the lenders. Ultimately, the project serves the Users, who benefit from the services or infrastructure delivered by the Project Company.

2.3 UNDERSTANDING THE PPP PROCESS

Having understood the structure and dynamics, it would be essential to delve into the process followed to observe how the Government of Balochistan aims to ensure approval processes and procedures are efficient and friendly for private sector. The steps below guide on this process:[8]

[7] https://ppp.worldbank.org/public-private-partnership/finance-structures-ppp

[8] https://bpppa.gob.pk/wp-content/uploads/2023/12/Balochistan_PPP_Policy_2021.pdf

2.3.1 PROJECT INITIATION AND DEVELOPMENT

PPP Authority will identify and originate potential projects that may be implemented under the PPP model. These projects will be identified from PPP Investment Plan, sectoral plans, annual development plans, and provincial and national development frameworks and policies. Tentative PPP projects will be identified based on 'Value for Money (VFM) analysis and the impact on improving public access to infrastructure and services. PPP Authority will prepare concept notes for identified projects and submit them to its 'Executive Committee' to be established by the PPP Board for review, approval, and access to 'Project Development Facility' funds for projects with a cost of up to PKR 50 million. For projects where funds required from PDF exceed PKR 50 million, the PPP Authority shall seek approval of the PPP Board via the PPP Unit.

2.3.2 TRANSACTION ADVISORS

Transaction advisors will be hired to conduct detailed feasibility studies initially and, in a case, where the project is viable, prepare all project documents, including but not limited to a detailed feasibility study, financial model, environmental risk assessment, the quantum of Government support required if any and draft PPP agreement. These project documents shall be submitted by the PPP Authority to the PPP Unit for review. After due review process and risk assessment, the PPP Unit shall submit the same to the PPP Board for consideration and approval with its recommendations and comments. Public sector authorities or companies with functional Boards may also submit PPP projects to the PPP Unit for consideration, review, and onward submission to the PPP Board for approval. Those PPP projects whose cost is less than PKR 300 million and don't require any VGF may be undertaken by the concerned Government Agency on its own without having to be presented to the PPP board for approval.

2.3.3 THE APPROVING BODIES FOR PPP PROJECTS

Table 2.1 below enlists the approving forum for range of project activities as per their cost:

Table 2.1: Approving bodies for PPP projects

Range of Projects	Approving Forum
PPP projects with a cost up to PKR 300 million and involving no VGF component.	Concerned Government Agency
PPP projects with a cost between PKR 300 million and PKR 5 billion.	PPP Board
PPP projects whose: • Total cost exceeds PKR 5 billion or • Involve VGF component of PKR 500 million or more or • Lease of asset or land worth PKR 500 million or more or • Contingent liabilities worth PKR 500 million or more or • Provincial Guarantee worth PKR 500 million or more	Provincial Cabinet on the recommendation of the PPP Board

Upon approval of a PPP project by the competent forum, the concerned Implementing Agency may proceed to Selection of the Concessionaire through open competitive bidding.

2.3.4 SELECTION OF THE CONCESSIONAIRE

Once project documents are approved by the Board or the Provincial Cabinet, as the case may be, the Implementing Agency will move towards project procurement. The guidelines for procurement and criteria for evaluation of bids will be explained in detail in the PPP rules. Upon conclusion of the bidding process, the PPP Authority will share results with the 'Executive Committee' for review and approval and announce results of the bidding and enter into formal negotiations with the selected private party.

Subject to approval of the PPP Board and the Cabinet and any other approvals required by the law, the requirement related to open competitive bidding may be waived in case a project is undertaken as a result of a direct arrangement or Agreement of the Government with a foreign state or states.

2.3.5 NEGOTIATION OF PPP AGREEMENT

After completion of the bid evaluation, a 'Negotiation Committee' led by the Implementing Agency with representation from PPP Unit will negotiate the contract and all the terms and conditions with the successful bidder. If there are any amendments in the terms of the draft agreement, the re-negotiated draft agreement will be shared with the PPP Board for final approval.

2.3.6 PROJECT IMPLEMENTATION

The PPP Agreement shall be executed by the Implementing Agency with the Concessionaire through a formal arrangement as laid down in the finalized PPP Agreement.

2.3.7 PROJECT MONITORING & EVALUATION

The Implementing Agency will be responsible for monitoring and evaluating the PPP project during its construction and operation period to ensure its conformity with the plans, specifications, performance standards and tariffs in the PPP agreement. The Implementing Agency will submit quarterly progress reports for the PPP project to the PPP Unit. The complete process is summarized as illustrated in figure 3 below:

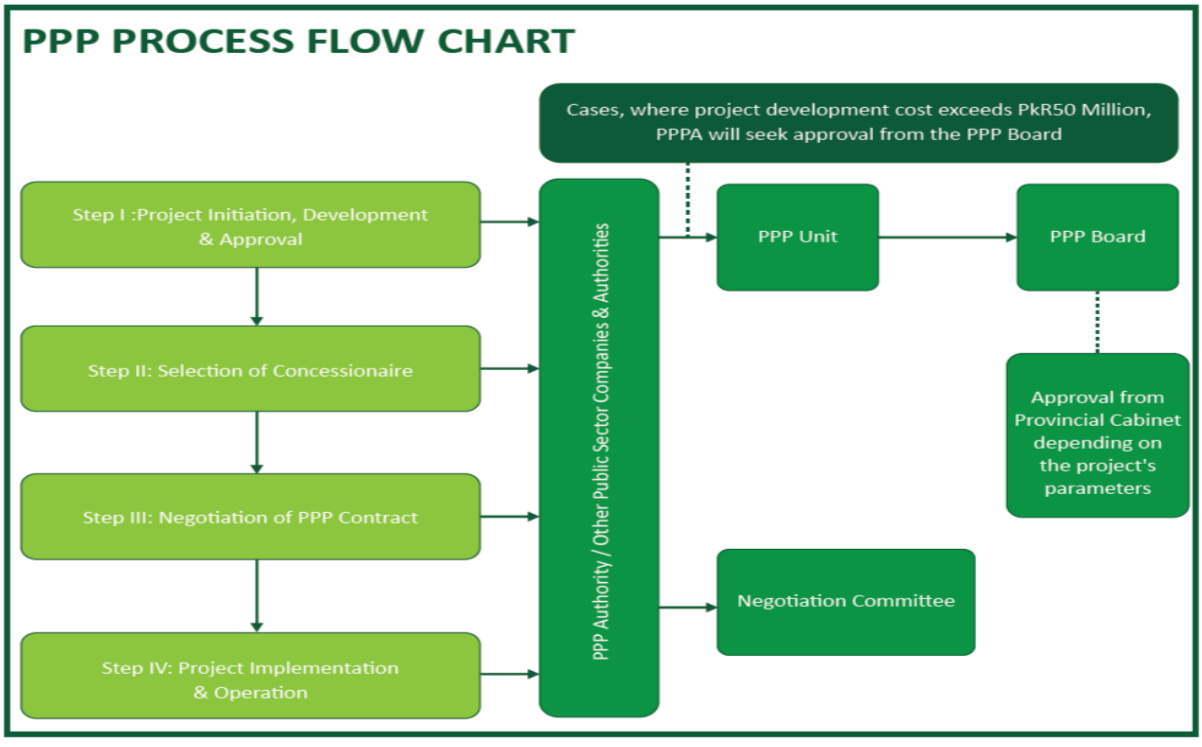

Figure 3: PPP Process Flow Chart

2.4 PPP IMPLEMENTATION MODELS FOR PROJECT DEVELOPMENT

Having understood the legal landscape and PPP process of Balochistan, it is important to understand a suitable PPP modality that should be considered for the project activity. The discussion below highlights the most common modalities for project execution under PPPs[9]. It is critical to understand, however, that the Balochistan Carbon offset Project is a carbon market project focusing on ARR and nature based efforts, not involving any construction or building. Hence, 'construction' would indicate plantation activities while operations indicate project management.

