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Feasibility Assessment for Watershed Investment Programs

Terms of Reference

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1. Background
   1. Water security and Nature-based Solutions

Water security – defined as ensuring an adequate amount of good quality water is available – is a global challenge. The water we use every day is directly dependent on the landscapes through which it flows, yet nearly half of global drinking water sources are significantly degraded. Compounding factors, such as population growth, climate change, and poor planning are only further exacerbating water insecurity. By 2025, almost 70% of the world’s population is expected to be living in water-stressed areas.

To tackle water insecurity, we urgently need to restore resilient, healthy watersheds, from where our water is sourced. Nature-based solutions for water security (NbS-WS) offer a promising path forward to address the twin crises of water and climate. NbS-WS are actions to protect, sustainably manage and restore natural or modified ecosystems that address water security challenges. These natural solutions support human wellbeing and ecosystems and take a systems approach to consider multiple aspects in a watershed (e.g., upstream users and land use patterns). Watershed Investment Programs (WIPs) are initiatives designed to deliver water security benefits by deploying a defined portfolio of NbS interventions within a specified service area.

1. 2. Watershed Investment Programs (WIPs)

A Watershed Investment Program (WIP) is an initiative designed to deliver ecosystem services (e.g., filtration, flood control, etc.) by investing in the protection or restoration of nature. WIPs aims to deliver water security and associated co-benefit outcomes via a defined portfolio of NbS interventions within a specified service area (the “NbS Investment Portfolio”). A WIP is a programmatic approach for delivering Watershed Investments, which are defined as transactions between a service provider and payer or beneficiary where financial or economic value is exchanged for activities or outcomes associated with the maintenance, restoration, or enhancement of natural areas considered important for watershed services (Forest Trends 2016).

Water security is a complex, multi-layered, and interconnected societal and environmental issue. To succeed, solutions need to be equally as holistic, well-informed, multi-layered, and adaptive. Key aspects of WIP development include:

* A thorough multi-stakeholder process that involves upstream and downstream stakeholders in development and decision-making to garner participation and endorsement, motivate investment, and mitigate conflicting interests.
* Adaptable and customizable to diverse contexts and scales, rather than prescriptive.
* Focused on long-term impact and an ability to clearly quantify, evaluate, and report outcomes at each stage of the WIP development process.
* Science-based approach that relies on information systems to link NbS intervention activities to ecosystem services and overall watershed context.

The WIP process is composed of four interconnected phases—Pre-Feasibility, Feasibility, Design, and Execution—grouped into Program Preparation and Program Implementation (Annex A)

1. Objectives and activities
   1. Purpose of the Feasibility Assessment

This Terms of Reference is for the second phase of a WIP – the Feasibility Phase. The Feasibility Assessment marks the movement from determining high-level NbS potential (Pre-Feasibility) to developing and evaluating the specific NbS Investment Portfolio that is attractive for your stakeholders to advance and commit to. Key goals of the phase include confirming the targeted level of ecosystem services, generating estimated co-benefits (e.g., biodiversity and carbon outcomes), and assembling a detailed understanding of the execution and costing realities for implementation scale-up. When the Feasibility Assessment is accompanied by a robust and iterative stakeholder engagement process, the result is a solid platform from which to transition into Design.

2. 2. Requirements of the Feasibility Assessment

The Feasibility Assessment provides a detailed technical scoping for your WIP and aims enhance the credibility and thoughtfulness of your intended program. It typically culminates in a summary business case that generates an overall view on the feasibility of your project and recommends an NbS investment portfolio to take into the Design phase, as well as an MoU with key stakeholders to move to the WIP Design Phase.

A key Feasibility outcome is to refine and iterate upon the indicative Theory of Change (produced at the conclusion of Pre-Feasibility) and generate a specific, compelling, and validated NbS Investment Portfolio that has been co-created alongside your priority stakeholders.

The key questions the Feasibility Assessment seeks to address include:

* What is the priority NbS portfolio, and what is it worth?
* How do priority NbS options translate in the local context?

Therefore, interested actors should prepare the following deliverables:

Deliverable 1: Priority NbS Investment Portfolio

As part of Pre-Feasibility, your WIP will have identified the target water security challenge(s) and selected possible NbS to address your issue. In Feasibility, you will assess the suitability, viability and sustainability of your selected NbS and agree with stakeholders on a list of NbS interventions that can address the key water challenges. To do so, you will need to assess your NbS portfolio from the standpoints of technical, legal, financial and implementation suitability. The methodology to develop your NbS Investment Portfolio and evaluate associated ROI/cost-benefit is presented in Annex B and is further detailed in the *Economic & Financial Analysis Deep Dive* of the *How-to Guide*.

