Approach Paper

The Natural Resource Degradation-Human Vulnerability Nexus:

An Evaluation of the World Bank's Support for Sustainable and Inclusive Natural Resource Management (2009-2019)

August 27, 2019

1. Background and Context

1.1 **Renewable natural resources represent essential livelihood assets for many resource-dependent communities, many of whom are extremely poor**.[1] If those renewable natural resources are well-managed, they can provide sustainable livelihoods, jobs and income, and reduce the vulnerability of resource dependent communities. If those renewable natural resources are degraded, they risk creating substantial environmental challenges and increasing human vulnerability.[2]

1.2 **Chronic poverty, natural resource dependency, and degradation of natural resources are strongly interrelated.**[3] The resource dependent poor are increasingly affected by the degradation of renewable natural resources including productive landscapes (land, soil, vegetation), coasts and coastal fisheries, and surface and groundwater. Some of the world's most vulnerable people live in areas where the degradation of renewable natural resources threatens, or will threaten, their lives and livelihoods (Appendix C; Table 1.1).

1.3 **Climate change exacerbates the magnitude of the natural resource degradation challenge, especially for the most vulnerable populations.** Natural resource degradation increases susceptibility and exposure to climate shocks and depletes resilience and adaptive capacity to climate change (World Bank 2010a; World Bank 2018). The combined effects of resource degradation and climate change could force more than 100 million people into poverty by 2030, especially in Africa and South Asia (World Bank 2016a). The effects of climate change, especially in resource degraded and fragile areas, could contribute to the displacement of up to 143 million people (See *Groundswell*, by K. Rigaud et. al 2018), and it could severely impact food security by reducing crop yields by 10 percent globally by 2050 (IPBES 2018).

Table 1.1. Convergence Between Degradation and Vulnerability

Renewable Resources	Illustrative Examples of the Degradation-Vulnerability Nexus
Landscapes (land, soil, vegetation)	The livelihoods of approximately 900 million people that depend on the natural resource base are affected by severe land degradation, *especially in the drylands* of Africa (including in the *Sahel),* in the *Cerrado* region in South America*,* and *Semi-Arid India*, where the levels of poverty are high.[4]

Coasts	The degradation of coastal regions of West Africa annually threaten the livelihoods of 500,000 people whose already precarious livelihoods depend on the quantity and quality of natural resources.[5]
Coastal Fisheries	Globally, small-scale fisheries – a vital source of protein, employment and income for the poor – are rapidly diminishing. In Southeast Asia, 64 percent of fisheries are at a medium to high risk from overfishing.[6] West African coastal fisheries are also either fully or over-exploited: incomes for artisanal fishers have dropped by as much as 40 percent per canoe over the last decade.[7]
Surface and Groundwater	Water scarcity and groundwater depletion is projected to leave large parts of South Asia, MENA, Southern Africa, and LAC (e.g. Mexico) without access to a crucial source of freshwater that will disproportionally affect the poor. India faces rapid and widespread groundwater decline. If current trends persist, for example, 60 percent of India's districts will reach critical level of depletion within two decades, rendering at least 25 percent of agriculture at risk.[8]

2. World Bank Policies and Interventions

2.1   **The World Bank has long recognized the importance of natural resources for poverty reduction and sustainable development in its policies and strategies, addressing environmental degradation through multiple interventions**. Over the last twenty years, World Bank strategies have acknowledged the risks posed by natural resource degradation and have focused on how to harness opportunities to achieve sustainable poverty reduction:

- The *World Bank's 2001 Environment Strategy* stressed the links between environmental degradation and poverty reduction. It aimed to raise the "quality of life" of the resource dependent poor by addressing the underlying drivers of degradation, increasing access and improving rights, and supporting livelihood approaches to increase the incomes and reduce the vulnerability of the poor.

- The updated 2012 Environment Strategy, a "*Green, Clean, and Resilient World for All*" sets forth a multi-pronged agenda to address the drivers and threats of resource degradation. The *green agenda* supports client countries to sustainably manage and conserve their vital natural resources to improve livelihoods and ensure food security. The *resilience agenda*, anchored in the findings of the *World Development Report on Development and Climate Change* (2010), was also introduced in response to the emerging threats posed by climate change to the resource base and livelihoods of the poor.

- More recently, the World Bank has made strong corporate commitment to help clients strengthen their resilience, including in the *Forward Look 2030*. Building on the *Climate Change Action Plan* (2016-2020), the World Bank also launched the *Climate Adaptation and Resilience Action Plan (2019)* committing US$50 billion of investment to help protect the lives and livelihoods of people that are dependent on rain-fed agriculture, pastoral, forest and coastal resources for their livelihoods. The risks associated with natural resource degradation and climate change were also the focus of the *Sustainable Development Practice*

Update to the Board held in March 2019. The resource degradation-vulnerability nexus has been stressed by IDA deputies as part of the climate change and fragility special themes.

2.2 **To implement its policies and strategies, the World Bank intervenes at different levels, and with different instruments, to address resource degradation risks and reduce the vulnerability of the resource dependent poor:**

i. It provides **analytical and technical support** through Country Environmental Assessments and global thematic and seminal studies that have demonstrated continuity across the World Bank's work on various resource degradation and vulnerability issues. These include *Confronting Drought in Africa's Drylands* (Cervigni and Morris, 2016); *Fighting Land Degradation at Landscape Scale* (Lovei, Agostini et al. 2017); *Uncharted Waters* (Damania et. al 2017); *The Changing Wealth of Nations* (Glenn-Marie, et al. 2018); and *Groundswell* (Kumari Rigaud, et al. 2018), amongst others.

ii. It supports **investments** that include (i) *resource focused approaches* that aim to restore, and promote the sustainable use of, vital natural resources within degraded landscapes, which include community-based approaches, sometimes with concomitant aims of reducing resource related conflict risks (e.g. through co-management schemes); and (ii) interventions that use *social protection approaches* as an entry point to target poor, resource dependent households and individuals while incentivizing restoration of the natural resource base.

iii. It engages in **partnerships** such as TerrAfrica[9], Global Landscapes Forum[10], Wealth Accounting and the Valuation of Ecosystem Services[11]; and more recently AFR100, which aim to achieve shared understanding and cooperation across countries, mobilize investments and enhance the technical quality of interventions.[12]

3. Objective, Rationale and Audience

3.1 **This is a forward-looking evaluation that will generate evidence about how well the World Bank has addressed natural resource degradation issues that threaten the lives and livelihoods of vulnerable resource dependent people – what works, where, why and for whom?** The evaluation will inform policy discussions concerning what the Bank should do more of, less of, and differently, including on the implementation of the World Bank's *Climate Adaptation and Resilience Action Plan* (FY21-25). Evidence gathered will inform the wider global development debate and policy dialogue on ways to address and alleviate the negative effects of the resource degradation-human vulnerability nexus, in affected areas.

3.2 To date, the evidence base remains fragmented across projects, resources and regions, and has not *systematically assessed* how World Bank interventions focus on natural resource degradation contribute to the *sustainable management* of natural resources and to the *reduction*

of associated human vulnerability. A preliminary portfolio review shows that the World Bank applies multiple approaches to address natural resource degradation risks and several metrics to assess natural resource and human vulnerability dimensions (see Para 4.11).

3.3 **Addressing natural resource degradation risks is a priority for World Bank clients, especially IDA countries**. Over half of all approved Country Partnership Frameworks cite sustainable natural resource management as a priority. IDA countries point to the severe and increasing risks to resource dependent communities. The combination of high demographic growth, depletion of resources, and weak state institutions contribute to increased fragility and conflict risks in IDA-FCV countries, especially in Africa. IBRD countries are seeking support for increased efficiency and sustainability of resource intensive sectors, including how to use improved resource management to increase incomes, including in lagging regions.

3.4 **Addressing natural resource degradation risks to reduce human vulnerability is codified in the Sustainable Development Goals and it is the focus of multiple United Nation Declarations ratified by client countries.** Addressing natural resource degradation is the aim of SDG 14 and 15 – which aim at promoting sustainable use of terrestrial and marine ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and biodiversity loss. Addressing degradation risks is also linked to SDG 1 (No Poverty) and SDG 2 (Zero Hunger). More than two decades after the signing of the United Nations Convention to Combat Desertification, for example, on 1 March 2019, the UN declared a landmark Decade on Ecosystem Restoration 2021-2030, striving to achieve protection of the marine environment and land degradation neutrality by 2030.

3.5 **The evaluation will address issues that have not been covered by previous IEG evaluations, including the focus on human vulnerability.** It will use available evidence from previous evaluations: *Managing Forest Resources* (FY13); *Towards a Clean World for All* (FY17); *Carbon Markets* (FY18); and it will build on the early findings of the *Climate Change Adaptation Evaluation* (FY12). It will use Country Program Evaluations, where relevant evidence is available. It complements future planned evaluations, including the *Management of Water Resources evaluation (FY22)* and *Agricultural Transformation (FY21)* (See Appendix D for summary of previous IEG evaluations).

3.6 **The evaluation's primary audience is policy and decision-makers, including the World Bank's Board and Management** Key stakeholders in the World Bank include the *Sustainable Development* and *Human Development* Vice Presidencies and the regional directors. The evaluation will produce actionable evidence for the Board and management and for key global practices including Environment and Natural Resources, Agriculture, Social Protection and Jobs, Water, and Social, Urban, Rural and Resilience (SURR), as well as for the Climate Change and Fragility, Conflict and Violence (FCV) groups. External stakeholders range from

foundations to UN agencies – especially those overseeing the implementation of environmentally relevant conventions – international and local civil society.

4. Evaluation Design

Scope

4.1   **The evaluation team constructed the high-level _Theory of Change_ (ToC) based on a preliminary literature review, a review of project documents, and consultations with selected experts in the World Bank (See Figure 4.1)**.

4.2   **While there are multiple causes of natural resource degradation, the evaluation is scoped to focus on the range of World Bank interventions that aim to support the improved management of renewable natural resources that are vitally important for the lives and livelihoods of resource dependent people**. These natural resources issues include: land and soil degradation (including coastal areas), surface and groundwater depletion, loss of forest resources and small-scale coastal fisheries. Shaded in grey, the evaluand includes partnerships, analytical work, policy support, and investments that are aligned with the evaluation aim (see Figure 4.1).