2.4.1 SERVICE CONTRACTS

Under a service contract, the government (public authority) hires a private company or entity to carry out one or more specified tasks or services for a period, typically 1–3 years. The public authority remains the primary provider of the infrastructure service and contracts out only portions of its operation to the private partner. The private partner must perform the service at the agreed cost and must typically meet performance standards set by the public sector. Governments generally use competitive bidding procedures to award service contracts, which tend to work well given the limited period and narrowly defined nature of these contracts. Under a service contract, the government pays the private partner a predetermined fee for the service, which may be based on a one-time fee, unit cost, or other basis. Therefore, the contractor's profit increases if it can reduce its operating costs, while meeting required service standards. One financing option involves a cost-plus-fee formula, where costs such as labor are fixed, and the private partner participates in a profit-sharing system. The private partner typically does not interact with the consumers.

The government is responsible for funding any capital investments required to inculcate improvement or expansion. For instance, in Sandakan, Sabah, Malaysia, where nonrevenue water (NRW) levels were among the highest in Malaysia at nearly 60% in the 1990s, a performance-based service contract was implemented to tackle physical water losses. In 2003, Jabatan Air Sabah awarded a 30-month NRW reduction contract to Halcrow Water Services in partnership with Salcon Engineering. By doing so, a specialized private company was engaged to manage and reduce water loss. [10] The contract focused on two core strategies: enhancing

[9] https://www.adb.org/sites/default/files/institutional-document/31484/public-private-partnership.pdf

[10] https://blogs.worldbank.org/en/ppps/performance-based-contracts-offer-a-pathway-to-efficient-water-m

active leakage control and replacing frequently bursting mains. By the end of the contract in July 2005, the project had successfully repaired around 2, leaks and reduced physical losses, exceeding the 15 Mld target, underscoring the effectiveness of well-structured service contracts in improving water utility performance. The discussion below comments on its advantages and disadvantages.

Advantages	Disadvantages
• Most suitable where the service can be clearly defined in the contract, the level of demand is reasonably certain, and performance can be monitored easily. • Provide a relatively low-risk option for expanding the role of the private sector. • Can quickly and significantly improve how a system operates and its overall efficiency. • Are often short term, allowing for repeated competition in the sector • Since only a specific service is being bid on, it's easier for new businesses to enter the market. This, combined with repeated bidding, encourages contractors to keep costs down and ensures ongoing competition.	• Not designed to bring in significant capital investment as the contractor is not obligated to provide financing. • The contractor's effectiveness can be hindered if expected financing from other sources (like government or donors) doesn't materialize. • Due to the discrete and segregated nature of the contractor's activities, improvements may be limited to specific areas without a broader or deeper impact on the overall system operations. • The public sector remains responsible for politically sensitive and system-critical functions such as tariff setting and asset ownership.

2.4.2 OPERATION AND MAINTENANCE CONTRACT

An Operations and Maintenance contract (or a management contract) expands the services to be contracted out to include some or all of the management and operation of the public service (i.e., utility, hospital, port authority, etc.). Although ultimate obligation for service provision remains in the public sector, daily management control and authority is assigned to the private partner or contractor. In most cases, the private partner provides working capital but no financing for investment. The private contractor is paid a predetermined rate for labor

and other anticipated operating costs. To provide an incentive for performance improvement, the contractor is paid an additional amount for achieving prespecified targets. Alternatively, the management contractor can be paid a share of profits. The public sector retains the obligation for major capital investment, particularly those related to expand or substantially improve the system. The contract can specify discrete activities to be funded by the private sector. The private partner interacts with the customers, and the public sector is responsible for setting tariffs. A management contract typically, however, will upgrade the financial and management systems of a company and decisions concerning service levels and priorities may be made on a more commercial basis. For instance, in Cambodia, 4-year management contracts with nongovernment organizations were put in place in primary health care facilities in 12 districts. The contractor has full-line management responsibility and must respond to performance targets including achievements in immunization, antenatal care, family planning, and services to the poor. The contractor must provide certain services free of charge (emergency obstetrical care, minor surgery, inpatient treatment of serious illnesses). Compared with publicly managed facilities, the Government found that private management was more effective than public management in terms of performance and coverage achievements, and improvement in working conditions for staff. The discussion below comments on its advantages and disadvantages.

Advantages	Disadvantages
• Allows for significant efficiency and operational improvements through private sector management expertise, without the need to transfer ownership of assets. • These contracts are generally simpler to design and implement, leading to less public and political contention compared to more comprehensive privatization options. • Since fewer staff from the private operator are typically involved, the costs	• The division between the private sector's role in service and management and the public sector's role in financing and expansion planning can be problematic. • The management contractor may lack the necessary autonomy or authority (e.g., over the workforce) to implement profound and sustainable changes. • If the operator's payment is tied to profits or incentives, there's a risk they might inflate reported achievements or

associated with these contracts are comparatively lower. • Management contracts can serve as a temporary solution to achieve modest improvements while more complex and extensive long-term strategies are being developed. • They offer flexibility to gradually increase the private sector's scope of involvement as improvements are demonstrated and the public sector becomes more comfortable with the partnership.	cut back on system maintenance to boost their profits.

2.4.3 BUILD TRANSFER (BT)/ANNUITY TYPE

Build-and-Transfer (BT) means a contractual arrangement whereby the Concessionaire undertakes the financing and construction of a given infrastructure or development facility and after its completion turns it over to the government agency or local government unit concerned, which shall pay the proponent on an agreed schedule its total investments expended on the project plus a reasonable rate of return thereon. This arrangement may be employed in the construction of any infrastructure or development project, including critical facilities which, for security or strategic reasons, must be operated directly by the Government[11]. However, it is worth noting that the arrangement is very similar to what shall be discussed in the subsequent arrangements mentioned in section 2.2.4. Contrastingly, it attracts more private investors because the model omits the operational phase of the project with a shorter payback period. From the government's perspective, a BT investor integrates the handling of investment, financing, and construction of the project. This set-up can reduce project management and coordination costs of government, as well as achieve integration advantages. For instance, the Daxing BT expressway project in Tongren City, Guizhou Province, exemplifies how a Build-Transfer (BT) Public-Private Partnership (PPP) model works

[11] https://www.lawinsider.com/dictionary/build-and-transfer-bt

in practice to overcome budget shortages for infrastructure development. Facing a shelved expressway project connecting the Daxing Industrial Zone to urban areas, the Tongren municipal government opted for a BT procurement model. This involved a private investor financing and constructing the 1.79 km, RMB 100 million Yuan expressway within 12 months, before transferring ownership to the public sector. The process began with the Daxing District Management Committee, an agency of the municipal government, preparing a project proposal to assess feasibility, market, scope, and financing, specifically exploring private capital use. This proposal underwent municipal government approval, followed by the committee engaging a design company and initiating land acquisition. Crucially, they also began negotiating with potential BT investors on project value, construction period, payment mechanisms, and repurchase guarantees. After these initial three stages, which took approximately six months, the committee proceeded to a competitive negotiation phase, leading to an open tender to officially select the BT investor based on financial capability, experience, and creditworthiness. Once chosen, the BT investor established a project company responsible for financing, building, construction management, and eventual transfer of the expressway to the Daxing District Management Committee. This entire process illustrates the BT model's practical application in leveraging private capital for public infrastructure, with the public sector retaining ultimate ownership and the private sector handling the build and initial financing[12].

