STAP guidance on climate risk screening

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1. Introduction

GEF investments are increasingly exposed to risks associated with climate change and natural disasters. At the same time, GEF funding contributes to the resilience of human and natural systems in the face of these risks. The need to systematically identify and address climate and disaster-related risks across GEF investments was identified by STAP and recognized by the GEF Council in 2010 (GEF/C.39/Inf.18, Enhancing Resilience to Reduce Climate Risks: Scientific Rationale for the Sustained Delivery of Global Environmental Benefits in GEF Focal Areas). The GEF Council asked STAP to examine the effects of climate change on GEF projects. More recently, the UNFCCC COP requested the GEF to "to take into consideration climate risks in all its programs and operations, as appropriate, keeping in mind lessons learned and best practices" (2016).

In December 2018, the GEF Council approved a new Environmental and Social Safeguards policy. On climate change and disaster risks, the new policy states that, "*short- and long-term risks posed by climate change and other natural hazards are considered systematically in the screening, assessment and planning processes…. based on established methodologies, and significant risks and potential impacts are addressed throughout the design and implementation of projects and programs*".

To meet this requirement, GEF agencies will need to demonstrate that policies and procedures are in place to enable them to conduct climate risk screening, and to develop and implement risk management plans. Between June and December 2019, the GEF Secretariat will facilitate an assessment of all GEF agencies against the Environmental and Social Safeguards policy and will work with agencies to strengthen practices where needed. STAP stands ready to assist in this effort. STAP will convene a workshop on climate risk screening with GEF agencies and the GEF Secretariat to promote learning, compare screening efforts, and discuss best practices.

This STAP guidance proposes a common standard for climate risk screening of GEF projects based on the scientific literature and builds on earlier work undertaken over the last several years in response to the Council's request that STAP examine the effects of climate change on GEF projects. At a minimum, each agency should use a risk screening process that includes four steps (hazard identification, assessment of vulnerability and exposure, risk classification, risk mitigation plan), ranks risks according to a clearly defined scale, and uses the best available data.

2. STAP's work on climate risk screening

In 2017, STAP analysed a sample of GEF-5 and GEF-6 projects, and found that:

- Climate information was often misinterpreted or misused or missing.
- Risk assessments were often for the duration of the project, rather than the lifetime of the expected GEBs
- Assessments were often done late in the project cycle, well after the design and objectives had been developed

- Where climate impacts were mentioned, there was rarely a plan for their amelioration.

Subsequently, STAP applied the World Bank and USAID climate risk screening tools to 24 GEF-6 Project Identification Forms (PIFs) and CEO-endorsed projects; this sample excluded LDCF/SCCF and climate change focal area projects. Some projects demonstrated innovative strategies for addressing climate risk, but many projects did not provide sufficient future climate information to enable climate risk to be addressed properly. The Chair presented these findings at the STAP Open meeting at the GEF Assembly in Da Nang on 23 June 2018[1].

Since the Assembly, the 18 GEF agencies were asked for information about how they undertook climate risk screening. A preliminary analysis of agency approaches suggests that about two-thirds are practicing some form of climate risk screening, with a number of agencies in the process of updating or considering a revised approach. About half of these, i.e. six, had adopted an approach which: identified the climate risks to a project; considered how climate risks might affect achievement of the project's objectives; and recommended action to ameliorate climate risk. The remaining third either did not respond, or provided insufficient information to reach a preliminary view of whether they did have a robust screening mechanism. [2] For some agencies, the time period over which climate risks were considered was not clear, i.e. over the period of project implementation, or over the longer-term; climate impacts were mentioned but there were no plans; and for others, screening appeared limited to certain types of project.

Climate risk screening is needed not only to ensure projects are resilient to shocks, but also for transformation and durability. The 2018 STAP paper, "Integration to Solve Complex Environmental Problems"[3], highlights the interrelationships between environmental and social challenges. It notes the need for broader systems thinking, including consideration of risks, to achieve transformation. STAP's June 2019 paper on durability[4] further demonstrates that mitigating risks is important to ensure that the benefits of GEF investment are sustained over time. Climate risk screening is critical to the success of GEF programs and projects.