Figure 4.1. Theory of Change
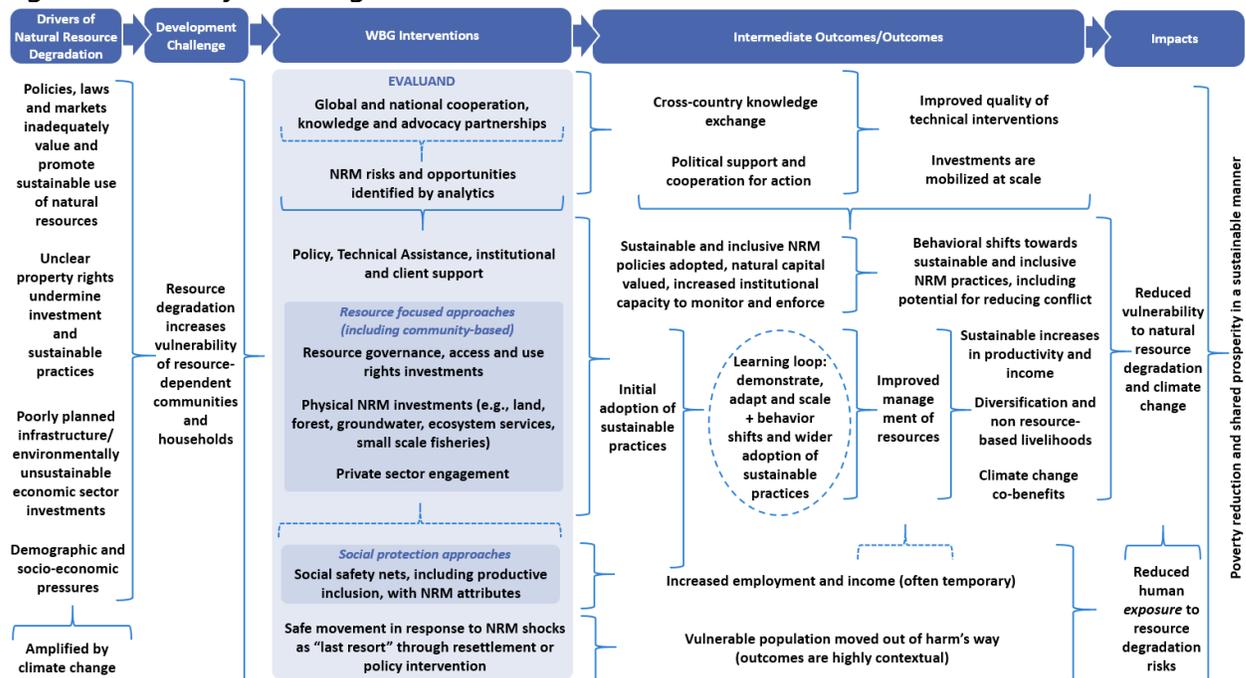
Source: IEG.

4.3   **World Bank investments, which include activities to improve the sustainable management of natural resources with the potential to reduce associated human vulnerabilities, can generally be categorized three ways**:

i.   *resource focused approaches*, that aim to restore, and promote the sustainable use of, vital natural resources within degraded landscapes, which include community-based approaches, sometimes with concomitant aims of reducing resource related conflict risks (e.g. through co-management schemes). Vulnerability reduction, in these approaches, is often associated with the contribution of improved natural resource management (NRM) with increases in productivity, income, and economic diversification.

ii. interventions that use *social protection approaches* as an entry point to target poor, resource dependent households and individuals while incentivizing improved management and restoration of the natural resource base. These are referred to as "productive inclusion" projects in the World Bank. Human vulnerability is initially addressed through temporary employment, food, or income (e.g. cash for work programs) in exchange for work commissioned to restore the productive resource base. The approach is designed to contribute to the jobs and poverty reduction agenda in the World Bank. It also seeks to create incentives for changed behavior of resource users to mitigate or correct resource degradation.

iii. While the World Bank has not historically played a large role in promoting *safe movement*, it is beginning to operationalize *safe movement*, as a last resort if land, and resources, cannot be maintained or restored. This is an emerging need, associated with severe human vulnerability, that has been expressed as part of the climate change adaptation dialogue in the World Bank and that will be explored as part of the review.

4.4   **A key feature of the evaluation will be to examine how the World Bank is intending, planning, and adapting to the imperative of replicating successful achievements, or taking them to scale.** The evaluation will assess whether project designs include modalities to achieve this through activities developed for testing and learning.

4.5   **The evaluation excludes analysis of the wider global commons[13] issues**. For example, while the evaluation will examine ecosystem services in landscapes that are vitally important for the well-being of resource dependent people, it will not examine global biodiversity issues (e.g. illegal trafficking, status of protected areas). Global biodiversity issues are being examined in a separate IEG synthesis note. While it will examine small scale fisheries that affect the livelihoods of coastal populations, it will not examine global marine issues. Likewise, while it will assess afforestation, reforestation, local deforestation and forest services within landscapes, it will not cover global tropical deforestation. The evaluation also

excludes analysis of environmental externalities associated with high value extractives and unsustainable planning and practices in economic sectors (e.g. infrastructure, agriculture).

4.6   **The evaluation is further scoped by omitting IFC and MIGA from the portfolio assessment.** The preliminary portfolio review showed that these institutions only have a small number of relevant mature interventions in line with the aim of the evaluation. However, IFC will be assessed, where relevant, as part of the case-based analysis.

Portfolio

4.7   **The evaluation team has identified a preliminary** *Natural Resource Degradation and Human Vulnerability* **portfolio using a multi-level process**. It included consultations with counterparts in the World Bank and a thematic, manual screening of projects and components to determine eligibility in line with the evaluation scope. (See Appendix C for portfolio identification methodology). The evaluation will develop the portfolio further, including through an enhanced consultation process, to ensure completeness and accuracy.

4.8   **The preliminary portfolio includes 561 World Bank lending projects approved between 2009 and 2019 aligned with the objective and scope of the evaluation** (excluding 84 AF, Table 4.1). These include the World Bank's different financing instruments such as investment lending (including GEF), policy lending, and Program for Results. A total of 285 lending projects (46 percent) are closed; they include: (i) *resource-focused approaches* and (ii) *social protection approaches* with natural resource management – referred to as "productive inclusion" projects in the World Bank. The preliminary portfolio assessment also identified 271 World Bank ASA products (Table 4.2).

Table 4.1. Preliminary Evaluation Portfolio FY09-19

Intervention Typology (n=561)		Active	Closed	Total
Resource-Focused Approaches	Sustainable Land and Water Management Projects including Community Based Approaches	193	199	392
	Land and NRM Policy and Institutional Strengthening	27	58	85
	Coastal Zone Management and Small-Scale Fisheries	42	22	64
Social Protection with NRM Approaches	Productive Inclusion projects (Cash for Work/NRM activities)	14	6	20
Total		**276**	**285**	**561**

Source: IEG/Business Intelligence.
Note: Excludes Additional Financing (84 projects). At least 129 WB projects are community-based, as identified through the CDD database (downloaded April 2019).

Table 4.2. Preliminary ASA Evaluation Portfolio FY09-19

Typology of ASA	# of ASA
Sustainable forest management	46

Typology of ASA	# of ASA
Coastal Zone Management and Fisheries	45
Country Environmental Analysis (CEA)	40
Water resources management	40
Climate change adaptation and resilience	28
Natural capital	15
Groundwater	13
Gender and Natural Resource Management	12
Land governance	11
Payment for Ecosystem Services (PES)	8
Land degradation	7
Social Protection with Natural Resource Management	3
Drylands	3
Total	**271**

Measurability Assessment at the Project Level

4.9 **The proposed theory of change is partly based on an assessment of the causal pathways outlined by "typical projects" in their appraisal documents and results frameworks.** The evaluation conducted a preliminary measurability assessment of 140 World Bank projects – with a sustainable land and water management focus—and of 20 projects that use social protection systems as an entry point to reduce the vulnerability of natural resource dependent communities. The preliminary assessment found that:

- Two-thirds of the sustainable land and water management (SLWM) investments include: (i) an objective statement that infers causality between Natural Resource Management (NRM) activities and the reduction of human vulnerability and (ii) core environmental indicators pitched at an output level (e.g. number of hectares of land under a sustainable land management regime). *Half of these projects also measure bio-physical change* (e.g. soil quality and fertility, siltation, species presence and diversity, vegetative cover, increased water, and reduction of fire incidences). *Most of these projects also measure changes to human welfare*, including income, employment, jobs, productivity, revenue and/or diversification of revenue, but the causal linkages are not always made explicit.

- The social protection approaches with an NRM focus *measure labor outcomes (*e.g. number of days worked) and *half of these project measure NRM outputs,* but the causal linkages between the two mechanisms is often not made explicit. NRM indicators are mostly pitched at an output level (number of hectares of areas restored, reforested, or put under a management regime). Some projects *measure rural diversification* activities (entrepreneurship, skills and training). Vulnerability metrics, in addition to the income or cash transferred, include measures of food security, asset accumulation, the ability to plan, and institutional capacity to respond to early warning systems. Some of these projects also include disaggregated results for the most vulnerable groups (elderly, children, refugees, etc.)

4.10   **The preliminary assessment confirms the measurability potential of the portfolio.** It provides information on the types and levels of indicators that World Bank projects typically use to measure environmental and human vulnerability outcomes in the identified portfolio. The evaluation will build on this preliminary analysis to develop a framework for assessing the World Bank's approaches and contributions to (i) improving the management of natural resources and (ii) reducing associated vulnerabilities of resource dependent people – including by exploring how vulnerability is conceptualized and measured.

Evaluation Questions

4.11   The overarching question for this evaluation is: *How well has the World Bank addressed natural resource degradation issues to reduce associated vulnerabilities of resource dependent people?*

4.12   This overarching question will be addressed answering the following sub-questions:

   i.   How strategically has the World Bank identified and addressed resource degradation issues that are threatening resource dependent people, in the places where those threats are most prominent?

   ii.   How effective has the World Bank's support for natural resource management (including resource-focused approaches and social protection approaches) been to promote sustainable use and to reduce the associated vulnerability of resource dependent people?

        a. What can we learn from existing evidence?

        b. What factors drive the results of these approaches?

        c. What are the evidence gaps?

   iii. Has the World Bank been effective in its efforts to partner globally?

Evaluation Levels and Methods

4.13   The evaluation has been designed to be conducted at three levels: (i) Global level (Data, Strategy and Portfolio); (ii) Socio-Ecological System (SES) Level; and (iii) Case Based Level (of relevant interventions) (See Table 4.3 and Figure 4.2).