2.4.4 BUILD OPERATE TRANSFER (BOT) AND SIMILAR ARRANGEMENTS

BOT and similar arrangements are a kind of specialized concession in which a private firm or consortium finances and develops a new infrastructure project or a major component according to performance standards set by the government. Such a contractual arrangement can take up many variations, including those cited in Table 2.2. Several of these are discussed in this section.

[12] https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/fileview/April_2017_1491821300__203.pdf

Table 2.2: Basic Project Delivery Options[13]

	Own	Conceive	Design	Build	O&M	Financial Responsibility
Design–Bid–Build	Public	Public	Private by fee contract		Public	Public
Design–Build	Public	Public	Private by fee contract		Public	Public
Build–Operate–Transfer (BOT)	Public	Public	Private by fee contract			Public
Design–Build–Finance–Operate (DBFO)	Public	Public or Private	Private by fee contract			Public, Public/Private or Private
Design, Build, Finance, Operation & Maintenance, Transfer (DBFOMT)	Public	Public or Private	Private by fee contract			Public, Public/Private or Private
Build–Own–Operate (BOO)	Private	Public or Private	Private by fee contract			

Under BOTs, the private partner provides the capital required to build the new facility. Importantly, the private operator now owns the assets for a period set by contract, sufficient to allow the developer time to recover investment costs through project revenues. Nonetheless, these generally require complicated financing packages to achieve the large financing amounts and long repayment periods required.

At the end of the contract, the public sector assumes ownership but can opt to assume operating responsibility, contract the operation responsibility to the developer, or award a new contract to a new partner. For Instance, Hong Kong, China issued a build–operate–

[13] https://www.adb.org/sites/default/files/institutional-document/31484/public-private-partnership.pdf

transfer (BOT) for constructing and operating its solid waste transfer facilities, which include a transfer station and fleet of transfer trucks. The government prequalified several firms based on their experience in designing and operating transfer stations, and then held a competitive tendering process to select the winning firm. The bidding documents laid out technical and environmental performance requirements, maintenance requirements, and equipment replacement schedules. The station has been built and is currently in operation. The Government conducts regular inspections of the transfer facilities to verify that the specified requirements are being met.

There are many variations on the basic BOT structure including build–transfer–operate (BTO) where the transfer to the public owner takes place at the conclusion of construction rather than the end of the contract (as discussed in the previous section) and build–own–operate (BOO) where the developer constructs and operates the facility without transferring ownership to the public sector. Under a design–build–operate (DBO) contract, ownership is never in private hands. Instead, a single contract is let out for design, construction, and operation of the infrastructure project. In a Design-Build (DB), a single private entity is responsible for both the design and construction of an infrastructure project. The public sector retains ownership and typically funds the project directly or through traditional public financing mechanisms[14]. The DB model can be extended to Design-Build-Finance (DBF) where additional responsibility for securing project financing is added on the private sector and the Design-Build-Maintain (DBM) adding the management of the asset's upkeep/maintenance for a specified period.

Nonetheless, the questions of ownership and the timing of the transfer are generally determined by local law and financing conditions, and the number of possible permutations is large.

In contrast, with the design–build–finance–operate (DBFO) approach, the responsibilities for designing, building, financing, and operating are bundled together and transferred to private sector partners. DBFO arrangements vary greatly in terms of the degree of financial responsibility that is transferred to the private partner. For instance, a DBFO Contract was executed to Develop, Operate, and Maintain a Toll Road in Gujarat, India. The contract for this 32-kilometer toll road facility includes the design and completion of the project road,

[14] https://www.scribd.com/document/410412638/CIB6358

including the pavement, cross-drainage works, bridges, toll facilities, medians, and separators. It also covers management, and operation and maintenance, including toll collection, operation of the toll plaza, traffic regulation, and maintenance of the facility. The contractor has relative autonomy to determine its work methods and plan its maintenance. Toll rates are based on a fixed formula and increase annually in line with an escalation formula linked to the consumer price index. For a higher toll increase than approved in the contract, a toll review committee is constituted to provide a recommendation to the Government. An independent engineer and independent auditor are hired to oversee the contract agreement and report to the Government and the contractor. Risks are mitigated as follows:

- **Land acquisition risk:** The Government bears all responsibility for completion.
- **Revenue risk:** Borne by contractor but tolls are automatically revised every year through an agreed indexation formula.
- **Inflation risk:** Borne by the contractor but this is transferred to the contractor because of the fixed price nature of the contract.
- **Risk of shortfall in traffic:** Provision to extend the contract in case of nonachievement of a 20% return over the 30-year period. Additional revenue is also possible at the discretion of the Government.
- **Force majeure risks:** Comprehensive insurance coverage and a temporary toll review provision to mitigate loss of revenue for a short period due to force majeure.

Finally, a "Design, Build, Finance, Operation & Maintenance, Transfer (DBFOMT)" PPP arrangement, sometimes called "turnkey" procurement, combines design-build and operations-and-maintenance contracts. One key difference from the BOT or DBO arrangement is that financing for a DBFOMT contract is almost always secured by a public sponsor. The public entity also holds the operational risk. For instance, in 2000, Bucharest and France-based utility company Veolia Environnement S.A. partnered to upgrade the city's water and sewer plant. Before the partnership, 31% of water samples in the city had too much chlorine and other chemicals. The $250 million DBFOMT agreement resulted in 100% of Bucharest's water sources testing clean for harmful chemicals by 2009 providing evidence of the model's viability[15].

[15] https://www.developer.com/public-private-partnerships-ppp/#:~:text=DBFOMT,also%20holds%20the%20operational%20risk.

The discussion below comments on the models' advantages and disadvantages[16] [17] [18].

Advantages (BOT)	Disadvantages (BOT)
• BOTs are highly effective in bringing private capital into the construction or renovation of infrastructure projects. • Often, the government acts as the sole or primary customer in BOT agreements, which can significantly lower the commercial risk for the private partner. • Transfer of design, construction and operation risk. • Potential to accelerate project activity. • Risk transfer provides incentive for adoption of whole life costing approach. • Promotes private sector innovation and improved value for money. • Improved quality of operations and maintenance. • Contract can be holistic. • Government able to focus on core public sector responsibilities.	• Contracts are more complex and tendering process can take longer. • Contract management and performance monitoring systems required. • BOTs are project-specific, meaning they are good for individual investments but may have less overall impact on broader system performance. • While private sector experience might reduce initial construction costs, private debt can be a more expensive alternative to public financing. • The benefit of competition is primarily restricted to the initial bidding phase. • BOT contracts are often subject to renegotiation during their lifespan, which can add complexity and uncertainty.
Advantage (Design Build)	**Disadvantage (Design Build)**
• Single point of responsibility reduces disputes and finger-pointing, improving accountability and streamlining communication. • Results in faster project completion due to concurrent design and construction activities. • Early contractor involvement can lead to more efficient design and construction solutions. • Design and construction risks shift from the owner to the contractor. The design-builder takes on the responsibility	• The agency has less influence over design details, which may affect project goals. • While lesser complex than BOT, it is more complex than traditional contract • Bidding is for the combined package, not separate design services, which can reduce competitive pressure on the design component alone. • The implementing agency has less direct input into detailed design once the contract is signed, as the design-builder has autonomy within the performance

[16] https://www.ppiaf.org/sites/ppiaf.org/files/documents/toolkits/Cross-Border-Infrastructure-Toolkit/Cross-Border%20Compilation%20ver%2029%20Jan%2007/Session%204%20-%20Private%20Sector%20Participation/Private%20Sector_02%20Diferent%20Models%20of%20PPP%20-%2029%20Jan%2007.pdf

