

## Using systemic approaches and simulation to scale nature-based infrastructure for climate adaptation

### Part I: Project Information

**GEF ID**

10632

**Project Type**

MSP

**Type of Trust Fund**

SCCF

**CBIT/NGI**

☐ CBIT

☐ NGI

**Project Title**

Using systemic approaches and simulation to scale nature-based infrastructure for climate adaptation

**Countries**

Global

**Agency(ies)**

UNIDO

**Other Executing Partner(s)**

International Institute for Sustainable Development (IISD)

**Executing Partner Type**

CSO

**GEF Focal Area**

Climate Change

**Taxonomy**

Focal Areas, Influencing models, Stakeholders, Gender Equality, Capacity, Knowledge and Research, Demonstrate innovative approach, Strengthen institutional capacity and decision-making, Private Sector, Capital providers, Individuals/Entrepreneurs, Large corporations, Communications, Awareness Raising, Public Campaigns, Civil Society, Non-Governmental Organization, Type of Engagement, Information Dissemination, Consultation, Local Communities, Gender results areas, Knowledge Generation and Exchange, Access and control over natural resources, Capacity Development, Gender Mainstreaming, Gender-sensitive indicators, Beneficiaries, Knowledge Generation, Innovation, Knowledge Exchange, Climate Change, Climate Change Adaptation, Ecosystem-based Adaptation, Climate finance, Climate resilience, Livelihoods, Private sector

**Rio Markers****Climate Change Mitigation**

Climate Change Mitigation 0

**Climate Change Adaptation**

Climate Change Adaptation 2

**Duration**

60 In Months

**Agency Fee(\$)**

190,000.00

**Submission Date**

7/10/2020

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
CCA-2	SCCF-A	1,250,000.00	2,240,954.00
CCA-3	SCCF-A	750,000.00	1,344,572.00
Total Project Cost (\$)		2,000,000.00	3,585,526.00

## B. Indicative Project description summary

### Project Objective

To enhance adaptation to climate change by establishing the business case, building capacities, and enabling increased investment in nature-based infrastructure

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
Component 1: Valuation of nature-based infrastructure (NBI)	Technical Assistance	<p>1.1 Improving the predictability and knowledge on the economic efficiency of NBI for climate adaptation and the provision of other infrastructure services through more comparable and credible evidence on capital and operating costs and benefits of NBI and how they perform compared to grey infrastructure alternatives.</p> <p>1.2 Increased confidence of all market participants in the use and performance on NBI. Market participants include project developers, design and engineering firms, cities, national governments, public and private investors</p>	<p><b>Output 1.1.1.</b> Tools to identify, select, value, record and communicate NBI solutions.</p> <p>Includes simulation models and templates for expressions of interest, project screening, project selection, spreadsheets for recording simulation outputs, documenting results.</p> <p><b>Output 1.2.1.</b> Customised valuations on nature-based infrastructure. Target: 10 valuations, every 12 months. 6 valuations in the first year of execution. Each Valuation will include the following,</p> <ul style="list-style-type: none"> <li>- Quantification of ecosystem services (biophysical value) and \$ value of ecosystem services</li> <li>- \$ value of capital and operating costs of traditional grey infrastructure that will deliver the same volume of service outputs over its life cycle.</li> <li>- Quantification of ecosystem services (biophysical value) and \$ value and of co-benefits (positive externalities) delivered</li> </ul>	SCC F-A	1,100,000.00	1,972,039.00

by the NBI such as jobs, labour income, industrial output, consumption, social costs of carbon.

- Comparison of economic costs and benefits of NBI with grey infrastructure solutions

-Scenario analysis on interventions to improve the climate adaptation potential of the NBI. Performed with the integration of EU Copernicus Climate Data

Component 2. Data Management and Dissemination	Technical Assistance	<p>2.1 Decision makers and infrastructure planners have access to data on the performance and costs of NBI.</p> <p>2.2 Decision makers are able to use the database to compare performance and costs of NBI with conventional grey infrastructure solutions.</p> <p>2.3 Uncertainties related to the use of NBI begins to decrease. Market participants begin to 'trust' NBI as a sound and predictable adaptation solution.</p>	<p>Output 2.1.1 Interactive online database with downloadable excel spreadsheets.</p> <p>Output 2.1.2. Bi-annual updates of the database.</p> <p>Output 2.2.1 Record on user engagement and number of downloads. (Reports on activities to help stakeholders use the database for adaptation and infrastructure decisions).</p> <p>Output 2.3.1. Web-based massive online open course (MOOC) including syllabus, modules, learning objectives, and user feedback questionnaires.</p>	SCC F-A	175,000.00	313,734.00
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Component 3. Capacity Building and Knowledge Manageme nt	Technical Assistan ce	<p>3.1 Decision makers have more knowledge and less uncertainties on the performance of NBI. They hence begin to include NBI in adaptation plans and infrastructure plans.</p> <p>3.2. Improved capacities of decision makers to compare the performance and cost of NBI with grey infrastructure.</p>	<p>Output 3.1.1. Records on registration and user feedback.</p> <p>Output 3.2.1. Annual update of teaching materials based on user feedback.</p>	SCC F-A	125,000.00	224,095.00
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Component 4. Outreach and Partnership	Technical Assistance	<p>4.1 NBI becomes a systematic consideration when planning adaptation and infrastructure.</p> <p>4.2 NBI becomes the preferred option and even maybe the default option for adaptation.</p>	<p>Output 4.1.1. Nature-based Infrastructure Resource Centre established at IISD as a project execution unit. Includes dedicated website for featuring components 1, 2 and 3 and project governance arrangements such as high-level project steering committee, technical advisory committee and processes and procedures for project execution.</p> <p>Output 4.1.2 Communication and outreach strategy to sustain the NBI Resource Centre and partnership beyond the project. Include donor outreach, dissemination, social media, advocacy, high level events, collaborative outreach with GEF, MAVA Foundation, GCA, UNIDO, IISD Global Adaptation Network, expert community on system dynamics.</p> <p>Output 4.2.1 Annual impact report of the NBI Resource Center (that will be established as a project unit at IISD). The report will record feedback, lessons learnt, success stories and impact.</p>	SCC F-A	450,000.00	806,743.00
Component 5. Monitoring and Evaluation	Technical Assistance	5.1. Project implementation informed by results from mid term review and up-scaling informed by the results of an independent terminal evaluation.	Output 5.1.1. Mid term review and independent terminal evaluation	SCC F-A	50,000.00	89,638.00

	Sub Total (\$)	1,900,000.00	3,406,249.00
Project Management Cost (PMC)			
	SCCF-A	100,000.00	179,277.00
	Sub Total(\$)	100,000.00	179,277.00
	Total Project Cost(\$)	2,000,000.00	3,585,526.00



**C. Indicative sources of Co-financing for the Project by name and by type**

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Others	MAVA	Grant	Investment mobilized	2,000,000.00
Civil Society Organization	IISD	In-kind	Recurrent expenditures	1,533,776.00
GEF Agency	UNIDO	Grant	Investment mobilized	51,750.00
<b>Total Project Cost(\$)</b>				<b>3,585,526.00</b>

**Describe how any "Investment Mobilized" was identified**

The MAVA foundation is a philanthropic organization with the mission to conserve biodiversity for the benefit of people and nature by funding, mobilising and strengthening partners and the conservation community. The MAVA foundation has pledged to support IISD's work on NBI with a grant in the amount of \$ 2,000,000. Furthermore, in the PIRs information will be provided how much investments in NBI could be mobilized through the NBI Resource Centre's advocacy and advise.

D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNIDO	SCCF-A	Global	Climate Change	NA	2,000,000	190,000	2,190,000.00
Total GEF Resources(\$)					2,000,000.00	190,000.00	2,190,000.00

E. Project Preparation Grant (PPG)  
PPG Required



PPG Amount (\$)				PPG Agency Fee (\$)			
50,000				4,750			
Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNIDO	SCCF-A	Global	Climate Change	NA	50,000	4,750	54,750.00
Total Project Costs(\$)					50,000.00	4,750.00	54,750.00

## Part II. Project Justification

### 1a. Project Description

#### 1) the global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description):

- The impact of climate change has been often at landscape and watershed scale requiring a more comprehensive approach and recognizing the role, potential and performance of nature in providing adaptation benefits. Without due consideration of the benefits and cost efficiency of nature-based infrastructure in the adaptation strategies, the over reliance on built or grey infrastructure may lock-in high carbon assets which are expensive to build and maintain. They also provide limited long-term adaptation benefits to vulnerable communities. Grey infrastructure is also material intensive with high environmental impacts across their life cycle - traction, processing, refining, transport and storage, component manufacturing, construction, maintenance, and disposal. Impacts at the extractive phase and the siting and design phase have particularly significant impacts on land, biodiversity, water, and air. Therefore, excessive emphasis on built or grey infrastructure could also lead to a degradation of land, loss of water bodies and loss of biodiversity making the ecosystem and related livelihoods further vulnerable to climate extremes.
- There is a growing realisation that Nature Based Infrastructure (NBI) can be a cost-effective solution for reducing vulnerability of communities and ecosystems to changing climates and extreme weather. There is also a growing appreciation that NBI can provide a series of positive externalities: they can slow further warming, boost biodiversity, and enhance ecosystem services. NBI can include bio-engineered components that increase their ability to withstand and guard against extreme weather. In addition, NBI can improve adaptive capacity of communities through enhanced socio-economic benefits such as jobs, increased productivity, and community engagement. Using NBI also reduces the need for governments to mobilize capital to finance expensive grey infrastructure solutions for adaptation.
- Given that sovereign debt and budget deficits are preoccupying governments all over the world, it is even more important that policy makers step-up to use the natural capital of their countries to enable economically cost-effective adaptation and infrastructure service provision. In the post COVID-19 era, where all governments have greatly increased sovereign borrowing, the focus ensuring that stimulus spending brings value-for money will be paramount. To this end, countries will be urgently looking for new, innovative and cost effective solutions for infrastructure and adaptation. If they know how to value NBI they can more successfully use their natural ecosystems for climate adaptation and provision of infrastructure services rather than systematically raising debt and increasing public spending on grey-infrastructure solutions.
- NBI can also help to address the massive financing gap for adaptive, resilient, and sustainable infrastructure. According to the Global Infrastructure Hub, the infrastructure deficit worldwide stands at over USD 90 trillion between now and 2040. Meeting this demand by relying only on traditional grey-built infrastructure is a missed opportunity; their carbon footprints can be high and their design for extreme weather resilience can be inadequate and expensive. Using NBI and properly valuing the economic benefits they provide, reduces these impacts and provides an impetus to consider ecosystems as tangible capital assets. NBI can also improve efficiency, productivity and resilience of built infrastructure improving their overall economic performance.