4.14   **At the Global Level**, the evaluation has been designed to answer key policy and strategy issues on whether the World Bank is "*doing the right things in the right places*." It will use existing evidence, external and internal, to determine whether the World Bank is identifying and addressing the resource degradation issues that are threatening the lives and

livelihoods of resource dependent people, in the places where those threats are prominent. It will do so through a:

- **Global Review of Natural Resource Degradation Issues and Associated Resource Dependencies** that contribute to Human Vulnerability using external and internal data sources to identify assess coherence between the global data, SCDs, CPFs, ASA, and investments.

- **Global Structured Literature Reviews (SLRs)** using available peer-reviewed studies, impact assessments etc. to identify factors of effectiveness of NRM interventions in terms of reducing degradation of resources and associated human vulnerabilities.

- **A Portfolio Review and Analysis (PRA)** to identify the relevant portfolio; gather and analyze existing evidence on identified interventions, map evidence gaps, and derive explanatory factors on effectiveness in line with the evaluation scope.

- **Partnership Mapping and Analysis** of relevant self and external evaluations, to assess roles and relative contributions to the World Bank's wider natural resource management and associated vulnerability reduction aims.

- **Group and Individual Key Informant Interviews** on (i) strategy and policy; (ii) partnerships; and (iii) explanatory factors.

4.15 **The second level of analysis will be conducted for the socio-ecological system.** A socio-ecological system is defined by its ecosystem and biophysical attributes (e.g. vegetation, geography, climate, soil) and its interactions with people and institutions that influence resource use.

4.16 The socio-ecological systems to be assessed will be selected through the global data analysis (see 4.14). Examples of socio-ecological systems that contain high levels of resource degradation and associated human vulnerability include:

➢ High pressure landscapes/watersheds (e.g. Eastern and Central Africa Highlands, mountain ecosystems in South America, China, Nepal, etc.)

➢ Tropical and subtropical drylands, grasslands, savannas, and shrublands in Arid and Semi-Arid climates (e.g. Sahel, Cerrado, Semi-Arid areas of Southern Africa and India, etc.)

➢ Coastal zone degradation and small-scale fisheries depletion (e.g. Coastal regions of West and East Africa, East Asia, etc.)

➢ Areas with high levels of Groundwater depletion (e.g. South Asia, Middle East and North Africa, Southern Africa, etc.)

4.17   **At the Socio-Ecological System Level, for 3-4 systems stratified across regions, the evaluation will:**

- **Map Projects:** Utilize project level data from the preliminary Portfolio Review to map interventions within socio-ecological systems.

- **Conduct Desk Reviews**: Reconstruct and develop holistic intervention theories on how WB intervenes in each of the 3-4 socio-ecological systems based on portfolio findings. Analyze and compare explanatory factors that influence effectiveness of World Bank interventions in the selected socio-ecological systems. Assess and utilize relevant World Bank analytical work, internal and external studies, impact assessments etc. This exercise will also reveal where evidence gaps exist.

4.18   **Finally, the Case Level Analysis is designed to identify and assess explanatory factors of effectiveness (in line with the evaluation scope) of selected World Bank interventions that support natural resource management in selected socio-ecological systems stratified across selected regions**.

- To ensure that the findings of the case-based analysis can inform the wider global policy debate, interventions will be selected on the principle of **'typical case' purposive sampling:** i.e. mature interventions that have characteristics that are representative of larger parts of the portfolio in select socio-ecological systems. Such characteristics include: (i) a typically occurring intervention logic based on accepted theory of change; (ii) a representative project design – component composition and alignment with causal theory; and (iii) results indicators – including corporate indicators – that are frequently utilized to measure attributable outcomes of the intervention typology.

- **The case level analysis will conduct a detailed assessment of what works** (in selected countries) considering the complexity of the specific socio-ecological system in which the cases are embedded. The analysis will be designed to consider and elucidate explanatory factors.

- The case-based approach will utilize several methods to collect relevant data and triangulate findings including: project M&E systems, external assessments, country-level workshops, individual and group interviews across identified stakeholder groups, primary and secondary data collection (including geospatial), etc. The analysis will also assess whether projects were designed and implemented to facilitate replication or impact at scale and the motivations behind.

- The case analysis will also carry out a **Policy Coherence Analysis** for the countries included. This will involve an analysis of the World Bank's present country portfolio and interviews with CMU staff (including Environmental and Social staff).

Table 4.3. Summary Table of the Evaluation Design

Evaluation Question(s)	*Overarching question: How well has the World Bank addressed natural resource degradation issues to reduce associated vulnerabilities of resource dependent people?*		
	How strategically has the World Bank identified and addressed resource degradation issues that are threatening the welfare and livelihoods of resource dependent people, in the places where those threats are most prominent?	**How effective has the World Bank's support for natural resource management (including resource-focused approaches and social protection approaches) been to promote sustainable use and to reduce the associated vulnerability of resource dependent people?**	**Has the World Bank been effective in its efforts to partner globally?**
Evaluation Level	**Evaluation Methods**		
Global	**Global Review of Natural Resource Degradation and Associated Resource Dependencies that contribute to Human Vulnerability** using external and internal data to identify and assess coherence (data, SCDs, CPFs, ASA, portfolio) **Portfolio Review and Analysis** - identify relevant portfolio; gather and analyze evidence on interventions; map evidence+ gaps **Key Informant Interviews**	**Structured Literature Reviews (global)** (using internal and external studies, impact assessments etc.) to identify factors of effectiveness (success or failure) associated with interventions.	Partnership mapping Analysis of self-evaluations Key Informant Interviews and Qualitative analysis of Responses
Socio-Ecological System Level		**Desk Reviews**: Reconstruct and develop holistic intervention theories on how WB intervenes in each of the 3-4 socio-ecological systems based on portfolio findings. Analyze and compare explanatory factors that influence effectiveness of World Bank interventions in the selected socio-ecological systems. Assess and utilize relevant World Bank analytical work, internal and external studies, impact assessments etc. This exercise will also reveal where evidence gaps exist. **Portfolio Review and Analysis:** Utilize project data from the PRA to map interventions within socio-ecological systems and to inform Desk Reviews.	
Case level	Policy Coherence Analysis of Select Country Portfolios	**Case-Based Analysis** to derive explanatory factors of success or failure of interventions embedded in select socio-ecological systems. It will use key informant interviews, analysis of existing data (where feasible) and desk study including findings from the structured literature reviews, and intervention analyses.	Key Informant Interviews

Figure 4.2. Summary Schematic of the Evaluation Design

Case Level

| Case Based Analysis: Region/Country 1 | Case Based Analysis: Region/Country 2 | Case Based Analysis: Region/Country 3 | Case Based Analysis: Region/Country 4 | Case Based Analysis: Region/Country 5 | Case Based Analysis: Region/Country 6 |

Socio-Ecological System Level

- Conduct **Portfolio Review and Analysis** of projects within identified Socio-Ecological Systems
- Reconstruct and develop holistic **Intervention Theories** of how WB intervenes in select Socio-Ecological Systems based on portfolio findings. Analyze and compare explanatory factors that influence effectiveness of WB interventions in the selected Socio-Ecological Systems
- Identify **"typical cases" within Socio-Ecological Systems** based on objectives, intervention logic, implementation modalities, and results frameworks

Global Level

- **Coherence Analysis** between global data analysis and the world bank's diagnostics, strategies, and investment portfolios
- **Portfolio Review and Analysis** to test causal assumptions and to derive explanatory factors of NRM and associated vulnerability reduction outcomes
- Map interventions within Socio-Ecological Systems
- Further refine ToC through **Global Structured Literature Reviews** (external literature, impact assessments) of known causal pathways and explanatory factors of sustainable NRM and associated vulnerability reduction
- Analysis of WB partnering efforts and relative contribution to addressing resource degradation issues and associated human vulnerability

- **Global Data** on resource degradation and associated human vulnerability identification and analysis
- Identification of relevant portfolio and preliminary review of NRM related approaches
- Development of indicative **Theory of Change** (ToC)
- **Global Partnership** identification in the resource degradation space

Selection Considerations

4.19   **The Criteria for the selection of 3-4 Socio-Ecological Systems:**

i.   Presence of high level of resource degradation and human resource dependency (see Data Sources in Appendix C).

ii.   Density and diversity of relevant Bank interventions within a given socio-ecological system.

iii. Diversity of Socio-Ecological Systems, including regional stratification, where feasible.

Criteria for selection of Case-Based Assessments:

i.   Presence of a diversity of interventions selected on the principle of 'typical case' purposive sampling, i.e. interventions that have characteristics that are representative of larger parts of the World Bank's portfolio.

ii.   Data availability and consideration of phased interventions to capture temporal dimensions.

iii. Diversity of World Bank Regions and Countries.

Design limitations

4.20   **Evidence may be lacking on the effectiveness of some elements of the approaches supported by the World Bank in the external literature.** Evidence may also be contradictory across a small number of studies. The structured literature review is designed to point out where such evidence gaps exist, and the case-based analysis is designed to assess explanatory factors of success and failure by casting a wider systems level net. The evaluation will note where the lack of existing evidence on the feasibility of approaches constrains an assessment of effectiveness.

4.21   **Generalizability will present a challenge but will be mitigated through several methodological approaches.** The evaluation will conduct cross-case analysis, comparing case-based evidence with evidence from the literature. It will also triangulate findings between the various evaluation methods.

4.22   **The evaluation's scope does not assess the unintended effects of World Bank interventions across sectors on natural resources at the global portfolio level.** The World Bank may be inadvertently causing degradation or missing opportunities to address key drivers in its investment and policy loans. This wider lens is recognized, and as such, aspects of sector policy coherence will be assessed as part of the case-based analysis. This includes an analysis of macro and sector policy and institutional issues that distort incentives to

accurately value natural capital that undermine sustainable resource management (as recognized in the ToC).

5. Quality Assurance Process

5.1   The Approach Paper and the Evaluation will undergo several quality assurance processes including internal IEG and World Bank management and staff review, as well as external peer review. Members of the Committee on Development Effectiveness also review the Approach Paper and the full evaluation report upon completion. Quality assurance is also sought through inputs from a PROACT and REACT workshop with World Bank Management and staff.