[17] https://nap.nationalacademies.org/read/23043/chapter/10#94

[18] https://www.scribd.com/document/410412638/CIB6358

for both design adequacy and construction quality.	
Advantage (Design, Build and Finance (DBF))	**Disadvantage (Design, Build and Finance (DBF))**
• Leverages private capital, reducing pressure on public budgets by tapping debt markets and lender equity. • Integrated delivery with financial discipline, encouraging whole-life cost approaches since financiers focus on long-term performance. • No Short-term restrictions of funds as procuring authority starts making payments after construction has been completed**.**	• Private contractors are not incentivized to achieve cost efficiencies, and it can be prone to variation claims. • The contractor has an incentive to maximize margins at the expense of quality as lifecycle costs are borne by the procuring authority. A high degree of monitoring would be required for this to avoid this which could be costly. • If payments involve deferred government appropriations, the private partner assumes the risk that future public funds might not be available as expected.
Advantages (DBM)	**Disadvantage (DBM)**
• The contractor is responsible for maintenance, incentivizing higher construction quality. • Maintenance obligations align contractor incentives with long-term asset performance. • Maintenance responsibilities shift to the private sector, easing government oversight.	• Governments must manage extended relationships, which can be complex. • Contractors may price in long-term risks, increasing upfront bids. • Long-term oversight is crucial for ensuring the contractor meets maintenance standards and performance indicators over the contract duration. • Long-term agreements are prone to changes and renegotiations due to unforeseen conditions, changes in standards, or evolving needs.
Advantages (DBFO)	**Disadvantages (DBFO)**
Same advantages as of BOT with additional including: • DBFO projects benefit from being financed partly or entirely by debt, which effectively leverages future revenue streams specifically allocated to the project.	• Contract can be more complex and tendering process can take longer than for BOT. • Contract management and performance monitoring systems required. • Funding guarantees may be required.

• These projects can tap into various revenue streams, with direct user fees (e.g., tolls) being common, but also including lease payments, shadow tolls, and vehicle registration fees in sectors like roads. • Delivers more predictable and consistent cost profile. • Increased risk transfer provides greater incentive for private sector contractor to adopt a whole life costing approach to design. • Even greater potential for accelerated construction programme. • Attracts more debt and private finance.	• These are also subject to renegotiation during their lifespan, which can add complexity and uncertainty.
Advantages (DBFOMT)	**Disadvantages (DBFOMT)**
Same Advantages as DBFO with additional including: • Turn-key solution as the project is made ready and final, and activated • No VGF or upfront fiscal burden on the public party • Low integration risk posed • Private sector accountability is retained and ensured • Promotes innovation, collaboration and long-term care	• Higher development complexity and time to structure • Market appetite may vary based on credit pricing risks • Strong contract management required • Dependence on private operator's technical credibility

An important thing to highlight here is that if the project activity involves rehabilitation of an existing facility, it would take form of Rehabilitate Own Transfer (ROT) and Rehabilitate Own Operate (ROO). Overall, the dynamics of the modality remain similar as a variation of BOT.

In summary, Table 2.3 below outlines the modalities discussed above to facilitate in decision making for BPPPA on which modality to opt for in proceeding for the Balochistan Carbon Offset project.

Table 2.3: Characteristics of PPP Modality Types[19]

PPP Modality Type	Main Features	Risk Transfers	Access to Private Finance	Ownership	Suitability
Service Contract	• Certain services are out-sourced to a private company. • Private company provides agreed services to the Govt • Govt retains general control and supervision.	• Service contracts provide a relatively low-risk option for expanding the role of the private sector. • No equity risk borne by the private company	• Limited infusion of private capital i.e. working capital.	• Government	• This type of PPP has limited benefits. • Service contracts can be a competitive form of operational type PPPs, and require a well-developed service industry. • Not suitable for initial investment
Operation and maintenance contract (O&M)	• Management and operation of a public infrastructure is out-sourced to a private company. • Similar to a service contract but the scope of services is wider with greater control passed to the private company.	• Similar to the service contract with additional risk of keeping the facility up to certain technical standards. • No equity risk borne by the private company.	• Limited infusion of private capital i.e. working capital.	• Government	• Suitable for projects with a significant operating content. • O&M could be applied to a BOT, DBFO, BOO, and ROO project. • A method to import private sector efficiencies and technical know-how. • Not suitable for initial investment.
Build Transfer/ or Annuity Type	• Private company finances the infrastructure. • Private company builds the infrastructure.	• Private company only assumes project development risks.	• Much greater infusion of private capital	• Government	• Suited to capital projects where the government can retain operating responsibility.

[19] https://www.ppiaf.org/sites/ppiaf.org/files/documents/toolkits/highwaystoolkit/6/pdf-version/5-36.pdf

	• Upon completion of the project activity, the infrastructure is transferred to the government. • Government pays the private company on an agreed schedule the total cost, plus a reasonable markup.	• No equity risk is borne by the private company	i.e. for project development.		• The government might end up paying more, as it is in effect borrowing from the private sector. • Can be suitable for high risk and/or low financial return projects
Design-Build (DB)	• Single private entity responsible for both design and construction • Public sector typically funds the project directly • Private sector responsibility ends largely upon project completion.	• Transfers design risk and construction risk from owner to private entity • Public sector retains financing and operational risk.	• Limited access to private finance.	• Govern ment	• Suitable for projects with clear functional requirements where speed and single-point responsibility are critical. • Best when the government has access to sufficient capital and wants control over long-term operations
Design-Build-Finance (DBF)	• Private entity designs and builds the infrastructure • Private entity arranges for project financing • Public sector repays financing over time (e.g., availability payments) after completion	• Transfers design, construction, and financing risks to the private entity • Public sector retains operational and demand/revenue risk	• Significant infusion of private capital for project development	• Govern ment	• Suitable when public capital is scarce but there's a reliable future revenue stream or strong government payment capacity • Allows accelerated project delivery by offloading immediate funding needs from the public budget
Design-Build-Maintain (DBM)	• Private entity designs, builds, and performs long-term maintenance of the facility.	• Transfers design, construction, and long-term	• No long-term project finance from private sector for initial	• Govern ment	• Ideal for projects where long-term asset performance and predictable maintenance costs are critical

	• Public sector typically finances the project or arranges for its financing separately • Public sector retains operational responsibility and revenue risk.	maintenance risks to the private entity • Incentivizes private sector to build for durability and low lifecycle costs.	construction (unless combined with DBF).		• Suitable when the public sector wants to outsource maintenance but retain operational control and financial risk.
Build Operate Transfer (BOT)	• Government finances the facility. • Private company builds the facility. • Private company operates the facility on a concession. • At the end of the O&M concession the facility is transferred to the government.	• Government bears the equity risk. • Private company bears the risks associated with project development.	• Limited access to private finance.	• Govern ment	• Suited to projects that involve a significant investment and operating content. • Does not overcome shortage of State funding for infrastructure
Design- Build-Finance-Operate (DBFO)	• Private company finances the facility. • Private company builds the facility. • Private company operates the facility on a concession. • At the end of the concession the facility is transferred to the government.	• Private company assumes equity and other commercial risks. • Private company assumes project development risk.	• Significant infusion of capital for project development and working capital for operation and maintenance.	• Private compan y until transfer	• Especially suitable if government has a large infrastructure financing gap. • Suited to projects that involve a significant investment/operating content.

Design, Build, Finance, Operation & Maintenance, Transfer (DBFOMT)	• Same as DBFO with Management and operation of a public infrastructure is out-sourced to a private company.	• Same as DBFO with additional risk of keeping the facility up to certain technical standards.	• Significant infusion of capital for both project development and operation and maintenance.	• Private company until transfer	• Same as DBFO with an additional advantage of private sector efficiencies and technical know-how for managing O&M.
Rehabilitate Own Transfer (ROT)	• Same as a BOT. • But for the rehabilitation of an existing facility rather than the development of a new one.	• As in DBFO	• As in DBFO	• Private company until transfer	• Suitable for rehabilitation but essentially DBFO • Suited to projects that involve a significant investment/operating content. • Market risk is lower because there is a demand history
Build own operate (BOO) and Rehabilitate Own Operate (ROO) (Effectively regulated Divestiture)	• Similar to a DBFO, except that the facility is not transferred to the government. • Operation and maintenance typically outsourced to another private company. • But for the rehabilitation of an existing facility rather than the development of a new one	• As in DBFO	• As in DBFO	• Private company	• Suited to projects that involve a significant investment/operating content. • Market risk may be lower if there is a demand history. • The step before privatization and can be a good solution if government does not want to assume project ownership.