- NBI also bring several co-benefits, i.e. positive externalities, including carbon sequestration, nutrient removal, water storage, harvesting and more. These have direct benefits for communities and livelihoods. Better use of NBI will strengthen livelihoods in both rural and urban settings. Larger scale NBI can also curb climate migration as healthy ecosystems coupled with other green technologies can sustain livelihoods across seasons and extreme weather events. The more NBI is scaled and integrated into planning and infrastructure master plans, the greater the opportunity for resilient livelihoods.
- The barrier we face is that the potential for NBI to provide adaptation and infrastructure services has not been rigorously and systemically assessed. Policy makers and investors may know, anecdotally, that biologically diverse forests, mangroves, wetlands, grasslands and agricultural lands provide valuable ecosystem services and adaptation benefits and sequester carbon, but they don't know the biophysical and monetary value of these benefits and services. They also do not know if they can rely on NBI as they are not able to compare, for example, the adaptation services of one mangrove forest in geography X, with another in geography Y. Most importantly, they are not able to compare the capital and operating costs of NBI with grey alternatives for adaptation. Until we are able to easily and reliably determine the financial and economic value of NBI, they will consistently be overlooked as an infrastructure solution for adaptation and sustainable public services. This is the barrier that this project seeks to address.
- Nature based infrastructure includes a) Natural ecosystems that can be conserved, rehabilitated and maintained in a productive state to deliver a range of ecosystem services and improve resilience against extreme weather. b) Hybrid infrastructure, also referred to as grey-green infrastructure that combines engineered and nature-based solutions. These include constructed wetlands, porous pavements, bioswales for stormwater runoff, sustainable urban drainage systems (SUDS), rain gardens, etc.

This proposal targets projects/interventions/programmes that integrate the conservation and regeneration of natural ecosystems to improve climate adaptation. Interventions can be in rural areas or adjacent to cities and include constructed or bioengineered elements such as artificial wetlands.

## **2) the baseline scenario and any associated baseline projects:**

The baseline scenario is that the entire development community, governments, investors, donors, and the international finance institutions (IFIs) are just beginning to understand that nature can be conserved, restored and used to deliver ecosystem and derived infrastructure services and adaptation benefits. The global development community is also beginning to realise that in some instances, nature can also be used as a substitute for grey infrastructure and also to compliment and increase the efficiency of grey infrastructure.

The development community only starts to understand that built alternatives are often material and resource intensive and generally have a much larger environmental footprint than NBI across their life cycle. Decision makers may not always consider how natural ecosystems can be restored and maintained to provide adaptation services. For example, in an effort to prevent floods from storm surges, many cities resort to building sea walls instead of looking into the value of restoring and bioengineering mangroves to provide the same adaptation benefit, as well as other co-benefits. Another example is that to provide clean water for municipal use, the focus is usually on building water purification plants instead of working to restore ecosystems upstream that would provide natural filtration and purification.

But this is slowly beginning to change. E.g. IUCN has developed the Global Standard for Nature-based Solutions for use by governments, businesses, investors, communities and NGOs in order to ensure that Nature-based Solutions (NbS) reach their potential to address societal challenges. Nature Based Solutions (NBS) are being promoted as an action track of Global Commission on Adaptation.

We are seeing that decision makers can embarked on NBI, even without considering their positive externalities and these projects are highly cost effective. For example, the city of New York has spent \$1.4 – \$1.5 billion on NBI for watershed protection projects. Had the City opted instead to build a filtration plant, taxpayers would had to pay approximately \$6 billion to build the plant plus another \$250 million per year for maintenance.

The growing track record of the methodology proposed for the NBI valuation indicate a growing interest on NBI and how NBI can be better integrated into renovation, refurbishment, urban planning, national adaptation plan and the like. For example, the valuation of done on the Saloum Delta, Senegal, is helping stakeholders work with conservation and restoration specialists to increase the delivery of adaptation services that the Delta can provide. Similarly, agricultural communities in Sardinia are using NBI assessments to increase maintain wetland ecosystems to reduce coastal erosion in flooding. They are realizing that in doing so, they also protect the taste and quality of their livestock and fisheries by-products. Further details can be found at <http://iisd.org/savi/>.

Stakeholders are only beginning to work on valuing nature and the ecosystem services nature provides in economic and financial terms. The UN System of Environment and Economic Accounting (UNSEEA) is working on guidelines for ecosystem accounts (SEEA-EEA, Experimental Ecosystem Accounts) and some countries have launched calls for submissions on the economic value of biodiversity. The Global Commission on Adaptation has identified nature-based solutions as a core adaptation strategy. “Valuing Water” will be the topic of the 2021 World Water Development Report, one of the annual flagship publications prepared by UN-Water. Under the International Water Focal Area, the GEF has already supported the development of a methodology to determine the economic value of water related ecosystem services (<https://iwlearn.net/valuation>). This hands-on methodology is based on a benefit transfer approach developed by UNIDO. It builds on the experience and results of the economic valuation of the ecosystem services provided by the Guinea Current Large Marine Ecosystem.

There is extensive research available on ecosystem services and many projects on the payment for ecosystem services are being implemented all over the world. But at the same time, the economic and financial value of ecosystem services for climate adaptation and public services are still not well understood nor accepted by policy makers focusing on climate adaptation and infrastructure. As a result, the track record on the performance of nature-based infrastructure as an adaption and infrastructure service solution is in its infancy. Adaptation and infrastructure decision makers need more: a) predictability, for example, will a mangrove forest effectively reduce coastal erosion that will in turn reduce the impact of storm surges and flooding as extreme weather incidences increase? b) comparability, for example, will a mangrove forest in country Y reduce erosion and flood damage to the same extent as a mangrove forest in country X?

Nature-based infrastructure has a nascent track record and as a result, has a lower level of predictability and comparability. Furthermore, there is only limited knowledge on easily applicable methodologies to determine the economic value of NBI and the positive externalities provided by NBI. Consequently, NBI have not yet been mainstreamed into adaptation and infrastructure planning.

The purposes of this project nature-based infrastructure refers to deliberately planned and managed natural ecosystems and working landscapes to:

- enhance the delivery of ecosystem services including those that are analogous to public infrastructure
- Enhance the delivery of co-benefits to human populations,
- reduce the need to traditional grey infrastructure
- serve as a substitute for traditional grey infrastructure
- increase the efficiency of traditional grey infrastructure

### **3) the proposed alternative scenario with a brief description of expected outcomes and components of the project:**

This project addresses the challenging scenarios outlined above.

The project will be implemented across 5 components.

**Component 1: Valuation of NBI.** The project will generate customised (or project specific) analyses of the economic and financial value of nature-based infrastructure.

The target will be 10 valuations every 12 months, but with 6 valuations only in the first 12 months. The objective is to help stakeholders understand the economic and financial benefits of using natural and bioengineered ecosystem solutions for climate adaptation.

#### **Who will conduct the valuations?**

Valuations will be provided by the Nature-based Infrastructure Resource Centre (NBI Resource Centre). The Centre will not only implement this project but also raise awareness, raise capacities and improve the enabling environment for NBI more widely. The Centre will be established at IISD. The Center will also plan to continue work after the close of this project.

#### **How will NBI projects be identified and selected for valuations?**

Valuations will be open to all proponents of nature-based infrastructure, including, but not limited to the networks of the MAVA Foundation, GEF, GEF implementing agencies e.g. IUCN, Global Commission on Adaptation or GCA (the vanguard cities and countries identified under the NBS Action track), the Private Financing Advisory Network (PFAN), UNIDO and IISD. In short, all public agencies and civil society organisations will be able to submit NBI projects, the NBI Resource centre will screen and select projects for valuation.

The NBI resource centre will develop a screening checklist and a subsequent project selection matrix to select projects for valuation. This checklist and matrix will be presented to the project steering committee for their approval. Once the steering committee has vetted and approved these selection materials, the NBI resource centre will carry out the valuation.

The NBI resource centre will develop the following templates to increase efficiency and transparency in the screening and selection of NBI projects:

- a) A preliminary screening checklist to help GEF, MAVA, GCA, UNIDO and other organisations to source and decide on NBI projects across their respective networks;

- b) Online template for expressions of interest, which will be posted on the NBI Resource Centre website, enabling all stakeholders to spontaneously submit NBI projects for selection by the project steering committee;
- c) a Project Selection Matrix to help the NBI Resource Centre and the project steering committee to make the final selection on NBI projects that will receive valuations. This Matrix will increase accountability and transparency in project selection;

**What is the simulation methodology that will be used to develop the NBI valuations? Why is the methodology innovative?**

The simulation methodology draws from the Sustainable Asset Valuation or SAVI, see [iisd.org/savi](http://iisd.org/savi) for full track record. The methodology is participatory, all models are co-created with NBI project stakeholders. Its features are:

- based on systems thinking and system dynamics simulation, coupled with project finance modelling.
- customised to each individual nature-based infrastructure project or policy.
- designed with the input of stakeholders, models are co-created through a multi-stakeholder approach that enables stakeholders to identify the material risks and opportunities that are unique to the NBI project.
- Incorporate best-in-class climate data from the EU Copernicus Climate Data Store.

**What are the outputs of the valuations? What are the KPI that will be calculated?**

1. the dollar value of ecosystem services highlighting those that provide carbon sequestration and adaptation benefits;
2. the dollar value of adaptation benefits and other biophysical, social and economic co-benefits (positive externalities). For example, labour income, job creation, increased industrial or agricultural puts; lowered spending on built infrastructure.
3. the dollar value of the capital and operating costs of grey infrastructure needed to provide the same volume of adaptation benefits;
4. scenario analysis on how ecosystem services and adaptation benefits will be affected by climate change, population growth, land cover change, and other pressures over time. Data from the simulation of climate change scenarios will be drawn EU Copernicus Climate Data Store. This is made possible through the ongoing collaboration between IISD and the EU Copernicus Fund and the Copernicus Climate Data Store. In 2020-21, IISD is testing the use of the EU Copernicus Climate Data in 2 GEF projects.