At the June 2018 Council STAP issued clarified and codified screening guidelines[5]. With respect to climate risk, the guidelines ask:

(i) How will the project's objectives or outputs be affected by climate risks over the period 2020 to 2050[6], and have the impact of these risks been addressed adequately?

(ii) Has the sensitivity to climate change, and its impacts, been assessed?

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[1] http://www.stapgef.org/sites/default/files/documents/Vietnam%20Final%20cc%20Presentation-rb.pdf

[2] http://www.stapgef.org/sites/default/files/documents/STAP%20Chair%27s%20Report%20to%2055th%20GEF%20Council%20FINAL.PDF

[3] http://stapgef.org/sites/default/files/publications/STAP%20Report%20on%20integration.PDF

[4] http://www.stapgef.org/achieving-more-enduring-outcomes-gef-investment

[5] http://stapgef.org/sites/default/files/publications/STAP%20screening%20guidelines_0.pdf

[6] This timeframe was selected because climate model projections diverge after 2050, based largely on mitigation measures and socio-economic developments, making climate risks beyond this date difficult to assess

(iii) Have resilience practices and measures to address projected climate risks and impacts been considered? How will these be dealt with?

(iv) What technical and institutional capacity, and information, will be needed to address climate risks and resilience enhancement measures?

In addition, agencies were given advice on the issues which STAP would be looking at in particular when screening the IPs to help promote innovation, integration and transformation – Annex 1. This included (item 4), identifying positive interactions between global environmental benefits and capturing synergies, minimizing negative interactions and managing trade-offs, especially for climate risk. This is an integral part of considering the best implementation options, and not simply a risk treatment after a project has been designed, after which options may be narrower. The agencies have begun to reflect climate concerns more explicitly in the IP PFDs, and to analyse the implications; and a number of agencies have begun to revise their processes for dealing with climate risk. (It is not that the IPs can be expected to change the course of climate change, but rather to ensure that the significance of climate change has been properly thought through, and whether different approaches might be more robust in dealing with future climate change.)

3. Understanding climate risk

An overview of climate risks, risk assessment procedures and tools based on the Intergovernmental Panel for Climate Change (IPCC) and scientific literature will be helpful to those GEF agencies which are updating their climate screening processes.

According to the IPCC, risk is the "potential for adverse consequences where something of value is at stake and where the occurrence and degree of an outcome is uncertain. In the context of the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard, or of adaptation or mitigation responses to such a hazard, on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure. Risk results from the interaction of vulnerability (of the affected system), its exposure over time (to the hazard), as well as the (climate-related) hazard and the likelihood of its occurrence" (IPCC 2018).

Risk assessments have four main elements:

1) identify the hazards;

2) assess vulnerability and exposure;

3) rate the risk; and

4) identify measures to manage the risk.

Hazards may include short-term, or acute, shocks (e.g. extreme events of storm, fire or flood), and slow onset, or chronic, events that occur over a long period of time (e.g. drought). Based on the IPCC definition of risk, climate risk assessments should not only consider consequences of hazards (e.g. food insecurity from a reduction of crop yield due to drought) but also consequences from responses (e.g.

food insecurity from expansion of biofuels for land-based mitigation, or methane emissions from increased rice farming promoted by projects).

Vulnerability describes 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. Vulnerability may be a result of physical, social, economic, and environmental factors. **Exposure** refers to the presence of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected. Negative impacts occur when something is both vulnerable and exposed.