2.5. REVENUE SHARING UNDER PPP

Section 2.4 presents the various options for project development under PPP modality, and the most viable option will be integrated with the financial revenue-sharing model. Having decided the modality, it is important to follow a contractual structure for project financing to support the selected modality and deciding the most suitable delivery mechanism. Since the project under consideration would ultimately be integrated into carbon markets, it is important to comprehend the models used globally and assess their applicability under Balochistan's context. Reviewing both the Balochistan Public Private Partnership Act, 2021 and the global carbon market models, it is observed that a revenue sharing is permitted under the acts provision and is also an established global model under carbon markets. Hence, the option is reviewed, analyzed and supported by case study to understand how it is applied.

In a revenue sharing model, the profits earned from the project activity is distributed amongst the key stakeholders, that may include local communities, government entities, private sector. Since the major revenue stream is the monetization of credits through carbon markets, the model allocates contributions and responsibilities of each party for dividing a pre-defined share as per an agreed upon contractual agreement[20]. For instance, the Kasigau Corridor project in Kenya[21] [22] demonstrates a revenue-sharing model where profits from carbon credit sales—over 1.5 million tons annually—are distributed among stakeholders. Developed by Wildlife Works, a private entity, the model allocates 33% of net revenue (after transaction costs) to landowners, regardless of direct involvement. While Kasigau involves landowners and a private developer, a similar model can be adapted for the proposed project, with revenue and responsibility sharing mutually agreed upon between the government (as landowner) and the private sector. While the case study has two major stakeholder, landowners and Wildlife Works, our project can be tailored to a similar model with the government and the private sector as the project will be commissioned in a government owned land. The revenue and responsibility sharing can be mutually agreed upon.

The revenue-sharing model presents several advantages in the context of mangrove restoration and carbon offset initiatives. One key benefit is mutual gain, as the model ensures that all stakeholders—communities, government entities, and project partners—receive a

[20] https://www.mdpi.com/2076-3387/12/4/156

[21] https://thinklandscape.globallandscapesforum.org/60785/when-selling-carbon-credits-give-communities-a-cut/

[22] https://verra.org/kenya-project-issues-first-redd-credits-under-vcs/

share of the benefits, fostering broad-based support and encouraging active participation in conservation efforts. This approach promotes equitable distribution of benefits, strengthening social cohesion and ownership. Additionally, the model supports alignment with conservation goals, offering direct financial incentives to landowners and communities, thereby motivating them to adopt and maintain sustainable practices essential for successful carbon credit generation. Another significant advantage is conflict minimization; by formalizing revenue allocations through transparent agreements, the model reduces the likelihood of disputes and helps cultivate long-term stakeholder cooperation. However, the model also comes with a notable challenge—the complexity of negotiation. However, this may be addressed with consistent and collaborative engagement between stakeholders. As such, while the model has strong potential for inclusive and sustainable development, it requires careful planning and facilitation to ensure successful implementation.

2.6 SUITABLE IMPLEMENTATION PATHWAYS

The analysis above presents a range of options informing the implementation pathways, highlighting key trade-offs and contextual relevance. However, in view of the pros and cons of each option, suitable options for consideration by BPPPA may include Build, Operate Transfer (BOT) and its similar arrangements presented in section 2.4.4. However, the Design Build (DB) approach is public in nature and noted as such as per the Balochistan PPP Policy 2021[23], hence, is not a suitable option. Furthermore, since the intervention would ultimately be developed as a carbon market project, the financial model of revenue-sharing may be integrated within the chosen modality.

2.7 CAPACITY ASSESSMENT OVERVIEW

Moving forward, it is necessary to identify the capacity of BPPPA and Forest & Wildlife Department for ensuring project delivery. Under PPPs, Balochistan Public Private Partnership Authority (BPPPA) has executed 9 projects, including Green Bus Service for Quetta, Integrated Solid Waste Management Project "The Safa Quetta Project, Integrated Parking Plazas Project etc. It also has a pipeline of 9 projects including Solar Salt Extraction Facility, Rehabilitation of the Balochistan House Islamabad etc.[24]. Moreover, as highlighted earlier, they

[23] https://bpppa.gob.pk/wp-content/uploads/2023/12/Balochistan_PPP_Policy_2021.pdf

[24] https://bpppa.gob.pk/#

have a dedicated PPP policy, 2021 with a strong governance framework, demonstrating that they are exceptionally well-equipped to manage and oversee a project of such nature.

Conversely, the Forest & Wildlife Department, the apex forest management department in the province, demonstrates a strong commitment to community engagement, evident through its decades of expertise in forest management and environmental regeneration efforts. These insights collectively highlight that both entities are well-suited to handle the project activity under a PPP modality.

3. THE CASE OF DELTA BLUE CARBON PROJECT[25] [26]

The Delta Blue Carbon (DBC) Project is a 60-year project initiated in 2015 and will run until 2075, restoring 350,000 hectares of mangroves and resulting in an estimated 142 million tCO2e over the project lifetime.[27] Over two phases the project will restore degraded mangroves across 600,000 hectares of the Indus River Delta in Pakistan's Sindh Province, resulting in over 250 million tons of CO2 sequestered over the project's lifetime. The project has already restored 73,000 hectares of degraded mangrove forests and tidal wetlands. DBC is registered in Verra's Verified Carbon Standard (VCS) Program and the Climate, Community & Biodiversity Standards (CCBS) Program.

DBC operates as a successful public-private partnership between the provincial government and Indus Delta Capital, a private carbon developer. This model demonstrates a form of financing where carbon markets are utilized to supplement government contributions for restoration of blue carbon habitats that include coastal and marine ecosystems. The sale of carbon credits through Climate Impact X, a global market place for carbon credits, provides a sustainable funding stream. Owing to the allied benefits of the project, the Sindh Climate Change Policy 2022 promotes sustainability of forests to ensure ecosystem services and Increase climate resilient forests in the province recognizing mangroves as a pertinent part[28]. As per **Verra**: "*The Delta Blue Carbon project is more than a climate change solution—it is an investment in the future of the Delta's local communities, biodiversity, and the planet alike.*" This reflects on the priorities set by carbon standards for developing projects of such nature.

Hence, the example of DBC reinforces the rationale for an ARR project in Balochistan to chalk out a well-planned PPP option that engages stakeholder, leverages carbon markets and private sector investment alongside government support, to ensure long-term financial viability and scale. Through this report, BPPPA is provided with substantial evidence that may support them in deciding a suitable modality that is tailored to the distinct needs of the province for developing the project.

[25] https://www.theigc.org/blogs/climate-priorities-developing-countries/market-based-solutions-sustainable-development

[26] https://verra.org/case-studies/delta-blue-carbon/

[27] Delta Blue Carbon

[28] https://docc.sindh.gov.pk/files/DoCC/Documents/Sindh%20Climate%20Change%20Policy%202022%20(Final).pdf

4. RISK ANALYSIS

This section delves into the risk assessment for the project activities. It has referred to key documents and guidelines such as those used to develop and assess carbon market projects by standard setting-bodies such as Verra and the Global Carbon Council, notably the AFOLU Non-Permanence Risk Tool by verra[29] and User's Guide GCC Non-Permanence Risk Tool[30], and scoped other key guidelines on risk planning such as the World Bank's Systematic Operations Ris-Rating Tool (SORT)[31] as references to gauge financial, operational, environmental, and regulatory risks pertaining to the project activities, which are unique to Balochistan's context. It assigns responsibility for each risk, proposes mitigation strategies, and evaluates how risk management aligns with the project requirements and supports project success.