Additional innovative features include:

- As the valuations will include comparison with the capital and operating costs of grey infrastructure, this project provides the fundamentals to explore blended capital solutions and crowd in the interests of private investors. The valuations, as outlined earlier, produce the justification governments need to provide risk capital to projects integrating nature-based infrastructure. This could be in the form of grants, equity, or subordinated debt. Risk capital is an essential component of any blended finance structure. It enables the participation of other sources of capital. It also decreases the overall cost of financing by improving the credit quality of the more senior tranches of financing. Project developers and investors, on the other hand, will have access to a preliminary



financial assessment on how nature-based solutions compare to built infrastructure alternatives. For this purpose, a project finance model will be developed for projects where this would be applicable. The financial model demonstrates how NBS impact the financial viability of the project. The modelling will include how cash flows can service the debt and generate return for shareholders under different levels of NBS integration. The results of the financial analysis can be the starting point for the financial feasibility assessment conducted later in the project development cycle.

- The valuations will also calculate both the dollar value and biophysical value of the adaptation benefits and other co-benefits provided by nature-based infrastructure. Natural ecosystems provide many services and benefits and limiting valuation to just one service or benefit is a missed opportunity. It also does not provide for the fair comparison of nature-based infrastructure with grey alternatives that do not offer so many co-benefits. For example, a wetland provides adaptation services such as the prevention of erosion and the accumulation of sedimentation that provides a natural barrier to prevent flood from extreme weather. But the wetland also absorbs nutrients, stores water, purifies water, sequesters carbon and much more. Similarly, the wetlands also provide livelihoods such as fisheries, tourism, harvesting, etc. The wetland can also provide increases in real-estate value of neighboring properties and in some cases, reductions in weather-related insurance premiums. The valuation of the wetland focusing only on its adaptation potential is therefore incorrect, and moreover, a missed opportunity. It is very important that markets and stakeholder value nature-based infrastructure for the full range of services provided, as otherwise, they will continue to undervalue natural capital in favour of grey alternatives.
- The systems dynamics simulation will include spatial data and spatial dynamics. Using spatial assessments the analysis will indicate what positive and negative outcomes take place in a specific location, and what economic actors and ecosystems will be impacted as a result. Any mitigation option will therefore have to be designed taking into account local impacts and local dynamics, with the option to offset, in other locations, global drivers of change. For example, GHG emissions that drive global climatic changes can be offset elsewhere. The assessments will also make a clear distinction between the different types of ecosystem services that included in the valuation. In summary, the use of special data and spatial dynamics will make the valuations more accurate.

All these elements, - the cross disciplinary simulation, the valuation using best-in-class data including the EU Copernicus Climate Data Store and the customisation to individual projects and policies - makes this project unique and innovative. During the PPG phase it will be elaborated how it can be ensured that environmental and social safeguards will be incorporated in this process.

**The project also addresses the GEF policy demand for systemic analyses to increase the systemic impacts of adaptation.**

Moreover, it provides the fundamentals to build comparable and verifiable track records on the economic and financial case for using nature in climate adaptation and infrastructure service provision. This unique and innovative mix of expertise, data and disciplines will go a long way to enable all stakeholders to systematically consider nature-based infrastructure in their mix of options for adaptation and infrastructure development.

#### **What are the credentials of this simulation methodology?**

The methodology has been validated and tested on over 15 projects. See full track record at the website of the Sustainable Asset Valuation or SAVi <https://iisd.org/savi/>. The methodology has been selected by the EU Copernicus Climate Data Store for the integration of Copernicus climate data into all simulation models. The simulation-derived outputs of this proposal will all be hence based on best-in-class climate data. Indeed, during 2020-21, IISD will be testing the Copernicus data integrated SAVi models on 2 GEF funded projects under the GEF Sustainable Cities Programme and Platform.

Further credentials are that in May 2020, UN System for Environmental and Economic Accounts, Experimental Ecosystem Accounts (SEEA EEA) has included the methodology (as in SAVi) in the Guidelines on the use of Ecosystem Accounts in Policy Scenarios.

The System Dynamics (SD) modeling field was created in the late 1950s by Dr. Jay Forrester at the MIT. It has a long history of success in informing public policy and this method is now taught in more than 100 universities worldwide. SD has been used as the main underlying method for Green Economy and Green Growth assessments by UN Environment, in national green economy planning in more than 30 countries by the Global Green Growth Institute; in landscape planning and analysis by WWF, The Nature Conservancy and by the US EPA in more than 10 countries. The New Climate Economy (NCE) is using systems dynamics as the main tool for the creation of low carbon development strategies in 6 countries.

Project finance (PF) modeling in its current form dates back to the 1980s, enabled by the emergence of spreadsheets. Investors use PF models to assess the financial feasibility of projects, determine the optimal financing structure (e.g. debt sculpting) and stress-test the project's viability under different risk scenarios. In order to ensure high model quality and readability, the PF models built for SAVi and this project follow the Corality SMART project finance modelling best practices.

### **What type of ecosystems and ecosystems services will be included in the valuations?**

Nature-based infrastructure includes many ecosystems - wetlands, mangroves, forests, lakes, lagoons, dunes, rivers, croplands and grasslands. We will use the System of Environmental and Economic Accounts, Experimental Ecosystem Accounts (SEEA-EEA) as main reference.

The ecosystem services that will be valued in economic terms will include provisioning, regulating, habitat and cultural services; the exact mix will be determined by the adaptation and infrastructure priorities of local stakeholders. Priority will be given to:

- Ecosystem services that either enables specific socioeconomic activity, reduce the cost of operations for both private and public actors, reduce or avoid extra-budgetary costs such reduce the costs of adaptation and damage related to climate hazards.
- Ecosystem services that can complement and even replace grey-built infrastructure to provide adaptation benefits/services. For example, water storage, prevention of erosion, protection against water scarcity and drought, protection against floods, and soil formation and composition.
- Ecosystem services that provide wider 'infrastructure and adaptation co-benefits'. For example, water storage, carbon sequestration, air purification, nutrient filtration/water purification, water supply and discharge, protection against water scarcity and drought, protection against floods, and soil formation and composition.
- Cultural services that make a direct contribution to primary and service sector outputs, for example: recreation, tourism, fisheries, agriculture, cottage industries, etc.

To provide for the fundamentals for blended capital, the valuation will also compare the restoration and maintenance costs of natural ecosystems with the capital and operating costs that would be required to build and maintain grey infrastructure alternatives that would provide the same magnitude of services.

### **What types of NBI co-benefits will be valued in biophysical and \$ value terms?**

Co-benefits particularly relevant for climate adaptation are marked with an \*

Groups of ecosystem services	Examples of ecosystem services	Co-benefits that are particularly valuable for adaptation
<ul style="list-style-type: none"> <li>- Ecosystem services that either enables specific socioeconomic activity to reduce the cost of operations for both private and public actors, reduce or avoid extra-budgetary costs, reduce costs of adaptation and damage related to climate hazards</li> <li>- Ecosystem services that can complement and even replace grey-built infrastructure to provide adaptation benefits/services</li> <li>- Ecosystem services that provide wider 'infrastructure and adaptation services' and co-benefits'</li> <li>- Cultural services that make direct contribution to primary and service sector outputs</li> </ul>	<ul style="list-style-type: none"> <li>- Carbon sequestration</li> <li>- Carbon storage</li> <li>- Habitat quality</li> <li>- Sediment retention</li> <li>- Air purification</li> <li>- Nutrient filtration/water purification</li> <li>- Water storage</li> <li>- Water supply and discharge</li> <li>- Soil formation and composition (land productivity)</li> <li>- Biodiversity (habitat quality)</li> <li>- Protection against water scarcity and drought</li> <li>- Protection against floods</li> </ul>	<ul style="list-style-type: none"> <li>• Avoided investment in built infrastructure*</li> <li>• Avoided O&amp;M costs for built infrastructure*</li> <li>• Avoided impacts of climate change on infrastructure (public and private, avoided reconstruction cost) *</li> <li>• Avoided health cost (for households, workers) *</li> <li>• Avoided investment in the health sector (e.g. from climate impacts, air and water pollution, vector borne diseases) *</li> <li>• Improved nutrition (from avoided crop losses) *</li> <li>• Higher value added (e.g. from agriculture*, as a result of reduced erosion, also recreation, tourism, fisheries, agriculture, cottage industries)</li> <li>• Employment and income creation</li> </ul>

- Protection against vector-borne diseases
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### How will the results of the NBI valuations be recorded and presented?

The results of each valuation will be documented in standardized report format. It will include the full suit of simulation results including KPI on financial performance. A technical annex will contain NBI valuation data and references, simulation models, data inputs sheets and a record on the co-design of the simulation with stakeholders..

### Component 2: Data Management and Dissemination. Publicly available, on-line database that records data on the performance of NBI.

As the project gets under way, the database will be preliminary populated with data from the IISD track record. Thereafter, it will be updated as a continuous research effort. As NBI valuations are screened, selected and completed, this data will also be included. We will also investigate an additional feature to invite registered users and researchers to upload new data on the performance of NBI.

All the data and simulation models will be made publicly available. This is core to the design and objectives of this project. The use of NBI for climate adaptation cannot be scaled without increasing access to authoritative data that are organised and presented in a user friendly manner. Public data is also critical to build the enabling environment for NBI. Data is also needed to increase the credibility and predictability of NBI as a reliable and cost effective solution for climate adaptation. The project execution organisation, IISD, is a mission driven not-for-profit civil society organization. All its work is publicly available, at all, and at no cost. IISD's experience has revealed that some NBI proponents/stakeholders initially did not want their valuations to be made public. In order to obtain the project specific data IISD had to sign non disclosure agreements with such NBI proponents/stakeholders. These NDAs have a clause that IISD has to obtain explicit written permission to publish the simulation results. So far, at the end of the analysis and valuation process, IISD could always obtain the permission to publish. IISD learnt that stakeholders' concern about their data being public was more due to: a) lack of experience with simulation-derived analysis; b) the very idea of assigning \$ values on environmental, social, economic and governance risks and externalities was new.