5.2   This approach paper has been peer reviewed by leading Natural Resource Management and Social Science specialists. These include:

- **Sara Scherr** is *the founder and President of EcoAgriculture Partners* and the co-founder of the *Landscapes for People, Food and Nature Initiative*, which she chairs. Prior, she served as Director of Ecosystem Services at Forest Trends; adjunct professor at the University of Maryland; co-leader of the CGIAR Gender Program; senior research fellow at the International Food Policy Research Institute and as a principal researcher and later the Board of the World Agroforestry Centre.

- **Arun Agrawal** is a *Professor at the School of Natural Resources & Environment at the University of Michigan*. His research and teaching emphasize the politics of international development, institutional change, and environmental conservation, and the role of indigenous knowledge, community-based conservation, and property rights in achieving sustainable development gains.

6. Expected Outreach, Outputs, and Tracking

6.1   **A final evaluation report will be delivered to the World Bank Board's Committee on Development Effectiveness (CODE), after integrating feedback from World Bank management**. In addition, the evaluation will produce intermittent outputs that can be utilized by key counterparts in a timely way (BBLs; contributions to Learning Weeks; briefings, thematic papers).

6.2   **The evaluation will be conducted in close collaboration with stakeholders**. World Bank consultations, including a scoping workshop, were held to inform the development of the Approach Paper. A wider set of consultations is planned for the evaluation process. An internal "PROACT" workshop that was held on April 23, 2019 with World Bank management and staff. A "REACT" workshop will be held prior to submitting the evaluation draft. Management and staff at all levels (regional, GP, country) and client counterparts, will be

integrated into the case-based analysis (information, interviews, etc.). A separate external stakeholder mapping exercise, to be conducted during the evaluation, will inform the external outreach strategy with IFIs, bilateral and UN agencies, academia and civil society. Once the evaluation is disclosed, it will be launched internally and externally as part of a *Communications and Influence Strategy*. Key conferences and events that could potentially be targeted for wider outreach are the Land and Poverty Conference, Global Landscapes Forum, and UNCCD events. The evaluation's expert panel will help develop outreach suggestions as part of their wider networks.

7. Resources

7.1   *Timeline and budget*. The evaluation will be submitted to CODE by the end of Q4, FY20. The budget for the study is estimated at $900,000, excluding dissemination. The budget was determined by estimating the costs of (i) methods necessary to answer the evaluation questions in sufficient depth; and (ii) conducting fieldwork in rural and remote project locations where vulnerable, resource dependent people live.

7.2   *Team and Skills Mix*. The skills mix required to complete this evaluation includes a multidisciplinary team with expertise in land and natural resource management and governance, resource economics and rural development, social anthropology and natural resource related conflict and fragility. Evaluation skills include both qualitative and quantitative, including participatory evaluation, the use of tech enabled tools – including geo-spatial tools and analysis. Members of the team are also skilled at specific evaluation methodologies relevant for this assessment including portfolio review and analysis, structured literature reviews, evidence gap maps, review and analysis of impact evaluations, and have familiarity with the policies, procedures, and operations of the World Bank.

7.3   The evaluation will be conducted by a core IEG team led and managed by Bekele A. Shiferaw (Lead Evaluation Specialist) and Lauren Kelly (Senior Evaluation Specialist), which includes Stephen Hutton (Senior Evaluation Specialist), Joy Butscher (Junior Professional Officer), Mari Noelle L. Roquiz (Evaluation Analyst), Chikako Miwa (Junior Professional Officer), Harsh Anuj (Data Science Specialist), Sengphet Lattanavong (Short-Term Consultant, portfolio), and Doruk Yarin Kiroglu (Short-Term Consultant, portfolio). Technical inputs will be provided by Jozef Vaessen (IEG Methods Advisor), April Connelly (Senior Natural Resource Management Specialist), Gurkan Kuntasal (Senior Environmental Specialist – IFC/MIGA, at the AP stage). International and local consultants with technical and regional expertise will support the literature reviews and case studies. The evaluation is being prepared under the overall direction of Alison Evans, Director-General, Evaluation and José Carbajo Martinez, Director, IEGSP.

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Appendix A. Detailed Timeline

Approach Paper Milestones	Date
Concept note meeting	1/2019
First brainstorming/scoping meeting	2/2019
PROACT Workshop	4/23/19
AP circulated for One Stop	5/8/19
Agenda setting meeting	5/16/19
Comments matrix circulated	5/16/19
One Stop review meeting	5/17/19
One stop meeting minutes circulated	5/22/19
DGE submission	5/24/19
Circulation to WB management	6/04/19
WB management comments received	6/21/19
DGE submission	6/25/19
WB management for information	6/26/19
E-Submission	6/28/19

Main Report Milestones	Date
Methods Workshop	May/June 2019
50% Workshop	12/18/19
80% Workshop	2/20/20
Draft Report circulated for One Stop	4/28/20
Agenda setting meeting	5/5/20
Comments matrix circulated	5/6/20
One Stop review meeting	5/7/20
One stop meeting minutes circulated	5/11/20
DGE submission	5/21/20
REACT Workshop	5/28/20
Circulation to WB management	6/2/20
WB management comments received	6/22/20
DGE submission	6/25/20
WB management for information	6/26/20
E-Submission	6/29/20

Appendix B. Team and Skills Mix

Team and Skills Mix. The skills mix required to complete this evaluation includes a multidisciplinary team with expertise in land and natural resource management and governance, resource economics and rural development, social anthropology and natural resource related conflict and fragility. Evaluation skills include both qualitative and quantitative, including participatory evaluation, the use of tech enabled tools – including geo-spatial tools and analysis. Members of the team are also skilled at specific evaluation methodologies relevant for this assessment including portfolio review and analysis, structured literature reviews, evidence gap maps, review and analysis of impact evaluations, and have familiarity with the policies, procedures, and operations of the World Bank.

Name	Skill areas
Bekele Shiferaw	Lead Evaluation Officer (Agricultural and Resource Economist – policy and economics of NRM, vulnerability, measurement, data analysis)
Lauren Kelley	Senior Evaluation Officer (Rural Development and Livelihoods Specialist, Social - Dimensions of Land and Resource Governance and Management, fragility and conflict specialist).
Joy Butscher	Junior Professional Officer Environment and Natural resource Management Specialist
Chikako Miwa	Junior Professional Officer M&E Specialist (Sustainable Development)
Stephen Hutton	Senior Evaluation Officer, Environment Economics, Environment and Climate Change Specialist
Harsh Anuj	Data Science and Knowledge Management Specialist, Geospatial analysis
Mari Noelle L. Roquiz	Evaluation Analyst
April Connelly	Senior Natural Resource Management Specialist (Natural Resource Management, forest management. Fisheries etc.)
Sengphet Lattanavong	Short-Term Consultant (data, coding, desk reviews)
Doruk Yarin Kiroglu	Short-Term Consultant (data, coding, desk reviews)
Bianca Castro	Short-Term Consultant (data, coding, desk reviews)
Subject matter expert(s)	Review and synthesis of global and World Bank evidence on NRM and vulnerability
Subject matter expert(s)	Review and synthesis of World Bank strategies, NRM interventions and vulnerability nexus
Subject matter expert(s) including National and Local	Qualitative and Participatory Evaluation Skills

Name	Skill areas
experts with subject and regional level expertise	
Subject matter expert	
Jozef L. Vaessen*	Methods advisor (IEG)
Rasmus Heltberg*	Lead Evaluation Officer, Partnerships Advisor
Peer reviewers	Dr Sara Scherr, President, Eco-Agriculture Partners, USA. Agricultural and natural resource economist specializing in policy and economics of sustainable natural resource management (NRM); resource degradation-vulnerability nexus. Prof. Arun Agrawal, Michigan State University. Institutional economics, poverty-climate change and vulnerability, market failure, property rights, local commons, and community-based NRM.

Appendix C. Portfolio Review and Case-Based Selection

World Bank Portfolio Identification Methodology

The approach paper process constructed a preliminary *Natural Resource Degradation and Vulnerability* portfolio through a multi-level process that included consultations with subject-matter experts in the World Bank, a review of the World Bank's analytical and sector work (some of which includes lists of relevant operations over the evaluation period) and relevant strategy documents (e.g. *Climate Change Adaptation Action Plan; Environment Strategy*).

Preliminary World Bank Lending Portfolio

For World Bank investment lending, the portfolio identification process utilized a two-step approach that (i) identified and selected projects based on sector and thematic codes (See Table C1) followed by (ii) a manual screening of project development objectives and components. This two-step process ensured that project selection is in line with the evaluation scope. As part of the evaluation process, the portfolio will be further developed, including though a more granular screening process, to ensure completeness and accuracy.

Table C.1. World Bank Sector/Theme Codes for Preliminary Portfolio Identification

Sectors	Themes
• Agriculture, fishing and forestry (AX)	• Climate Change (81)
• Crops (AH)	• Land Administration and Management (725/83)
• Livestock (AL)	• Biodiversity (834/80)
• Irrigation and Drainage (AI)	• Environmental Policies and Institutions (84/82)
• Agricultural Extension, Research and Other Support Activities (AB)	• Water Resource Management (85)
• Forestry (AT)	• Other Environment and Natural Resources Management (86) (old theme code)
• Fisheries (AF)	• Nutrition and Food Security (67/68)
• Public Administration – Agriculture, Fishing & Forestry (AK)	• Rural Policies and Institutions (77) (old theme code)
• Other Agriculture, Fishing and Forestry (AZ)	• Rural Services and Infrastructure (723/78)
• Animal Production and Fishing (AJ)	• Other Rural Development (79) (old theme code)
• Industry, Trade and Services	• Natural Disaster Management (75/52)
• Agriculture markets, commercialization, agri-business (YA)	• Personal and Property Rights (423/36)
• Flood protection (WD) (old sector code)	• Social Inclusion (51/100)
• Financial Sector (FX)	• Social Safety Nets (521/54)
• Other Non-bank Financial Institutions (FL)	• Other Social Protection and Risk Management (52/56)
• Social protection (SX)	• Conflict Prevention and Post-Conflict Reconstruction (53/58)
• Social Protection (SA)	• Gender (59/61)
• Public Administration/ Social Protection (SG)	• Other Social Development (62) (old theme code)
• Public Admin (BX), Sub National Government (BH)	
• Other Public Administration (BZ)	