4.1 METHODOLOGY

Risks are prioritized using a likelihood-impact matrix, followed by mitigation strategies to minimize these identified risks.

4.1.1 LIKELIHOOD

The likelihood of a risk indicates the probability of its occurrence for a specific activity. When the probability of a risk associated with an activity is higher, we rate the probability accordingly. For example, if the supply of poultry decreases, it is highly likely that the price of poultry will rise.

4.1.2 IMPACT

The impact or severity of a risk represents the potential consequences it carries for the associated activity. When the severity of a risk is higher for a particular activity, we rate the severity accordingly. For instance, industrial waste dumping in rivers poses an existential risk to aquatic life, making it a high-hazard risk associated with the activity.

[29] https://fundacionglobalnature.org/wp-content/uploads/2024/09/Anexo-3_-AFOLU_Non-Permanence_Risk-Tool_v4.0-1.pdf

[30] https://www.globalcarboncouncil.com/wp-content/uploads/2024/03/users-guide-gcc-non-permanence-risk-tool-v1.pdf

[31] https://www.worldbank.org/content/dam/Worldbank/document/SORT_Guidance_Note_11_7_14.pdf

4.1.3 RISK SCORING

The risk matrix uses a numbering system from 1 to 5 to assess the risk based on its Probability and Severity. A score of "1" indicates the lowest rating, while a score of "5" represents the highest rating. The matrix automatically calculates the risk scores by multiplying the Probability and Severity values, providing an overall assessment for each risk.

4.1.4 RISK RATING

The risk matrix categorizes risks into five score ranges. If the risk score falls between 1 and 5, it is classified as "Very Low." A score between 6 and 11 indicates a "Low" risk category. For scores ranging from 12 to 16, the risk is classified as "Moderate." A score between 17 and 20 corresponds to a "High" risk category. Finally, a risk score ranging from 21 to 25 falls into the "Very High" category.

By utilizing the risk matrix, we can effectively evaluate and classify risks based on their associated scores, providing valuable insights into the level of concern and priority they require.

4.2 POTENTIAL RISKS

As per the methodology stated in section 4.1, the following risk matrix has been crafted which identifies potential financial, operational, environmental and regulatory risks pertaining to the project activity.

Table 3.1: Risk Matrix

Component	Risks Identified	Description of Risk	Likelihood	Impact	Risk Score	Risk Rating
Financial	**High investment cost and high cost of Verification and Validation bodies (VVBs)**	To initiate carbon credit ventures requires substantial upfront cost that limits investment opportunities for smaller developers especially private sector investors. Moreover, the registration costs for projects and the fee required from the VVBs for verification makes it financially unviable for small scale projects	**4**	**4**	**16**	**Moderate**
	Credit Price Fluctuation	Uncertainty regarding the carbon credit prices in future can hinder investment opportunities due to limitations in assessing profitability and changing market dynamics.	**4**	**4**	**16**	**Moderate**

	Access to Finance for Projects	Because of perceived risks in carbon markets, its high initial costs or limited access to credits some projects do not access the necessary finances. This financial constraint can cause project delays, reduce the scale of operation or sometimes completely stop the project. Moreover, inadequate funding can also hinder a project's capacity to invest in a robust monitoring system or to fulfil the certification requirements thus impacting the authenticity and profitability of Carbon Credits produced	**3**	**5**	**15**	**Moderate**
	Effective and equitable Use of Revenue Earned from Sale of Credits	Lack of clear policy or legal instrument on ownership and distribution of revenues generated from sale of Carbon Credits can lead to conflicts/disputes and affects profitability particularly when multiple stakeholders are involved.	**3**	**4**	**12**	**Moderate**

Operational	**Site Logistics**	Difficulty in site accessibility may cause added costs for ensuring proper transportation thereby delaying site preparation.	**3**	**3**	**9**	**Low**
	Political instability turnover of officials	Changes in political leadership or key government officials can lead to shifts in policy, delayed decision-making, renegotiation of existing agreements, or loss of institutional memory, creating uncertainty and hindering long-term project stability.	**3**	**4**	**12**	**Moderate**
	Site Security	Sites in Balochistan are sensitive in terms of security thereby requiring escorts for the field teams for safety.	**3**	**5**	**15**	**Moderate**
	Stakeholder Engagement	Not properly engaging the stakeholders may lead to tensions in project development. For instance, insufficient buy-in from coastal communities	**4**	**4**	**16**	**Moderate**
	Lack of Monitoring,	Inadequate data collection, insufficient reporting frameworks, and weak verification	**4**	**4**	**16**	**Moderate**

	Reporting, and Verification Mechanisms	processes may hinder the tracking of progress, transparency, and the ability to make informed decisions.				
	Technical Capacity Gaps	Shortage of specialists may compromise planting success.	**1**	**4**	**4**	**Very Low**
Environmental	**Water Scarcity**	Reduction in water availability poses threats to species planted in the ARR project activity. This is further exacerbated by the geographic location in a hyper arid region.	**4**	**4**	**16**	**Moderate**
	Sea Level Rise and Salinity	Rising sea levels may increase soil salinity beyond 40 ppt, inhibiting growth of species.	**4**	**4**	**16**	**Moderate**
	Local Biodiversity	Monoculture plantation in the ARR project, for instance, planting only Avicennia marina can lead to reduced biodiversity.	**3**	**4**	**12**	**Moderate**
	Climatic Variability	Exposure of the ARR project to extreme climatic conditions such as heatwaves, droughts or floods leads to increased mortality	**4**	**4**	**16**	**Moderate**

		and an elevated difficulty in project maintenance.				
	Soil Degradation	Wind erosion, deforestation, uncontrolled livestock and prolonged droughts leading to soil degradation. Also, intensive plantation practice can deplete soil nutrients.	**4**	**4**	**16**	**Moderate**
Regulatory	**Permitting and Land-Use Approval Delays**	Land tenure disputes or delays in land clearance for facilitating project activities.	**4**	**3**	**12**	**Moderate**
	Carbon Policy Shifts	Pakistan's draft Carbon Market Policy (2025) may alter credit ownership rules under PPPs.	**3**	**4**	**12**	**Moderate**
	Stringent Standard Requirements	Meeting stringent requirements from standards, like Verra, can be costly and time-consuming.	**4**	**4**	**16**	**Moderate**
	Global Market Regulation	Amendment of international policies that may affect determination of the carbon credits value as well as trading procedures	**3**	**4**	**12**	**Moderate**

Community	**Land Use Conflict & Potential for Displacement**	Mangrove areas are often valuable for aquaculture, agriculture, and coastal development, leading to conflict between different stakeholders over land use, resource access, and management. The pursuit of profits from carbon trading can exacerbate these conflicts, potentially forcing communities off their traditional lands, leading to social injustice and project failure.	**4**	**4**	**16**	**Moderate**
	Inadequate Community Buy-in/Social Conflict	Lack of comprehensive and continuous engagement with local communities, or failure to ensure benefit-sharing and perceived fairness, can lead to local resistance, social unrest, protests, and significant project delays or even failure. This includes issues arising from land use changes or restrictions.	**3**	**5**	**15**	**Moderate**
	Ineffective or Inequitable Benefit Sharing	Even if a benefit-sharing plan exists, if benefits are not effectively delivered, are perceived as unfair, or do not reach the intended	**4**	**4**	**16**	

		beneficiaries, it can lead to internal community divisions, mistrust, and project opposition. This includes challenges in validating and distributing benefits.				
	Cultural/Social Misunderstandings or Exclusion	Project design or implementation failing to adequately consider local cultural norms, traditions, power structures, or inadvertently excluding specific vulnerable groups (e.g., women, minorities) can lead to social friction, human rights concerns, and a lack of genuine participation.	**3**	**4**	**12**	**Moderate**
	Absence of Conflict Resolution Mechanism	Risk of conflict among stakeholders during implementation, MRV, carbon credit sales, and benefit sharing. Conflicts may arise if local people and NGOs feel their knowledge, support, rights, and benefits are ignored by developers and partners.	**3**	**4**	**12**	**Moderate**