The database will be searchable and interactive. It will provide for downloads in the form of excel spreadsheets.

The purpose of the database to record, publish and raise awareness on the types of biophysical and economic data that is needed to value nature-based infrastructure as an adaptation solution and an infrastructure service provider. The subsection above describes the multi-disciplinary valuation assistance that this project will provide. The database will be organized following the same rationale, each representing different ecosystem services, co-benefits, and comparison with grey infrastructure. Included herein will be a) indicators on the performance of different ecosystems (see attachment 1 on the different ecosystems that will be valued); b) assumptions and proxies used to estimate the volume and value of ecosystem services and co-benefits when project-specific data is unavailable and unreliable; c) proxies used to compare the capital and operating costs of nature-based infrastructure with grey alternatives. d) indicators and proxies for the simulation of physical and transitional risk of climate change. The data on the physical climate risks is drawn from EU Copernicus Climate Data Store. This data is available due the ongoing collaboration between IISD also hosts the Climate Data Store.

By way of example, IISD is in the very early stages of compiling prototype data to calculate the costs risks and externalities of grey infrastructure. See the primer on this prototype at the link below. The proposed nature-based infrastructure database will incorporate the prototype data. <https://www.iisd.org/sites/default/files/publications/savi-database-primer-brochure.pdf> IISD also hosts the [IISD – Experimental Lakes Area Database](#). IISD also hosts the IISD – Experimental Lakes Area Database that is available for researchers and the wider public. We will draw from these experiences for setting up the database with appropriate protocols for data-sharing.

**Component 3: Capacity building and Knowledge Management.** Capacity building on the use of systemic approaches to value the adaptation services, infrastructure services and other co-benefits provided by natural capital. This will be implemented as a massive open online course (MOOC).

Capacity building will focus on the use of systemic approaches to value the adaptation services, infrastructure services and other co-benefits provided by natural capital. This will be implemented as a massive open online course (MOOC) as well as through training sessions that will be provided in person and on-line for NBI stakeholders. This includes stakeholders involved in the NBI projects that receive valuations. Capacity building will also take place at events of the GEF, UNIDO, IISD, and other organisations working on NBI.

The MOOC will be targeted at budget holders and decision makers on infrastructure and climate adaptation and available for a wider audience with basic knowledge on macroeconomics, climate adaptation, sustainable development or nature-based solutions. While the specifics of the MOOC will be designed during the project, we envisage the course will be 6 weeks long, require 4 hours effort per week and be accessible initially at no-cost upon registration. As project implementation will progress the PSC will work on a long term sustainability and strategy for the NBI resource centre which might also comprise elements of cost recovery.

The MOOC will encompass a cross-disciplinary syllabus organised over several modules. To enhance learning, videos, links and background reading will be included. To increase learning impact, activities to help participants to apply the knowledge acquired to identify nature-based adaption opportunities and conduct preliminary valuations will also be included. The course will be promoted across the GEF, MAVIA, UNIDO and IISD networks and much wider. It will be updated annually using the outputs from component 1 and 2.

Additional capacity building on the use of simulation for NBI valuation will be provided to the proponents of the NBI projects receiving valuation. This will be undertaken at the onset of the assessment when the simulation models will be co-created with stakeholder participation. Further capacity building will take place when the results of the valuation are complete and being presented. The capacity building will cover the business case for NBI, the data used for the valuations and how the simulations was conducted.

Events will also be organised at key forums of the GEF, UNIDO, GCA and IISD to raise awareness of on the value of NBI on climate adaptation.

#### **Component 4: Outreach and Partnerships.**

The Nature-based Resource Centre will be established by IISD to implement the project. Its main function will be capacity building and the provision of advisory and advocacy services. It will collaborate with all stakeholders to deliver all the project outputs. It will also engage with a wide arrange of stakeholders to improve the enabling environment for NBI and promote the integration of NBI into adaptation projects and policies.

The NBI Resource Centre will undertake outreach to source NBI projects, raise project profiles and disseminate deliverables across networks of GEF, MAVFA Foundation, GCA, UNIDO, IISD and to the wider public. Outreach is also important to share lessons learnt, deepen stakeholder engagement, and explore additional partnerships for funding and dissemination. Outreach will be targeted to donors, networks, private capital holders, and the broader development community. This is a critical component to ensure the overall success of the project. We will also conduct dedicated outreach in collaboration with GEF, UNIDO, the MAVFA Foundation, and GCA including events and panels at their respective high-level events.

Outreach includes a dedicated website, social media, newsletter, webinars, strategy to target press and media and strategy to tap into the networks of GEF, GCA, MAVFA Foundation, UNIDO, and IISD.

The NBI Resource Centre will also work to improve the enabling environment for NBI, within the scope and duration of this project and wider. The Centre will develop a longer-term strategy for work and outreach during the course of this project.

## **Component 5: Monitoring and Evaluation**

Project implementation will be informed by results from an independent mid-term evaluation and up-scaling will be informed by the results of an independent terminal evaluation.

### **4) alignment with GEF focal area and/or Impact Program strategies:**

#### **Alignment with CCA 2:**

Using nature-based infrastructure as an adaptation solution can be more efficient and cost effective, especially when we value the economic and financial gains. This project will help stakeholders appreciate this and make investment decisions on adaptation infrastructure accordingly.

As countries prepare and implement their national adaptation plans, we observe a huge reliance on grey solutions and the siting of grey solutions at the detriment of naturally occurring adaptation services that ecosystems can offer. This project can address this issue and prompt the inclusion and mainstreaming of natural and bioengineered solutions into national adaptation plans.

In a similar vein, we also see national infrastructure master plans being developed with a focus entirely on grey assets and with little regard to how these assets will withstand extreme weather. Indeed, using natural assets as providers of infrastructure services is nascent. As this project compares the capital and operating costs of nature-based infrastructure with grey solutions, this project will also impact thinking and innovation on infrastructure master planning.

Systems Thinking, and System Dynamics simulation is at the heart of all the project components and outputs. In fact, this project directly delivers on GEG CCA2 as nature-based infrastructure will increase the systemic benefits of adaptation. Component 1, the analysis on the valuation of nature-based infrastructure uses Systems Thinking as underlying methodology. We place the project or policy in its unique, geographical, environmental, social and economic system and simulate how its performance - provision of ecosystem and derived adaptation and infrastructure services - are impacted by climate

change and other material development scenarios. Component 2 includes all peer reviewed and project specific data used to conduct these analyses. Component 3 builds expertise using Systems Thinking and simulation on planning adaptation and infrastructure and thus proving the business case nature-based assets.

**Alignment with CCA 3:** The NBI valuations produced in component 1 will increase predictability and comparability on the performance of NBI vis a vis private investors. These stakeholders need to have confidence that NBI will perform as forecasted. To build this confidence, they need to have information to compare and contract the performance of several NBI projects across different geographies. This project will provide the critical mass of such information and provide for meaningful dialogue with private investors.

NBI project developers will also find this project to be of value, as it will add momentum to their advocacy on proposing and promoting NBI. This is of particular relevance to globally operating corporations that have realized that climate change impacts and the resulting loss of eco-system services is a threat to their business sustainability and have thus committed to engage as environmental stewards. UNIDO is actively cooperating with such industries. For example, UNIDO's collaboration with the HEINEKEN beverage producer and with the management entities of Eco-Industrial parks to promote public private partnerships on environmental stewardship activities. In this context, the NBI valuations will inform decision makers on the most cost effective NBI solution to adapt to climate change and to restore eco-system services as required. This will warrant the environmentally, socially and financially sustainable operation of businesses in harmony with neighboring communities and nature. Here, the NBI valuations will have a strong catalytic leverage towards transformative change. While the results of the NBI valuation will inform the investment decisions of dedicated private sector entities in line with their commitments, UNIDO will use the results for dialogue with government and IFIs as required for the up-scaling of the private sector led and financed NBI investments.

#### **5) incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing:**

The support of the SCCF will provide for faster and more transformative adaptation by helping decision makers appreciate and calculate the value of ecosystem services and the value of co-benefits provided by NBI. Ongoing practice shows that the integration of NBI into adaptation planning and infrastructure planning is increasing, but progress is very slow. Without better information on the economic advantages of NBI, public and private counterparties will move forward to plan and deploy grey alternatives with heavy carbon and environmental footprints across their life cycle. This will lock global societies into a green-house-gas-heavy and natural resource and material-consuming future. Natural resource extraction will increase, biodiversity related challenges will increase, and natural ecosystems will become even more vulnerable to climate change. The support of the SCCF is very important to prevent this occurrence and will be instrumental to increase the deployment of NBI.