While there are several ways to rate climate risk – from a letter grade to a color – most scales consider issues such as severity or scale of impacts, probability and ability to mitigate or adapt to hazards. The IPCC classifies the level of additional risk due to climate change on a scale from undetectable to very high[7]. Translating the IPCC risk scale to projects, GEF projects could be ranked as:

- ***Very high risk*** - The outcome of the project will be jeopardized by climate change, with a potential for severe impacts of significant irreversibility. Climate-related risks are likely to result in financial, environmental and/or social underperformance or failures. Adaptation measures are likely to be ineffective, extremely costly, socially unacceptable or increase risk and reduce resilience. Adaptation limits may be reached, or loss and damage will occur.
- ***High risk*** - There is a potential for widespread impacts from climate change. Outcomes may be undermined by climate change, and adaptation measures may not be readily available. Financial, environmental and social underperformance or failure cannot be excluded. However, risk management activities are likely to increase resilience and adaptive capacity of households, infrastructure, communities, and ecosystems.
- ***Moderate risk*** - Impact from climate change may occur, but will be limited, transient or manageable. Financial, environmental and social underperformance or failure is unlikely. The system has the capacity to manage volatility, shocks, stressors or changing climate trends.
- ***Low Risk*** - No impact from climate change, or even positive impact, is expected based on best available science. Financial, environmental and social underperformance or failure appears very unlikely.

Table 1 provides possible examples of very high, high and moderate risks relevant to GEF Focal Areas and the Impact Programs.

[7] See for example - Hoegh-Guldberg, O., D. Jacob, M. Taylor, M. Bindi, S. Brown, I. Camilloni, A. Diedhiou, R. Djalante, K.L. Ebi, F. Engelbrecht, J. Guiot, Y. Hijioka, S. Mehrotra, A. Payne, S.I. Seneviratne, A. Thomas, R. Warren, and G. Zhou, 2018: Impacts of 1.5ºC Global Warming on Natural and Human Systems. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

Based on the risk rating, ameliorative actions are identified and prioritized through the creation of risk management plans. Risk management includes actions, strategies, or policies to reduce the likelihood and/or consequences of risks or to respond to consequences. It is also important to confirm that these adaptation or mitigation interventions do not themselves result in additional risks.

Table 1. Examples of climate-related risks for GEF investment by Focal Area that may jeopardize project objectives and outcomes, and broader environmental benefits, based on the IPCC *Special Report on the impacts of global warming of 1.5°C above pre-industrial levels* (2018) and other scientific literature. (This excludes adaptation and mitigation because their focus is directly on climate change.)

International Waters	
Very High Risk	In the case of 'less mobile' ecosystems (e.g., coral reefs, kelp forests and intertidal communities) mass mortalities and disease outbreaks will increase in frequency as temperatures increase. Multiple lines of evidence indicate that the majority (70-90%) of warm water coral reefs that exist today will disappear at 1.5°C.
High Risk	Marine organisms are shifting their biogeographical ranges to higher latitudes at rates that range from approximately 0 to 40 km per year, causing novel ecosystems to assemble.
Moderate Risk	Warmer waters impose direct metabolic costs on reef fish, reducing swimming capacity and increasing mortality rates.

Biodiversity	
Very High Risk	Under a 2°C scenario, 18% of insect species, 8% of vertebrate species, and 16% of plant species are projected to lose over half of their climatically-determined geographic range.
High Risk	A shift of major ecosystems types will occur as a result of climate change (at 1°C, about 7%, and at 2°C, 13% of ecosystems will need to shift). East African montane centers of biodiversity are particularly threatened, since many represent isolated populations with no possibility of vertical or horizontal migration[8].
Moderate Risk	Extreme weather events, such as flooding, drought and fire, will accelerate the degradation of already vulnerable habitats. African biodiversity with low mobility and located in flat and extensive landscapes, may be at risk of change in seasonality and fires. Rising temperatures are closely linked to outbreaks of a fungal disease that contributes to the decline of amphibian populations in Latin America.

Chemicals and Waste[9]	
Very High Risk	Permafrost thaw could be a significant source of methylmercury to Arctic aquatic ecosystems. Mercury can travel long distances in the air and water, bioaccumulate and bio-magnify up food chains, reaching levels that can be dangerous to the health of ecosystems and humans.
High Risk	For some water-soluble Persistent Organic Pollutants (POPs) such as Perfluorooctanesulfonic acid (PFOS), warmer temperatures may increase bioavailability. Higher temperatures could increase primary emissions of POPs that can volatilize, and secondary emissions by re-volatilizing previously deposited POPs. Increase in temperatures of 1°C has been estimated to increase the volatility of some POPs such as polychlorinated phenyls

[8] Warren, R, Price, J, VanDerWal, J, Cornelius, S, Sohl, H. (2018) *The implications of the United Nations Paris Agreement on Climate Change for Globally Significant Biodiversity Areas*. Climatic Change, 147 (3-4), 395–409.