The preliminary portfolio identification process screened the 4,002 projects approved between 2009 and 2019 that had one or more of the above sector and thematic codes. The assessment

then screened for relevant content (in line with the evaluation aim and scope). The preliminary portfolio screening process identified 561 World Bank lending projects (excluding 84 AF). Of these, 285 lending projects are closed. Of these, at least 129 World Bank projects are community-based, as identified through the CDD database (downloaded April 2019). The preliminary portfolio identification suggests that the evaluation primarily covers five key GPs (Environment and Natural Resources; Agriculture; Social, Urban, Rural and Resilience; Water; and Social Protection and Labor). Projects are also mapped to various regions, with a predominance of projects in Sub-Saharan Africa, Latin America and the Caribbean, East Asia and Pacific, and South Asia, by project numbers (see Figure C.1)

Figure C.1. Breakdown of Preliminary WB Portfolio (n=561)

a. By Region

AFR 38%
LCR 21%
EAP 15%
SAR 12%
ECA 8%
MNA 5%
OTH 1%

b. By Global Practice

ENV 46%
AGR 21%
SURR 13%
WAT 8%
SPL 4%
Other 8%
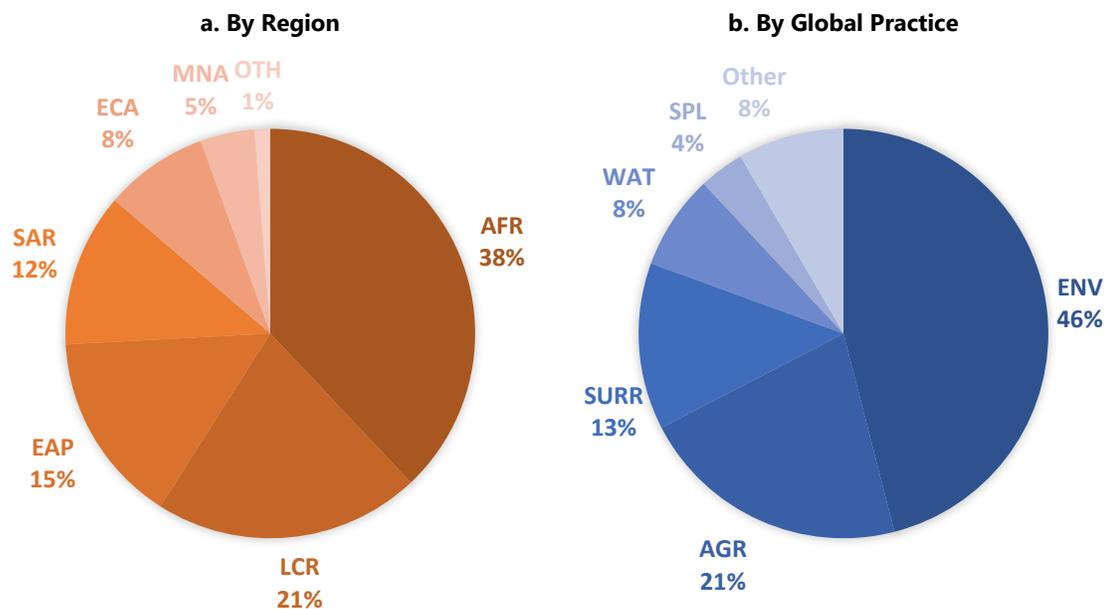
Source: IEG.

This portfolio includes: (i) *resource-focused interventions*, including through community engagement, and private sector investment, that are designed to support improved and sustainable management of natural resources. These also include community based natural resource management projects designed to reduce tension over resource scarcity. They also include (ii) interventions that use social protection approaches as an entry point to target poor and vulnerable households while incentivizing restoration of the resource base, through cash, food, employment, etc.

Summary of Overall World Bank Evaluation Portfolio

Table C.2. Preliminary evaluation portfolio FY09-19

WBG	Intervention Typology		Active	Closed	Total
WB (n=561)	*Resource-Focused Approaches*	Sustainable Land and Water Management	193	199	392
		NRM Policy and Institutional Strengthening	27	58	85
		Coastal Zone Management and Small-Scale Fisheries	42	22	64
	Social Protection Approaches	Social Safety Nets with NRM	14	6	20
	Total		**276**	**285**	**561**

Source: IEG/Business Intelligence.
Note: Excludes Additional Financing (84 projects). At least 129 WB projects are community-based, as identified through the CDD database (downloaded April 2019).

Typical Lending Product Interventions in the Evaluation Portfolio

The World Bank employs multiple approaches and instruments to support improved and sustainable natural resources management in ways that address associated vulnerabilities for resource dependent people. A list of "typical interventions follows in Table C.3.

Table C.3. Description of Typical Interventions in the Preliminary Evaluation Portfolio

Intervention	Description	Illustrative Indicators
Sustainable Land and Water Management/ Landscape Approaches (including community-based approaches) **(Includes SLWM, Dryland and Rangeland Management, Afforestation, REDD+)**	Interventions at spatial scales that attempt to optimize the spatial relations and interactions among a range of land cover types, institutions, and human activities in an area of interest. Typical activities include landscape restoration, basin protection, reducing soil erosion, afforestation, agroforestry, and carbon finance. These include community-based interventions, including interventions designed to support the co-management of natural resources to reduce tensions and prevent conflict over resources (due to scarcity, changing demographics and development considerations, and exacerbated by climate change).	• Land area under sustainable landscape management practices (ha) • Increase of diversified vegetative cover in selected degraded sites (ha) • Percent increase in income of households from SLM-related interventions in the project operational areas (%) • Proportion of population by household in target villages reporting at least 20% increase in well-being or household/livelihood assets (%) • Forest area brought under management plans (ha) • Area restored or re/afforested (ha) • People in targeted forest and adjacent communities with increased monetary or non-monetary benefits from forests (#) • Areas of wind protection plantations in saline coastal areas established under the project (ha) • No. of different local tree and shrub species available in the project areas (#) • Increased household income of beneficiaries participating in alternative income generating activities (%)
Institutional Strengthening (NRM Related Institutions)	Capacity building and institutional strengthening of institutions – at local to national levels – that have key roles and responsibilities in natural resource management.	• Percent completion of a national institutional framework for SLM planning, implementation and coordination (%) • Interinstitutional protocol for deforestation control in targeted deforestation hotspots developed • Institutions provided with capacity building support to improve management of landscapes

Intervention	Description	Illustrative Indicators
Coastal Zone Management/ Fisheries	Integrated management of coastal zones and fisheries in ways that balance environmental, economic, human health, and human activities.	• Fisheries management plans implemented • Issuance of industrial fishing licenses in line with precautionary principle • Targeted Households with access to project-promoted livelihood activities outside of capture fisheries • Share of key demersal indicator species stable or rebuilding • Sustainable-use marine protected areas with a Management Effectiveness Tracking Tool (METT) score of 50 or higher • Households in targeted coastal areas with less exposure to erosion • Households in targeted coastal areas with less exposure to flooding
Social Protection with NRM	Safety nets that support natural resource management activities through various Social Safety Nets such as public works, cash for work, un/conditional cash transfers and insurance.	• Beneficiaries of labor market programs • Beneficiaries of social safety net programs • Proportion of cash transfer beneficiary households with food consumption score above 35
Rural Land Tenure	Securing land tenure rights for both women and men by strengthening rural land institutions responsible for implementing land policy and establishing viable land information and registration systems.	• Community delimitation certificates recorded in SiGIT in the name of the community, including an approved micro-zoning plan (Number) • Beneficiaries who received a DUAT (Rights to Use and Benefit from Land) recorded in SiGIT (Land Information Management System) (Number) • Women who received a DUAT recorded in SiGIT in their name or jointly (Percentage)
Groundwater Governance and Management	Address key limitations in policies, regulatory frameworks, knowledge, investments, and institutional capacity for improved groundwater management.	• Blocks with arrest in the rate of decline of groundwater levels • GPs *(Gram Panchayat)* which have adopted participatory groundwater management • States with improved groundwater monitoring and disclosure of groundwater data • Enhanced capacity for sustainable transboundary groundwater management in the Ministries responsible for groundwater

Source: IEG.

Preliminary World Bank Advisory Services and Analytics (ASA) Portfolio

The preliminary ASA portfolio identification process used a similar methodology as with investment lending (using thematic and sector codes and key word searches in the abstracts) to identify 271 pieces of World Bank financed advisory and analytical work in line with the evaluation aim (See Table C.4).

Table C.4. Preliminary ASA Evaluation Portfolio FY09-19

Typology	# of ASA
Sustainable forest management	46
Coastal Zone Management and Fisheries	45
Country Environmental Analysis (CEA)	40
Water resources management	40
Climate change adaptation and resilience	28
Natural capital	15

Typology	# of ASA
Groundwater	13
Gender and Natural Resource Management	12
Land governance	11
Payment for Ecosystem Services (PES)	8
Land degradation	7
Social Protection with Natural Resource Management	3
Drylands	3
Total	**271**

Source: IEG.

Socio-Ecological System Level Selection

To select socio-ecological systems, the evaluation approach uses data from a variety of relevant recent sources to identify geographic areas that are experiencing high levels of resource degradation and resource dependence. Among other sources, which will be identified through an iterative process during the evaluation, an indicative list includes:

Part I: Geographic areas with high levels of resource degradation:

i. **Soil Erosion Risk** (index) from the World Resources Institute (WRI) (2016). Measures the risk of soil erosion based on a modified Revised Universal Soil Loss Equation (RUSLE) model.

ii. **Soil Erosion Rate, Annual Mean** (tons/ha/year) from Naipal et al. (2015) and World Bank World Development Indicators. Measures the loss of topsoil due to erosion.

iii. **Global Soil Erosion** (ton/Ha/year) from Borrelli et al. (2012). An assessment of global soil erosion for 2012 (Figure C.2.).