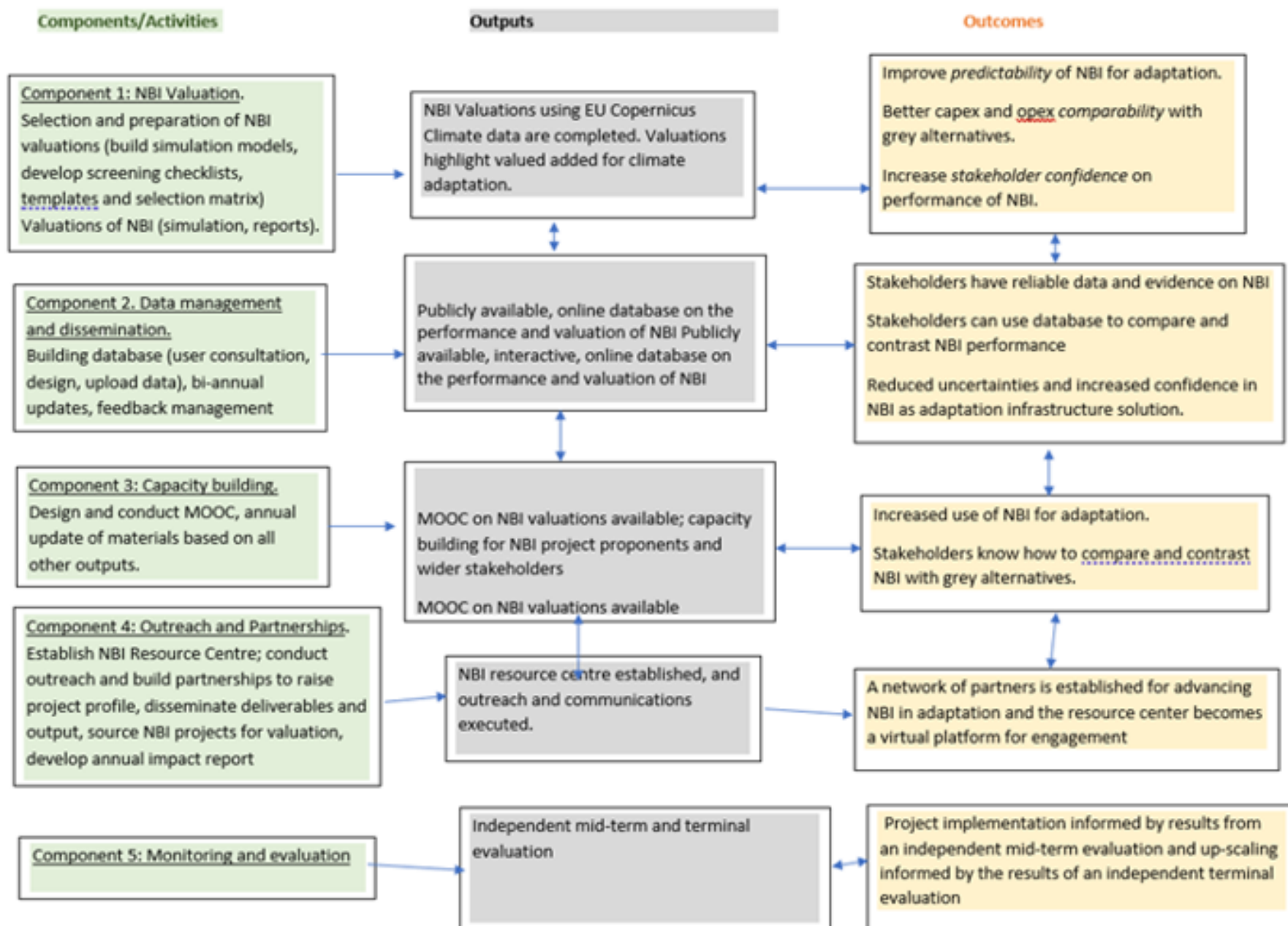
The proposal is co-financed by the MAVA Foundation, one of the most important funders of nature conservation, nature-based infrastructure, the use of nature-based infrastructure to increase resilience and broader research on economics for ecosystems and biodiversity. The goals of the MAVA Foundation are aligned with the goals of the SCCF - supporting developing countries reduce vulnerability to climate change, implement development strategies that are

resilient to extreme weather and at the same time, increase deployment and expertise of low carbon technologies.

IISD is also provided in-kind contributions to this project. These contributions include funding use, since September 2016, to develop and validate the simulation methodology and establish its track record. It also includes funding to incorporate EU Copernicus Climate data into all the simulation models, including the models that will be used for this project. The use cases for the EU Copernicus climate data integration includes 2 GEF funded projects in Johannesburg.

The preliminary Theory of Change is presented below. The TOC will be improved in the full proposal.





6) global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF):

This project will generate evidence, knowledge and skills to increase the use of NBI as an adaptation strategy. While 2,340 counterparts will be trained, the project will reach a total of 115,000 direct beneficiaries. The project will support valuation of NBI in 10 adaptation projects every year, with only 6 valuations planned for the first year, thereby enhancing their adaptation outcomes for vulnerable communities and ecosystems in terms of enhanced resilience to flooding, droughts and increased temperatures. It is expected that some 15 policies/development plans will be influenced to mainstream NBI in climate change adaptation. In addition to direct adaptation benefits, the project will contribute to provide climate change mitigation benefits and contribute to sustainable development goals (SDGs) on some 21,425 ha of land that will be managed for climate resilience. These co-benefits include carbon sequestration, nutrient removal, water storage, increasing biodiversity, prevention of erosion, protection of soil, contributing to sustainable land management, providing for harvesting and livelihoods, provision of 'cultural services' such as tourism and leisure and much more.

## **7) innovation, sustainability and potential for scaling up:**

Innovation is ensured at the very outset as this proposal aims to scale the integration of NBI into climate adaptation.

Additional innovation is ensured through the use of Systems Thinking and System Dynamics simulation for knowledge integration in the valuation of NBI. Back casting and forecasting how ecosystem services will be impacted by various industrial, economic and climate change scenarios has not been done before. Comparing capital and operating costs of NBI with built alternatives is also innovative and will increase the business for integrating NBI into adaptation solutions. Based on project characteristics, the project finance simulation can also be used to compare the financial performance of NBI with grey alternatives. Decision makers will then have both valuations to work with - a first in many instances. All these dimensions will support the deployment of adaptation strategies to maximise systemic, societal gains.

Innovation is also ensured as the simulation and NBI valuation will draw from the best-in-class climate data from the European Union Copernicus Climate Data Store. At the time of writing, IISD is integrating Copernicus Climate data into the baseline simulation models that will be used to implement this proposal. In addition, in May 2020, the UN System for Environmental and Economic Accounts, Experimental Ecosystem Accounts (SEEA EEA) included the methodology that will be used for the valuation of NBI (Sustainable Asset Valuation or SAVi) in their Guidelines on the use of Ecosystem Accounts in Policy Scenarios.

The most innovative element is the partnership between the GEF and the MAVA Foundation to scale the integration of NBI into climate adaptation plan, programmes and projects across the world. This has never been done before.

Sustainability of the project rests on the premise that this project will increase awareness and demand for NBI. With increased demand, the project could attract additional funders and develop innovative business models. Most importantly, this project will help decision makers conduct their own valuations of NBI, or at the very least identify opportunities and ask consulting experts the right questions. The objective of the project will then have been achieved. The sustainability of the NBI Resource Centre will be ensured as this project will increase the awareness on and demand for NBI. As implementation gets underway, simulation and valuation methodologies will also mature, and continuous innovation will take place. A sustainability strategy will be discussed by the PSC including looking at new donors and the development of new business models under which the NBI Resource Centre can continue to operate and innovate. This will inherently include the continuous upgrading of the web platform and MOOC. In keeping with its mandate to champion innovation for a sustainable world, IISD envisions that the NBI Resource centre will continue to operate after the close of this project, offering even more innovative advice, assistance and training on NBI in climate adaptation.

Scale up is planned for through component 4, which seeks to widely disseminate project outputs. Links with the GCA, the UNIDO and the IISD National Adaptation Plan (NAP) Global Network are key scaling strategies.

## 1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

This project is open to NBI proponents from all countries of the world including but not limited to the networks of the GEF, GCA, UNIDO and IISD. It is expected that a majority of the NBI proposals will address adaptation issues in the countries most vulnerable to climate change.



Notre Dame Global Adaptation Index

The areas in red, including most of Africa and South Asia, are very vulnerable to climate change and ill-prepared to deal with its impact. The few countries in blue, including Vietnam, Ghana, Rwanda, Namibia and Botswana, are countries that are vulnerable but are relatively well equipped. Countries in yellow are less vulnerable but also less prepared. The countries in green, which include most of the world's developed countries, are both less vulnerable and better equipped

to deal with the challenge of climate change.

## 2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above, please explain why:

As this project draws on 4 years of experience in carrying out valuations of NBI and infrastructure more widely, this project inherently is building up on extensive stakeholder consultation.

- Local communities were consulted through ongoing NBI valuations in Senegal, South Africa, India, Sri Lanka, Tanzania, to ensure the the NBI valuations results can be used by them to advance the use of nature as a source of livelihoods, diversified revenues and a cost effective adaptation solution. IISD also consulted with the global federation of local authorities ICLEI.
- 
- Civil society organisations were consulted including WWF Africa and WWF South Africa, IUCN, EcoShape, Wetlands International, Global Green Growth Institute; New Climate Economy, Birdlife International. Consultations pertained to the use of system dynamics and project finance simulation to value, in dollar terms, ecosystem services and co-benefits. Consultations also included how these organisations can use NBI valuations to design more effective conservation strategies, to use NBI for climate adaptation and also to start discussions with project developers and impact investors.
- 
- Private sector NBI project developers such as Van Oord and DEME, hybrid infrastructure design and engineering specialists such as Arup and Lagarde Design solution were consulted on their interest to use simulations to integrate more NBI into urban and coastal resilience.
- 
- Private investor networks such as Global Impact Investor Network (GIIN) and Conservation Finance were consulted on blended financing for NBI
- 
- Policy makers we consulted on their interest to use NBI valuations to design more synergistic industrial development and adaptation policies. These policies could take into account the cost of restoring nature to deliver ecosystem services that bring infrastructure benefits rather than only relying on grey-infrastructure solutions.
- 
- Public budget holders were consulted on their appetite to allocate infrastructure development budgets to NBI, especially to hybrid green-grey and blue-grey solutions.
- 
- Local research organisations were consulted on project level data and their interest to participate in project specific data collection. They were also consulted on their interest to use simulation for NBI.
- Domestic banks and domestic investors were consulted to assess their interest, appetite, and openness to consider nature as an asset.
-

Furthermore, the entire project, across the components, emphasises stakeholder participation. Stakeholders involved in this project include policy makers working on adaptation and infrastructure, urban planners, urban resilience officers, NBI solution providers, project sponsors, project developers, local communities, and civil society. This includes the NBI and conservation experts, especially across the networks of the GEF, MAVA Foundation, UNIDO and the Global Commission on Adaptation. These stakeholders will be in the front line as we work to scope each NBI valuation, identify the ecosystem services and co-benefits most relevant to them, and co-create the design of the simulation. We will work with public budget holders, public funders and private financiers as we calculate and compare the capital and operating costs of NBI with grey infrastructure. These stakeholders will need this comparison to appreciate the business case for NBI.

UNIDO as the implementing agency is the UN organization with the mandate to promote Inclusive and Sustainable Industrial Development (ISID) and thus has the comparative advantage to work with private sector entities. Faced with the impacts of climate change the more advanced industries have realized that their active engagement as environmental steward in public private partnerships will be required for their business sustainability and the sustainable provision of valuable ecosystem services to people, nature and businesses. In each of the participatory bottom up planning workshops UNIDO has moderated (e.g. under its partnership with the HEINEKEN beverage industry in Algeria, Ethiopia, Indonesia and Nigeria) representatives from government, civil society, academia and the private sector identified NBI as a priority action for climate change adaptation and for the restoration of ecosystem services. In this process, the stakeholders have demanded for an easily applicable methodology to determine the economic benefits of NBI and to compare their costs and benefits with grey infrastructure solutions.