[9] Based on: Rydberg, J., Klaminder, J., Rosén, P., & Bindler, R. (2010). Climate driven release of carbon and mercury from permafrost mires increases mercury loading to sub-arctic lakes. *Science of the total environment*, 408(20), 4778-4783; Wang, X., Wang, C., Zhu, T., Gong, P., Fu, J., & Cong, Z. (2019). Persistent organic pollutants in the polar regions and the Tibetan Plateau: A review of current knowledge and future prospects. *Environmental Pollution;* Yang, Z., Fang, W., Lu, X., Sheng, G. P., Graham, D. E., Liang, L., ... & Gu, B. (2016). Warming increases methylmercury production in an Arctic soil. *Environmental pollution*, *214*, 504-509; Yu, J. G., Yue, B. Y., Wu, X. W., Liu, Q., Jiao, F. P., Jiang, X. Y., & Chen, X. Q. (2016). Removal of mercury by adsorption: a review. *Environmental Science and Pollution Research*, *23*(6), 5056-5076; UNEP/AMAP (2011). Climate Change and POPs: Predicting the impacts. Report of the UNEP/AMAP Expert Group. Secretariat of the Stockholm Convention, Geneva, Switzerland; UNEP, (2019). Global Environmental Outlook 6. United Nations Environment Programme, Nairobi, Kenya; Lindsey, R. 2018. Climate Change: Global Sea Level. NOAA. https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level; Flynn, T.J et al. Implications of Sea Level Rise for Hazardous Waste Sites in Coastal Floodplains. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.391.7715&rep=rep1&type=pdf

	(PCBs) by 10 – 15%, and a 10°C temperature increase which may be possible at the local scale, could result in a 3-fold increase in volatility of POPs.
Moderate Risk	Sea-level rise, especially in Small Island Developing States (SIDS) and other coastal floodplains, can inundate contaminated lands and waste management facilities such as engineered landfills and hazardous chemicals/waste management sites thereby exposing the environmental and human beings to pollution and associated adverse effects

Drylands and FOLUR Impact Programs	
Very High Risk	As temperatures increase there will be a drastic decrease in maize crop globally, including the potential collapse of the maize crop in some regions. Micronutrients will accumulate less in food, bringing as many as 150 million people into protein deficiency by 2050.
High Risk	There is significant reduction in the global production of wheat (by 6.0 ± 3%), rice (by 3 ± 4%), maize (by 7 ± 5%), and soybean, (by 3%) for each degree Celsius increase in global mean temperature.
Moderate Risk	Some land area will have extreme decreases of renewable groundwater resources at 2°C, with strong drying trends in the Mediterranean region and Southern Africa. A loss of 7–10% of rangeland livestock globally is projected for approximately 2°C of warming, with considerable economic consequences for many communities and regions.

Sustainable Forests Impact Program	
Very High Risk	Global warming of 3°C–4°C may result in a significant dieback of the Amazon forest. In Central America, tropical rainforest biomass would be reduced by about 40% under warming of 3°C, with considerable replacement by savanna and grassland.
High Risk	Warmer and drier future conditions result in increased fire, drought, pathogens, and insect activity, which will lead to forest dieback or alter vegetation state. Future wildfire potential increases significantly in the United States, South America, central Asia, southern Europe, southern Africa, and Australia. Some tropical and temperate forests may decline because of increased aridity, while savannas expand. Particularly vulnerable regions are Central and South America, the Mediterranean Basin, Southern Africa and South Australia.
Moderate Risk	Potential for decoupling of species interactions due to different seasonal response to climate change, for example plants and their insect pollinators emerging out of sync.