*N.B. The main body of the document produced should not exceed 50 pages. Please use annexes where necessary.*

* 1. **NbS Options Catalogue and accompanying technical studies.** The identification of applicable NbS for your water security challenge and local context.
     1. *Connect Ecosystem Services to NbS Interventions.* Using the ‘long list’ of NbS identified in the Pre-Feasibility Assessment, identify the water security outcomes and ecosystem services gains of your NbS. The *NbS Factsheet* and *Green-Grey Deep Dives* are especially helpful during this task.
     2. *Select NbS interventions with stakeholders.* Remove from the intervention list any NbS identified whose gains do not match the primary concerns and needs of your stakeholders.
     3. *Consider NbS trade-*offs. Identify potential trade-offs of your NbS intervention portfolio. Trade-offs are the negative aspects of a given intervention or suite of interventions, including negative impacts, the non-delivery of a benefit of interest or some other aspect of the solution set that is undesirable. Further guidance is available in the *Co-Benefits and Trade-Offs Deep Dive*. Identifying trade-offs during Feasibility is critical to inform whether to exclude a particular NbS or if there are additional financial considerations or mitigation actions needed to address the trade-offs.
     4. *Undertake a Business as usual (BAU) scenario simulation.* Complete technical studies to better determine your business-as-usual scenario. This includes, but is not limited to, biophysical impact modelling, predicted future land use/land cover (LULC), and predicted hydrology changes [For more information, please see Annex C).
     5. *Undertake target intervention scenario modelling*. Repeat the activities undertaken for the BAU scenario simulation for your target interventions. Compare outputs with those under the BAU scenario to quantify changes to your priority ecosystem service (e.g., water quality) between the two scenarios.
     6. *Produce GIS mapping of priority interventions.* Based on your results from the ecosystem services assessment and scenario simulation, produce GIS mapping to illustrate where the priority NbS would need to be implemented in your watershed.
     7. *Produce an initial NbS short list* with stakeholders that considers the results from your Options Catalogue and accompanying technical studies analyses.

* 1. **Financial analysis.** Compile the total cost of the evaluated natural infrastructure interventions in watershed health. A financial analysis will assess whether the project is viable from the investor’s point of view.
     1. *Produce an NbS costing model.* Estimate the full lifecycle costing profile of your NbS Investment Portfolio which projects costs (usually on an annual basis) over the WIP’s useful life (often estimated over a 30-year timeframe).
        1. This includes NbS intervention costs (implementation, maintenance, opportunity and transaction costs) and program costs (see Annex D for more detail).
        2. Key questions to answer include: What are the full costs of the proposed NBS program activities to date? What are the projected future annual costs of the proposed NBS program based on the expected time profile of each activity?
     2. *Identify and project funding sources that can be mobilised to cover NbS costs*.
        1. Identify which beneficiaries are investing in the WIP or NbS activities
        2. Identify the existing capital structure of the WIP. This refers to the way the program will fund or finance its NbS through some combination of direct stakeholder investment, debt, equity, or hybrid
        3. Identify whether there is a financing gap and whether it will be necessary to mobilize reimbursable financing to cover this gap. If this is the case, the consultant will formulate recommendations as to potential sources of reimbursable financing and will incorporate hypothesis regarding availability and terms of repayable financing in the financial model. The consultant will develop a financial model that incorporates those projections and allows testing various scenarios in a number of areas, including on the cost side and on the revenue side.
  2. **Economic analysis.** An economic analysis will assess whether the investment is worthwhile for society.
     1. *Project the estimated costs and benefits of your NbS intervention portfolio* to assess the economic viability of your NbS interventions.
        1. Use one or more economic analysis (Cost-Benefit Analysis and/or Cost-Effectiveness Analysis) and communicate these using a set of summary indicators or metrics (as pre-determined by the Client). It’s recommended that your team calculate the same indicators your beneficiaries or stakeholders use to make investment decisions.
        2. *Calculate your NbS ROI.* Develop benefit monetization functions to understand program ROI and drive funding interest.
  3. **Socio-economic analysis.** Assess the overall acceptability of the proposed NbS portfolio measures at the local level and the ability to mobilize local funding sources for their implementation.
     1. *Assess the capacity of water sector actors* and other economic actors at the local level to adopt the proposed activities. This includes an assessment of the land tenure status within the source water areas linked to the WIP, to understand the feasibility and durability of various nature-based solution interventions.
     2. *Assess the willingness of water sector actors* and other economic actors at the local level to support - and, for relevant actors, to contribute to – the financing of the proposed activities.
     3. *Identify accompanying measures* that would be required to facilitate the adoption of the proposed NbS portfolio of interventions.
  4. **Priority NbS Investment Portfolio Recommendation.** Using the results from the NbS options catalogue and financial and economic analysis, assess where your WIP will see the greatest improvement in ecosystem services relevant to the water security challenge for the least cost.
     1. *Conduct an implementation analysis* comparing the estimated labour requirements for implementation of each of the NbS types to currently available on-the-ground absorption capacity and the social acceptance of these measures
     2. *Provide a recommended list of priority NbS interventions* subject to expected budget constraints and stakeholder needs. It is imperative that this recommendation be validated by key actors (for example, your local lead) before you include it in your finalised Priority NbS Investment Portfolio.