IISD as the designated execution agency has also worked with above mentioned stakeholders during project identification - drawing from over 10 years of technical and advisory services on sustainable infrastructure and over 4 years of using the proposed methodology. Following preliminary meetings with the GEF and the MAVA Foundation, IISD consulted with cities networks, urban resilience officers and infrastructure planners in V20 countries. The proposed project design draws from all these inputs that stressed the importance of increasing expertise and the use of simulation for NBI in climate adaptation.

This project was designed drawing from 4 years of experience in using the proposed methodology - co-creating each valuation to respond to the needs of its stakeholders.

A particularly important point is that each NBI valuation will be customised to each NBI project context, with the input of project proponents and their stakeholders. The simulation design will be co-created with the stakeholders. The NBI valuation workflow is given below:

<b>Step 1</b>	Engage with use case proponents including governments, UN agencies, cities, NGOs, project developers, design and engineering firms, private investors. Hold discussions with NBI project proponents and their stakeholders to understand and record project context and characteristics.
<b>Step 2</b>	Deepen discussions with NBI project proponents to identify material project risks, material externalities, and more appropriate climate scenarios.
<b>Step 3</b>	Work with NBI project proponents to co-create causal loop diagrams to determine model boundaries, data needs, and emerging dynamics triggered by the project.
<b>Step 4</b>	<p>Create the custom simulation models.</p> <p>Obtain and verify project-specific data.</p> <p>Complement with internationally recognized data sets.</p> <p>Determine model assumptions and verify data and assumptions with use cases.</p>
<b>Step 5</b>	<p>Run the simulation. Validate the model and results following best practice in system dynamics and project finance modelling.</p> <p>Simulate alternative scenarios to test model sensitivity.</p>
<b>Step 6</b>	Analyse the results. Prepare report documenting results.
<b>Step 7</b>	<p>Engage with NBI project proponents to present results.</p> <p>Discuss how the model outcomes will be used for making decisions on low-carbon and resilient infrastructure. Discuss options for raising blended capital.</p>
<b>Step 8</b>	<p>Publish and disseminate report on model outcomes.</p> <p>Engage with NBI project proponents to support next steps.</p>

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.



### 3. Gender Equality and Women's Empowerment

**Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).**

Mal adaptation to climate change impacts women the hardest. There are many reasons for this including poverty, inadequate education, gender-bound patterns in the division of labour, entrenched cultural practices and even biological differences in heat sensitivity and resistance to extreme weather. The increased use of NBI can reduce some of these vulnerabilities.

For one, women can be more open to trying out nature-based solutions as their traditional and indigenous knowledge can increase trust and confidence in the performance of nature. Gender literature also indicates that women are can more easily be persuaded to learn and start innovative approaches that build on traditional knowledge. They are therefore more willing participants in ecosystem-based approaches to climate adaption.

Women are also likely to better recognise that NBI is restorative and regenerative by design. They are first to gain from the co-benefits of NBI such as water purification, water storage, the preservation of soil and the diversification of livelihoods through harvesting. As nature-based infrastructure can be planned for long periods, 30 to 60 years, it provides the opportunity to implement transformative adaptation - strategies that address gender regimes related to the access, use and control over resources including land distribution, labour division and decision making power. Integrating NBI can increase opportunities for empowering women and training them for roles in conservation, sustainable harvesting and sustainable agriculture. Natural resource management is also an entry point for changing relations – the proactive engagement with women changes power relations and increases joint decision making. This is indeed particular important for climate resilience.

To integrate the gender dimension into the whole scope of project management; these steps may be distinct activities and will be incorporated into the different activity components of the project:

- IISD's gender expert will conduct a gender analysis during the PPG period and provide recommendations on how gender mainstreaming can be improved throughout the project activities.
- All staff and experts involved by UNIDO and IISD into the implementation and execution of this project and contractors will be required to successfully complete the training/workshop on basic gender training (e.g. UN "I know gender courses" <https://trainingcentre.unwomen.org/portal/product/i-know-gender-1-2-3-gender-concepts-to-get-started-international-frameworks-for-gender-equality-and-promoting-gender-equality-throughout-the-un-system/> ). When relevant, project staff and experts will have gender related tasks incorporated into their job descriptions.
- Gender aspects will be integral elements of the trainings in order to raise awareness and build capacity on gender issues.

**Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes**

**closing gender gaps in access to and control over natural resources; Yes**

**improving women's participation and decision-making; and/or Yes**

generating socio-economic benefits or services for women. Yes

Will the project's results framework or logical framework include gender-sensitive indicators?

TBD

#### 4. Private sector engagement

**Will there be private sector engagement in the project?**

Yes

**Please briefly explain the rationale behind your answer.**

The rationale for NBI valuation is also to demonstrate to private investors, the cost effectiveness of using NBI in climate adaptation. More certainty and predictability on the adaptation potential of NBI is important to increase the confidence of private investors to crowd-in. As often expressed by industries wishing to engage in environmental stewardship approaches, private investors require comparable and verifiable information on the forecasted adaptation performance as well as on their financial and economic costs and benefits of NBI. They also require analyses that compare the performance of NBI to grey assets that provide the same adaptation benefits. The NBI valuations conducted via this project will provide the much-needed due diligence for private capital participation in climate adaptation.

Private businesses, in particular those already engaged in environmental stewardship activities, are also likely to be stakeholders in the NBI projects that will be valued. Their views will then be included in the design of the simulation. Certainly, stakeholders that directly derive their business sustainability from the health and integrity of natural capital are well placed to participate in innovative conservation and finance solutions.

## 5. Risks to Achieving Project Objectives

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

Risk	Mitigation Measure	Risk category: High, Medium, Low
Delays in the sourcing of NBI projects for selection for valuation by the PSC due to the COVID-19 pandemic.	Engage with GEF, GCA, UNIDO, MAVA Foundation, IISD NAP Global Network to identify potential projects while the development of the full project proposal is on going.	Medium
The post-COVID-19 global economic downturn will diminish momentum on climate adaptation.	This project will demonstrate that adapting to extreme weather using cost-effective NBI is a pre-requisite for economic resilience. As NBI is likely to require lower capital expenditure, it becomes an even more attractive option during times of public budget stress.	Low
The post- COVID-19 recovery stimulus will increase public spending on infrastructure. This will automatically increase the momentum to deploy high carbon, high impact build assets.	Ensure Component 4 on outreach is implemented as soon as the project proposal is approved.	Medium
The post- COVID-19 environment will make international travel for project execution and outreach difficult.	Work online. IISD routinely works electronically with partners and NBI proponents, using teleconference platforms and on-line tools to engage stakeholders, discuss priorities, co-design NBI valuations, share results and explore next steps.	Low
Delays in sourcing and identifying NBI projects for valuation.	Develop preliminary screening checklist (output 2) to guide MAVA Foundation, GEF, GCA, UNIDO, IISD NAP Global Network and other organisations to identify and propose projects.  Develop online template to enable NBI project proponents	Medium

	<p>ents to spontaneously propose NBI projects for valuation.</p> <p>Develop a Project Selection Matrix based on which the NBI Resource Centre will select projects for valuation.</p> <p>This proposal also includes a dedicated component on outreach and communication to mitigate this risk.</p>	
Delays in interacting with project stakeholders to design the analysis and obtaining minimum level of project specific data to provide a credible valuation.	<p>Ensure Project Selection Matrix is designed to evaluate the following: availability of project level data, the ability of project proponents to work online, the willingness of project proponents to source/research project level data; the extent to which the project is a priority for climate adaptation.</p> <p>Use the outputs in Component 2 of this proposal to fill in develop proxies/assumptions to fill project-level data gaps.</p>	Medium
The NBI Resource Centre spends too much time to supplement project specific data gaps.	Use the outputs in Component 2 of this proposal to fill in develop proxies/assumptions to fill project-level data gaps.	Low
The NBI Resource Centre spends too much time on providing the valuation and writing the outputs.	<p>Develop a series of templates to collect data, record results and present results.</p> <p>Develop the full series of system dynamics models on Vensim that can be customised to different ecosystem and adaptation contexts.</p> <p>Develop the corresponding series of input and output data sheets on Excel.</p> <p>Develop the corresponding Project Finance Models with corresponding output files on Excel.</p>	Low
Insufficient outreach and communication	The proposal includes a dedicated component on outreach and communication	Medium

reach and communication.	reach and communication.	
The global development community are not developing the NBI skills fast enough.	Components 2 and components 3 of this proposal are expressly designed to mitigate this risk.	Medium
Climate change continues to worsen. Stakeholders require even more information on how NBI will perform as extreme weather becomes the 'new normal'.	<p>Model design will include climate scenarios.</p> <p>Simulations and valuations will be based on data from the EU Copernicus Climate Data Store.</p> <p>Simulations and valuation will also draw from the InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) models and maps on ecosystems. InVEST was developed by the Natural Capital Project.</p>	Medium
Environmental and social safeguard-related risks	Environmental and social safeguard-related risks are not likely to be relevant in the context of this project as it is not an investment. According to the UNIDO Environmental and Social Safeguards Policy and Procedures (ESSPP), the proposed project is likely to have minimal or no adverse social and/or environmental impacts. No further specific environmental and/or social assessment is required during Project Formulation, although those with procurement components may still have potential environmental and social sustainability considerations. These should be addressed as part of the regular project design activities and through UNIDO's and IISD procurement processes, as applicable.	Low