Sustainable Cities[10] Impact Program	
Very High Risk	At least 136 megacities (port cities with a population greater than 1 million in 2005) are at risk from flooding due to sea level rise, and major economic loss and displacement. Many of these cities are in South and Southeast Asia.
High Risk	At 1.5°C of warming, twice as many megacities (such as Lagos, Nigeria, and Shanghai, China) could become heat-stressed, exposing more than 350 million more people to deadly heat by 2050 under midrange population growth.
Moderate Risk	Electricity generation from hydroelectric dams will decrease due to changes in rainfall and will affect energy provision for cities. Road, air, rail, shipping, and pipeline transportation can be affected directly or indirectly by increases in precipitation and temperature; extreme weather events (flooding and storms) and incidence of freeze–thaw cycles.

[10] Based on: Revi, A., D.E. Satterthwaite, F. Aragón-Durand, J. Corfee-Morlot, R.B.R. Kiunsi, M. Pelling, D.C. Roberts, and W. Solecki, 2014: Urban areas. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 535-612.

4. Risk screening data and methods

An effective climate risk screening should cover the four main elements mentioned above and can be based on a literature review or conducted using online tools. Both require: information on climate projections for the country or region, and if possible, for the specific location of the project; information about relevant potential hazards (e.g. heavy rainfall leading to flood, low rainfall leading to drought, temperature changes which could lead to heat waves, sea-level rise, or changes in other extreme events such as hurricanes and cyclone); and current and projected exposure, vulnerability and adaptive capacity.

There are numerous organisations and institutions which provide *climate change data*, including, but not limited to, the IPCC, the World Meteorological Organization (WMO), NASA, The World Resources Institute and the World Bank. The World Bank's Climate Change Knowledge Portal[11], and The World Resources Institute's Climate Analysis Indicators Tool[12], for example, provide global data on historical and future climate data, vulnerabilities and impacts. It is also possible to explore data by country, region and watershed. A wide range of screening methodologies have been developed.

Screening tools are available from the World Bank, Asian Development Bank, WMO, IUCN, Stockholm Environment Institute, USAID, DFID, GTZ, among others, and through private sector companies such as Mott Macdonald. Sectoral tools have been developed for forestry, roads, waterways and others. Annex 2 provides some examples of such tools.

There is unlikely to be a single "right" tool for all GEF agencies. Data and tools are constantly changing and being updated. It is important for GEF agencies to select and the use credible climate data, both near-term and longer-term, and robust tools for their climate risk screening. In addition to using screening tools, workshops can be used to further verify information collected with local partners, and interviews or site visits can help the project preparation team better understand the challenges and opportunities associated with shocks and stresses.

5. Suggested timing for risk screening

Climate risk screening during project design is crucial to enable risk mitigation measures to be incorporated into projects. To ensure durability of the project, a risk screening should cover a minimum 30-year period from the planned project start date[13]. A preliminary climate risk screening should be conducted prior to PIF submission, and should also be done for child projects in Impact Programs. At the PIF stage, projects should identify risks and planned risk mitigation or adaptation measures. Medium and high-risk projects should conduct a detailed evaluation of climate change risks and risk management options prior to CEO Endorsement. A comprehensive, practical risk management plan should be developed and submitted to the GEF Secretariat. If one or more risks are accepted, a justification should

[11] https://climateknowledgeportal.worldbank.org/
[12] http://cait.wri.org/?_ga=2.161610172.1417639714.1556917553-435254878.1556301068
[13] This date was selected because climate models diverge significantly after 2050, complicating risk screening.

be given. If a project is classified as very high risk, a different location with different activities or different outcomes, should be considered.

6. Next Steps

To be successful, risk screening requires a long-term commitment to strengthening the climate rationale and improving resilience of GEF investment, both by the agencies, and by the GEF Secretariat. Agencies will need to put in place systems that ensure adequate climate risk screening is part of the project design and planning process. STAP expects all future PIFs will reflect basic information about climate risk, including how climate change could affect the proposed intervention, expected outputs and outcomes, with proposed action to manage significant risk. At the CEO-endorsement stage, STAP would expect a more detailed assessment of climate risk and a management plan for the amelioration of those risks.