Deliverable 2: Business Case

The business case provides a platform to agree with stakeholders on the overall opportunity for NbS to generate water security outcomes. It is contingent on the validation of Deliverable 1 by key actors, particularly section 1.5.

*N.B. The main body of the Business Case should not exceed 30 pages. Please use annexes where necessary.*

* **Identify your audience and case rationale**. Identify to whom you are making the Business Case (for example, this could be a selection of organisations, partners, funders etc., or it could be a more targeted audience). Identify the rationale of the Business Case, including what exactly you are trying to say and achieve. Present this in a couple of slides to your Client.
  1. **Produce a Business Case Report**. This is a summary narrative document tying together the above inputs to generate a view on overall feasibility and recommend an NBS investment portfolio to take into Design.

1. Minimum required activities beyond deliverables
2. Prepare an overall technical methodology at the start of your Feasibility Assessment and have key methodological aspects validated by your stakeholders. Have the methodology reviewed and evaluated by technical counterparties within your prospective funders to ensure it meets their needs.
3. Provide a detailed workplan outlining each task’s and sub-task’s timeline and level of effort. Be sure to include review times as well. This is to ensure all stakeholders (contractor, Client, Sponsor) are agreed on deliverable dates.
4. Organise site visits to collect site-specific data and create bespoke hydrologic modelling
5. Conduct stakeholder outreach to determine the true ‘current state’ of implementation capacity and social acceptance in local communities for your priority NbS options.
6. Ensure regular communication with, and integration of, the client team into the feasibility process.
   * + - Hold a kick-off meeting (face-to-face and/or virtual)
       - Host decision milestone workshops related to methodology, data inputs, resolution, benefits monetisation assumptions, and NbS ‘short list’.
       - Host regular team/client progress updates
       - Hold an engagement closing meeting with Client and other partners involved in the phase
7. Assignment timeframes and deliverables

The estimated time for the work is 6-8 months, including scheduling and facilitating consultation meetings, field travel, data and reports gathering and analysis leading to the final business case containing the synthesis of key information, providing a view on the overall feasibility of the WIP and recommending an NBS investment portfolio to take into Design. See Annex E for a suggested timeline of all ToR activities.

The estimated amount of effort expected for the work is as follows:

|  |  |
| --- | --- |
| Area of focus | Estimated working days |
| Stakeholder engagement | 30 |
| Project management | 30 |
| Economics & finance | 35 |
| Science management | 35 |
| Hydrologic modelling | 40 |
| GIS & Cartography | 40 |
| Total | **210** |

1. Experience requirements

As WIPs are multi-dimensional and cross-sectoral in nature, expertise will need to be sought at various points. Key core staff involved in developing the WIP Feasibility Assessment should demonstrate experience, knowledge and capacity in the following:

* Experience in strategic planning, analysis, and assessment of ecosystem services and hydrological modelling (including relevant modelling tools/methods and GIS/Cartography) for environmental and infrastructure projects.
* Experience in the successful development of documents used for fundraising purposes, or similar products that demonstrate the Return on Investment of a proposed project for social, environmental and economic interests
* Experience in project management
* Equipment, personnel, and expertise required to complete modelling, analysis, and writing deliverables described in this document
* Experience in financial analysis of grey and green infrastructure investments
* Experience in ROI analysis for environmental and water projects
* Knowledge of and experience with nature-based solutions and financing mechanisms, preferably Watershed Investment Programs, in similar contexts
* Experience in institutional analysis and the definition of governance arrangements
* Experience in socio-economic impact analysis of water projects.
* Knowledge of the geographical study area and relevant stakeholders. Prior experience with the specific area and stakeholders is preferred, though experience from similar contexts is also desirable.
* Experience in the development of communication strategies and stakeholder convening and articulation, preferably in the geographical study area or in similar contexts
* Experience professionally coordinating with different stakeholders in the public and private sectors and with civil society organizations to achieve desired deliverables.