Figure C.2. Soil Erosion Rate (2012).
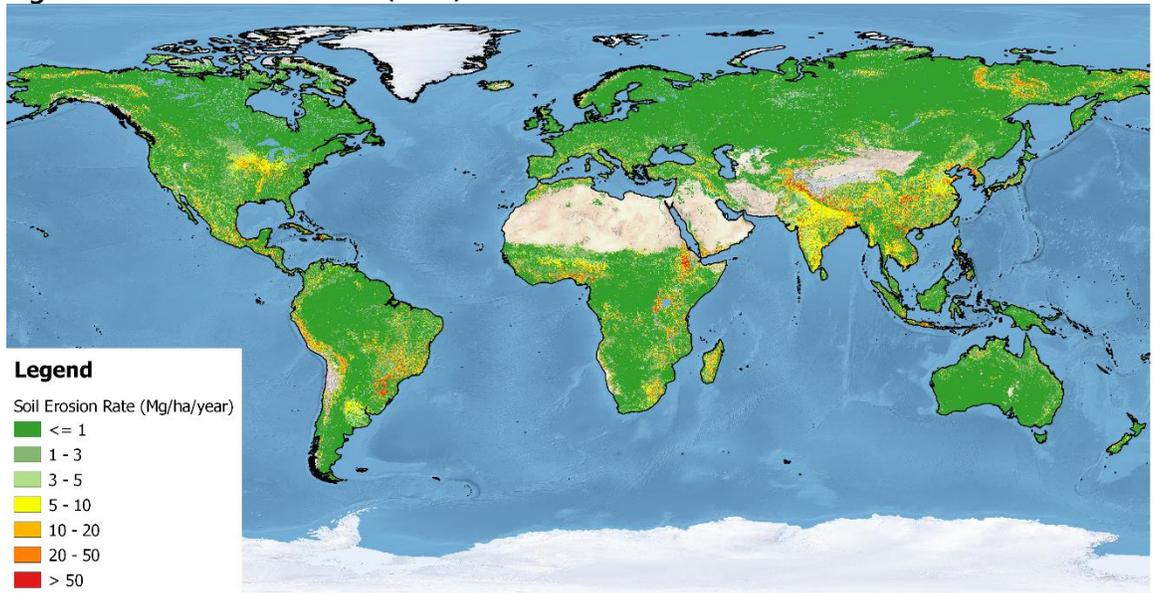
Data Source: Borrelli et al. (2013); Map Credit : IEG (2019).

iv. **Soil Organic Carbon Stocks** from 0-5cm of soil depth (tons/ha) from Hengl et al. (2017). Measures the amount of available organic carbon in soil up to a depth of 5 cm.

v. **Loss of Soil Organic Carbon** relative to original condition (as a proxy for land degradation) from the IPBES (2018) *Assessment Report on Land Degradation and Restoration*.

vi. **World dryland areas** according to the United Nations Convention to Combat Desertification and Convention on Biological Diversity definitions from UNEP-WCMC (2015) (Figure C.3.).

Figure C.3. World dryland areas according to the United Nations Convention to Combat Desertification and Convention on Biological Diversity definitions

Legend
- ☐ (yellow) Additional areas included in CBD definition
- ☐ (tan) Arid
- ☐ (red) Dry subhumid
- ☐ (gray) Hyperarid
- ☐ (orange) Semiarid
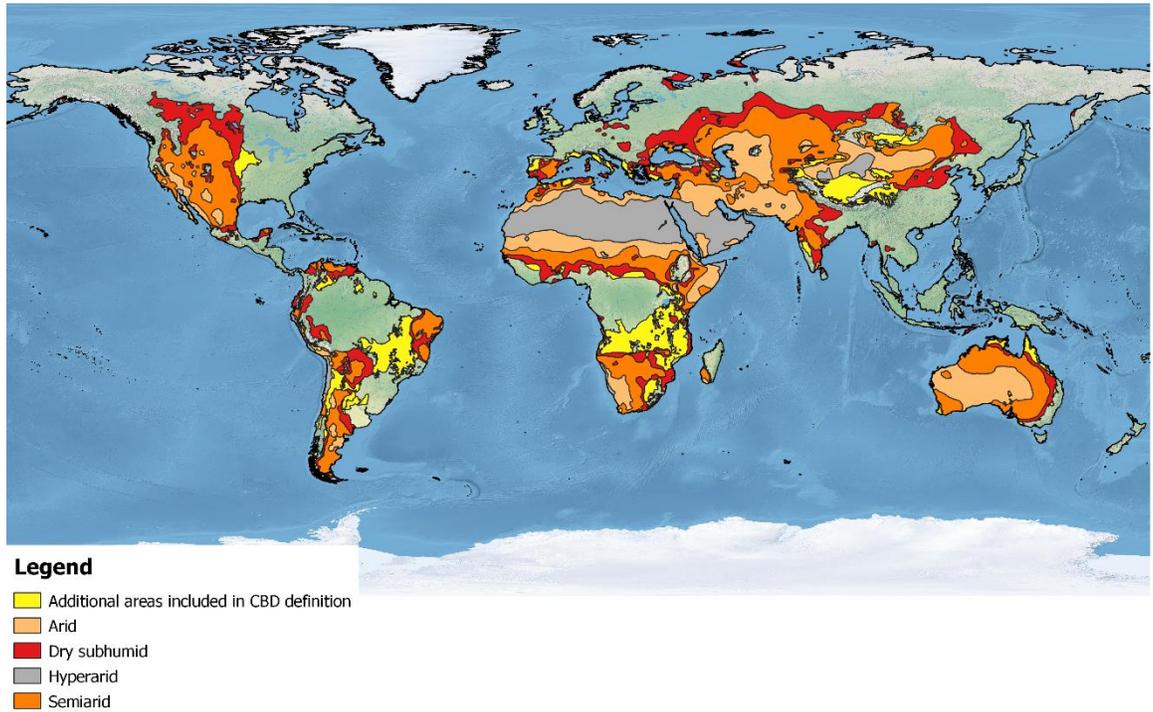
Data Source: UNEP-WCMC (2015); Map Credit: IEG (2019).

vii.   **Rangeland Areas** in 2000 from Ellis, E.C. et al. (2013) (Figure C.4.).

Figure C.4. World Rangeland Areas
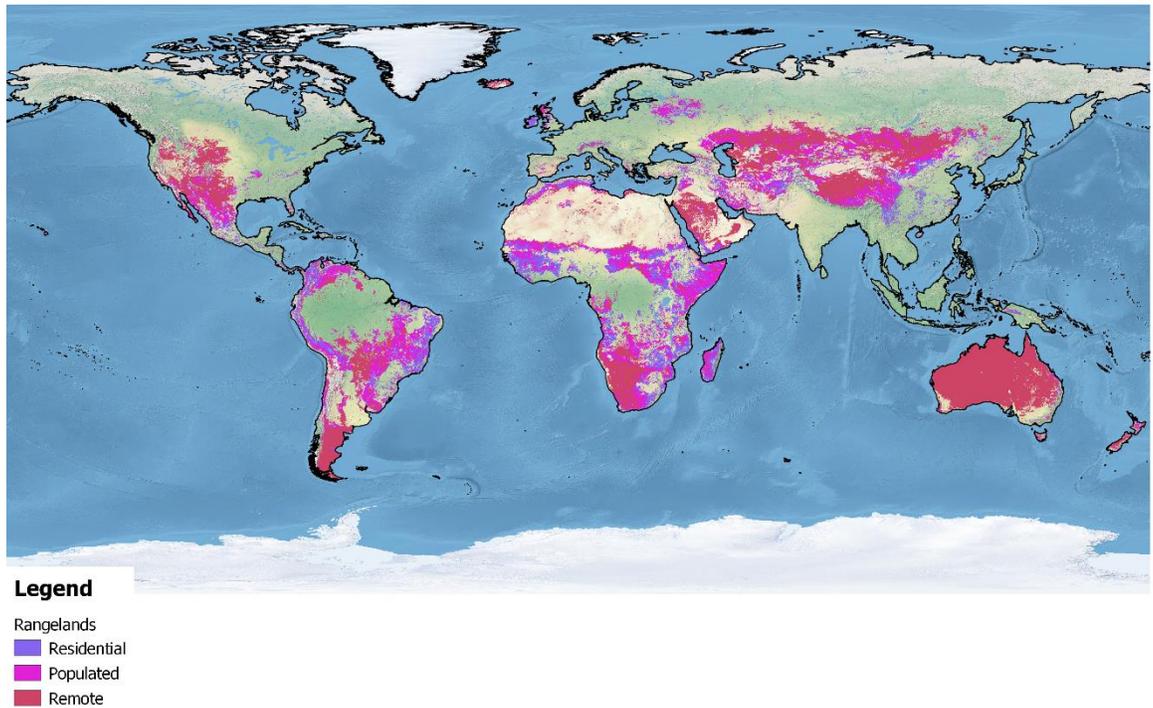
Data Source: Ellis, E.C. et al. (2013); Map Credit: IEG (2019).

viii.   **Mountains Regions** from Karagulle, D. et al. (2017) (Figure C.5).

Figure C.5. World Mountain Areas
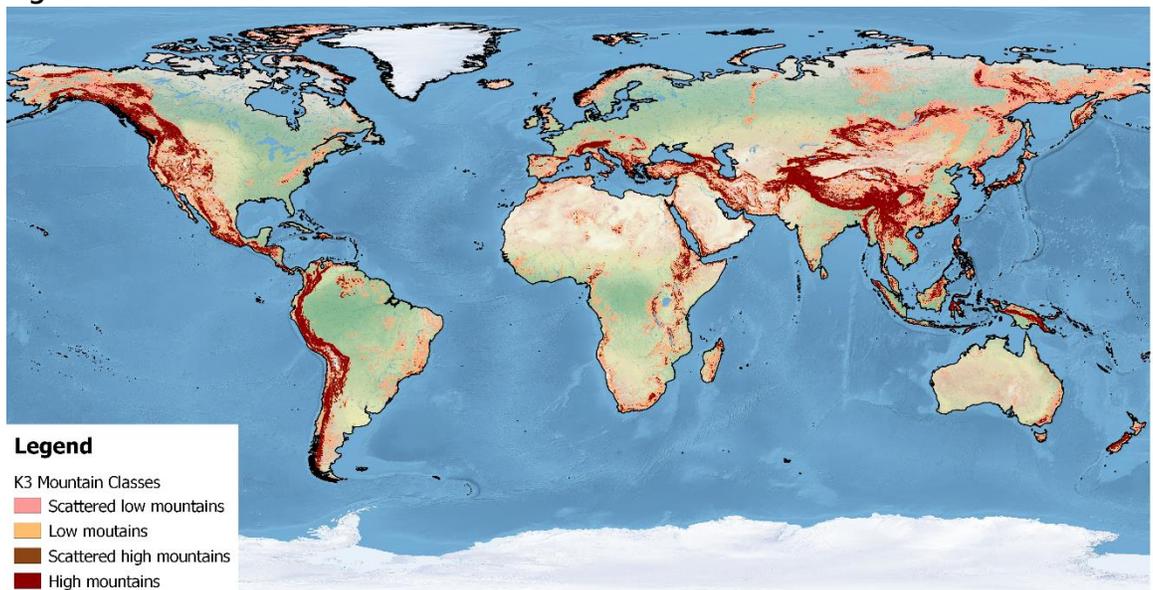
Data Source: Karagulle, D. et al. (2017); Map Credit: IEG (2019).

ix.   **Water Scarcity Data** from Mekonnen and Hoekstra (2016) and **Per Capita Water Availability and Future Population Growth**, 2050 (FAO Aquastat, 2014; 2015) in

Uncharted Waters - The New Economics of Water Scarcity and Variability (World Bank 2017) (Figures C.6. and C.7.).