	Capacity Constraints of the community	Low capacity of communities to assess site conditions or understand project interventions can pose a significant problem where the community is not well informed about the project intervention.	**4**	**4**	**16**	**Moderate**
Legal & Institutional	**Legal Delays in Acquisition of Approvals**	Protracted bureaucratic processes, land tenure disputes, legal challenges, or delays in securing necessary clearances from various government departments can significantly delay project initiation and implementation.	**4**	**4**	**16**	**Moderate**
	Inadequate Legal/Policy Framework for Carbon Rights & Benefit Sharing	Absence of clear legal definitions for carbon rights ownership, or a well-defined and enforceable benefit-sharing mechanism, can lead to disputes among stakeholders.	**3**	**4**	**12**	**Moderate**

4.3 RISK RESPONSIBILITY

Section 4.2 identifies potential risks anticipated in the project activity. To effectively manage these, it is pertinent to map the actors responsible for each risk. This section, therefore, assigns responsibility for managing identified risks to specific agencies, clarifying which parties are accountable for addressing each potential risk. This mapping is shown in Table 3.2.

Table 3.2: Entities Bearing Risk Responsibility.

Risk	Responsible Entity	Capacity and Resources
High investment & VVB costs	Private Sector Investors (Concessionaires)	Private sector funds the project activity.
Credit Price Fluctuation	Concessionaire as the project proponent	The private investor shall bear keep tab of the credit price fluctuation for the sale of carbon credits.
Access to Finance for Projects	BPPPA, Government of Balochistan	BPPPA compiles technical proposals and liaise with the government to ensure that a conducive environment is provided to pool in private finance.
Effective and Equitable Revenue Distribution	BPPPA, Concessionaire, community	Defines revenue-sharing mechanisms and ownership structures under PPP agreements. A representative from the community is part of the negotiation.
Site Logistics	Government of Balochistan	Provision of utility connections for power, gas, telephone, water, and internet facility at project site; clearance of right of way or acquisition of land necessary for the

		project; rehabilitation and resettlement necessitated because of the execution of the project; and any other administrative responsibility is within the mandate of the government.
Political Instability & Turnover of Officials	Government of Balochistan, BPPPA	BPPPA's mandate should include strategies for institutionalizing project continuity despite political changes.
Site Security	Government of Balochistan + Pakistan Army	Security of project personnel is administered by the government and managed by the Pakistan army.
Stakeholder Engagement	Concessionaire	The Concessionaire is primarily responsible for direct engagement with local communities and stakeholders (as part of project implementation, often a contractual obligation)
Lack of MRV Mechanisms	Concessionaire	The Concessionaire is responsible for establishing and implementing robust Monitoring, Reporting, and Verification (MRV) systems as per project methodology and contractual obligations.
Technical Capacity Gaps	Concessionaire, BPPPA (Facilitation)	The Concessionaire is responsible for ensuring adequate technical expertise for project implementation (e.g., ARR specialists). BPPPA may facilitate

		capacity building or technical assistance where gaps are identified, as part of its role in promoting successful PPPs
Water Scarcity	BPPPA, Concessionaire, irrigation department	Conduction of Environmental impact Assessment (EIA) is mandated by the act on BPPPA and is a requisite for project standards including the concessionaire within. The irrigation department is responsible for equitable water distribution and addressing water scarcity.
Sea Level Rise & Salinity	BPPPA, Concessionaire, Environment Department	Conduction of Environmental impact Assessment (EIA) is mandated by the act on BPPPA and is a requisite for project standards including the concessionaire within. The environment department is responsible for implementing policies to mitigate adverse impacts of climate change.
Local Biodiversity	Concessionaire, BPPPA, Provincial Environment + Forest & Wildlife Department	The Concessionaire and BPPPA are responsible for ensuring the project's activities do not negatively impact local biodiversity, as per environmental regulations and project standards. The Provincial Environment and Forest Departments have the mandate for biodiversity protection and

		oversight. Environmental Impact Assessments (EIAs) are a key capacity.
Climatic Variability	Concessionaire, Environment Department	The Concessionaire must integrate climate risk assessment and adaptation strategies into project design and implementation. The environment department may offer guidance and policy frameworks for environmental stewardship.
Soil Degradation	Concessionaire, Forest & Wildlife Department	The Concessionaire is responsible for implementing sustainable land management practices within the project area to prevent and mitigate soil degradation. The Forest & Wildlife Department provide technical guidance and oversight on land management.
Permitting & Land-Use Approvals	Government of Balochistan	Provision of utility connections for power, gas, telephone, water, and internet facility at project site; clearance of right of way or acquisition of land necessary for the project; rehabilitation and resettlement necessitated because of the execution of the project; and any other administrative responsibility is within the mandate of the government.

Carbon Policy Shifts	Concessionaire	The Concessionaire as the project proponent to ensure that project is well-aligned with the carbon market policy.
Stringent Standard Requirements	Concessionaire, BPPPA (Oversight/Facilitation)	The Concessionaire is directly responsible for meeting the technical and reporting requirements of chosen carbon standards (e.g., Verra), as this impacts credit issuance. BPPPA would have an oversight role in ensuring that the project adheres to agreed-upon standards as part of the project agreement
Global Market Regulation	Concessionaire	The Concessionaire is responsible for any potential shifts in the global carbon markets as the project developer.
Land Use Conflict & Potential for Displacement	Government of Balochistan, BPPPA and the community	Government of Balochistan is primarily responsible for land tenure, resource rights, and land use planning. BPPPA ensures social safeguards are met by allowing mediation between proponents and community.
Inadequate Community Buy-in/Social Conflict	Concessionaire and BPPPA	The Concessionaire to ensure robust consultation processes. BPPPA for ensuring standards by providing guidance and project monitoring.

Ineffective or Inequitable Benefit Sharing	Concessionaire and BPPPA	Concessionaire is responsible for actual distribution. BPPPA for oversight and ensuring fairness in benefit sharing mechanism.
Cultural/Social Misunderstandings or Exclusion	Concessionaire and BPPPA	Concessionaire needs to conduct thorough social assessments. BPPPA ensures compliance with social safeguards.
Absence of Conflict Resolution Mechanism	Concessionaire and BPPPA	Both the parties collaborate for robust Environmental and Social Impact Assessments well incorporating the grievance redress mechanism within the assessments.
Capacity Constraints of the community	Concessionaire and BPPPA	The Concessionaire to ensure robust consultation processes. BPPPA for ensuring standards by providing guidance and project monitoring.
Legal Delays in Acquisition of Approvals	Government of Balochistan and BPPPA	Multiple government departments are involved in granting various clearances and BPPPA's role is to facilitate.
Inadequate Legal/Policy Framework for Carbon Rights & Benefit Sharing	BPPPA and Law & Parliamentary Affairs Department	BPPPA and Law & Parliamentary Affairs Department are crucial for drafting/amending relevant legislation.