1. WIP lifecycle

Timeline

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Figure 1 The four phases in the lifecycle of a Watershed Investment Program

1. NbS Investment Portfolio Methodology

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Figure 2 NbS Investment Portfolio Evaluation Flow Diagram

1. Scenario simulation activities
2. *Land use/land cover (LULC)*
3. Analyze patterns and rates of change in land use and land cover (LULC) change compared with a somewhat recent reference time period (pre-1991, depending upon satellite image availability) across the watershed area nearby urbanized areas. The scale of the analysis will be determined by the size of observed actual LULC changes during the reference period.
4. Project future LULC changes through the year 2050, based on i) extrapolation of observed changes since the reference period and ii) any expected future changes in relevant laws and regulations or their enforcement. Depending on the complexity of LULC change and the importance of adequately capturing the locations of future LULC changes for purposes of hydrologic or hydraulic modelling, this will require remote sensing analysis, and may or may not require a formal modelling approach using specialized software (e.g., Land Change Modelling Specialist [LCM]).
5. *Hydrological modelling*
6. *Identify a hydrologic/hydraulic modelling approach suitable to quantifying the effect of LULC changes on priority ecosystem services.*

The modelling approach is determined by the temporal (annual, monthly, daily, or hourly) and spatial resolution (at specific points in the catchment) of model outputs required for the analysis of priority ecosystem services flows, as well as by model data needs and the extent to which they can be satisfied with available data or data that can be generated through field experiment during the duration of this project.

1. *Build, calibrate and test the hydrologic model*

Apply established minimum best-practice guidelines for hydrologic model development and evaluation (e.g., split-sample approach). Model performance on key outputs should meet established criteria for at least fair model performance to ensure credibility of the overall ROI analysis.

1. *Run the hydrologic model on the BAU scenario to generate outputs of the priority ecosystem services in each scenario. Build the linked hydraulic and morphologic model*
2. WIP costs

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Figure 3 WIP Costing Categories for NbS interventions and program management

1. ROI analysis

The below provides more detail on indicative steps you can take

* 1. *Calculation of cost-effectiveness metrics*

1. *Single-objective cost-effectiveness metrics*

Assess the cost-effectiveness (units of target output per USD invested in Conservation scenario) of the Conservation scenario for each target output. This will result in one cost-effectiveness metric for each target outcome, with all Conservation scenario costs assigned to that outcome. These metrics are primarily of interest to evaluate whether conservation is cost-competitive with alternative, conventional solutions to provide a given target output, as it allows compare the cost-effectiveness of the Conservation scenario with that of a conventional alternative.

1. *Multi-objective (integrated) cost-effectiveness metrics*

For a more holistic, multi-objective comparison of the cost-effectiveness of the Conservation scenario with that of alternative, conventional solutions to water security challenges, multi-objective cost-effectiveness metrics are needed. These metrics permit comparison of the cost-effectiveness of the Conservation scenario in achieving the full suite of target outcomes, with the cost-effectiveness of a bundle of alternative, conventional interventions that provide this suite of target outcomes. Since the target outcomes have different units (cubic meter of additional water supply during times of scarcity; reduction in sediment concentrations in water abstracted directly by households and by the public utility; reduced number of flooded structures), no single cost-effectiveness metric can be calculated for a multi-objective intervention suite. Rather, individual cost-effectiveness metrics for each outcome are calculated by assigning a share of the total cost of the Conservation scenario to each of its target outcomes. One way of determining these shares is to base them on the relative costs of an alternative, conventional intervention portfolio that produces similar quantities of the suite of target outcomes. Other rationales for deriving cost shares for target outcomes should be explored.

* 1. *Costs of alternative, conventional interventions*

Compile information on cost and output levels alternative, conventional projects that produce the target outcomes produced by the Conservation scenario (e.g., increased water supply). Where possible, this information should be used to construct estimates of the costs of projects that are similar in target output levels as the Conservation scenario. In short, what would the least-costly conventional project cost that increases water supply by a similar amount as the Conservation scenario?

* 1. *Choice of discount rate*

Costs and benefits must be converted to their present value (PV) equivalents using appropriate discount rates. For private individuals and private companies, these rates should be based on the private rate of pure time preference (individuals) and the private cost of capital (companies), respectively. Public investments in long-lived conservation projects should be discounted using the long-term social discount rate.[[1]](#footnote-1)

1. Suggested Timeline

The below is an indicative timeline for the activities in this ToR, which can take between 7-8 months. Month 8 is a buffer month, which is to be used if the NbS options catalogue and accompanying technical studies takes longer than expected.

Chart, funnel chart

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1. A recent study estimates the long-term social discount rate for Sierra Leone at 3.99 percent. See Addicott, Ethan T., Eli P. Fenichel, and Matthew J. Kotchen. "Even the Representative Agent Must Die: Using Demographics to Inform Long-Term Social Discount Rates." *Journal of the Association of Environmental and Resource Economists* 7.2 (2020): 379-415. <https://doi.org/10.1086/706885> [↑](#footnote-ref-1)