Figure C.6. Regions Experiencing Severe Water Scarcity (1996-2005)
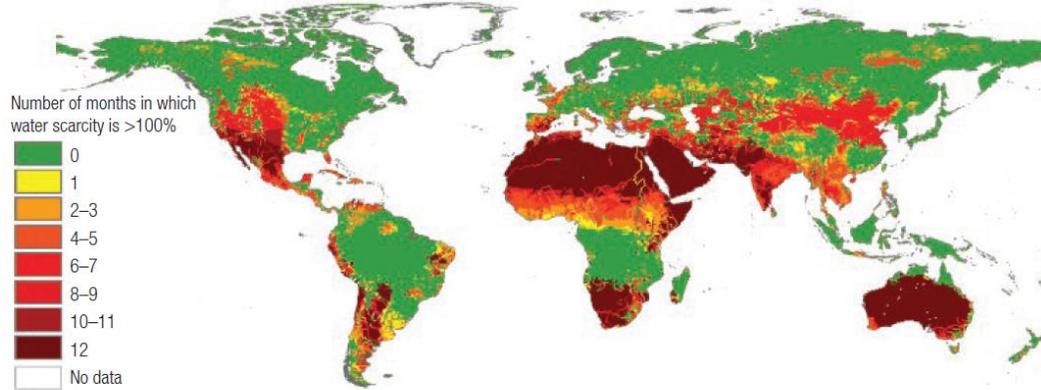
Source: Mekonnen and Hoekstra 2016.
Note: Water scarcity > 100 percent reflects a situation where net surface and groundwater withdrawals plus environmental flow requirements are greater than the available supply.

Source: Uncharted Waters - The New Economics of Water Scarcity and Variability (World Bank 2017).

Figure C.7. Per Capita Water Availability and Future Population Growth, 2050
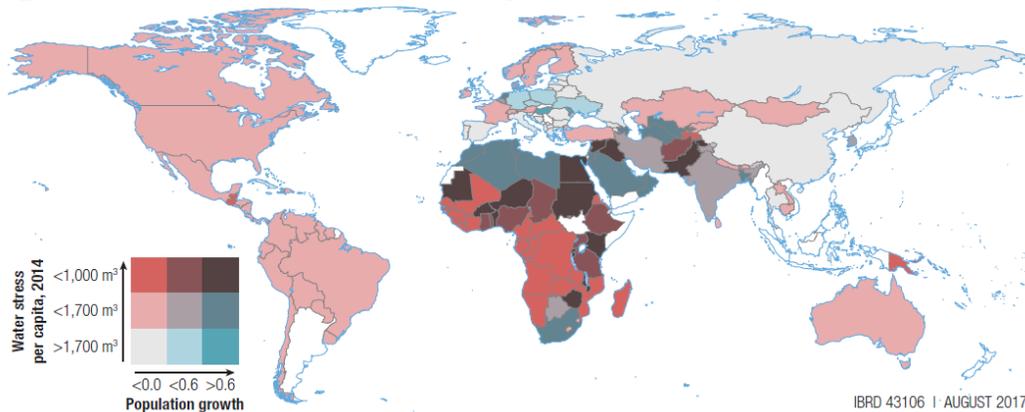
Sources: Freshwater availability data: FAO AQUASTAT database. Population growth estimates: United Nations Population Division, World Population Prospects, 2015 revision (moderate scenario), for the year 2050.
Note: Map 1.1 shows the intersection of water stress, measured as per capita water availability, and population growth. Data on water availability are missing for countries in white.

Source: Uncharted Waters - The New Economics of Water Scarcity and Variability (World Bank 2017).

x.   **Water depletion,** from Brauman et al. (2016), which is the fraction of available renewable fresh surface and groundwater available in a watershed consumptively used by human activities on annual, seasonal, and inter-annual time scales, for 15,091 watersheds delineated in Water GAP3 (Figure C.8.).

Figure C.8. Water depletion rates

Legend
Water Depletion Category
Less than 5%
5 - 25%
Dry-Year
Seasonal
75 - 100%
> 100%
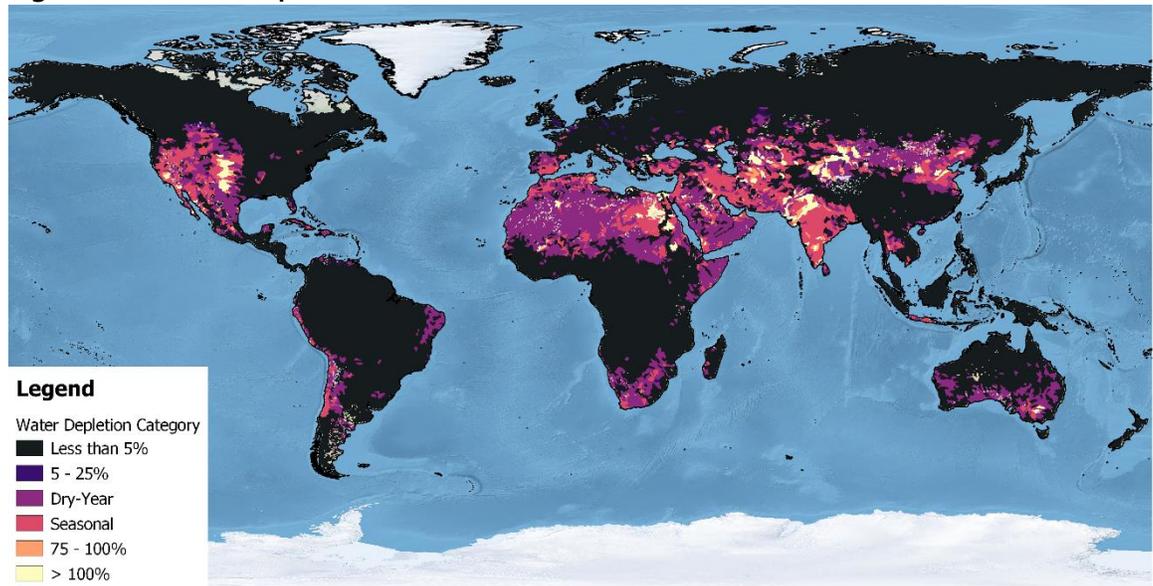
Data Source: Brauman et al. (2016); Map Credit: IEG (2019).

xi.   **Aqueduct Baseline Water Stress** from Hofste et al. (2019). Measures the ratio of total water withdrawals to available renewable surface and groundwater supplies.

xii.   **Projected Change in Level of Water Stress in 2030** (increase/decrease) from Luck et al. (2015). Measures the change in water supply, water demand, water stress, and seasonal variability, projected for the coming decades under scenarios of climate and economic growth.

xiii.   **Water Stress Country Rankings from Gassert et al. (2013**). Global rankings of water-quantity-related risks by country.

xiv.   **Aqueduct Groundwater Table Decline** (cm/year) during 1990-2014 from Hofste et al. (2019). Measures the pace of groundwater reserves depletion.

xv.   **Forest Loss and Gain (km sq**), and total forest loss as a percentage of total land area, from *High-Resolution Global Maps of 21st-Century Forest Cover Change* (Hansen et al. 2013).

xvi.   **Small Scale Fisheries:** Projected impacts and vulnerabilities associated with climate change in ocean subregions and risks to fisheries from observed and projected impacts from *The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals* (FAO 2018) (Figure C.9.).

Figure C.9. The State of the World Fisheries and Aquaculture (2018)
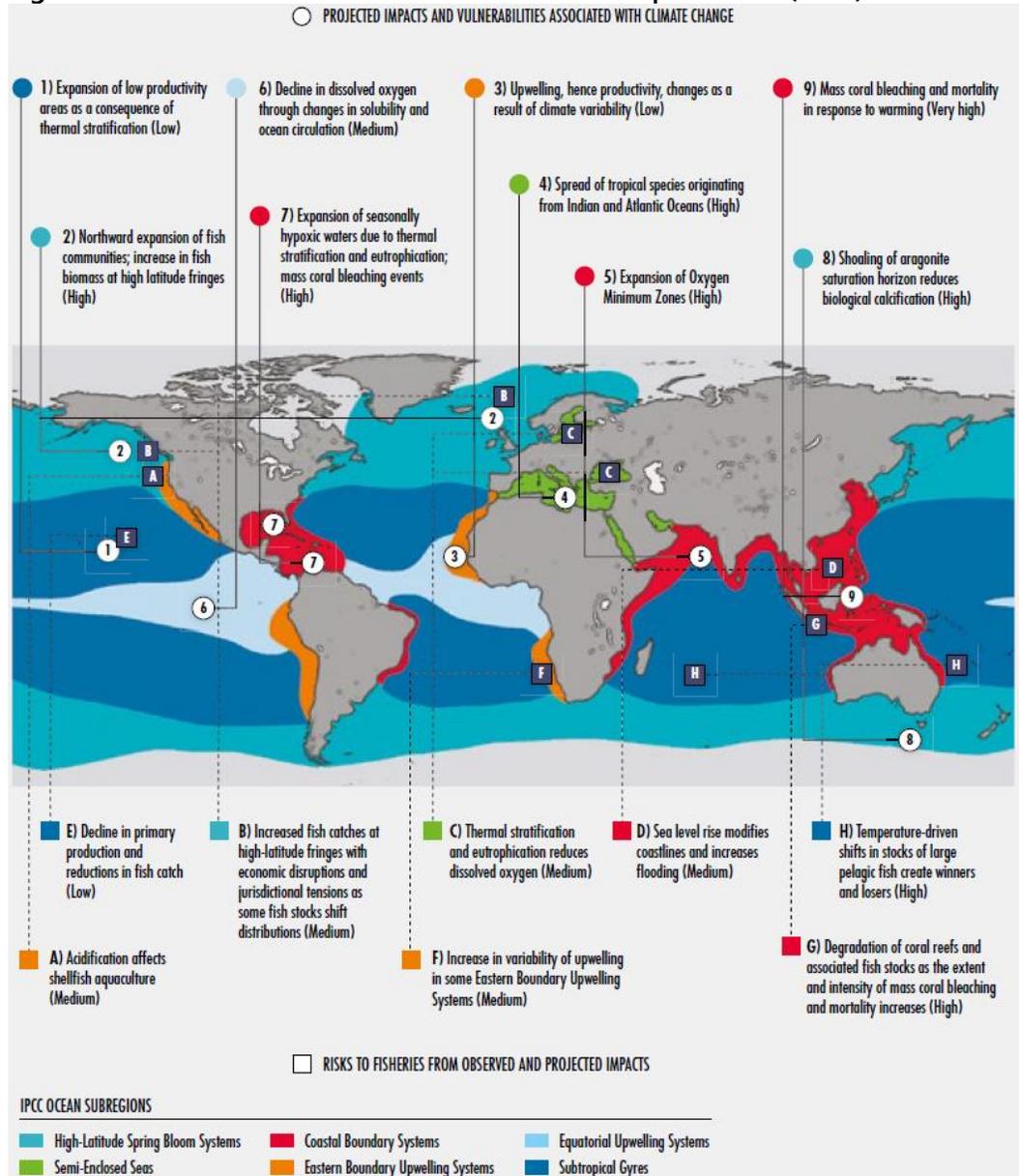
Source: The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals (FAO 2018).