4.4 RISK MITIGATION PLAN

Having identified the potential risks and mapping the responsible agencies, this section presents a suitable mitigation plan that would support in averting and minimizing the identified risks. It also verifies if the recommended PPP modality is suitable in minimizing the anticipated risks thereby reinforcing the efficacy of the model. Furthermore, it estimates the cost incurred for that measure which shall allow well-informed decision making for risk management. The risk mitigation matrix is as illustrated in Table 3.3 below:

Table 3.3: Risk Mitigation Matrix

Risk	Risk Rating	Mitigation Strategy
High investment & VVB costs	Moderate	• Leverage private sector capital by the project proponent by providing a conducive environment for private investment.
Credit Price Fluctuation	Moderate	• Negotiate a floor price for the anticipated carbon credits and get ex-ante carbon credits issued for certainties in revenue.
Access to Finance for Projects	Moderate	• Use the first-loss capital to de-risk private investment thereby pooling in private finance. • Fast track the approval processes and government protocols to ensure smooth operations.
Effective and Equitable Revenue Distribution	Moderate	• Negotiate clear contractual terms defining the revenue splits under the PPP agreement. This agreement shall be done with the consensus of the major parties involved including the community representative, private sector and the government. • Utility of digital platforms to ensure transparency of data and revenue distribution.
Site Logistics	Low	• Coordinate with public partner to ensure provision.
Political Instability & Turnover of Officials	Moderate	• Embed critical project terms and commitments in legislation (e.g., Balochistan PPP Act) rather than just contractual agreements, to provide greater legal stability. • Foster strong relationships with multi-party stakeholders (including opposition) to build consensus for long-term projects.
Site Security	Moderate	• Develop security protocols and standard operating procedures for personnel safety well before start of project activity in coordination with the Government of Balochistan and the Pakistan army.
Stakeholder Engagement	Moderate	• Elect a community representative for facilitating PPP negotiations and ensure clear communication and equitable revenue distribution as per the community needs. • Proper training sessions conducted to ensure that the community is well-informed on their roles in contributing towards the project activity.
Lack of MRV Mechanisms	Moderate	• Procure and ensure MRV expertise • Plan MRV activities in line with the global standards such as Verra.

Technical Capacity Gaps	Very Low	• Identify key technical expertise and needs and align procurement accordingly based on a time-bound schedule
Water Scarcity	Moderate	• Coordinate with public partner to ensure provision.
Sea Level Rise & Salinity	Moderate	• Conduct periodic soil salinity monitoring (quarterly sampling) and implement corrective actions (e.g., dredging, channel adjustments)
Local Biodiversity	Moderate	• Avoid monoculture wherever possible. For instance, planting Avicennia marina and Rhizophora together or planting cover crops along with these species. • Follow a strict environmental MRV plan based upon guidelines and best practices
Climatic Variability	Moderate	• Schedule planting during post-monsoon stabilization (September–October) to avoid peak flood and heat periods • Provide climate-resilient nursery designs (shade nets, misting systems) to reduce sapling stress
Soil Degradation	Moderate	• Carry out soil restoration measures such as windbreak installation. • Rotate planting plots annually and incorporate organic soil amendments, such as compost, to rebuild fertility.
Permitting & Land-Use Approvals	Moderate	• Develop and maintain a permit-status dashboard with weekly updates to BPPPA leadership on land permits and approvals. • Resolve potential conflicts anticipated pre-bid.
Carbon Policy Shifts	Moderate	• Maintain coordination with MoCC&EC regarding any updates in the provisions of the national carbon policy. • Include a revenue adjust clause in the PPP agreement to re-negotiate splits, in case new provisions are introduced.
Stringent Standard Requirements	Moderate	• Arrange capacity building, where necessary, for the concessionaire on the standard methodologies such as Verra. • Follow precedents of successful case studies such as Delta Blue Carbon Sindh and arrange meetings with DBC professionals for knowledge exchange.
Global Market Regulation	Moderate	• Build flexibility into PPP agreements, allowing renegotiation of revenue splits if global rules shift significantly. • Maintain coordination with MoCC&EC to realize any potential policy shifts anticipated.

Land Use Conflict & Potential for Displacement	Moderate	• Conduct a thorough social impact assessment (SIA) during project planning to identify potential conflicts and vulnerable population. • Implement and maintain a Free, Prior, and Informed Consent (FPIC) process for communities which includes a clear and transparent agreements with communities regarding land use and benefit sharing, ensuring traditional land rights are respected. • Develop a Grievance Redressal Mechanism for social inclusion and providing a platform to address complaints
Inadequate Community Buy-in/Social Conflict	Moderate	• Implement a comprehensive and continuous stakeholder engagement plan from project inception through implementation and monitoring. • Implement and maintain a Free, Prior, and Informed Consent (FPIC) process for communities • Facilitate genuine community participation in decision-making processes.
Ineffective or Inequitable Benefit Sharing	Moderate	• Develop a clear, transparent, and culturally appropriate benefit-sharing plan in close consultation with local communities, ensuring it addresses their priorities and needs. • Establish independent and transparent mechanisms for validating and distributing benefits, potentially involving community representatives in oversight. • Implement and maintain a Free, Prior, and Informed Consent (FPIC) process for communities • Develop a Grievance Redressal Mechanism for social inclusion and providing a platform to address complaints • As per the DBC experience, an electronic mode of transfer for cash benefits is transparent and efficient
Cultural/Social Misunderstandings or Exclusion	Moderate	• Implement and maintain a Free, Prior, and Informed Consent (FPIC) process for communities. • Develop a Grievance Redressal Mechanism for social inclusion and providing a platform to address complaints • Conduct thorough socio-cultural assessments to understand local norms, traditions, and power structures. • Ensure diverse representation in community engagement processes, actively seeking input from and addressing the needs of vulnerable groups • Integrate local knowledge and traditional practices into project design where appropriate.
Absence of Conflict Resolution Mechanism	Moderate	• Establish a multi-stakeholder conflict resolution mechanism, including community representatives, project proponents, and independent mediators, to address disputes in a timely and impartial manner.

		• Ensure the mechanism is easily accessible, culturally appropriate, and trusted by all parties.
Capacity Constraints of the community	Moderate	• Train project staff on cultural sensitivity and inclusive engagement practices. • Provide targeted capacity building and training to communities on project objectives, interventions, technical aspects, and their rights and responsibilities.
Legal Delays in Acquisition of Approvals	Moderate	• Engage proactively with relevant government agencies and build strong relationships. • Prepare all documentation meticulously and submit it promptly.
Inadequate Legal/Policy Framework for Carbon Rights & Benefit Sharing	Moderate	• Develop explicit contractual agreements among all stakeholders clearly defining carbon rights and benefit distribution. • Implement and maintain a Free, Prior, and Informed Consent (FPIC) process for communities including agreement and consent for the agreed upon benefit sharing mechanism.

5. CONCLUSION

This report explored a range of PPP modalities and financing models in the context of a carbon-financed ARR project in Balochistan. The report presents a comprehensive analysis of the avenues under PPP modality to assist BPPPA in deciding the most aligned with the project's financial, environmental, and operational objectives. Various global and domestic models were assessed, and a number of them can be adapted or integrated under the broader PPP framework as per legal permissibility and institutional readiness in Balochistan. However, exploring Build-Own-Operate (BOT) and its similar arrangements is suggested, with the exclusion of Design-Build (DB) since it does not qualify under the definition of a PPP. Further, the financial model of revenue-sharing will be integrated within the selected modality.

Additionally, the comprehensive risk analysis assessed potential risks, identifying responsible parties and potential mitigation measures. The strategies may be embedded into the project design, ensuring effective and inclusive project delivery, aligning with the global carbon market landscape and international best practices. By approaching the ARR project through a structured and inclusive PPP model, Balochistan may position itself as a key player in the carbon market landscape, fostering environmental resilience and socio-economic upliftment while generating critical carbon finance.