STAP believes there is an opportunity for the GEF partnership to lead the way by piloting a range of new measures aimed at mainstreaming evidence-based decision-making for climate resilience. STAP will continue to follow progress by GEF agencies towards the end. The STAP Chair will report on progress with climate risk screening in her reports and presentations to the Council. STAP looks forward to further discussing next steps and ways to support risk screening efforts at a workshop on climate risk.

Annex 1: What STAP will look for in screening the Impact Program framework documents to help promote innovation, integration and transformation

Issue	Why
1. Identify types of innovation to foster scaling, including technological, financial, business model, policy, and institutional innovation (1)	Transformation at scale will require multiple forms of innovation. Which forms are needed will affect how to scale and with whom to engage
2. Identify and analyse barriers to scaling and transformation, for example institutional, governance, cultural, and vested interests	Important to identify relevant stakeholders, and to help design appropriate engagement strategies
3. Identify positive interactions between global environmental benefits, and capture the synergies. Minimise negative interactions, and manage any trade-offs, including climate risk (2) (3)	To maximise global environmental benefits, by improving effective integration, and to achieve multiple benefits, and avoid or minimise negative environmental impacts
4. Identify multi-stakeholder process(es) to address innovation, pathways to scaling and transformation, and how to maximise global environmental benefits	Multi-stakeholder processes are essential, and need to evolve, in developing the program, during implementation, and afterwards to achieve transformational change, including the sustainability of outcomes and scaling out
5. Provide a theory of change which includes points 1 to 4 above (4)	Important to clarify the assumptions and risks which underlie the intended transformation pathways, and to address any limitations
6. Outline a monitoring, evaluation and learning process which will track the intended innovations, integration and scaling (5)	To enable learning about innovation, integration and transformation during and after implementation, and foster adaptive management, both within the IP and across the GEF partnership

(1) Toth, F., 2018. Innovation and the GEF: Scientific and Technical Advisory Panel to the Global Environment Facility. Washington, DC. https://www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF.STAP_.C.55.Inf_.03_STAP_Innovation.pdf

(2) Bierbaum, R. et al. 2018. Integration: to solve complex environmental problems. Scientific and Technical Advisory Panel to the Global Environment Facility. Washington, DC. http://stapgef.org/sites/default/files/publications/STAP%20Report%20on%20integration.PDF

(3) STAP guidelines for screening GEF projects http://stapgef.org/sites/default/files/publications/STAP%20screening%20guidelines_0.pdf

(4) O'Connell, D., Abel, N.,Grigg, N., Maru, Y., Butler, J., Cowie, A., Stone-Jovicich, S., Walker, B., Wise, R., Ruhweza, A., Pearson, L., Ryan, P., Stafford Smith, M. (2016). "Designing projects in a rapidly changing world: Guidelines for embedding resilience, adaptation and transformation into sustainable development projects. (Version 1.0)". Global Environment Facility, Washington, D.C. http://stapgef.org/sites/default/files/publications/RAPTA%20Guidelines%20-%20High%20Resolution.pdf

(5) Stocking, M. et al. 2018. Managing knowledge for a sustainable global future. Scientific and Technical Advisory Panel to the Global Environment Facility. Washington, DC. http://stapgef.org/sites/default/files/publications/STAP%20Report%20on%20KM.pdf