## 6. Coordination

**Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.**

*Coordination on project execution:*

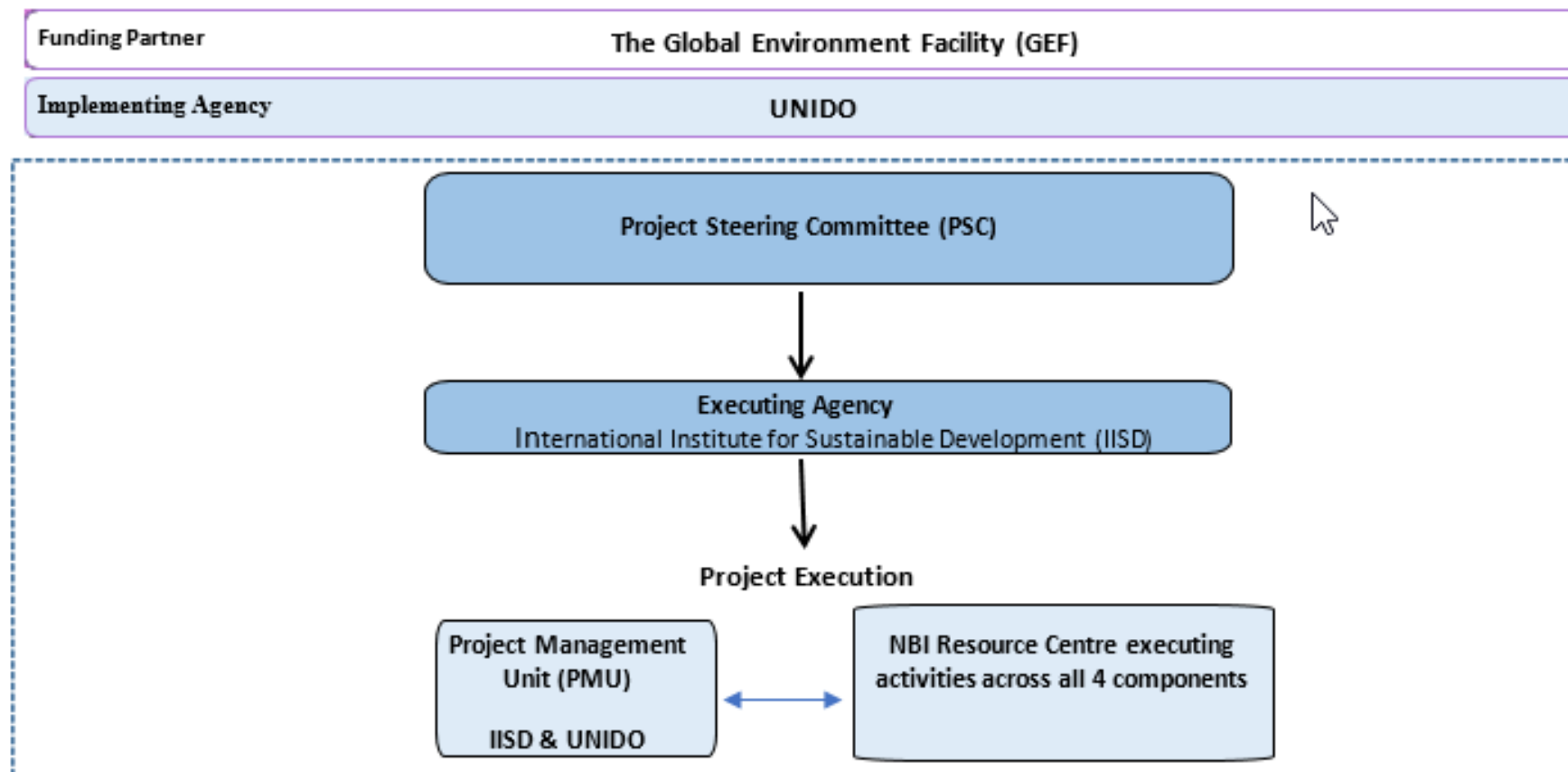
The project will be implemented by UNIDO as GEF Agency. Execution will be carried out by IISD.

The NBI resource centre (to be established by IISD) will also serve as the project management unit. Thus, it will be staffed with subject matter experts as required to carry out the valuations, provide advisory services and take charge of advocacy work as well as with project management experts from IISD as required for close cooperation with the designated UNIDO project manager to ensure smooth coordination and management of the project. In order to assure cross-fertilization with other initiatives in the field of NBI and simulation the NBI resource center will consult and exchange on all subject matter issues with a technical and advisory committee. The composition, responsibilities and modus operandi of the technical and advisory committee will be determined during the PPG phase.

The NBI Resource Centre will also work to improve the enabling environment for NBI outside the scope and beyond the duration of this project, The centre will also coordinate implementation and ensure outreach and collaboration across the networks of the GCA, UNIDO the MAVA Foundation Networks, the GEF Networks, the IISD NAP Global Network etc.

The project will be guided by a project steering committee (PSC) which will include representatives from the GEF, IISD, MAVA Foundation, UNIDO, GCA, and other experts on simulation and NBI for climate adaptation. The project steering committee will meet virtually every 6 months to review progress and advice on resolving ongoing challenges.

During the project preparation phase, the main stakeholders shall draft (i) the Terms of Reference for the PSC and its role in decision making during the project lifetime for example in relation to output 1.2.1 on the selection of the valuation projects, as well as (ii) a long-term sustainability strategy and business plan for the Resource Center in line with section 7. on sustainability.



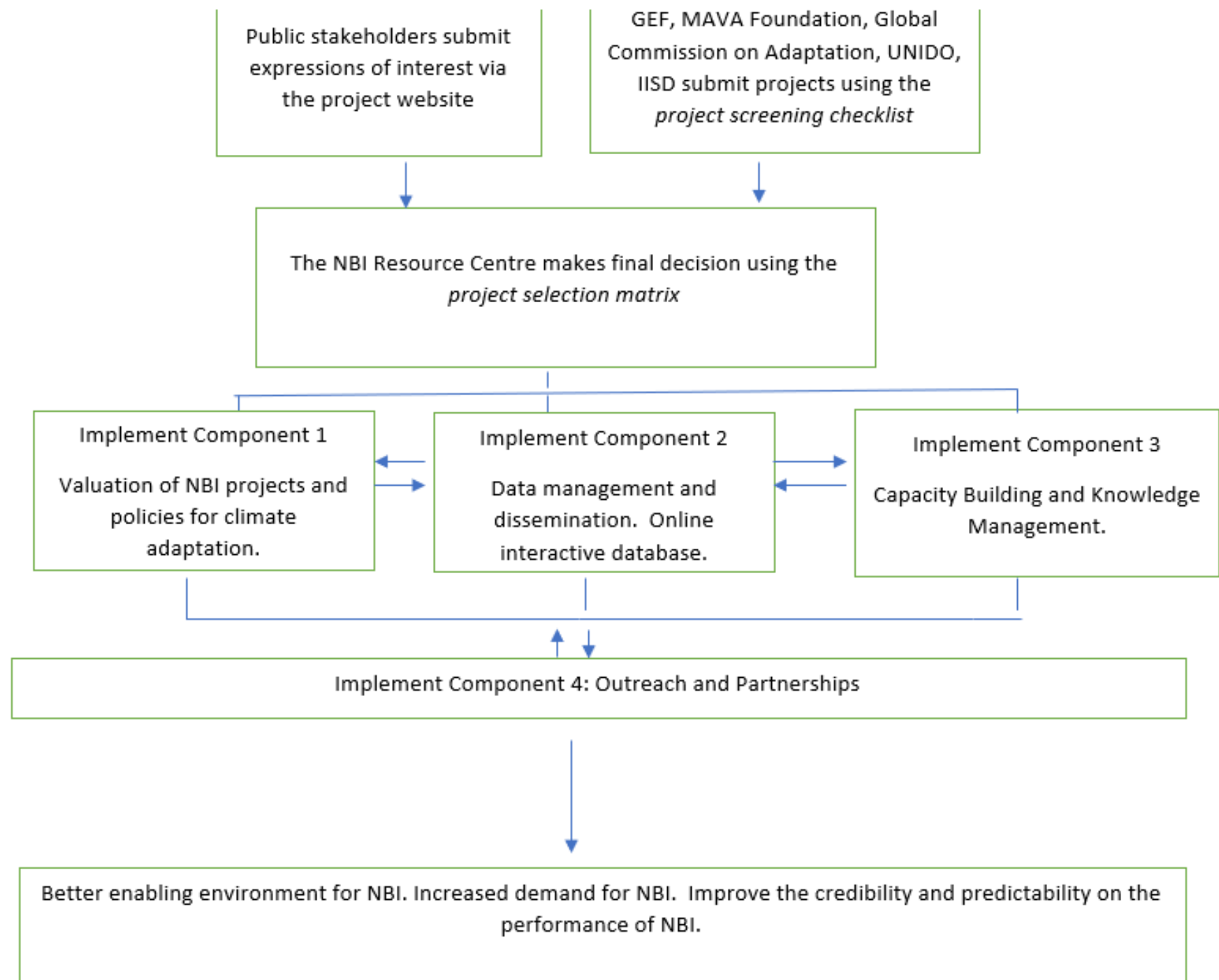
*Coordination across the components 1, 2, 3 and 4:*

The NBI valuations in component 1, will be derived from project specific information and moreover from ongoing research and data synthesis. This body of knowledge and data will grow incrementally as the NBI valuations are conducted and the ongoing research continues. This data will be catalogued online and disseminated under component 2. Component 3, the MOOC, will draw from the learning and data in components 1 and 2 and will be updated every 12 months. Components 4, outreach and partnerships, will communicate the results and deliverables of the project, seek collaborations and feed into a range of ongoing initiatives on NBI. Please see the flow diagram below on the organisation of the project, across the 4 components.

### **GEF-MAVA project on nature-based infrastructure for climate adaptation.**

**Flow diagram on the how Nature-based Infrastructure Resource Centre (NBI Resource Centre) will implement the project across components 1, 2, 3 and 4.**





*Coordination with GEF, MAVA Foundation, UNIDO, GCA:*

This project will liaise and source NBI projects from the GEF Global Platform for Sustainable Cities and other GEF initiatives. UNIDO as the implementing agency will contribute NBI proposals from its engagement with leading globally operating private sector entities and from eco-industrial parks that engage in NBI as part of their environmental stewardship activities. The project will also liaise, source projects, and disseminate outputs through the networks of the GCA, which have identified nature and infrastructure as action tracks. This project will also liaise with the IISD National Adaptation Plan (NAP) Global Network and disseminate deliverables and outputs across IISD's extensive global networks.