Part II: Indicative Data Sources for Mapping Resource Dependence and Associated Vulnerability

xvii.   **Poverty Headcount Ratios at $1.90 a day** (2011 PPP) (% of population, years vary depending on data availability) from the World Bank World Development Indicators.

xviii.   **Rural Poverty Headcount ratios at national poverty lines** (% of rural population, years vary depending on data availability) from World Bank World Development Indicators.

xix. **Hidden Dimensions of Poverty Dataset (HDD)** – in progress. IEG is collaborating with the World Bank's HDD team (located across GPs, including ENV and Poverty) to identify and assess the spatial linkages between environmental degradation and poverty at the subnational scale using various natural resource indicators and poverty and human development indicators (as proxies).

xx. **Notre Dame Global Adaptation Initiative** (2019) NND-GAIN measures overall vulnerability by considering vulnerability in six life-supporting sectors – food, water, health, ecosystem service, human habitat and infrastructure.

xxi. **Employment in Agriculture** (% of total employment); Employment in agriculture, male (% of male employment); Employment in agriculture, female (% of female employment) from World Bank World Development Indicators (modeled ILO estimate).

xxii. **Proportion of Men and Women Employed in Agriculture** from USAID's DHS Program (various years based on survey).

xxiii. **Livestock production index** from World Bank World Development Indicators, FAO (2016). Livestock production index includes meat and milk from all sources, dairy products such as cheese, and eggs, honey, raw silk, wool, and hides and skins.

xxiv. **Number of Forest Proximate Persons** (i.e. population residing up to 5 km from the boundaries of forest areas), and forest proximate persons as a percentage of total population, from Forests & Livelihoods: Assessment, Research, and Engagement (FLARE) (2012).

xxv. **Income from forest services** from the CIFOR Poverty Environment Network (PEN) (2016). From survey data collected from 7,978 households across 24 developing countries.

xxvi. **Percentage of rural households cooking with wood and charcoal** from USAID's The DHS Program.

xxvii. **Percentage of households engaging in hunting of wild animals, and the average annual household income from the sale of wild meat** (US$ per year) from Nielson et al. (2018). From survey data collected from 7,978 households across 24 developing countries.

xxviii. **Share of employment of fishers and fish farmers in total labor population** (2016) and Per capita fish consumption by top consumers (2013) *from Impacts of climate change on fisheries and aquaculture* (FAO 2018).

xxix. **Pressure on small scale and artisanal fisheries from oceanhealthindex.org** (2018). Pressures are the sum of the ecological and social pressures that negatively affect scores for a 'goal'. Here the 'goal' is opportunity for small scale and artisanal fisheries.

xxx. **Value of Small and Artisanal Fisheries catch as a proportion of GDP** in 2014 from Sea Around Us and World Bank World Development Indicators (2016).

xxxi. **Share of Fresh, Chilled or Frozen Fish and Seafood in total household consumption expenditure** (%) for households in the lowest income quintile in rural areas from the World Bank Global Consumption Database (2010).

Appendix D. Summary of Previous Evaluations

IEG has evaluated the WBG's support to environment and development, but evidence gaps remained on the contribution of its effort to address natural resource degradation and vulnerability. This evaluation will build from some existing studies:

Environmental Sustainability (FY08) looked at environmental operations approved between 1990 and 2007. It recommended for the WBG to: (i) reformulate and update the 2001 Environment Strategy in light of the increasingly importance of the private sector and climate change (which has been achieved); (ii) adopt more cross-sectoral and spatially focused approaches; (iii) improve M&E; (iv) improve internal and external coordination and collaboration (World Bank 2008).

Safeguards and Sustainability (FY10) focused on the strategic relevance of the safeguards system and contributed to an overhaul of the Bank's safeguard policies. Following several years of consultation and protracted negotiation, the World Bank's new Environmental and Social policies were put in place in October 2018.

Managing Forest Resources (FY13) assessed the 2002 Forest Strategy, that put the three goals of poverty reduction, conservation and economic development on equal footing. It covered WBG forest sector operations approved between 2002-2012. It concluded that while forest operations have contributed to environmental outcomes, poverty reduction has not been satisfactorily addressed.

Toward a Clean World for All (FY17) assessed the WBG's pollution management portfolio. Where relevant, IEG's findings will be cross-referenced.

IEG's Results and Performance Report (FY17) found that while there had been a 4% growth in the share of projects with potential environmental benefits, this had come mainly through increased support for climate change mitigation and adaptation, while many other areas of environmental support had been flat or declining.

Carbon Finance (FY18) looked the Carbon Finance portfolio including some in forests and land use sectors which provided joint mitigation and adaptation co-benefits. The evaluation found that unlike the mitigation outcomes these environment co-benefits were not systematically targeted and measured.

Appendix E. Definitions

Adaptation: Process of adjustment to actual or expected climate change and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate change and its effects.

Adaptive capacity: Ability of systems, institutions, humans, and other organisms to adjust to potential damage, take advantage of opportunities, and respond to consequences of climate impacts.

Climate change: A change in the state of the climate that can be identified (for example, using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity.

Resilience: Capacity of social, economic, and environmental systems to cope with a hazardous event, trend, or disturbance by responding or reorganizing in ways that maintain their essential function, identity, and structure while maintaining the capacity for adaptation, learning, and transformation.

Sustainable livelihood: Livelihood that endures over time and is resilient to the impacts of various types of shocks including climatic and economic.

Sustainable Natural Resource Management: Integration of non-degrading forms of natural resource use and management to ensure that current decisions will not foreclose opportunities and threaten the lives and livelihoods of future generations.

Vulnerability: Propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including exposure, sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

Endnotes

[1] Renewable natural resources are defined as being "capable of being replaced by natural ecological cycles or sound management practices" (Merriam Webster). The use of the term "renewable" as thus used to scope the resources selected for this evaluation. Some resources, such as topsoil, are renewable over a longer term under good management practices but can be characterized as a "finite" or "non-renewable" resource (i.e. by FAO) in situations where the topsoil has been so severely degraded that it is not recoverable within a human lifespan. For groundwater, recent studies also show that about 6 percent of the groundwater resource in the upper two km of the Earth's landmass is renewable within a human lifetime (Gleeson et al. 2015). Many resources are renewable, but also depletable, like natural forests and fish which can be overexploited or depleted when the rate of exploitation or harvest exceeds the rate of natural regrowth or renewal.

[2] There are many different interpretations of the concept of vulnerability, as it relates to the vulnerability associated with environmental change. There are both hazard-shock approaches to its definition and measurement and Entitlement Livelihood approaches, both of which are used by different constituencies in the World Bank. Examples of different interpretations include the IPCC definition, or the " propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC 2014, 1772–75)." "Vulnerability is also inextricably linked to resilience (Briguglio et al. 2008; Cervigni and Morris 2016) which captures the extent to which individuals can prepare for tomorrow by nurturing coping measures both to reduce sensitivity, exposure and enhance adaptive capacity. Resilience is often seen as the inverse of vulnerability; resilient households or communities and systems are less vulnerable (Cervigni and Morris 2016). Other frameworks that use an integrated model of the two elements, that are designed to measure the impacts of environmental change has also been applied by practitioners, including in the World Bank. As part of its participatory approach, this evaluation will use an inductive approach to identify and report on the way that the World Bank has sourced, defined, utilized and applied these various frameworks and utilize them to support an analysis of the causal pathways between the WB supported natural resource management interventions and vulnerability reduction at the individual, household and community level.

[3] Degradation of natural resources entails the deterioration of the environmental resource base which reduces the productivity and flow of ecosystem functions and services that undermine long-term sustainability of human activities. The degradation of renewable natural resources includes degradation of land and depletion of fertile soils; overexploitation of fish stocks and groundwater; deforestation; loss of valuable biodiversity; and destruction of habitats and ecosystem including degradation of coastal zones that increasingly threaten sustainable development and undermine poverty reduction. (IPBES, 2018)

[4] http://drylandsystems.cgiar.org/content/why-land-degradation-our-greatest-issue-today

[5] World Bank. 2018. West Africa Coastal Areas Resilience Investment Project.
http://projects.worldbank.org/P162337?lang=en

[6] https://asiafoundation.org/2018/03/28/southeast-asias-fisheries-near-collapse-overfishing/

[7] http://www.worldbank.org/en/news/feature/2016/05/16/safety-and-sustainability-for-small-scale-fishers-in-west-africa

[8] World Bank. 2018. Atal Bhujal Yojana (Abhy)-National Groundwater Management Improvement.
http://projects.worldbank.org/P158119?lang=en

[9] http://terrafrica.org/

[10] https://www.globallandscapesforum.org/

[11] https://www.wavespartnership.org/

[12] https://afr100.org/

[13] The "global commons" as used in this context includes environmental resources such as oceans, tropical rainforests, biodiversity and the atmosphere. Although some of these resources can be either regional or national public goods and may belong to specific national jurisdictions (e.g. rainforests) their degradation, overexploitation and depletion often impose global environmental impacts and consequences which affect all countries.