Annex 2 - Examples of climate risk screening tools relevant to GEF focal areas

Sector	Organisation	Scale	Modelling tool	Open Access	Expected Outcomes	Name of Tool
Agriculture and Biodiversity	World Bank	Global	Yes	No	• Qualitative and quantitative rating on climate sensitivity • Explanation of reasons for sensitivity rating • Brief adaptation options • Relevant literature and tools for previous climate change risk screening projects	Assessment and Design for Adaptation to Climate Change (ADAPT)[14]
Sustainable cities, agriculture and biodiversity	World Bank	Global	Yes	Yes	• Qualitative data on climate sensitivity • Brief adaptation options • Rating of climate change hazards	Think Hazard! [15]
Sustainable cities, energy and water resources	Japan International Cooperation Agency (JICA)	Global	Yes	Yes	• Quantitative excel-based rating of climate change risks linked to energy, transport and water scarcity	Climate Finance Impact Tool [16]
Food security and resource efficiency	World Conservation Unit (IUCN), Stockholm Environment Institute (SEI), IISD and SDC	Africa, East Asia and Latin America	No	Yes	• List of livelihood resources for the community that are most affected by climate hazards and most important for responding to climate change impacts • Proposed adjustments to existing projects • Proposed new activities to support climate adaptation • A list of key opportunities and barriers to revised/new projects implementation	Community-based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL)[17]
Water scarcity and land degradation	World Resources Institute (WRI)	Global	Yes	Yes	• Water risk mapping • Qualitative mapping of risks • Quantitative mapping of risks and impact	Aqueduct Water Risk Atlas[18]
Multi-sectoral	Environment Agency, UK	Global	Yes	Yes	• Quantitative information to approaches used in the adaptation sector • Climate risk information for impact assessment • Rapid assessments to assist impacts and adaptation analysis	Statistical DownScaling Model (SDSM) [19]

[14] Available on the World Bank's Climate Change Knowledge Portal
[15] http://thinkhazard.org/en/
[16] https://www.jica.go.jp/english/our_work/climate_change/mitigation.html
[17] https://www.iisd.org/cristaltool/
[18] https://www.wri.org/resources/maps/aqueduct-water-risk-atlas
[19] https://www.sdsm.org.uk

Water resource management and flood management	World Meteorology Organization and Global Water Partnership	Coastal-areas	No	Yes	• Different aspects of climate variability and climate change and its affects flood risks • Possibilities of how flood risks can be managed successfully	Flood management in a changing climate [20]
Resource efficiency, food security, land degradation and water resource management	Asian Development Bank (ADB)	Global	No	Yes	• Cost-benefit analysis (CBA) for evaluating adaptation • Inherent issues of sustainable development, such as, for example, the role of capacity building, partnerships, institution strengthening, etc.	Climate change adaptation through integrated risk assessment (CC AIRR)[21]
Water resource management and agriculture	Stockholm Environment Institute (SEI)	Global	Yes	Yes	• Integrated water resource planning assessments • Calculates water demand, supply, runoff, infiltration, crop requirements, flows and storage and pollution generation, treatment, discharge and instream water quality under varying hydrologic and policy scenarios • Evaluates a full range of water development and management options, and takes account of multiple and competing uses of water systems • Graphical drag-and-drop GIS-based interface with flexible model output as maps, charts and tables	Water Evaluation and Planning (WEAP) System [22]
Transportation	World Bank	Ethiopia	No	Yes	• Country specific report on climate impacts on roads • Identifies adaptation measures • Conducts economic assessment, and develops short- and long-term strategies	Making Transport Climate Resilient[23]
Transportation	USAID	Global	No	Yes	• Highlights climate change impacts on infrastructure • Assists with decision-making of transportation-related decisions	Addressing Climate Change Impacts on infrastructure: Transportation [24]
Forest management	FAO	Global	No	Yes	• Highlights importance on how forest management helps tackle climate change through mitigation and adaptation • Recommendations on protection of biodiversity	Managing forests for Climate Change [25]

[20] https://www.gwp.org/globalassets/global/toolbox/references/flood-management-in-a-changing-climate-apfm-wmogwp-2009.pdf
[21] https://www.adb.org/publications/climate-proofing-risk-based-approach-adaptation
[22] https://www.weap21.org/
[23]https://openknowledge.worldbank.org/handle/10986/12889 ;
[24] https://www.climatelinks.org/sites/default/files/asset/document/Infrastructure_Transportation.pdf
[25] http://www.fao.org/3/i1960e/i1960e00.pdf