*Liaising and exchanging with Horizon2020 / Horizon Europe*

The project will also liaise and exchange experience with EU Horizon2020 / Horizon Europe projects that focus on nature-based infrastructure and climate adaptation. Part of this EU funding framework targets nature-based solutions as part of its Research & Innovation Policy Agenda. Examples of such projects include ThinkNature, Naturvation, Green Surge, UrbanGreenUP, GrowGreen, NAIAD, Nature4Cities, ConnectingNature and UrbanNature Labs.

*Liaising with Global Networks:*

Other projects and networks that will be targeted in project sourcing, dissemination and outreach include: Local Governments for Sustainability (ICLEI), the Green Climate Fund (GCF), the UN One Planet Network, the UN Environment Sustainable Infrastructure Partnership; the Green Growth Knowledge Platform, the OECD Working Party on Procurement and Infrastructure, the C40 cities network, Wetlands International, the UN Global Compact, WWF country offices such as WWF South Africa that focus on nature-based infrastructure. We will also liaise with conversation finance and impact investment networks to disseminate project results. Of relevance are the Global Impact Investment Network, the Conservation Finance Network, and the Conservation Finance Alliance.

*Liaising with simulation experts and networks:*

This project will liaise with international experts and networks related to systems dynamics and project finance simulation. This is important to disseminate results, exchange best practice and moreover, to ensure continuous innovation on the simulation models being used to provide the NBI valuations. Of importance of the international Systems Dynamics Society, and the project finance best practice Corality Smart and F1F9.

## 7. Consistency with National Priorities

**Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions**

Yes

**If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc**

The UNFCCC process that provides the overall framework for this proposal are:

- Nationally Determined Contributions (NDC): a document where actions are listed for mitigation and adaptation (<https://unfccc.int/nationally-determined-contributions-ndcs>).
- National Adaptation Plans (NAP): The NAP process helps countries conduct comprehensive medium- and long-term climate adaptation planning. It is a flexible process that builds on each country's existing adaptation activities and helps integrate climate change into national decision-making. <https://unfccc.int/topics/adaptation-and-resilience/workstreams/national-adaptation-plans> (there also sectoral plans, e.g. on health - HNAPs)
- National Communications to the UNFCCC: this is a document that primarily present past performance, which is where the performance of nature based projects can be mentioned.

Countries are also increasing NBI as key component of their adaptation plans and strategies. The project will directly inform several sectoral planning processes, including for infrastructure that could be complemented or replaced by nature-based solutions. This is of particular relevance in the case of agriculture, water, urban development as well as cross-sectoral national development plans.

The IISD National Adaptation Plan (NAP) Network, that works with 140 countries informs us that countries are starting to include nature-based infrastructure as an adaptation strategy, but the challenge lies in the lack of expertise to plan, predict, budget and eventually execute NBI solutions. Further evidence is that focus on NBI is increasing comes from the GCA, that has nature-based infrastructure as an action track. E.g. Viet Nam has sought support from the German Ministry for the Environment, Nature Conservation and Nuclear Security for the implementation of Viet Nam's adaptation targets in its NDC in the area of nature-based solutions (NbS) and ecosystem-based adaptation (EbA).

The global leadership provided by the EU on nature and climate is also important to note, as it will be advance the agenda on NBI. Of particular note is the Horizon Europe grant framework which includes cities and grantees outside the EU. The framework includes a strong focus on nature-based solutions as well as 're-naturing' cities. Another EU policy that will influence NBI for climate adaptation at the global level is EU Action plan for resilience in crisis prone countries which includes countries outside the EU. Broader leadership through the EU biodiversity strategy and the EU Green Deal will also drive global interest and demand for NBI.

## 8. Knowledge Management

**Outline the Knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.**

The project is designed to continuously improve generating, recording, sustaining and improving knowledge across the 4 components. The NBI valuations (component 1) will feed into the NBI database (component 2) and the design/updating of capacity building activities and materials (component 3). Outreach and Partnerships (component 4) will disseminate knowledge and generate demand for new valuations (component 1).

Component 1: Generation and recording information/knowledge will be ensured using templates and the publication of results including data, assumptions and simulation models. Sustaining knowledge and improving knowledge will occur organically, as learning from one valuation will inform and improve others. Improving knowledge will hence increase across the project life.

Component 2: Generating and recording knowledge and sustaining knowledge will take place as intelligence from component 1 are recorded the public database. As the database expands and stakeholders begin to use it, knowledge will improve.

Component 3: Generating and recording knowledge and moreover the sustaining of knowledge will occur as intelligence from components 1 and 2 are used to develop capacity building materials and conduct capacity building activities. Improving knowledge will occur as decisions makers learn how to identify, plan and work on preliminary valuations.

Component 4. Sustaining knowledge will be core as intelligence and outputs of components 1, 2 and 3 will be used for outreach, dissemination and build new partnerships. Improving knowledge will happened as feedback from the wider development community will feed into the continued improvement of component 1m and subsequently 2 and 3.

## 9. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

**Overall Project/Program Risk Classification\***

PIF

CEO Endorsement/Approval MTR

TE

Low

#### Measures to address identified risks and impacts

Provide preliminary information on the types and levels of risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the project (considering the GEF ESS Minimum Standards) and describe measures to address these risks during the project design.

Environmental and social safeguard-related risks are not likely to be relevant in the context of this project as it is not an investment. According to the UNIDO Environmental and Social Safeguards Policy and Procedures (ESSPP), the proposed project is likely to have minimal or no adverse social and/or environmental impacts. No further specific environmental and/or social assessment is required during Project Formulation, although those with procurement components may still have potential environmental and social sustainability considerations. These should be addressed as part of the regular project design activities and through UNIDO's and IISD procurement processes, as applicable.

#### Supporting Documents

Upload available ESS supporting documents.

Title

Submitted

Annex D - ES Screening\_Template\_200172\_countersigned

### Part III: Approval/Endorsement By GEF Operational Focal Point(S) And Gef Agency(ies)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

Name

Position

Ministry

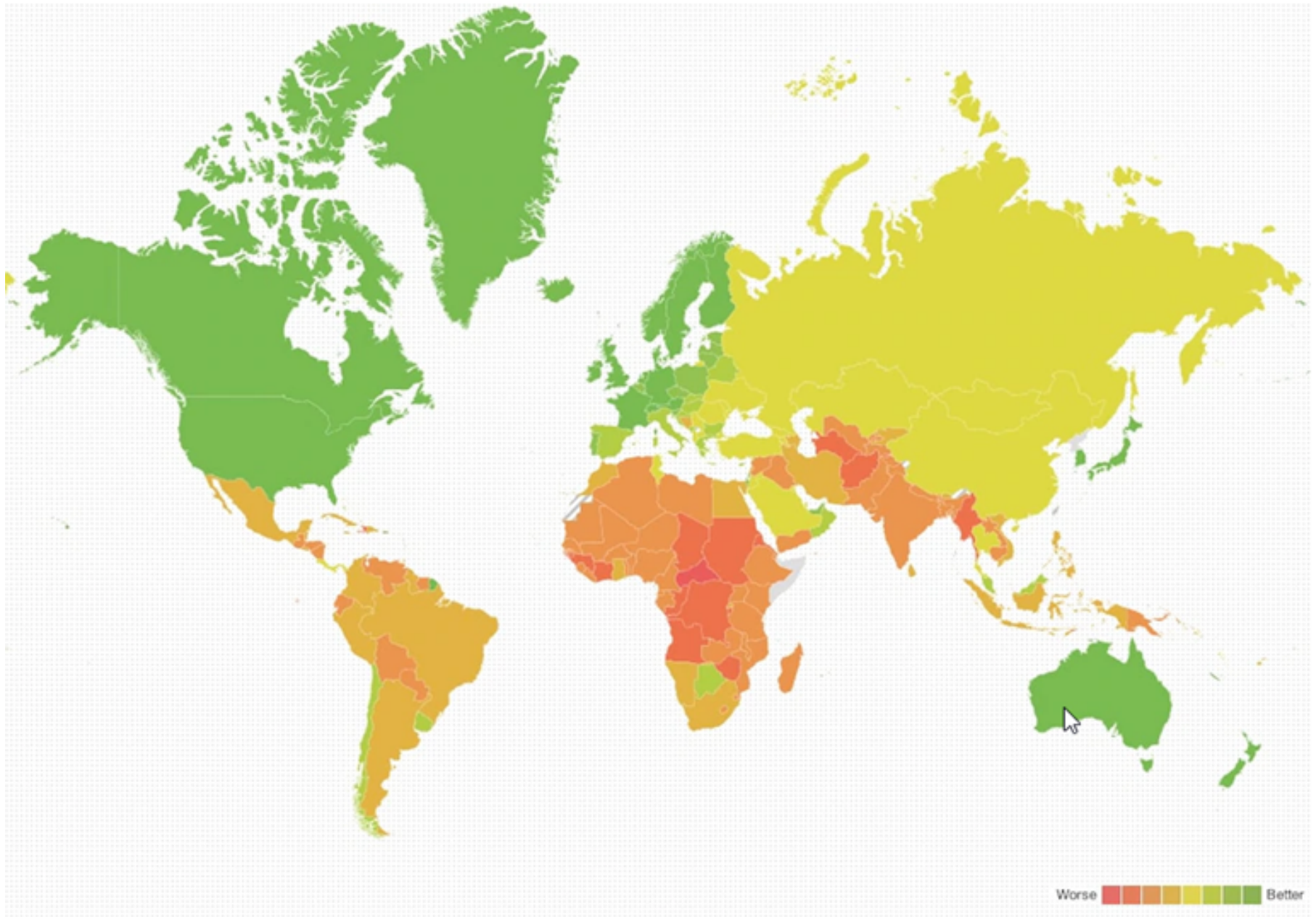
Date

## **ANNEX A: Project Map and Geographic Coordinates**

Please provide geo-referenced information and map where the project intervention takes place

The areas in red, including most of Africa and South Asia, are very vulnerable to climate change and ill-prepared to deal with its impact. The few countries in blue, including Vietnam, Ghana, Rwanda, Namibia and Botswana, are countries that are vulnerable but are relatively well equipped. Countries in yellow are less vulnerable but also less prepared. The countries in green, which include most of the world's developed countries, are both less vulnerable and better equipped to deal with the challenge of climate change.

Here is the map broken down by readiness, with green indicating "more ready" and red indicating "less ready":



And here is the map for vulnerability:



