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Climate and DRR Check

Guidance on how to integrate Climate Change Mitigation/Adaptation and Disaster Risk Reduction into Development Cooperation

Climate and DRR Check

Impressum:

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Part I: Introduction and aim of the Climate and DRR Check

1. Introduction and background

1.1. Aim and structure of the document

SDC aims at systematically integrating climate change related issues and disaster risk reduction (DRR) into development cooperation. This is in line with the commitment of OECD members on how to "work to better integrate climate change adaptation in development planning and assistance, both with their own governments and in activities undertaken with partner countries". The so called Climate and DRR Check is an approach to support SDC staff and their project partners in analysing existing and planned cooperation strategies, programmes and projects with respect to their exposure and influence on climate change and natural disasters. Therefore, SDC has developed this document which is structured into three main parts:

- **Part I** outlines the **rationale** and **framework** of SDC's Climate and DRR Check and provides the user with procedural information about the check.
- **Part II** contains the **practical handbook**. This is the **core part** of the document and shall guide SDC staff and operational partners through the process of how to screen and assess existing and planned strategies, programmes or projects with regard to their exposure to climate change and natural disasters. The handbook is a **self-explanatory and hands-on guidance** which is leading the user through the process of the Climate and DRR Check.
- **Part III** of the document **provides supporting materials**.

1.2. Rationale of the Climate and DRR Check

Tackling climate change and reducing the negative impact of natural disasters is widely perceived as being one of the greatest challenges we are facing today. As developing countries are particularly vulnerable to the impacts of climate change due to their high dependence on natural resources and their limited capacity of coping with these impacts, climate change poses a challenge on meeting important development objectives. Disasters and progressing climate change seriously undermine core development priorities such as poverty alleviation or human security and will become more significant in the next decades.

Tackling disaster risk and climate change related issues is always about **handling uncertainties**. The description of the current situation is already uncertain. Even more uncertainties arise when it comes to future developments. Although there is strong agreement among different climate change models about large-scale temperature changes, uncertainties regarding changes

in precipitations, climate variability and extremes prevail, and even more when it comes to smaller scales (national, sub-national, and local level). Climate science is not and will never be in a position to provide precise quantitative forecasts for all aspects of the climate in specific locations for the next few years, decades or centuries (OECD 2009). Dealing with current and future uncertainties is therefore one of the important characteristics of this Climate and DRR Check. Development cooperation and humanitarian aid efforts already deal with highly uncertain planning factors such as future population levels, economic conditions or rules, and regulations. Climate change is an additional relevant factor of uncertainty.

Disasters, as a norm, are triggered naturally. However, damage or destruction is often the result of inappropriate development such as the creation of highly vulnerable structures, institutions or networks. Climate change does not only manifest itself through changes in the average weather conditions but also through such extreme events as floods, droughts, heat waves or cyclones. Climate change is closely linked with increased disaster risks, and coping strategies also highly correlate between climate change adaptation and disaster risk reduction. A combined approach to tackling climate change related risks and other natural disasters is therefore chosen for the Climate and DRR Check.

Systematically integrating climate change and disaster risk reduction (DRR) into SDC's development cooperation and humanitarian aid is manageable and has to be looked at in order to achieve and secure development goals sustainably. During the last years, different guidelines and tools were developed by development agencies to help integrating climate change and DRR into development cooperation.[1] SDC has compiled relevant information and developed an own Climate and DRR Check. In comparison to similar tools it does not only include adaptation but also disaster risk reduction and climate change mitigation and is applicable to SDC specific procedures.

What do climate change adaptation and mitigation mean?

Adaptation is defined as the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2007b).[2]. Mitigation on the other hand refers to human interventions aimed at reducing the emission of greenhouse gases at the source or at enhancing carbon sinks (IPCC 2001).

1 A. Olhoff and C. Schaer 2010: A Stocktaking of Tools and Guidelines to Mainstream Climate Change Adaptation provided by the UNDP provides an overview of tools and concepts

2 Other definitions of adaptation to climate change can be found in Schipper 2007: www.preventionweb.net/files/7782_twp107.pdf

The idea of adaptation to climate change is displayed in Figure 1.

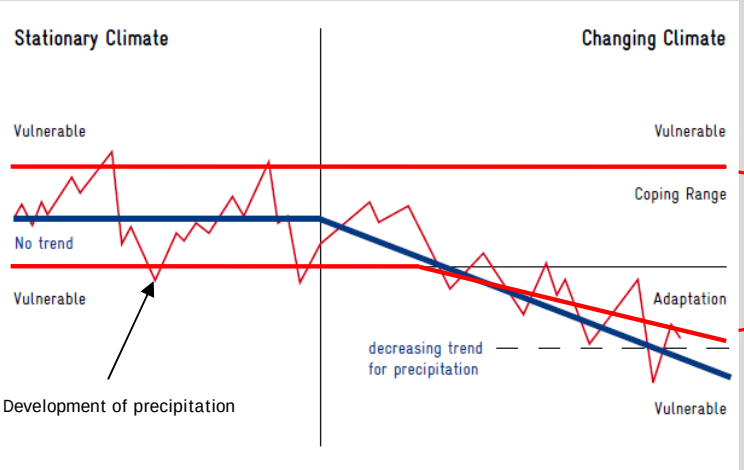


Figure 1 Idealised concept of adaptation. Source: GTZ 2009b. The red curve illustrates the potential development of precipitation in a developing country. Historically, farmers developed strategies on how to cope with these varying levels. However, they were also vulnerable to these extremes when weather events were too extreme. With the change in climate, the trend in the example of this precipitation curve is decreasing and conditions exceed the coping range more often. Proactive adaptation measures can therefore broaden the coping range.

Overlaps between "business-as-usual" development strategies and adaptation can be frequent. Activities undertaken to achieve development objectives can automatically lead to adaptation benefits. For example, decisions taken as part of development activities oriented towards reduced poverty and improved nutrition, education, infrastructure and health would be synergistic with adaptation. Business-as usual developments that do not take climate change into account, likely lead to **maladaptation**.

*Examples for maladaptation (increased risk)***:**
The construction of transport infrastructure in hazardous zones might lead to maladaptation. New roads might be weather-proof, even taking future climate into account, but they might trigger new human settlement in areas at high risk for particular impacts of climate change, such as coastal zones vulnerable to sea-level rise (OECD 2009).
Poorly shaped insurance solutions may also lead to maladaptation. If insurance cover is cheap and readily available, it may cause the effect that incentives to adapt are reduced and people act with more risk (e.g. create settlements in flood prone areas, cultivate crops which have poor resistance to droughts).

What is meant by disaster risk reduction?

Disaster risk reduction (DRR) is the concept and practice of reducing disaster risks by systematically analysing and managing the causal factors of disasters. These include reduced exposure to hazards[3], lesser vulnerability[4] of people and property, wise management of land and the environment, and improved preparedness for adverse events. (UNISDR 2009)

The idea of the risk concept is displayed in Figure 2.

Risk concept: the planning of preventive and preparedness measures, following an integrated approach to:

- reduce existing risks
- adapt to changing risk factors
- prevent the further increase in risks (e.g. "do no harm")

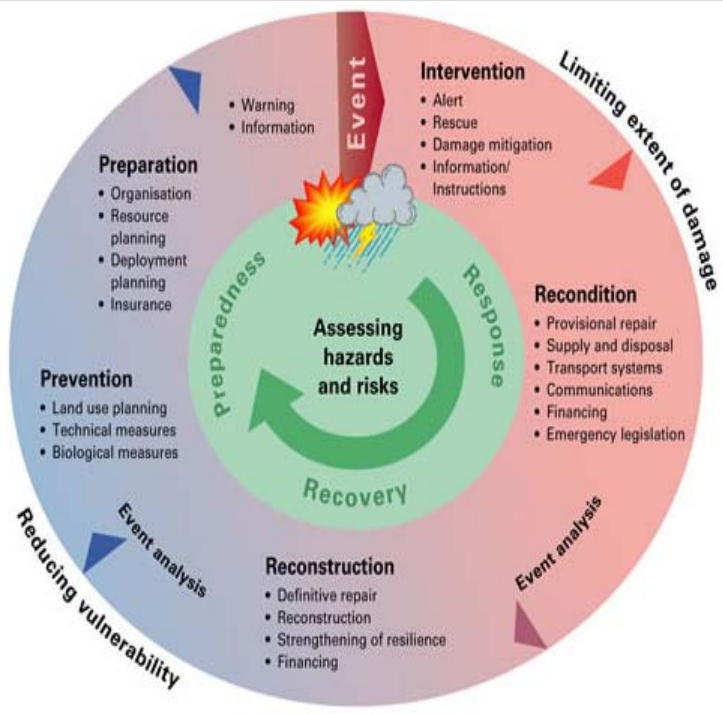


Figure 2 Risk concept. Source: Planat 2004. The planning of prevention and preparedness measures with an integrated approach

3 A **hazard** is a dangerous phenomenon, substance, physical event, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (UN ISDR).

4 **Vulnerability**: Conditions determined by physical, social and institutional, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards (UN ISDR). The vulnerability is lower when there are positive factors, which increase the ability of people to cope with hazards (coping capacity or adaptive capacity).

How is adaptation different from regular development?

Adaptation to climate change and DRR can either be implemented as part of a stand-alone adaptation strategy or be integrated within development processes in order to make these more resilient[5] or better adapted to climate change. While in some cases, stand-alone adaptation measures are needed, adaptation measures will mostly need to be implemented as part of a broader suite of measures within existing development processes, which are referred to as "mainstreaming" or "integrating" climate change adaptation into development cooperation and/or into institutional structures of a partner country.

Figure 3 shows a way for mapping out adaptation activities in the context of development cooperation. On the left side of the continuum the focus lies on vulnerability and overlaps with traditional development practices. On the right side, activities seek to target climate change impact, and fall outside the realm of development. In between lays a broad spectrum of activities with gradations of emphasis on vulnerability and impacts (McGray et al. 2007). The continuum can be roughly divided into four types of adaptation/DRR efforts (from left to right), whereas the two in the middle can be seen as the ones we are targeting in the Climate and DRR Check and which therefore refer to integrating climate change and DRR into development cooperation:

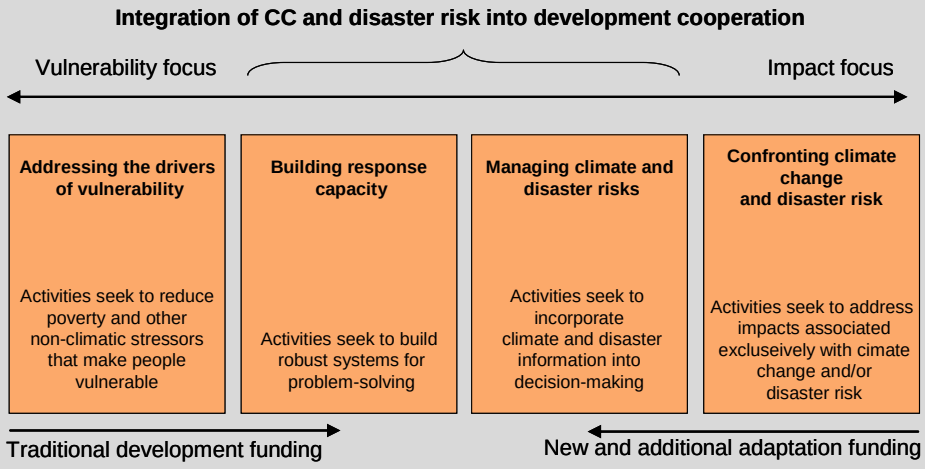


Figure 3 Source: Adapted from McGray et al. (2007) in Klein and Persson (2008).

5 **Resilience** means the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions (UN ISDR).

1.3. The outcome of the Climate and DRR Check

The Climate and DRR Check provides guidance to systematically screen and assess existing and planned strategies, programmes and projects with regard to their exposure to climate change and natural disasters. It helps to identify adaptation measures for coping with climate change by reducing risks and enhancing opportunities in order to integrate climate change adaptation into development cooperation. The Climate and DRR Check is focused on the integration of climate change and DRR into development cooperation as illustrated in Figure 3. Furthermore, the Climate and DRR Check supports the process of integrating the results into SDC's procedures. As an outcome, it supports the systematic integration of climate and DRR into development cooperation and humanitarian efforts and therefore contributes to more sustainable development activities and resilient livelihoods**. It is not the aim of the check to develop adaptation projects or targeted DRR projects but rather taking climate change and natural disasters systematically into account (mainstreaming)** as a further factor to think about while drafting a strategy, programme or project.

1.4. Principles of the Climate and DRR Check

SDC's Climate and DRR Check is based on the following principles:

Principle 1 – The OECD guidance as reference

The OECD guidance on Integrating Climate Change Adaptation into Development Cooperation (OECD 2009)[6] was approved in May 2009 by the ministers of environment and development. It has high legitimacy and is recognised as the **referential framework** for the donors regarding the integration of climate change adaptation at the national, sectoral, local and project level. The OECD guidance and its **four step approach** is therefore taken as reference framework. However, SDC's Climate and DRR Check shall go beyond the scope of the OECD guidance – which is mainly referring to adaptation – by systematically integrating also:

› Climate change mitigation,

› Disaster risk reduction.

Principle 2 - Integrated into SDC's procedures and Project Cycle Management (PCM)

The present document provides guidance for SDC staff on tackling climate change and DRR risks. . The Climate and DRR Check is one of the SDC proposed tools related to risk assessment

6 The OECD guidance is available at: www.oecd.org/document/3/0,3343,en_2649_34361_44096282_1_1_1_1,00.html.

and provides a substantial input for the information on main risks that is mandatory in the entry proposal and credit proposal.

SDC's Climate and DRR Check is applicable at different intervention levels such as cooperation strategies, programmes and projects. The handbook (in PART II) provides practical advice on how to integrate the findings into SDC's procedures (risk assessment as part of the entry or credit proposal, logframe etc.). [7] The Climate and DRR Check is closely connected with SDC's PCM, meaning that the steps of the Climate and DRR Check are fully integrated into SDC project procedures.

Principle 3 – Combining climate change adaptation, disaster risk reduction and climate change mitigation

Climate-related changes and particularly extreme events are important issues that are of interest to both the climate change adaptation and the DRR community. While the climate change research has a stronger emphasis on gradual and creeping changes, such as the increase of the mean temperature, sea level rise and changes in precipitation patterns, the disaster risk reduction community has a dominant focus on crises and disasters linked to sudden onset hazards such as floods or storms (Birkmann, J. et al. 2009)[8]. As impacts of climate change often occur in the form of extreme events, the convergence between disaster risk reduction and climate change adaptation is obvious and therefore, disaster risk reduction is considered as a core element of adaptation. Coping strategies and measures highly overlap as outlined in Figure 4. Because of this huge overlap, the integration of climate change adaptation and disaster risk reduction are methodologically jointly addressed in the Climate and DRR Check. The check considers both gradual climate shifts as well as extreme hydro-meteorological and non-hydro-meteorological related natural events.

7 For integrating DRR explicitly, please also refer to SDC Guidelines on Disaster Risk Reduction (SDC 2008).
8 Birkmann, J. et al. (2009) outlines further conceptual differences and similarities between climate change adaptation and disaster risk reduction.

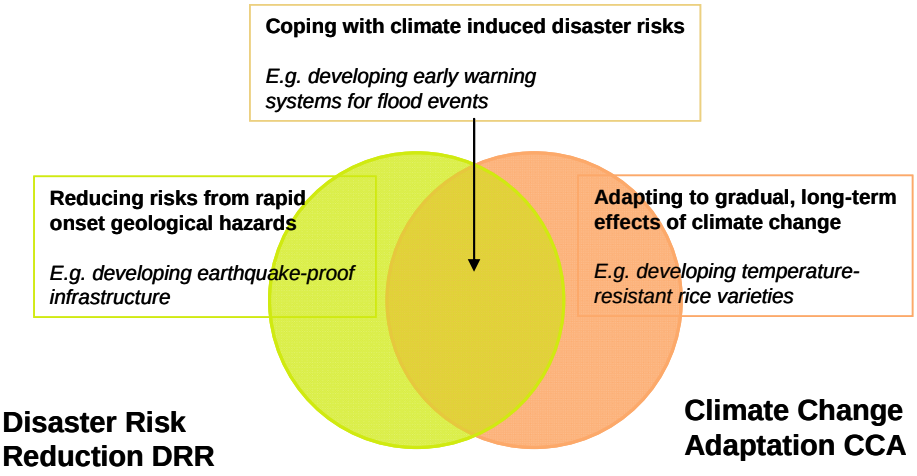


Figure 4 Overlap of climate change adaptation and disaster risk reduction**.** Source: SDC.

Due to practical reasons, climate change mitigation is covered separately within the handbook. Nevertheless, there may also be overlaps between adaptation, DRR and climate change mitigation (for instance climate-resilient farming which enhances sinks of greenhouse gases).

Principle 4 - Modular approach and flexibility

The scope and depth of the Climate and DRR Check can be adapted to reflect specific needs and constraints. The modular approach allows to first conduct a rough analysis of the relevance of climate change and natural hazards (Module 1; Climate and DRR Screening) and if necessary a more in-depth assessment in a second step (Module 2; Climate and DRR Detailed Assessment). This means that only strategies, programmes or projects assumed to be exposed to significant risks in the future need to run through a detailed assessment.

1.5. Main elements of the Climate and DRR Check

The Climate and DRR Check can be applied at different levels such as at strategic and programmatic level as well as at programme or project level. The Climate and DRR Check has two modules:

Module 1 - Climate and DRR Screening: This module (taking max. 2 hours) serves as a first screening to see, whether the strategy, programme or project's activities have a significant impact on greenhouse gas emissions or whether the activities are at significant risk caused by climate change, climate variability or natural disasters (tectonic hazards, etc.). The result of Module 1 is needed to decide whether a Climate and DRR Detailed Assessment has to be conducted (Module 2).

Module 2 – Climate and DRR Detailed Assessment: Module 2 (taking 2 to 3 days) allows to systematically integrate climate change (adaptation and mitigation) and disaster risk reduction into an existing or planned strategy, programme or project. **Module 2 is only applied when possible significant risks and opportunities have been identified under Module 1** and a more thorough assessment is considered necessary

At the strategic and programmatic level, the Climate and DRR Detailed Assessment is called **Climate and DRR Lens** and is more generic than the detailed assessment at the project level.

The detailed assessment at project level comprises of the four step approach developed by the OECD allowing analysis of risks and selection, identification, monitoring and evaluation of adaptation/DRR and climate change mitigation measures. The results of the Climate and DRR Detailed Assessment are integrated into the mandatory risk assessment in the planning documents (project document, chapter 7 and annex 5 of credit proposal) and the logframe. For adaptation and DRR, this approach is described in section B (chapter 1 and 2), for climate change mitigation in chapter 2.2.

2. Organisational and procedural matters

When to conduct and how to integrate the results into SDC procedures?

The Climate and DRR Check shall be conducted as early as possible in the identification and planning of a new intervention or a new phase of a strategy, programme or project. In the case of a new intervention, the screening (Module 1) should be applied at the beginning of a planning process and the results should be integrated into the entry proposal. In the case of a running intervention, the screening should be applied at the moment of the review.

An eventual detailed assessment (Module 2) shall be conducted at the moment of the elaboration of the project document or the cooperation strategy and the credit proposal. The results of the different steps shall therefore be integrated into these documents. The principle entry points for integration of the results of the Climate and DRR Check into SDC's procedures are on the one hand the mandatory risk assessment in the planning documents (project document, chapter 7 and annex 5 of credit proposal) and the logframe on the other hand. Details are described in the respective sub-chapters of Part II of this document.

Who should do the Climate and DRR Check and who should be involved?

Responsibilities and elaboration processes differ depending on the module of the Climate and DRR Check.

Module 1 (screening) shall be conducted individually, by the programme officer in charge (national programme officer and/or desk at headquarters). If required, the screening can also be conducted participatory with involved project partners. The provided screening checklist (refer to section A) is self-explanatory so that the screening can be conducted without further methodological support of climate and DRR experts. The decision whether a detailed assessment has to be conducted shall be taken by the COOF and reported in the entry proposal

The elaboration of Module 2 (detailed assessment) is more complex and is following a participatory approach (involving relevant stakeholders). Overall responsibility for conducting the Climate and DRR Check is with the programme officers in charge. The assessment itself shall ideally be carried out in the form of a workshop (e.g. in the framework of a planning workshop) allowing participation of different stakeholders (SDC representatives, project partners, target groups etc). The responsibility for preparation and planning of the workshop could be assigned to different persons involved in the project depending on their skills and expertise in this field. Moderation is best be done by experts outside of the project team. The team may seek advice and support of SDC's Climate Change & Environment Network and SDC's Disaster Risk Reduction Network. The networks have the responsibility to coordinate climate and DRR related activities to facilitate the application of the tool in the operational divisions of SDC. Experts being familiar with the Climate and DRR Check methodology could be mobilised for facilitating the application of the check. The decision on how many people shall be involved for conducting the Climate and DRR Check is left to the respective project team. However, it is suggested to assign one person taking the role of a moderator especially when doing stakeholder consultations.

Details on elaboration of the Climate and DRR Check are described in the respective subchapters of Part II.

How detailed should the Climate and DRR Check be?

The Climate and DRR Check method is a framework allowing for a maximum of flexibility. The depth of the check can be adjusted to the problem (risks) and the needs. Whereas the Climate and DRR Screening (Module 1) will not take more than one to two hours (depending on the familiarisation with the guidelines), the duration of the Climate and DRR Detailed Assessment (Module 2) would usually be around two to three days of workshops/stakeholder consultations,

provided that the available data and information on the strategy, programme or project and climate change and natural disasters is compiled in advance.

Which strategy/policy/programme/project should be "climate and DRR checked"?

Climate change and natural disasters are posing a challenge to a broad range of development objectives. Systematically considering climate and disaster risks within an overall risk assessment is crucial. Therefore, it is recommended for *all* activities (strategies, policies, programmes or projects) to conduct the screening (Module 1), which is a rough assessment of climate and DRR related risks. A more detailed assessment (Module 2) shall however be limited to activities facing potentially significant climate and other natural risks (and opportunities).

In order to avoid duplication of efforts, no detailed assessment has to be conducted for activities and in contexts that are very similar to already assessed activities. These do not have to undergo the procedure, but could benefit and integrate the result of a previous similar assessment.

Part II: Handbook for the Climate and DRR Check

The PART II of this document is the handbook which provides SDC staff and partners with a hands-on guidance on the integration of climate change and disaster risk reduction into strategies, policies, programmes and projects. The handbook has two main modules (see Figure 5): Module 1: Climate and DRR Screening, and Module 2: Climate and DRR Detailed Assessment. The Module 1 is outlined in Section A, whereas Module 2 is outlined in section B.

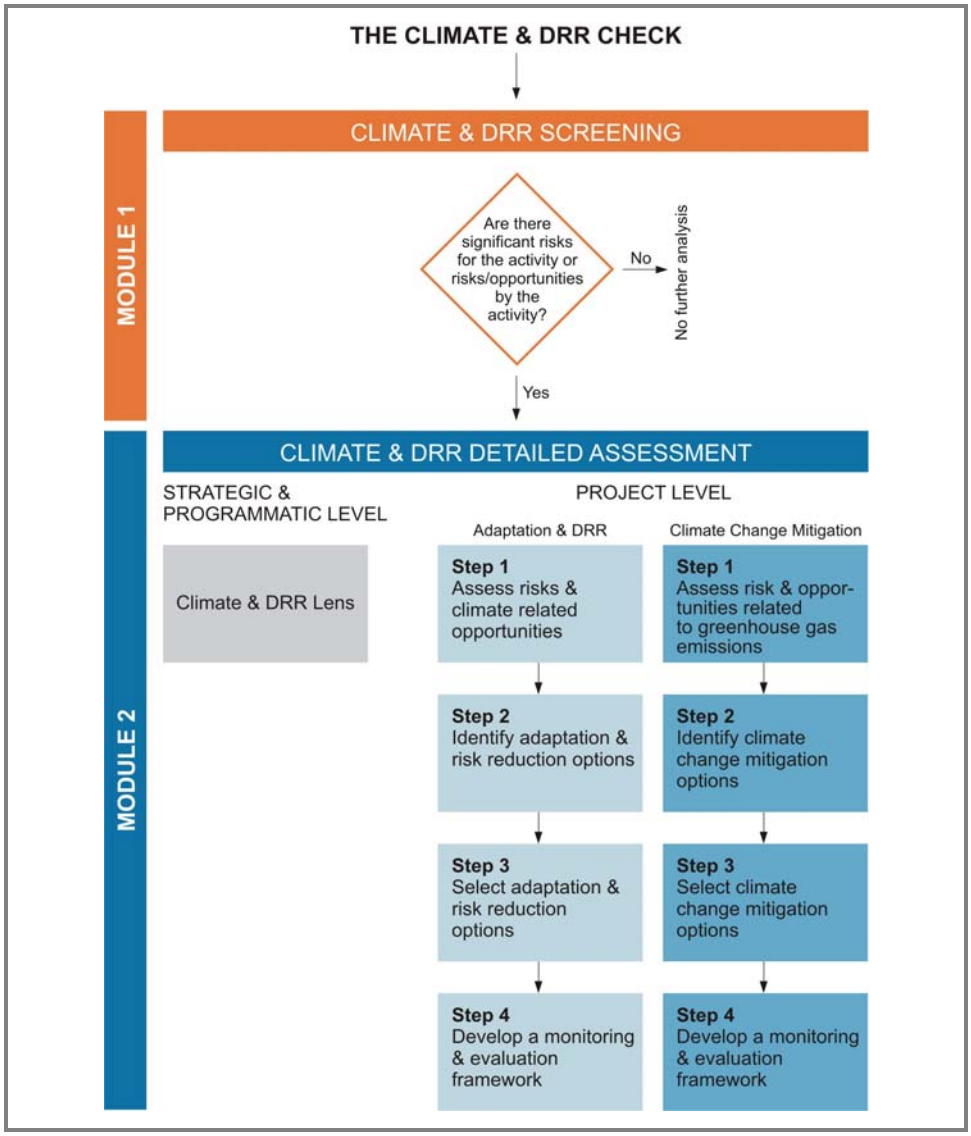


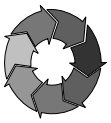
Figure 5 Overview of the Climate and DRR Check.

A. MODULE 1: Climate and DRR Screening

Aim

The screening aims at identifying whether a strategy, policy, programme or project (referred to hereafter as activity) is potentially at risk from climate or natural disasters and whether an activity may produce or reduce existing or future risks (e.g. greenhouse gas emission reduction potential; landslide reduction potential). It helps to make a **rapid and rough assessment of risks and/or opportunities** and to take a decision whether to proceed with a detailed assessment (Module 2) or not. Please note that some risks from climate change or natural disasters always exist. The question is whether the probability and potential negative impacts on the activity constitute a significant risk or not. Therefore, climate and natural disaster risks may be assessed in comparison to other risks for an activity that might have been identified within a risk assessment process. The screening shall be applied at a very early stage of planning of a strategy, programme or project. It is meant to be completed in a rather generic and quick waywithout having specific knowledge on climate change and natural disasters and without having access to detailed climate data.

What to do



The Climate and DRR Screening has two components:

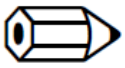
- (A) Adaptation & DRR Screening and
- (B) Climate Change Mitigation Screening.

This *should b*e done by answering the key questions using the **template format** under subchapter "*Recommended links and supporting materials*". At the end, you will make an overall estimation of the risk and opportunities. Based on your estimation you shall decide whether a detailed assessment shall be conducted or not (Module 2). In general, it is recommended to go for a detailed assessment if the risks are high and the capacities to cope with these risks are low. The following key questions should be answered:

- Are there any significant risks for the activity caused by climate change and/or other natural hazards?
- Are there any significant risks that the activity may produce? Are there any opportunities to reduce risks related to natural disasters?
- Is there a significant risk that greenhouse gas emissions will substantially increase by the activity? Are there opportunities arising from the activity of reducing greenhouse gas emissions or enhancing carbon sinks?

Please note that there is a margin of discretion on what is meant by "significant" risk and subsequently on whether there is a need to conclude a detailed assessment or not.

Results of the Climate change and DRR Screening and tables to complete



- As a result of this screening, the key questions are answered in the template checklist provided below.
- Overall risks are roughly estimated.
- It is decided whether a detailed assessment shall be conducted or not.
- It is decided whether the detailed assessment shall be conducted for an entire strategy, programme and project or only parts of it.

A.) Adaptation & DRR Screening

Questions	Yes	Partially	No	Justifications[9]
1. Exposure and natural hazards				
1.1 Does the activity take place in at least one of the following sensitive areas or sectors?				
› Agriculture and rural development (including livestock and fisheries)				
› Forestry (e.g. reforestation, forest management, agro forestry)				
› Natural Resources Management & Biodiversity				
› Integrated Water Resource Management				
› Water and Sanitation				
› Urban Development (including land use and planning)				
› Health Services, Education				
› Infrastructure (e.g. communication, roads, transport)				
› Energy (e.g. hydropower)				
› Others				
1.2 Does the activity be located in any of the following types of sensitive geographical areas and locations?				
› Arid/semi arid zones				
› Tundra				
› Mountain ecosystems				
› Small islands				
› Coastal regions				

[9] Add a comment if you feel that a clarification or justification is necessary, e.g. specifying the type of activity (from the listing) that is concerned.

Questions	Yes	Partially	No	Justifications[10]
› Deltaic areas, flood plains, alluvial fan, peat land				
› Zones exposed to (tropical) storms				
› Zones in the reach of volcanic activity				
› Zones exposed to landslides				
› Seismic zones				
› Zones exposed to wildfire				
› Zones exposed to biological hazards (e.g. locust)				
› Old-grown forests				
› Others				
1.3 Do the objectives of the activity be affected due to one of the following natural hazards?				
› Shifts (spatial and temporal) in average and/or extreme temperature				
› shifts (spatial and temporal) in average and/or extreme rainfall patterns				
› Other extreme weather events, such as storms				
› Volcanic activity				
› Earthquake (including tsunamis)				
› Landslides				
› Rock-, snow-, ice-avalanche				
› Other natural hazards				
2. Impacts and Vulnerability				
2.1 If the activity is exposed to climate and other natural hazards, which impacts do you expect?				
› increased frequency and/or severity of extreme weather events and associated natural and semi-natural disasters (e.g. floods, droughts, cold and heat waves, storms, hurricanes, cyclones)				
› raised sea level and increases of costal erosion				
› increased pick discharges, runoff and river bank erosion				
› increased and accelerated land sliding				
› acceleration in desertification and soil loss and erosion processes				

[10] Add a comment if you feel that a clarification or justification is necessary, e.g. specifying the type of activity (from the listing) that is concerned.

Questions	Yes	Partially	No	Justifications[11]
› seasonal or permanent reduction in the availability of freshwater, e.g. seasonal changes in stream flows, reduced precipitation, glacier retreat, salinity intrusion due to sea-level rise, reduced groundwater recharge rate				
› decrease in water quality, e.g. increased salinity and concentration of pollutants, chemical and microbiological contamination as a result of floods, increased pathogens and disease vectors as a result of higher water temperature (e.g. malaria)				
› loss or shifts of habitats and changes in ecosystems, e.g. loss of biodiversity, accelerated extinction and displacement of species				
› decrease in food productivity				
› increased frequency and/or severity of disease and pest outbreaks, as pests and disease vectors modify their range of proliferation (e.g. due to more suitable breeding conditions)				
› changes in atmospheric pollution patterns, e.g. increased smoke and particulate matter pollution, increased frequency and severity of dust storms as a result of droughts				
› human migration				
› loss or damage of infrastructure				
› others				
2.2 Which of the following livelihood assets might be affected by the hazard?				
› Human capital				
› Social capital				
› Natural capital				
› Physical capital				
› Financial capital				
› Political capital				

[11] Add a comment if you feel that a clarification or justification is necessary, e.g. specifying the type of activity (from the listing) that is concerned.

Questions	Yes	Partially	No	Justifications[12]
2.3 Which of the following factors influence the vulnerability? Specify whether the influence is positive or negative.				
› Human capital: skills, knowledge, health and ability to work				
› Social capital: social resources, including informal networks, membership of formalised groups, relationships of trust that facilitate co-operation and inclusion of vulnerable groups				
› Natural capital: natural resources such as land, soil, water, forests				
› Physical capital: basic infrastructure (roads, water & sanitation, schools, ICT) and producer goods (tools, equipment)				
› Financial capital: financial resources including savings, credit, and income from employment, trade and remittances				
› Political capital: power and capacity to influence political decision-making, formal and informal participation, access to political processes, freedom and capacity collectively organise and claim rights				
3. Overall estimation of the risk for the activity				
3.1. Do climate change, climate variability and other natural hazards significantly endanger the achievement of the objectives of the activity?	The activity is significantly endangered if it is located in a sensitive sector and in a geographical area exposed to climate and/or other natural disasters. To answer the question, make an overall evaluation of questions 1.1–1.3.			
3.2 Do you estimate that the women and men involved in the activity have the capacities to adapt to the impacts of the hazards?	The capacity is higher, the lower the vulnerability of the people. To answer the question, make an overall evaluation of questions 2.1–2.3.			
3.3 Based on the evaluation of 3.1 and 3.2, do you estimate that there are significant risks for the activity and that a detailed assessment shall be carried out?	Yes ☐ No ☐ In general, it is recommended to do a detailed assessment ➢ if the activity is significantly endangered **and** the capacity to adapt is low			
4. If a detailed assessment shall be carried out, go to Part II, section B chapter 1 (for strategic and programmatic level) or 2.1 (for project level).				

Table 1 Adaptation and DRR Screening

[12] Add a comment if you feel that a clarification or justification is necessary, e.g. specifying the type of activity (from the listing) that is concerned.

B.) Climate Change Mitigation Screening

Questions	Yes	Partially	No	Justification[13]
1. Greenhouse gas related risks and opportunities				
1.1. Is the activity in a sector which potentially causes greenhouse gas emissions?				
› Energy supply				
› Transport				
› Building				
› Industry				
› Agriculture (including livestock) and rural development				
› Tourism				
› Forestry				
› Waste and waste water management				
› Others				
1.2 Is there a risk that the activity produces *substantial* greenhouse gas emissions?				
› generation and distribution of energy (e.g. coal power plant, diesel generator)				
› operation of buses, cars, airplanes, ships, trains				
› heating, cooling, construction of buildings				
› industrial production				
› microbial transformation of nitrogen fertilisers in soils				
› digestion processes of cattle and other ruminant animals (production of fermentation gases) and manure concentration in more intensive systems				
› deforestation, forest degradation and unsustainable land use				
› landfill, waste water treatment				
› others				
1.3 Are there any opportunities arising from the activity of reducing greenhouse gas emissions or enhancing carbon sinks?				
› improving energy efficiency (e.g. industry, energy supply, buildings, transport)				
› promoting low-carbon technologies to convert energy and in particular to generate heat and power (e.g. renewable energy such as biogas, solar, wind)				

[13] Add a comment if you feel that a clarification or justification is necessary, e.g. specifying the type of activity (from the listing) that is concerned.

Questions	Yes	Partially	No	Justification[14]
› opting for more sustainable modes of transport				
› reducing deforestation (and stopping desertification), avoiding land use change, promoting reforestation and sustainable land use				
› modifying agricultural practices, notably to making more efficient use of nitrogen-based fertilisers and improving the management of manure				
› reducing waste through recycling and composting (meaning energy recovery with heat and power generation and landfilling with landfill gas recovery)				
› capturing and burning of biogas in sewage treatment plants				
› others				
2. Capacities				
2.1 Which of the following factors influence the capacities of the people to manage the risks and/or opportunities? Explain under justification whether the influence is positive or negative.				
› Human capital: skills, knowledge, health and ability to work				
› Social capital: social resources, including informal networks, membership of formalised groups, relationships of trust that facilitate co-operation and inclusion of vulnerable groups.				
› Natural capital: natural resources such as land, soil, water, forests				
› Physical capital: basic infrastructure (roads, water & sanitation, schools, ICT) and producer goods (tools, equipment)				
› Financial capital: financial resources including savings, credit, and income from employment, trade and remittances				
› Political capital: power and capacity to influence political decision-making, formal and informal participation, access to political processes, freedom and capacity collectively organise and claim rights				

[14] Add a comment if you feel that a clarification or justification is necessary, e.g. specifying the type of activity (from the listing) that is concerned.

3. Overall estimation of the risk and opportunities by the activity	
Is there a significant risk that greenhouse gas emissions will substantially increase by the activity?	The risk is considered significant if the activity is located in a sector, which potentially causes greenhouse gas emissions and the activity is likely to produce substantial greenhouse gas emissions. To answer the question, make an overall evaluation of questions 1.1 and 1.2.
3.2. Do you see significant opportunities of reducing greenhouse emissions by the activity?	The opportunities are considered significant if the activity is located in a sector which potentially causes greenhouse gas emissions and the activity can contribute to reduce greenhouse gas emissions. To answer the question, make an overall evaluation of questions 1.1 and 1.3.
3.3. Do you estimate that the women and men involved in the activity have the capacities to manage those risks and/or opportunities?	To answer the question, make an overall evaluation of questions 2.1.
3.4. Based on the evaluation of 3.1, 3.2 and 3.3, do you estimate that there are significant risks and/or opportunities by the activity and that a detailed assessment shall be carried out?	Yes ☐ No ☐ It is recommended to do a detailed assessment ➢ the higher you assess the risks (3.1) and the lower the capacities of women and men to manage those risks (3.3) and/or ➢ the higher you assess the opportunities (3.2)
4. If a detailed assessment shall be carried out, go to Part II, chapter 2.2	

Table 2 Climate Change Mitigation Screening.

Elaboration and how to make use of the results

The screening is applied at the beginning of the planning process of a new intervention (strategy, programme or project) or the review of a running intervention. It will best be conducted by the national programme officer being in charge of the intervention as he or she is familiar with the context and the focus of the intervention. There is no need to conduct data research or to have broader stakeholder consultations in order to complete this first quick screening. The decision whether to proceed and do a detailed assessment should be taken by the responsible at COOF and reported in the entry proposal.

Main conclusions (estimation of overall risks and opportunities caused by the activity and risks for the activity) should be reflected in the entry proposal (for new interventions) or the review (for new phase of running interventions) and serve as an input for the planning process..

B. MODULE 2: Climate and DRR Detailed Assessment

Module 2 shall be applied when the screening (Module 1) indicates conducting a detailed assessment. The methodology for this detailed assessment differs between the intervention level (strategic/programmatic level and project level) on the one hand and between adaptation/DRR and climate change mitigation on the other hand.

- For an **Adaptation and DRR Detailed Assessment at strategic and programmatic level**, please follow the methodology described in **Chapter 3**.
- For an **Adaptation and DRR Detailed Assessment at project level**, please follow the steps described in **Chapter 4**.
- For a **Climate Change Mitigation Detailed Assessment** please follow the steps described in **Chapter 5**.

1. Strategic and programmatic level

The Climate and DRR Detailed Assessment outlined in this section is aimed for strategies such as country, sector or cooperation strategies and is called **Climate and DRR Lens**. Also complex programmes may be better assessed with this proceeding. For practical reasons, it will only be made reference to the strategic level in the following. The process of the Climate and DRR Check at strategic and programmatic level and the interlinkage between Module 1 and Module 2 are displayed in Figure 6.

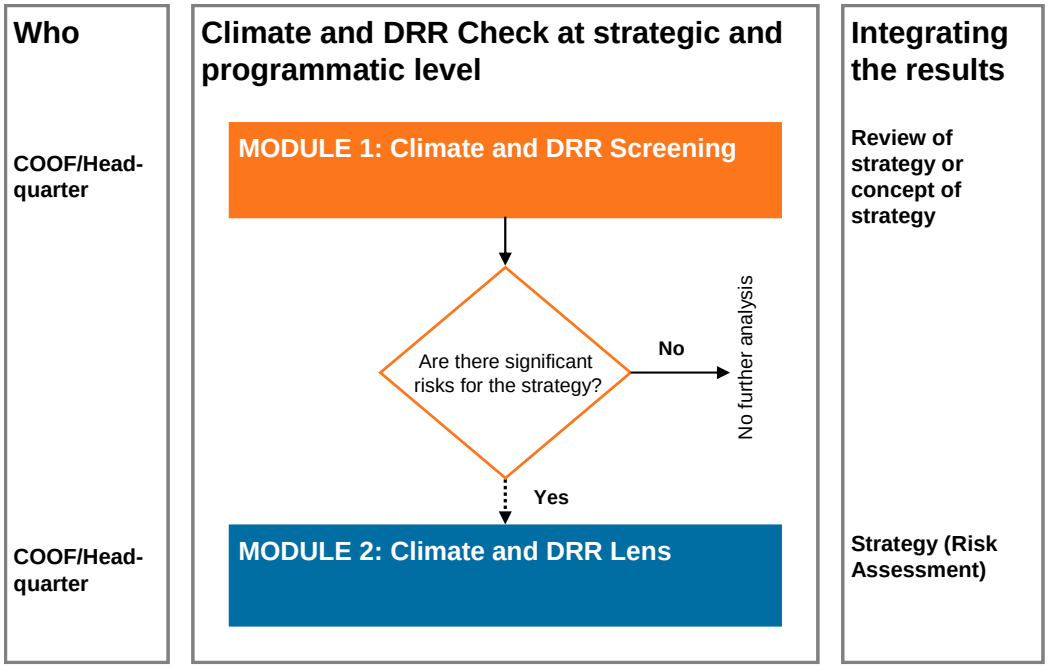


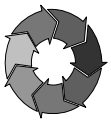
Figure 6 Module 1 and 2 at strategic and programmatic level. Module 1 is outlined in section A.

Aim

The Climate and DRR Lens is focusing on the **assessment of risks** related to climate change and natural disasters. The aim of applying a Climate and DRR Lens is to assess, whether a strategy or its strategic goals, objectives or priorities are at risk from climate change and other disasters (such as e.g. tectonic disasters) and to conceive a strategy which is more effective at reaching its objectives also in the face of a changing climate. In other words, it means planning with a longer time scale and a wider range of possible variability in mind. The Climate and DRR Lens shall be applied as early as possible in the planning of a new strategy or programme or a new phase of an existing strategy and programme (e.g. during the planning workshop).

For this assessment, **risk** is defined as the "probability of harmful consequences resulting from **interactions** between natural or human-induced **hazards** and **vulnerable conditions**" (UN ISDR 2004). Detailed definitions and examples can be found in the risk assessment at project level in chapter 2.1 of Part II.

What to do



A. Analyse the context of climate change and DRR

In an initial step it should be assessed whether and how the strategy under consideration will be affected by climate change or disaster risks (create a risk portfolio). Try to assess the most relevant climate and disaster risks in the **geographic strategy area**. You may also take into account existing risk scenarios. Please note that this is a qualitative assessment where a certain scope of discretion is left for the persons conducting this analysis.

You may consult the following nationally available information: national communications to the United Nations Framework Convention on Climate Change (UNFCCC); National Adaptation Programmes of Action (NAPAs, for LDCs[15]); national implementation reports of ISDR's Hyogo Framework for Action 2005–2015[16];, Common Country Assessment (CCA) of the United Nations Development Assistance Framework GFDDR's Country Assistance Strategies (CAS)[17]; national disasters statistics (refer to section "Recommended links and supporting material", p. 27). While doing this assessment you shall be able to answer the following three key questions:

- What are the most important climate related and/or other natural hazards the country, region or sectors are facing?
- What are the relevant factors influencing current and future vulnerability?
- Which key national development priorities, geographical areas, and/or sectors are likely to be particularly affected by climate change and/or other natural hazards?

B. Assess to what extent the proposed strategic goals/objectives could be affected by climate change and disaster risk and whether a business as usual strategy could lead to maladaptation

In a second step try to assess whether the goals/objectives to be addressed in the strategy are particularly at risk from climate change and other natural hazards. Furthermore, you shall think about whether the strategic goals/objectives could lead to maladaptation (refer Chapter 1.2). The idea is not just to answer these questions but rather to consider potential consequences the objectives/strategic goals might have when taking into account climate change and disaster risk reduction. You shall be able to answer the following key questions:

- To what extent could the goals/objectives be at risk from climate and other natural hazards?

15 LDCs: Least Developed Countries
16 ISDR: International Strategy for Disaster Risk Reduction
17 GFDRR: Global Facility for Disaster Risk Reduction and Recovery

› To what extent the goals/objectives could incentivize maladaptation with regard to climate change and disaster risk?

C. Integration of climate and disaster risk considerations in the strategy

In this sub-step you shall assess whether risks from climate change and disasters have already been adequately addressed during the planning period and whether the strategy has been aligned with existing national strategies regarding climate and or disaster risk. Please note that this is a qualitative estimation and there is no explicit threshold for "adequately". The following questions shall be answered:

› Has climate change and DRR been adequately considered in the strategy?

› Is the strategy adequately considering national climate change or disaster risk reduction strategies or plans?

D. Adjust the strategy if necessary

With the application of the former steps (step A to C) you will be able to conclude whether the strategy faces risks from climate change and/or natural disasters. You may now be in a position to decide

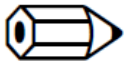
a) Whether the goals and objectives of the strategy are at risk or not;

b) Whether the identified risks have been already adequately addressed in the process of strategy development;

c) Whether the strategy needs to be adjusted;

d) How the strategy needs to be adjusted (e.g. reformulation and/or recommendations for considering the identified risks at project or sectoral level).

Results of the Climate and DRR Lens and tables to complete



The findings of the sub-steps may be reported in the following tables.

A. Analyse the context of climate change and DRR
› What are the most important climate related and/or other natural hazards facing the country, region or sectors? …
› What are the relevant factors influencing current and future vulnerability in the country, region or sectors? …
› Which key national development priorities, geographical areas, and/or sectors are likely to be particularly affected by climate change and/or other natural hazards? …

Table 3 Proposed reporting format to assess the context of climate change and DRR.

B. Assess the strategic goals/objectives			
	To what extent could the goals/objectives/priorities be at risk from climate hazards and other natural hazards?	**Assess the potential of maladaptation or missed opportunities arising from climate change and DRR**	**Outline possible adjustments to be made**
Strategic goal/objective or priority 1	*Assess how and to what extent the goals/objectives or strategic priorities could be at risk from climate change and or natural hazards*	*Assess to what extent the goals/objectives or strategic priorities could incentivize activities that become riskier under a changing climate (settlements in flood-prone areas) or whether the strategy could support activities justified under a development perspective but may not under a climate change adaptation perspective*	*Assess how the strategy shall be adjusted, e.g. reformulations or recommendations for considering the identified risks at project or sectoral level*
Strategic goal/objective or priority 2	…	…	…

Table 4 Proposed reporting format to assess the strategic goals/objectives or priorities.

The general assessment whether the strategy adequately addresses climate and disaster risks and eventual adjustments of the strategy shall be reported in textual format (in the revised strategy). The following Table 5 and Table 6 may help you to report your findings.

C. Integration of climate and disaster risk considerations in the strategy		
		Explanation
› Has climate change and DRR been adequately considered in the strategy?	Yes ☐ No ☐	
› Is the strategy adequately considering national climate change or disaster risk reduction strategies or plans?	Yes ☐ No ☐	

Table 5 Proposed reporting format to analyse whether climate and disaster risks are already considered in the strategy.

D. Adjust the strategy (if necessary)		
		Type of adjustments
Has the strategy to be adjusted due to the identified climate and disaster risks?	Yes ☐ No ☐	*If yes, explain what kind of adjustments need to be done (e.g. reformulations, recommendations at project level)*

Table 6 Proposed reporting format to summarise eventual strategy adjustments.

Elaboration and how to make use of the results

The climate and disaster risk assessment for strategies shall be straightforward and rather short. The responsible persons at the COOF shall conduct the context analysis (step A) taking into account suggested links (outlined in the section *recommended links and supporting material* below) Steps B and C (how is the strategy affected and how are climate change and/or other natural disasters considered) may best be conducted in discussion among strategy development team members. Decision on an eventual adjustment of the strategy shall be taken jointly by the COOF and the headquarter or during the planning workshop. The findings shall be integrated in the strategy (risk assessment part).

Recommended links and supporting material

General information on **climate change** and country situation:

- "**National Communications**" of the respective country (all parties to the UNFCCC) include both the impacts of climate change and the emissions of greenhouse gases within their borders: http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php
- **National Adaptation Programmes of Actions** (NAPAs) are issued by all Least Developed Countries (LDCs) that are members to the UNFCCC. They include country profiles with regard to climate change and key adaptation needs: http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php
- Reports from the **Intergovernmental Panel on Climate Change** (IPCC) can be downloaded here: www.ipcc.ch/publications_and_data/publications_and_data_reports.htm

Information with regard to **disaster risk** and respective impacts can be found here:

- The **UNISDR** (United Nations International Strategy for Disaster Reduction) website: www.unisdr.org/ provides information with regard to disaster risk reduction such as country re-

ports, disaster statistics, etc. It also provides a list of national platforms focal points: www.unisdr.org/eng/country-inform/ci-national-platform.html

- **Preventionweb** (www.preventionweb.net/english/) serves the information needs of the disaster risk reduction community, including the development of information exchange tools to facilitate collaboration.
- **Swiss Re** (www.swissre.com/clients/client_tools/about_catnet.html)**:** The CatNet™ functions and data facilitate a professional overview and assessment of natural hazard exposure for any location worldwide. This makes CatNet™ a valuable tool in preparing local, regional and cross-regional risk profiles. The main features of CatNet are natural hazard atlas, country-specific insurance data and links to disaster statistics.
- **EM-DAT** (www.emdat.be/database): Provides systematic collection and analysis of disaster risk data. The database provides hands-on country and disaster profiles, disaster lists, reference maps as well as disaster trends.
- **Munich Re** (www.munichre.com/en/reinsurance/business/non-life/georisks/natcatservice/default.aspx) Comprising some 28,000 data records, NatCatSERVICE is the most comprehensive natural catastrophe loss database in the world. A comprehensive world map is available on NatCatService**.**

2. Project level

2.1. Adaptation and DRR

This chapter is a guide leading the user step by step through the detailed assessment process for the project level. Climate change adaptation and disaster risk reduction is jointly addressed in this module. Assessment with regard to climate change mitigation is addressed separately in chapter 2.2. The process of the Climate and DRR Check at project level and the interlinkage with the Module 1 is displayed in Figure 7.

The principle entry points for integration of the results of the Climate and DRR Detailed Assessments are the mandatory risk assessment on the one hand and the logframe on the other hand. After finishing the step by step approach, the process should be closed by re-feeding the logframe with adjusted outcomes, indicators and/or objectives.

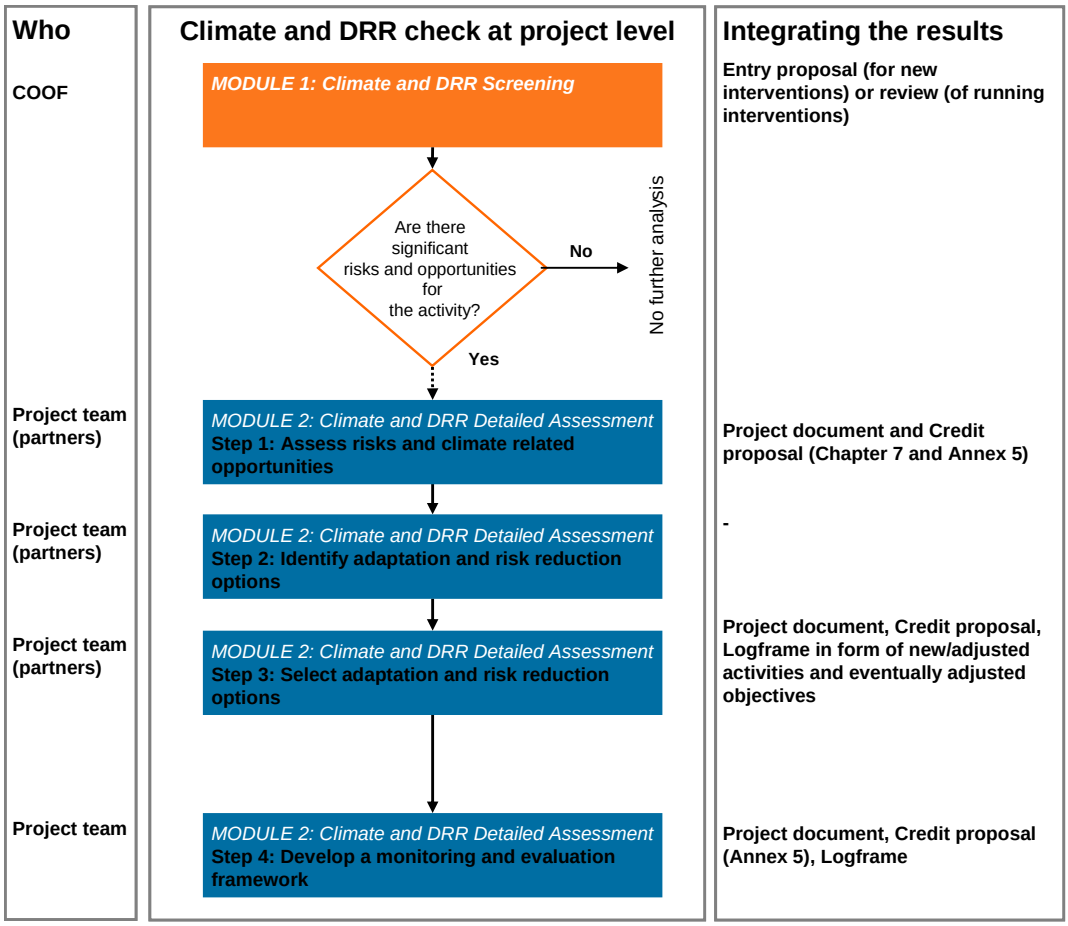


Figure 7 Module 1 and 2 at project level. They follow the Project Cycle Management of SDC.

Step 1: Assess risks and climate related opportunities

Aim

Step 1 of the detailed assessments is building on the rough screening conducted in Module 1. It deepens the assessment of the relevance of climate and disaster risks and compiles the basic information for the detailed assessment. The aim of this step is to **identify climate and disaster related risks and opportunities** deriving from a changing climate. It is the most complex and comprehensive step of the detailed assessment. The following steps 2 to 4 depend significantly from the quality of this step 1.

The following definitions are used (for all definitions please refer to the GLOSSARY):

Risk[18]= Hazard*Vulnerability

This means that risk increases respectively decreases inline with the probability and gravity of the hazard and the vulnerability.

- **Risk**: The combination of the probability of an event and its negative consequences. (UN ISDR 2009)
- **Hazard**: A dangerous phenomenon (e.g. physical event), substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. (UN ISDR 2009)
- **Vulnerability**: The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.[19] (UN ISDR 2009).

The vulnerability is lower when there are positive factors, which increase the ability of people to cope with hazards (**coping capacity or adaptive capacity[20]**)

It is important to highlight that the total current and future risk from climate and other hazards shall be assessed, not only the additional risk from climate change. Programmes and projects have to respond to the total risk and not only to the incremental risk due to climate change. This means that in fact there is no need to differentiate between climate variability and climate change but rather the total risk from climate and other hazards need to be taken into account.

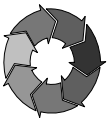
18 The **definition of risk** in this handbook refers to the risk concept of DRR community (UN/ISDR 2004) and not the climate change adaptation community.

19 **As an example:** Florida faces intense and frequent physical hazards such as floods, storms but the vulnerability is lower compared to locations with similar hazards (e.g. due to good status of information, good public evacuation programmes etc.). Hence, the overall risk is lower compared to locations with similar hazards and high vulnerabilities.

20 In this handbook, **both terms** are used jointly addressing both concepts of the DRR community (immediate reactions, decision-making and dealing with the hazard impact) as well as the climate change adaptation community (adjustments to changing conditions or changing environment in the medium-and long-term).

Generally it is virtually not possible to assess the risks attributed to climate change (in difference to current climate variability).

What to do



A. Collect available data on climate, natural hazards and socio-economic information

Try to compile historical data sets for your area of concern (project area, region, etc.) including temperature, precipitation and extreme events (frequency and severity). Include also local knowledge and qualitative assessments or surveys of local people, especially when local climate data is not available. Based on that, you will have a first overview on climate information and will be able to identify relevant hazards. You may consult links provided in section *"Recommended links and supporting materials*" (p. 36) as a basis for this step and search for relevant information at national or sub-national level. You will most likely not be able to find data on sound climate projections or scenarios for your project area or else they will be highly uncertain. However, some links in section *"Recommended links and supporting materials"* will give you a first idea on projected changes at a macro level.

Not only climate information is important for a risk assessment; the risk depends very much on the vulnerability of people. Data and information on socio-economic and environmental circumstances as well as on the policy environment has therefore to be included in the risk and opportunity assessment. With this information you will be able to have an overview on these circumstances and proceed with the next sub-steps.

B. Identify most relevant hazards

Identify and qualitatively assess the *most relevant* hazards and events in the project area or targeting the project's objectives or main activities. By interpreting hazard information and through local surveys or judgements of local people you will gain insights on the severity and frequency of such events, whether these have changed over time etc. To identify most relevant hazards, the best way is to look for disasters/events national statistics, surveys on past events etc. Of course you will not be able to make a scientific assessment on the future severity and frequency of such events and future (climate) scenarios are generally very uncertain and not available at sub-national or local level. But gathering information on historical severity and frequency will help you to get a sense on whether these parameters have changed and in general the climate variability has increased or not. Examples of the elements of the risk and opportunity assessment are provided in Table 8.

C. Identify assets most at risk:

Whether climate and/or other natural hazards have an impact on systems and populations depends very much on the available assets and their geographical distribution in the project area. E.g. floods may only have an impact on populations, when their assets are located in the flood-prone area. With this step you will identify the assets *most at risk* from the identified hazards. You may use the concept of livelihood assets to identify the relevant assets and specify them (refer to Table 8 for examples).

***D. Identify factors influencing current and future vulnerability/adaptive capacities*:**

Many of the factors which shape vulnerability to climate change or natural disasters have nothing to do with the climate or the disasters themselves. Vulnerability of people or a community depends on several physical, social, economic, political and environmental factors (examples of possible influencing factors are displayed in Table 8). They can either positively influence the adaptive/coping capacities of people or on the contrary as a development barrier enhance the vulnerability of people. Gaining an overview on these relevant factors and how they interrelate is a highly complex step that requires a systemic view taking into account different perspectives. This is not only important for assessing risks and opportunities, but will also help you to better define appropriate adaptation options (chapters 0 and 0). You may best proceed by drawing up influencing factors on a project area or system and showing their interrelations (e.g. in a mind-map). Focus on main and more direct influencing factors in case you could not make an in-depth assessment. While concluding this step you will be able to answer the question “What are the relevant factors influencing current and future vulnerability respectively coping/adaptive capacity?

***E. Identify most important impacts of hazards today and in the future*:**

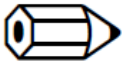
Impacts are consequences of climate change (or natural hazards) on natural and human systems. Impacts of hazards differ substantially depending on available assets in a certain area. By combining the information on relevant hazards (B), the assets most at risk (C) and the influencing factors (D), you will be able to answer the question “What are today and in future the most important impacts of the identified hazards on the assets at risk? Examples of possible impacts are displayed in Table 8.

F. Make a general and qualitative assessment of risks and opportunities:

The risk and opportunity assessment is a combined assessment of relevant hazards and vulner-

abilities. Assess qualitatively the magnitude of the risks and climate related opportunities on the project area/objective or main activity (low, high etc.) and give a rationale on your risk and opportunity assessment. You may also make a general assessment of risks and opportunities at the level of the whole project (and not only at the level of single objectives and activities) in order to have a more holistic view on risks and opportunities. .

Results of step 1 and tables to complete



- Relevant climate, hazard and socio-economic data information is collected.
- Relevant current and future hazards are identified and vulnerabilities are qualitatively assessed.
- Overall risks and climate related opportunities are assessed.

The result of this step may be summarised in the format of the following Table 7.

Risk and climate related opportunity assessment					
	Relevant current and future hazards to which the project is exposed	**Vulnerability**		**Most important impacts of hazards today and in the future**	**Risk/opportunity and general assessment**
		Assets mainly affected by these hazards	**Factors influencing current and future vulnerability/adaptive capacity**		
Project area/objective or main activity 1	*List most relevant climate hazards and roughly assess their frequency and severity today and in the future*	*List and specify relevant livelihood assets*	*List relevant influencing factors and mention in what direction they influence (enhancing or limiting adaptive capacity/ coping capacity)*	*Mention relevant impacts.*	*Provide an overall assessment of current and future risks and opportunities.* *Include a qualitative assessment of the magnitude of the risks*
Project area/objective or main activity 2	…	…	…	…	…
Project in general	…	…	…	…	*Overall assessment of risks and opportunities for the whole project*

Table 7 Proposed reporting format for step 1.

Where appropriate and according to the depth of this assessment, the table shall be complemented by explanations and interpretations in textual format.

Elaboration and how to make use of the results

The risk and opportunity assessment requires a combination of literature research, local surveys and stakeholder consultations. Data collection and literature research (A) will best be done by one or a few people out of the project team. For further information on how to collect and analyse climate data please refer to GTZ (2009b): www2.gtz.de/dokumente/bib/gtz2009-0175en-climate-change-information.pdf. For the collection of climate data you might also consult local research institutions. The information shall be compiled in advance so that it could serve as a basis for broader consultations in the subsequent steps. A first rough identification of relevant hazards

(B), assets at risk (C) and relevant influencing factors (D) and impacts (step E) might also be done by a small group of people out of the project team. However, these preliminary findings shall be discussed and amended in a broader stakeholder consultation process (workshop) including project partners and local groups. For the general assessment of risks and opportunities (F) and the verification of identified factors influencing the adaptive capacity (E) consultation and involvement of different stakeholders is key. The appreciation of risks and opportunities is generally not based on scientific and objective criteria but largely depends on political estimations and perceptions of stakeholders.

The information gained through this risk and opportunity assessment (Table 7, eventually with text) shall be integrated into the planning documents, (1) into the project document and (2) into chapter 7 (Risk Management) and Annex 5 (Risk Analysis) of the credit proposal. The identified risks and impacts shall be transferred to the table in Annex 5 as follows:

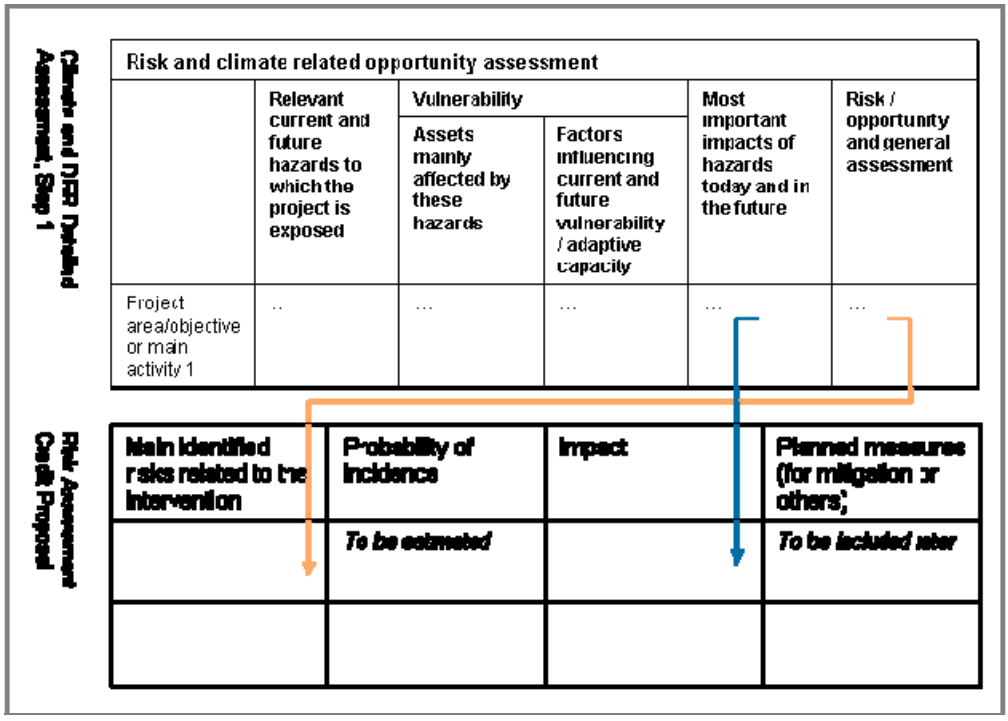


Figure 8 How to transfer the results of step 1 into the Annex 5 of the Credit Proposal on Risk Assessment.

Please note that in order to complete the table, you will need to add the **probability of incidence** and the **planned measures**. While the latter will result from step 3, the former has to be estimated during risk assessment.

Recommended links and supporting material

Examples for elements of risk and opportunity assessment	
Elements of the risk and opportunity assessment	**Examples**
Project area/objective or main activity	› Rice production › Animal husbandry › Urban sanitation and water supply; Watershed management › Forest management › Transport infrastructure › Hydropower production
Relevant current and future hazards to which the project is exposed	› Event hazards: Droughts, heat waves, floods, storms, landslides, debris flows, rock-, snow-, ice-avalanche; tectonic hazards such as earthquake, volcanic activity, tsunami › Gradual shift hazards: sea level rise, climate zone shifts, salinization of areas
Assets mainly affected by these hazards	› Human capital: skills, knowledge, health and ability to work › Social capital: social resources, including informal networks, membership of formalised groups and relationships of trust that facilitate co-operation › Natural capital: natural resources such as land, soil, water, forests › Physical capital: basic infrastructure (roads, water & sanitation, schools, ICT) and producer goods (tools and equipment) › Financial capital: financial resources including savings, credit, and income from employment, trade and remittances › Political capital: power and capacity to influence political decision-making, formal and informal participation, access to political processes, (access to vote), freedom and capacity collectively organise and claim rights
Factors influencing current and future vulnerability/adaptive capacity	› *Enhancing factors*: Access to and control over natural, human, social, physical and financial resources (refer to assets), e.g.: high level of education, good quality infrastructure, reliable water source, diversified income sources; user and property rights, decentralised organisation of public services, enabling policy environment, availability of an information and communication system/channels and appropriate information and communication technologies (ICTs) › *Limiting factors*: Development barriers in general, e.g.: poverty, critical health conditions, low education, prevalence of highly vulnerable groups, high unemployment, degradation of vegetation, scarcity of natural resources, human pressure on ecosystems, fragile states etc.
Most important impacts[21] of hazards today and in the future	› Water: Reduced freshwater ability, decrease in water quality › Ecosystems: exceeded resilience of ecosystems, extinction of species, loss of habitats › Food: falling crop and timber productivity, decreasing fishery resources,

21 The categories of impacts are derived from IPCC 4th Assessment Report. Climate Change 2007: Impacts, Adaptation and Vulnerability. Report of the Working Group II of the Intergovernmental Panel on Climate Change (IPCC); Cambridge University Press, Cambridge, UK.

Examples for elements of risk and opportunity assessment	
Elements of the risk and opportunity assessment	**Examples**
	soil erosion, desertification › Coasts: damage from floods and storms, coastal erosion › Health: impacts on human health, increased frequency/severity of disease and pest outbreaks › Settlement and society: Migration, increasing risk of conflicts, erosion of institutions › Victims (deaths), injured, displaced, affected people › Livelihood loss: such as harvests, financial (income) or physical capital (e.g. infrastructure)

Table 8 Examples for concluding step 1.

Risk and climate related opportunity assessment - Example					
Project area/ objective, main activity	***Relevant current and future hazards to which the project is exposed***	***Vulnerability***		***Most important impacts of hazards today and in the future***	***Risk opportunity and general assessment***
		Assets mainly affected by these hazards	***Factors influencing current and future vulnerability/ adaptive capacity***		
Rice production	*Droughts are already occurring today and will become even more severe in future.* *Gradual temperature increase will most likely continue.*	*Natural and financial capitals*	*Low level of education of the community in general and prevalence of highly vulnerable minority groups.*	*Rice fertility and harvest will decrease with an increase in temperature and with more severe droughts.*	*Severe risks to the communities in the project area, as they are highly dependent on rice production. They will face a severe loss of income and food shortages due to decrease in harvest.* *The risk is assessed as high also due to limited adaptive capacity.*

Table 9 Exemplary table for step 1.

General information on **climate change and DRR on a country** level:

- **National Communications** of the respective country (all parties to the UNFCCC) include both the impacts of climate change and the emissions of greenhouse gases within their borders: http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php
- **National Adaptation Programmes of Actions** (NAPAs) are available for all Least Developed Countries (LDCs) that are members to the UNFCCC. Including country profiles with regard to climate change and key adaptation needs: http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php
- Country profiles on adaptation with an overview of key climate change figures, provided by **UNDP:** www.adaptationlearning.net/
- The **UNISDR** (United Nations International Strategy for Disaster Reduction) website: www.unisdr.org/ provides information with regard to disaster risk reduction such as country information, HFA focal points, national platforms, reports on HFA implementation, disasters/events statistics, library on disaster risk reduction, etc. It also provides a list of national platforms focal points: www.unisdr.org/eng/country-inform/ci-national-platform.html
- The **EMDAT** database provides global disaster statistics, including country-level disaster profiles: www.emdat.be/
- General information on climate change can be found in the reports of the **Intergovernmental Panel on Climate Change** (IPCC), which can be downloaded here: www.ipcc.ch/publications_and_data/publications_and_data_reports.htm
- **Climate Data** and projected impacts: The World Bank provides a **Climate Change Data Portal** where one can search for regional climate data and projected impacts. This tool support to get a first overview or a feeling for possible changes. However, uncertainties remain with these projections: http://sdwebx.worldbank.org/climateportal/
- **Swiss Re** (http://www.swissre.com/clients/client_tools/about_catnet.html)**:** provides the CatNet™ functions and data facilitate a professional overview and assessment of natural hazard exposure for any location worldwide. This makes CatNet™ a valuable tool in preparing local, regional and cross-regional risk profiles. The main features of CatNet are natural hazard atlas, country-specific insurance data and links to disaster statistics.

Further readings and information:

- If you are interested more deeply in how climate change information is being researched and analysed, you may consult the **GTZ (2009b):** This document provides a guidance on how climate change information can be gathered, which experts shall be consulted during this process and how data from climate models need to be interpreted: www2.gtz.de/dokumente/bib/gtz2009-0175en-climate-change-information.pdf
- The platform **WikiAdapt** provides knowledge sharing opportunities for the climate adaptation community including helpful links, tools and documents on adaptation topics: http://wikiadapt.org/index.php?title=Main_Page The website includes also a set of different climate data tools: http://wikiadapt.org/index.php?title=Software_and_database_tools Such as the **Climate Change Explorer (CCE):** This tool is a desktop client that provides an interface to download, manage and visualize downscaled model output. It provides users with an analytical foundation form which to explore the climate variables relevant to their particular adaptation decisions.
- For information about "**ICTs and Disaster Management"** you can consult www.bcoalliance.org/climate-change or www.itu.int/ITU-T/climatechange or http://www.apdip.net/publications/iespprimers/eprimer-dm.pdf

Step 2: Identify adaptation and risk reduction options

Aim

Step 2 of the detailed assessment aims at **identifying possible adaptation and risk reduction options**. A brainstorming of possible adaptation and risk reduction options is conducted without worrying about feasibility, costs or other limiting factors. Only **new or adjusted options** that are not yet included in the project shall be identified here.

This step 2 is designed to be rather simple and short and is closely linked with step 3 where the identified options will be evaluated. Steps 2 and 3 could also be taken together in one step.

What are adaptation and risk reduction options?

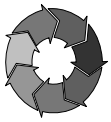
A wide array of adaptation and risk reduction options is already available; however more efforts are often required to deal with possible future climate developments. The focus of all types of measures shall rather be on prevention[22] and preparedness[23] than on response. Adaptation op-

22 Prevention: The outright avoidance of adverse impacts of hazards and related disasters (UN ISDR).

tions can be classified along different structures, e.g. along **sectors** (water, agriculture, health, tourism etc.) or along **types** of options such as[24]:

- **Policy development:** These types of options include financial options (e.g. facilitate access to credits or payments for ecosystem services), spatial planning (e.g. design and implement zoning regulations and building codes), laws and regulations (e.g. adoption of local policy and ordinance initiatives, building codes), governance options or others (such as e.g. relocation of vulnerable population or infrastructure).
- **Capacity development:** This type can be divided in three main categories: First of all, knowledge building such as e.g. improving environmental education or building capacity in weather forecasting, or hazard mapping. Secondly, strengthening monitoring and evaluation such as e.g. expand monitoring programmes; develop capacity to model climate change effects and research. Thirdly, the development and implementation of early warning systems.
- **Awareness building:** This type includes measures in order to achieve a behavioural change as well as awareness building. Awareness building is often a precursor of capacity development. Awareness building activities mainly take place on a community, household, school and administration level. Awareness raising via campaigns and events leads to change in behaviour and dissemination of good practices.
- **Particular adaptation/risk reduction:** These types include activities to directly reduce risks in particular locations. The effects for the beneficiaries are directly visible. The measures can be in form of infrastructure options, which are normally technical options such as e.g. installation of wells, treatments and reuse of wastewaters, building dams, installation of collectors, storm gates and pumps. Many potential adaptation measures are not climate specific but constitute good practices that contribute to wider developmental and sustainability objectives (e.g. promote water efficiency, Integrated Water Resources Management, more robust crop seeds). This type of measures also includes the resettlement of people to safe grounds.

What to do



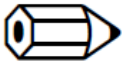
The hazards, vulnerabilities, impacts and risks identified in step 1 shall be the starting point for the brainstorming of possible adaptation and risk reduction options. You might think of new options as well as of adjustments of already existing options of the project and also of very specific as well as of general options for the whole project. The options shall be brainstormed irre-

23 Preparedness: The knowledge and capacities developed by governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions (UN ISDR).

24 These types of options refer to the SDC intern report: “Effectiveness of SDC's Commitments in Disaster Risk Reduction” (SDC 2010b)

spective of their feasibility. The list of possible adaptation and risk reduction options in sub-chapter *"Recommended links and supporting materials"* (p. 43) serves as a basis for this step. For sector specific considerations the links outlined in sub-chapter *"Recommended links and supporting materials"* can be consulted. Furthermore it has to be addressed that societies have a long record of managing the impacts of weather- and climate-related events as well as disaster risks. It is therefore advised to also taking into account local knowledge which might be gathered by stakeholder consultations. While concluding this step, you will be able to answer the question "What are adaptation or risk reduction options to be considered and what traditional knowledge and adaptation & risk reduction options may be included?"

Results of step 2 and tables to complete



- Different categories of adaptation and risk reduction options are assessed.
- Possible adaptation and risk reduction options are identified regardless of their feasibility.
- Traditional knowledge is consulted e.g. via stakeholder consultations.

The result of this step may be summarised in the format of the following Table 10.

Brainstorming of adaptation and risk reduction options						
	Relevant current and future hazards to which the project is exposed	**Vulnerability**		**Most important impacts of hazards today and in the future**	**Risk/opportunity and general assessment**	**Possible adaptation or risk reduction options**
		Assets mainly affected by these hazards	**Factors influencing current and future vulnerability/adaptive capacity**			
Project area/ objective or main activity *Transfer from step 1*	*Transfer from step 1*	*Transfer from step 1*	*Transfer from step 1*	*Transfer from step 1*	*Transfer from step 1*	*List and specify possible options*
Project area/ objective or main activity *Transfer from step 1*	…	…	…	…	…	…
Project in general	…	…	…	…	…	*List and specify general options*

Table 10 Proposed reporting format for step 2.

Elaboration and how to make use of the results

The brainstorming of adaptation and risk reduction options may be based on the supporting material in section *"Recommended links and supporting materials"* below and inputs from stakeholders. A preliminary list of options may be developed by a project team member and then be amended (e.g. by traditional adaptation options) identified in a broader consultation among project partners. The result of this brainstorming (table, eventually with text) will be used for the selection of possible adaptation and risk reduction options and shall at this stage not yet be integrated into the planning documents.

Recommended links and supporting material

The following matrix provides examples of different types of adaptation and risk reduction options according to sectors. Please note that the following matrix only shows some examples of options, and that categories and types of options may vary.

Adaptation and risk reduction options according to types and sectors (selected examples)

Type / Sector	Policy development	Capacity building	Awareness building	Particular adaptation/risk reduction
Water and Sanitation	› Introduce water pricing › Encourage water efficient production	› Expand monitoring for water supply and use › Develop capacity to model climate change effects on a regional scale › Develop early warning systems	› Awareness raising at community, household and school level with regard to water usage.	› Enhance watershed management, rainwater harvesting › Promote Integrated Water Resource Management › Install more wells, construct dams › Technical flood control measures › Mangrove tree buffers › Restoration of vegetation or tree cover › Protect key water and sanitation infrastructure
Agriculture and Rural Development	› Introduce payment for ecosystem services › Adopt land reforms that promote sustainable land management › Include insurance or other forms of risk sharing	› Promote soil conservation in farming practices	› Promote farmers' access to training, advisory services, financial services and market prices	› Adopt drought resistant crops and/or varieties › Soil conservation measures › Promote drip irrigation technologies › Promote stable vegetation covers
Forest/natural resource management	› Strengthen land planning and management institutions › Adopt land reforms that promote sustainable land management	› Implement adequate conflict prevention and management mechanisms	› Awareness raising at school and community level in order to change behaviour of natural resource management	› Maintain a critical mass of diversified, natural forest ecosystems in forest regions › Use adapted species (drought, flood, fire resistance) › Build firebreaks and strengthen fire

Adaptation and risk reduction options according to types and sectors (selected examples)				
Type / Sector	**Policy development**	**Capacity building**	**Awareness building**	**Particular adaptation/risk reduction**
				management systems and procedures (e.g. installation of surveillance towers, water reservoirs) › Facilitate monitoring through remote sensing technology
Health	› Strengthen food safety regulation › Strengthen programmes aimed at fighting the effects of malnutrition › Develop emergency preparedness plans	› Promote good sanitation practices › Develop systems for monitoring drinking water, food quality › Build capacity for emergency preparedness plans › Strengthening local institutions and volunteers in order to respond to pre- and post-disaster measures.	› Awareness raising at e.g. household level in order that people know their preparedness plans (campaigns)	› Implement sanitation practices, use of mosquito nets › Improve access of most vulnerable populations to health services › Upgrade or modernise refrigeration facilities to ensure proper conservation of drugs and vaccines › Promote access to community health
Education	› Education infrastructure planning keeping up with demographic patterns (e.g. in case of climate induced migration) › Strengthening programmes under the control of education	› Enhance quantity (through facilitating distance-learning) and quality (more interactivity) of education through appropriate ICTs.	› Awareness-raising on climate change and its effects in schools	Make educational infrastructure as "climate-resilient" and earthquake proof as possible
Energy	› Take CC impacts into account in strategic decisions on energy infrastructure development (e.g. reduce dependence on hydropower where stream flows are expected to decrease)	› Capacity building with regard to renewable energies.	› Awareness raising on links between energy supply, vulnerability, dependency of non-renewable sources	› Reduce dependency on single sources of energy, and opt for more diverse energy sources › Make energy conversion infrastructure more resilient to extreme climatic events and earthquakes.
Urban Devel-	› Take into account	› Monitor trends in	› Awareness raising	› Climate resilient

Adaptation and risk reduction options according to types and sectors (selected examples)				
Type / Sector	**Policy development**	**Capacity building**	**Awareness building**	**Particular adaptation/risk reduction**
opment	climate variability in urban development planning (e.g. need for higher-capacity drainage and flood protection systems) › Relocate vulnerable population	migrations and human settlements to keep track of the most pressing needs and to integrate them in urban infrastructure investment planning › Promote technically sound hazards and risk maps.	among the population e.g. with regard to earthquakes.	and sustainable urban settlements › Strengthen and upgrade key urban infrastructure and buildings to make them more climate resilient. › Building shelters (floods, cyclones)
Private sector development, employment	› Undertaking public investments that enhance the resilience of essential infrastructure (e.g. transport, energy supply, water supply, telecoms) as a basis for private sector development	› General and sector-specific capacity building programmes focused on the dissemination of adaptation-related good practices and the development of adaptation plans (specific focus on Small and Medium Enterprises (SMEs))	› Running awareness campaigns targeted at private enterprises about climate-related risks and challenges;	› Setting up financial services (e.g. subsidised loans) to support the implementation of SME climate adaptation programmes.

Table 11 Examples of adaptation and risk reduction options.

Adaptation options also serving as climate change mitigation options:

Please note that some adaptation options can also at the same time be greenhouse gas mitigation options. This is mainly the case for options within the agriculture, forestry and land use sector in general.

Example: Ensuring a critical mass of diversified forests or restoring soils in order to prevent soil and land degradation may at the same time sequester carbon and therefore serve both as an adaptation and climate change mitigation options.

You may consider these options also with a view to climate change mitigation (emission reduction potential) but without doing a detailed assessment according to chapter 2.2 Climate Change Mitigation).

- If sector specific information is required, the ***sector scripts*** **of EuropeAid** might provide valuable information on how climate change is affecting different sectors and what possible options for adaptation might be chosen: http://www.environment-integration.eu/component/option,com_docman/task,cat_view/gid,109/Itemid,278/lang,en/
- **National Adaptation Programme for Action** (NAPA): http://unfccc.int/national_reports/napa/items/2719.php
- **UNFCCC** local coping strategies database: http://maindb.unfccc.int/public/adaptation/ provides a database where one can find summaries of different coping strategies (including local contact persons).
- **WRI 2007:** Weathering the Storm – Options for Framing Adaptation and Assessment provides an overview of case descriptions of adaptation strategies according to different sectors and countries including the relevant link (Annex starting page 43): http://pdf.wri.org/weathering_the_storm.pdf
- **Tearfund 2009a:** CEDRA (Climate change and Environmental Degradation Risk and Adaptation assessment) provides a checklist including impacts and adaptation options according to different sectors: http://tilz.tearfund.org/webdocs/Tilz/Topics/Environmental%20Sustainability/CEDRA%20checklist.doc
- **HFA 2005:** Hyogo Framework for Action 2005-2015 (outlining the international commitments and framework with regard to disaster risk reduction
- The **UNISDR** (United Nations International Strategy for Disaster Reduction) website: http://www.unisdr.org/ provides information with regard to disaster risk reduction such as country information, HFA focal points, national platforms, reports on HFA implementation, disasters/events statistics, library on disaster risk reduction, etc. It also provides a list of national platforms focal points: http://www.unisdr.org/eng/country-inform/ci-national-platform.html
- **Preventionweb** (http://www.preventionweb.net/english/) serves the information needs of the disaster risk reduction community, including the development of information exchange tools to facilitate collaboration. Information regarding the design and development of the project together with background documentation can be accessed here along with some services that have been put in place.
- **IFRC (http://www.climatecentre.org/)** The Red Cross/Red Crescent Climate Centre is the reference centre on climate change of the Red Cross/Red Crescent family. The Centre's main approach is to raise awareness; advocate for climate adaptation and disaster risk reduction (within and outside the Red Cross and Red Crescent)

Step 3: Select adaptation and risk reduction options

Aim

After having brainstormed different adaptation and risk reduction options, try to **select the most appropriate options** based on a chosen set of criteria. This will form the basis for an eventual revision of the project's activities.

Implementing adaptation and risk reduction options depends on different factors including both the inability of natural systems to adapt to the rate and magnitude of climate change, as well as technological, financial, cognitive and behavioural, and social and cultural constraints (IPCC 2007). In this step the most promising and feasible options are selected. The following criteria might be considered to evaluate the options:

Recommended criteria to consider for selecting adaptation and risk reduction options:

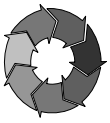
Effectiveness: The extent to which the adaptation option reduces vulnerability and provides other benefits. You might also think of **no regret** or low regret options: These are options that would be justified under current climate as well as under all plausible future scenarios, including the absence of manmade climate change. No regret adaptation options are beneficial and cost effective, even if no climate change occurs and shall therefore be favoured.

Cost: This criteria concerns whether an adaptation or risk reduction option is relatively expensive or inexpensive. It includes investment cost as well as cost over time such as operation and maintenance costs, reconstruction costs, etc.

Feasibility: This criterion addresses how feasible the implementation of the options might be. It refers to whether the necessary human, legal, administrative, financial, technical and other resources are available. It also refers to whether general/public acceptance/willingness is given. Options that can be implemented under the current operational framework will normally be favoured over adaptation options that require new authority, new technology, changes in people's preferences or other significant changes.

Sustainability: This criterion addresses how sustainable the measure would be. Not only in terms of social, economic and ecological sustainability, but also in terms of whether the option will sustain without financial support from development cooperation.

What to do



A. Collect relevant data on the selection key criteria and score the options

The potential options from step 2 are assessed according to the most relevant criteria: effectiveness, cost, feasibility and sustainability. These criteria are not compulsory but suggested. Consider whether additional criteria for the assessment of the proposed adaptation and risk reduction options are needed (e.g. time factor such as short term, long term) and include them accordingly. The assessment of these criteria shall mainly be done in a qualitative way, preferably in discussion with the project team and partners. If available, you may include quantitative information, e.g. on costs of the options. The assessment will help to justify the selection of the measures that shall be implemented in the project. Refer to sub-chapter *"Recommended links and supporting materials"* (p. 50) for further details on these criteria.

The findings can be reported in Table 12. Explain your assessment of the options and score them.

B. Evaluate the options

Evaluate the different adaptation and risk reduction options by taking into account all criteria. This assessment will also be conducted in a qualitative way and you will be able to say which options are prioritised and shall be included into the project.

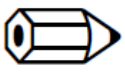
C. Assess the options in an overall context

Assess the adaptation and risk reduction options from the "bird's eye perspective". Therewith you will identify the set of most promising options with regard to the entire project and decide which ones shall be implemented. Try to assess whether this result makes sense from an overall perspective. If you select different options you shall also asses whether they be effective together or if they overlap or complement each other.

D. Include selected options

Finally, include the most promising options into your project. You therefore might adjust or amend your main activities (eventually also objectives) accordingly.

Results of step 3 and tables to complete



- The identified options are assessed with regard to the most relevant selection criteria.
- The most promising options are selected.
- The selected options are assessed with a "bird's eye perspective".
- The selected options are included in your project.

The result may be summarised in the format of Table 12. The overall assessment (bird's eye perspective) and the decision on which of the options shall be implemented is best described in textual format. Selected options shall be justified with good arguments and low hanging fruits shall be preferred.

Assessment and selection of proposed options						
	Effectiveness	**Cost**	**Feasibility**	**Sustainability**	**Further criterion?**	**Overall evaluation**
Possible adaptation or risk reduction options *Transferred from step 2*	*Explain how effective the option is and score with (0) not effective, (1) effective, (2) very effective* *Assess whether the option is a "no-regret"*	*Explain how costly the option is and score with high costs (0), medium costs (1), low costs (2)*	*Explain how feasible the option is to implement and score with not feasible (0), feasible (1), very feasible (2)*	*Explain how sustainable the option is and score with e.g. low (0), medium (1), high (2)*	*Explain and score the options to this criterion accordingly.*	*Make an overall assessment of the option with regard to the outcome of the criteria scoring. Options with good scores in all criteria shall be preferred.*
…						

Table 12 Proposed reporting format for the assessment and selection of adaptation and risk reduction options.

Elaboration and how to make use of the result

An assessment of options is highly depending on the individual perceptions of the persons involved. This step shall therefore be done in a multidisciplinary team and through discussions and consultations among project partners and other relevant stakeholders. Especially sub-step C (assessment in an overall context) requires a close involvement of all project partners as they have to decide whether to include the newly identified options into the project. The result of this process, namely the selected options shall be integrated into planning documents (project document, logframe and Annex 5 of the credit proposal) in form of new/adjusted activities and eventually adjusted objectives.

Main identified risks related to the intervention	Probability of incidence	Impact	Planned measures (for mitigation or others)
Identified in step 1	*Identified in step 1*	*Identified in step 1*	*Include proposed options identified here*
…	…	…	…

Figure 9 How to transfer the results of step 3 into the Annex 5 of the Credit Proposal.

Recommended supporting material

The following questions might help to address the four main criteria.

QUESTIONS TO CONSIDER WHILE ASSESSING THE CRITERIA			
Effectiveness	**Cost**	**Feasibility**	**Sustainability**
› Is the option reducing vulnerability? › Is the option providing co-benefits for other sectors? › Is the option flexible? Can it be adjusted in response to changing conditions? › Is the option a no-regret option? › How big is the group of beneficiaries? (Options that provide small benefits to large numbers of people will often be favoured over those that provide larger benefits, but to fewer people.)	› Is the option relatively expensive or relatively inexpensive compared to other options? › Are the initial costs of implementation high or low? › Are the costs over time (operation and maintenance, administration and staffing, etc.) high or low? › How high are the external costs of the option (take into account non-economic costs and economic and/or quantifiable costs)?	› Do necessary human, legal, administrative, financial, technical resources exist? › Is there a need to adjust other policies to accommodate the adaptation option? › Is the option acceptable to local stakeholders (socially, culturally)? › Are these resources available for use?	› Is the option socially, economically and environmentally sustainable? › Is the option sustainable in a longer term without financial support from development cooperation?

Table 13 Questions to conclude the assessment and selection of the proposed options.

Assessment and selection of proposed options - Example						
	Effective-ness	***Cost***	***Feasibility***	***Sustaina-bility***	***Further criterion?***	***Overall evaluation***
Drought resistant crop	*2 The option is very effective, as it is directly linked to the main risk.*	*1 Relatively high initial costs (pur-chase of crops), but no addi-tional operational costs*	*1 The option is feasible but faces some initial barriers (farmer's acceptance of the new seeds, train-ing require-ments, changes in practices)*	*1 Potentially large sustain-ability benefits. The new crop seeds need to be well estab-lished and accepted by the farmers to sustain after termination of the project.*	*None*	*The option is making a relevant con-tribution to more climate resilience. Needs in-vestments in training and awareness building in order to be effective and sustainable.*

Table 14 Exemplary table for step 3.

Step 4: Develop a monitoring and evaluation framework

Aim

As a final step you will develop a **framework to monitor and evaluate the success of the adaptation and risk reduction options** to be implemented. The aim of this step is to define indicators to evaluate the outputs and outcomes of the implemented adaptation and risk reduction measures. Whereas outputs refer to the products, capital goods and services which result from a development intervention, the outcomes are the likely or achieved short-term and medium-term effects of an intervention's outputs (definitions of the OECD DAC).

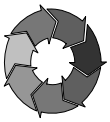
Although the evaluation of climate change and disaster risk options is a highly challenging task (refer to Box on main barriers below), this shall not prevent from evaluating whether an action was justified or not. You shall still try to evaluate whether the intended benefits have been achieved and/or whether there have been any adverse outcomes.

Main barriers of evaluating climate change and disaster risks measures

1. The measure may be designed for adapting to infrequent extreme event (climatic and tectonic disasters). If such an event occurs, the measure can be evaluated. If not, it may be difficult to determine whether the activity was nevertheless meaningful and properly implemented.

2. The measure may incorporate long-term risks from climate change and other natural risks leading to a time discrepancy between the project duration and the time horizon of climate change or other natural risks. This is even more difficult to evaluate and long term changes in climate and other risks may not be evident when the project is evaluated.
3. The comparison of a scenario with adaptation (CC and DRR) with a scenario without adaptation (baseline) might not be meaningful as the no-adaptation scenario hardly exists in reality. This occurs because most development options have a strong implicit climate change adaptation component.

What to do



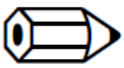
A. Define output and outcome indicators

During the project planning phase the monitoring system will be defined. You shall therefore – based on eventually revised objectives – define output and outcome indicators for the selected options to be implemented. Output indicators are normally formulated quantitatively or semi-quantitatively, e.g. numbers of people trained; degree of implementation of early warning systems etc. In general, they do not differ from output indicators formulated for any kind of projects. Outcome indicators are generally formulated in a more qualitative manner. Examples of possible output and outcome indicators are listed in Table 16. In order to complete this step, you shall work with the logframe, meaning that existing indicators shall be adjusted or amended.

B. Define control questions (optional)

As described above, it is extremely challenging to evaluate the outcome of adaptation and disaster risk measures. When evaluating the project you may find it helpful to evaluate the success of the options by answering control questions. A list of possible questions to address is provided in Table 17.

Results of step 4 and tables to complete



The result of this step may be summarised in the format of the following table:

Evaluation indicators		
	Output indicator	**Outcome indicator**
Options to be implemented	*Define output indicator (e.g. quantitative ones)*	*Define outcome indicators*
…	…	…

Table 15 Proposed reporting format for the evaluation and monitoring framework.

Elaboration and how to make use of the result

Output and outcome indicators may be defined by one or two persons of the project and then be discussed and verified by the project team. The result of this step shall be integrated in into the planning documents (project document, logframe and Annex 5 on Risk Analysis of the credit proposal).

Recommended links and supporting material

Examples of output and outcome indicators		
	Output	**Outcome**
Policy development	› Mechanism for coordination (e.g. evacuation, climate change) between sectors is established	› National CC and/or DRR plan established and implemented › CC and DRR is mainstreamed in the local political institutions
Capacity development	› Early warning system installed › Number of trainings in soils conservation provided › Local emergency response team established	› Perceived change in ability to respond to future change achieved
Awareness building	› Number of schools and students for awareness raising reached	› Change in behaviour reached (e.g. watershed management, soil conservation in farming practices)
Particular adaptation/risk reduction	› Drought resistant seeds available by farmers › Water and irrigation systems adapted	› Higher yields due to cultivation of drought resistant crops and improved water management › Perceived change in ability to respond effectively to future change achieved › Perceived change in individual vulnerability achieved

Table 16 Possible output and outcome indicators.

Possible control questions
› Are the risks which justified the measures still anticipated?
› Have any impacts from climate change and/or disaster risk been felt? If yes, did the measure worked out as intended?
› Did the measures lead to any kind of maladaptation?
› Has the implemented measure led to non climate/DRR related benefits (no regret measure)?

Table 17 Possible outcome and control questions to consider.

Guidance and literature for monitoring and evaluation of climate change adaptation and DRR is still very limited. Most guidances dealing with integration of climate change adaptation into development cooperation do not properly address the section monitoring and evaluation. More information is available in the context of disaster risk reduction.

You may find some ideas with regard to **climate change adaptation** specific monitoring and evaluation here:

- **USAID 2007:** A Guidance manual for Development Planning: http://www.usaid.gov/our_work/environment/climate/docs/reports/cc_vamanual.pdf
- **Tearfund 2009b:** Climate Change and Environmental Degradation Risk and Adaptation assessment: http://tilz.tearfund.org/webdocs/Tilz/Topics/Environmental%20Sustainability/CEDRA%20D5.pdf

You may find some ideas with regard to monitoring and evaluation of **disaster risk reduction** measures here:

- **ISDR 2008:** Indicators of Progress: Guidance on Measuring the Reduction of Disaster Risks and the Implementation of the Hyogo Framework for Action. http://www.unisdr.org/eng/about_isdr/isdr-publications/15-indicator-of-progress/Indicators_of_Progress_HFA.pdf
- **ProVention 2007:** Evaluating Disaster Risk Reduction Initiatives: Guidance not 13. http://www.proventionconsortium.org/themes/default/pdfs/tools_for_mainstreaming_GN13.pdf.

2.2. Climate Change Mitigation

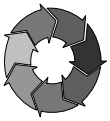
The Climate and DRR Check does not only assess whether climate change poses a risk to an activity (strategy, policy, programme or project) as described in sections A and B but also, whether the activity itself causes climate related risks and opportunities. This part refers to greenhouse gas emission reductions or mitigation of climate change. The DRR terminology of mitigation, meaning measures undertaken to limit the adverse impact of natural hazards, are described in this handbook as adaptation and risk reduction measures (see GLOSSARY).

Even if the lion's share of greenhouse gas emissions are emitted in developed countries, climate change mitigation shall also not be neglected in developing countries. A low carbon development has several additional benefits such as higher independency of increasing energy prices, strengthening of the local economy and more reliable energy supply when using locally available renewable energy.

Aim

The objective of this assessment is to identify the **main impacts and opportunities of existing or planned activities on climate change** (greenhouse gas emission risks and opportunities). It analyses how projects or programmes can contribute to mitigating climate change and identifies alternative options and measures to maximise these contributions.

What to do



The process follows the four step approach as described in Module 2 but without going into too many details.

Step 1: Assess risks and opportunities related to greenhouse gas emissions

This step is very straightforward and will help you to become more conscious of the project or programme's positive and negative impacts on greenhouse gas emissions. You first list the **relevant project areas, objectives, main activities or sectors** of the programme or project already identified during the screening in Module 1. You will then elaborate on **potential risks** of these sectors, project areas, objectives or main activities already identified in the screening in Module 1 (Question 1.2 of the screening: "Is there a risk that the activity produces *substantial* greenhouse gas emissions?) You may precise these risks and complement them if needed. Then list the **potential opportunities**, which may arise from the activities in your programme or project in order to reduce GHG emissions. The opportunities in the screening Module 1 (question 1.3)

will help to conclude this step. Examples of possible risks and opportunities are displayed in Table 22.

Step 2: Identify climate change mitigation options

In this step you shall brainstorm on possible mitigation options for the identified risks. You can consider two categories of options:

- Options **improving existing processes, practices**, e.g. by considering energy efficiency in building, using the potential of restoration of natural degraded forests and bushland, re- and afforestation, reducing emissions from deforestation, modifying agricultural practices and introducing agro forestry.
- Options **adding a mitigation component** to the project, e.g. using agricultural waste for energy production, energy recovery.

Please note that several climate change mitigation options (mainly in the land use sector) may also serve as adaptation options (refer to chapter 6.2).

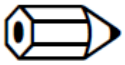
Step 3: Select climate change mitigation options

This step shall be developed analogously as for selecting adaptation options (refer to Chapter 0). You shall evaluate the identified mitigation options according to the key criteria such as effectiveness, cost, feasibility, sustainability and additional criteria, if appropriate. You shall also take into account possible trade-offs arising from mitigation options. Trade-offs may arise when e.g. rural energy supply is promoted (leading to increased emissions) which is however acceptable from a development perspective. You shall then score the options. Finally, you shall evaluate the options from an overall perspective and define which one is prioritised and shall be included into the project or programme.

Step 4: Develop a monitoring and evaluation framework

First of all, define output indicators for the measures to be implemented. These are similar to other project output indicators and are not explained in detail here. In order to monitor the effect of the measure you will also define outcome indicators. Such indicators might be e.g. the amount of GHG emissions reduced; the amount of energy saved or the energy efficiency improved.

Results of the climate change mitigation Detailed Assessment



You may report your findings in the tables below:

Result step A) Assess risks and opportunities related to greenhouse gas emissions

Risk and climate related opportunity assessment		
	Potential risk of the project	**Potential opportunity**
Project area/objective or main activity	*Describe and/or amend potential risks identified in Module 1 (B, 1.2)*	*Describe and/or amend potential opportunities identified in Module 1 (B, 1.3)*
Project area/objective or main activity	…	…

Table 18 Proposed reporting format for step A.

Result step B) Identify climate change mitigation options

Brainstorming of climate change mitigation options	
	Possible climate change mitigation options
Project area/objective or main activity *Transfer from step A*	*List and specify possible mitigation options addressing the identified risks and opportunities above*
Project area/objective or main activity *Transfer from step A*	…

Table 19 Proposed reporting format for step B.

Result-step C) Select climate change mitigation options

Assessment and selection of proposed options						
	Effectiveness	**Cost**	**Feasibility**	**Sustainability**	**Further criterion?**	**Overall evaluation**
Possible mitigation option *Transferred from step B*	*Explain how effective the option is and score with (0) not effective, (1) effective, (2) very effective*	*Explain how costly the option is and score with high costs (0), medium costs (1), low costs (2)*	*Explain how feasible the option is to implement and score with not feasible (0), feasible (1), very feasible (2)*	*Explain how sustainable the option is and score with e.g. low (0), medium (1), high (2)*	*Explain and score the options to this criterion accordingly.*	*Make an overall assessment of the option with regard to the outcome of the criteria scoring.* *An option with good scores in all criteria shall be preferred.*
…						

Table 20 Proposed reporting format for step C

Result step D) Develop a monitoring and evaluation framework

Evaluation indicators of climate change mitigation options		
	Output indicator	**Outcome indicator**
Options to be implemented	*Define output indicator (e.g. quantitative ones)*	*Define outcome indicators*
…	…	…

Table 21 Proposed reporting format for step D.

Elaboration and how to make use of the result

The assessment of climate change mitigation shall be conducted very straightforward by consulting the provided supporting materials and filling in the result tables. This shall be done through discussions among the project team members and stakeholder consultations, as appropriate. The identified options and the respective evaluation indicators shall be included in the planning documents (project document, logframe and Annex 5 on Risk Analysis of the credit proposal)

Recommended links and supporting material

Assessment of greenhouse gas related risks and opportunities (examples)		
Sectors, project area/objective or main activity	**Greenhouse gas related risks**	**Greenhouse gas related opportunities**
Livestock practices	Relatively high methane emissions of ruminants and emissions from manure	More sustainable practice promoted (compared to BAU), more sustainable pasture land management (-> sink resp. lower source of carbon), manure treatment, biogas production
Agricultural practices	Inappropriate fertilizer use, compaction of soils, tillage of organic soils	Carbon sequestration in soils through minimum tillage, soil conservation, enhancement of soil organic carbon contents
Rural electrification	Potentially higher emissions (compared to scenario without electricity)	Potential of using locally available renewable energy (hydropower, solar, renewable biomass), potential of substituting carbon intensive cooking fuel by renewables, using efficient stoves
Forest management	Intensively or unsustainably managed forests can result in higher emissions	Protecting, maintaining or using forests sustainably as a carbon sink
Transportation system	Road construction leading to higher traffic volume	Eventual potential/basis for sustainable modes of transport (efficient vehicles), shorter distances
Industrial processes	Eventually higher emissions compared to manual labour	Potential of using energy efficient industrial processes
Information and Communication System	Deploying ICTs in projects has considerable GHG emission potential	Closing information and communication gap through ICTs instead of e.g. transport

Table 22 Examples of possible greenhouse gas related risks and opportunities.

Possible climate change mitigation options in selected sectors	
Sector	**Climate change mitigation option**
Use of Energy (in transport, building, etc)	› Improve energy efficiency e.g. in building (insulation of houses etc.) › Improve energy savings by reducing system losses › Change from fossil fuels to renewable energy source › Opt for investment in energy-efficient and low-carbon transport modes
Agriculture	› Modify agricultural practices, e.g. promote climate-friendly farming which increases carbon stored in soil (minimum tillage, organic farming and others) › Avoid burning biomass on fields but rather use it as a source of energy replacing fossil fuels or incorporate in soil to increase soil fertility › Avoid energy-intensive farming systems (high-input in fertilizers, pumping of groundwater and long distances to markets)
Livestock	› Rehabilitate degraded pasturelands (e.g. by alleviating nutrient deficiencies, re-planting grasses) › More efficient use of fertilisers, particularly nitrogen › Control and use methane emissions from manure › Use and enforce environmental regulation to control some practices that have an impact on climate (e.g. regulation of manure application on crop- and pasturelands)
Forest	› Develop sustainable afforestation and re-forestation projects specifically designed to support environmental and poverty alleviation goals as well as carbon sequestration › Increase carbon density in forests › Develop financing mechanisms (“payments for environmental services”) to avoid deforestation and promote forest regeneration › Improve the enforcement of legislation aimed at preventing deforestation or unsustainable timber production activities › Adopt harvesting practices that minimise carbon losses (e.g. maintaining partial forest cover, minimising losses of organic matter, avoiding most slash-and-burn techniques)
Waste	› Controlled incineration of organic waste, especially if associated with energy recovery, results in minor net CO_2 emissions › Recover landfill gas and use it as a renewable source of energy, for electricity and/or heat generation
Urban Development	› Avoid an increase in transportation by supporting shorter distances and public transport › Improve traffic management systems and guiding route choice, so as to reduce congestion › Modify building standards to improve (in a mandatory way) the energy efficiency of buildings
Industry	› More efficient end-use electrical equipment; heat and power recovery; material recycling and substitution › Controlling emissions of non-CO_2 GHGs (e.g. fluorinated gases used in refrigeration and air conditioning systems)

Table 23 Examples of possible greenhouse gas mitigation options. Depending on the context, the feasibility of the options need to be assessed. Please note that several measures in the agriculture and forest sector may also serve as an adaptation option (refer to chapter 2.1).

Greenhouse Gases and mitigation potential and options

› On the U.S. Environmental Protection Agency (U.S. EPA) website you can find information on sources and sinks of different GHG: http://www.epa.gov/climatechange/emissions/index.html

The following link show different abetment options and potentials in different sectors:

› **Europe Aid:** Sector scripts can be found here**:** http://www.environment-integration.eu/component/option,com_docman/task,cat_view/gid,109/Itemid,278/lang,en/

› **GTZ 2009a** Accounting for Emissions - Calculating tool tested in six energy—related projects: http://www2.gtz.de/dokumente/bib/gtz2009-0176en-accounting-emissions.pdf

› **UNFCCC** provides a short overview on mitigation options and potential according to different sectors: http://unfccc.int/resource/cd_roms/na1/mitigation/Module_3/Module3.ppt

› A comprehensive collection of mitigation options, potentials, co-benefits and barriers outlined for different sectors can be found in: **IPCC 2007**: http://www.ipcc-wg3.de/publications/assessment-reports/ar4/working-group-iii-fourth-assessment-report

Calculating greenhouse gas emissions:

The following link provides a guideline how to **calculate greenhouse gas emissions** in energy related projects:

› **GTZ 2008:** Accounting for Greenhouse Gas Emissions in Energy-Related Projects- Applying an Emission Calculating Tool to Technical Assistance: http://www.gtz.de/de/dokumente/gtz2008-en-climate-ghg-emissions-accounting.pdf

› The **greenhouse gas protocol initiative**:http://www.ghgprotocol.org/calculation-tools/all-tools

› Further links about **GHG calculating** are summarised in the following paper: http://www.deq.idaho.gov/air/assist_business/ghg/inventories.pdf

Certified Emission reduction projects

› SDC's Climate Change & Network can provide support with regard to certification process for emission reduction project (such as Clean Development Mechanism projects).

Part III: Supporting materials

1. Supporting service provided by SDC

Fur further support and information you can contact and/or check the website from the two responsible networks of SDC. Information from pilot workshops and other pilot activities is available on their website:

› **The SDC Climate Change & Environment Network**¨(http://www.sdc-climateandenvironment.net), hosted by SDC's Global Programme Climate Change encompassing representatives from Headquarters and from the field.

› **The SDC DRR Network** (http://www.riskandsafetynet.ch/en/Disaster_Risk_Reduction/Network) encompassing representatives from Headquarters and from the field

2. Additional supporting materials[25]

(I) Background material and policy frameworks:

› **HFA 2005:** Hyogo Framework for Action 2005-2015 (outlining the international commitments and framework with regard to disaster risk reduction)

› ***IPCC 2007****: Climate Change 2007:*http://www.ipcc-wg3.de/publications/assessment-reports/ar4/working-group-iii-fourth-assessment-report

› **OECD 2009:** Integrating Climate Change Adaptation into Development Co-operation, Policy Guidance (providing the conceptual framework of this report)

› **SDC 2007:** Disaster risk reduction in the project cycle management (providing the basics on how to integrate DRR into SDC's project cycle management)

› **SDC 2010a:** CC&DRR check concept & consultation (providing the background and rational of this report)

› **SDC 2008:** SDC Guidelines on Disaster Risk Reduction, (providing SDC's background framework on DRR).

25 References in italics are already outlined in the report and therefore not further specified in this section.

(II) Handbooks, manuals and tools:

- **A. Olhoff and C. Schaer 2010:** A Stocktaking Report on screening tools developed by UNDP (providing an overview of different tools and guidances available in order to mainstream adaptation into development cooperation)
- **Brot für Alle/HEKS 2009:** Participatory Tool on climate and disaster risk (it is a hands-on participatory tool and provides the reader with many useful links)
- **European Commission 2009:** Guidelines on the Integration of Environment and Climate Change into Development Cooperation (Provides hands-on guidelines on how to integrate environment into development planning)
- ***Sector scripts of EuropeAid****:* http://www.environment-integration.eu/component/option,com_docman/task,cat_view/gid,109/Itemid,278/lang,en/
- **GTZ 2010:** Integrating Climate Change Adaptation into Development Cooperation (this is a training manual for a practice oriented training based on the OECD Policy Guidance. The training manual is developed by GTZ, access?).
- ***GTZ 2009a****:* Accounting for Emissions: http://www2.gtz.de/dokumente/bib/gtz2009-0176en-accounting-emissions.pdf
- ***GTZ 2009b:*** *Practitioner's Manual:*http://www2.gtz.de/dokumente/bib/gtz2009-0175en-climate-change-information.pdf
- ***GTZ 2008:*** *Accounting for Greenhouse Gas Emissions in Energy-Related Projects:*http://www.gtz.de/de/dokumente/gtz2008-en-climate-ghg-emissions-accounting.pdf
- ***ISDR 2008:*** http://www.unisdr.org/eng/about_isdr/isdr-publications/15-indicator-of progress/Indicators_of_Progress_HFA.pdf
- ***ProVention 2007:*** http://www.proventionconsortium.org/themes/default/pdfs/tools_for_mainstreaming_GN13.pdf.
- ***Tearfund 2009a:*** http://tilz.tearfund.org/webdocs/Tilz/Topics/Environmental%20Sustainability/CEDRA%20checklist.doc
- ***Tearfund 2009b:***http://tilz.tearfund.org/webdocs/Tilz/Topics/Environmental%20Sustainability/CEDRA%20D5.pdf
- ***USAID 2007:***http://www.usaid.gov/our_work/environment/climate/docs/reports/cc_vamanual.pdf
- *The* ***greenhouse gas protocol initiative****:*http://www.ghgprotocol.org/calculation-tools/all-tools
- *Further links about* ***GHG calculating****:* http://www.deq.idaho.gov/air/assist_business/ghg/inventories.pdf
- ***WRI 2007:*** http://pdf.wri.org/weathering_the_storm.pdf

(III) Knowledge platforms:

- **SDC Network CC & Environment** (http://www.sdc-climateandenvironment.net/), the platform is hosted by the Global Programme Climate Change (GPCC).
- The Adaptation Learning Mechanism (**ALM**) (http://www.weadapt.org/) is an interactive knowledge sharing platform implemented by the UNDP in collaboration with the World Bank, UNEP, UNFCCC and GEF. The platform provides the latest news on climate adaptation initiatives and general information on climate adaptation – including partners, methods, tools and experiences.
- **GFDRR** (http://www.gfdrr.org/gfdrr/) Global Facility for Disaster Reduction and Recovery is a partnership of 32 countries and 6 international organisations committed to helping developing countries reduce their vulnerability to natural hazards and adapt to climate change. The website includes valuable links on climate change adaptation and Disaster Risk Reduction.
- ***Intergovernmental Panel on Climate Change (IPCC):***
  http://www.ipcc.ch/publications_and_data/publications_and_data_reports.htm
- **Preventionweb** (http://www.preventionweb.net/english/) serves the information needs of the disaster risk reduction community, including the development of information exchange tools to facilitate collaboration. Information regarding the design and development of the project together with background documentation can be accessed here along with some services that have been put in place.
- **Riskandsafetynet.ch** (www.riskandsafetynet.ch), the platform provides a comprehensive overview of concepts and strategies relevant to SDC. Selected tools, publications and training opportunities in the field of DRR are presented as well.
- The Swedish International Development Cooperation Agency (**SIDA**) is currently finalising a screening tool which will soon be available on their website;
  http://mkb.slu.se/helpdesk/index/Sida%20Screening%20Tool%20Flyer%20FINAL.pdf
- **UNFCCC** (www.unfccc.int) webpage is the official website of the United Nations Framework Convention on Climate Change and provides all essential information about international climate change policies, as well as submissions of National Communications, NAPAS, and greenhouse gas inventories. **National Communications**: http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php, **NAPA**s:
  http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php
- ***UNISDR*** *(United Nations International Strategy for Disaster Reduction) website:*
  http://www.unisdr.org/

- **WeAdapt** (http://www.weadapt.org/) is a practical webplatform which disseminates existing adaptation documents from different sources. It is a discussion platform assembling "good practice" across a range of topics related to climate change adaptation (vulnerability, risk mapping, multi-criteria assessments, etc). WeAdapt includes a number of relevant recommendations, articles, case studies, tools and links, and can therefore prove helpful when working with climate adaptation mainstreaming. A new feature on WeAdapt is the "adaptation layer" on Google earth, where adaptation activities, partnerships, etc are accessible worldwide through Google earth.
- ***WikiAdapt:*** *http://wikiadapt.org/index.php?title=Software_and_database_tools*

(IV) Data tools:

- ***Change Data Portal*** *http://sdwebx.worldbank.org/climateportal/*
- ***Climate Change Explorer (CCE):***
  http://wikiadapt.org/index.php?title=Software_and_database_tools
- *The* ***EMDAT*** *http://www.emdat.be/*
- **MunichRe -.(**http://www.munichre.com/en/reinsurance/business/non-life/georisks/natcatservice/default.aspx**)** Comprising some 28,000 data records, NatCatSERVICE is the most comprehensive natural catastrophe loss database in the world. A comprehensive world map is available on NatCatService
- **PRECIS** http://precis.metoffice.com/index.html is based on the Hadley Centre's regional climate modelling system. It has been ported to run on a PC (under Linux) with a simple user interface, so that experiments can easily be set up over any region The tool provides climate impact assessments in developing country contexts which are freely available to numerous users. The tool uses GCM to provide grid-scale averages of spatio-temporal hydro-climatic state variables as well as soil hydrology and thermodynamics, and some vegetation dynamic variables.
- **SERVIR** http://www.servir.net is a regional visualisation and monitoring system for Mesoamerica and Africa that integrates satellite and other geospatial data for improved scientific knowledge and decision making. SERVIR addresses the nine societal benefit areas of the Global Earth Observation System of Systems (GEOSS): disasters, ecosystems, biodiversity, weather, water, climate, oceans, health, agriculture and energy. Here, "climate" covers not only current weather conditions but also climate change projections.
- **Swiss Re** (www.swissre.com/clients/client_tools/about_catnet.html)**:** The CatNet™ functions and data facilitate a professional overview and assessment of natural hazard exposure for any location worldwide. This makes CatNet™ a valuable tool in preparing local, regional and

cross-regional risk profiles. The main features of CatNet are natural hazard atlas, country-specific insurance data and links to disaster statistics.

2.1. Glossary

Adaptation Adjustments in human and natural systems, in response to actual or expected climate stimuli or their effects, that moderate harm or exploit beneficial opportunities (UNFCCC).

Adaptive capacity/Coping capacity
The ability of people, organisations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters (UN ISDR). Whereas adaptation implies adjustments to changing conditions and is often long-term with the aim of maintaining the standard of living, the term coping capacity is often short-term and linked to the ability to cope with the impacts of a hazardous or extreme event. For this Climate and DRR Check both connotations are combined in the term adaptive capacity/coping capacity.

Awareness building The processes of informing the general population, increasing levels of consciousness about risks and how people can act to reduce their exposure to risks (UN ISDR).

Capacity development Efforts aimed to develop human skills or societal infrastructures within a community or organisation needed to reduce the level of risk (UN ISDR).

Climate Change Climate is changed if over an extended period (decades or longer) there is a statistically significant change in measurement of either the mean state or variability of the climate for that place or region – may be due to natural processes, or persistent anthropogenic changes in atmosphere or in land use (UN ISDR).

Climate variability Climate variability refers to variations in the mean state and other statistics of the climate on all temporal and spatial scales beyond that of individual weather events. Variations may occur due to natural or anthropogenic forcing (IPCC 2007).

Disaster Serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and

insufficient capacity or measures to reduce the potential negative consequences of risks (UN ISDR).

Disaster Risk management

The systematic process of using administrative decisions, organisation, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards (UN ISDR).

Disaster Risk Reduction

The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events. (UN ISDR)

Global warming Increase in the earth's mean temperature due to the so-called enhanced greenhouse effect (ADPC)

Greenhouse gas A gas, such as water vapor, carbon dioxide, methane, chlorofluorocarbons (CFCs) and hydro chlorofluorocarbons (HCFCs), that absorbs and re-emits infrared radiation, warming the earth's surface and contributing to climate change (UNEP, 1998) (UN ISDR).

Hazard A dangerous phenomenon, substance, physical event, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (UN ISDR)

Impact Consequences of a climate change (hazard) or any other natural disaster on natural and human systems.

Maladaptation/ (Increased risks)

A business-as-usual development which by overlooking climate change impacts, inadvertently increases exposure and/or vulnerability to climate change. Maladaptation could also include actions undertaken to adapt to climate impacts that do not succeed in reducing vulnerability but increase it instead (OECD 2009).

Mitigation (DRR)	The lessening or limitation of the adverse impacts of hazards and related disasters (structural and non-structural measures) (UN ISDR).
Mitigation (CC)	Human intervention aimed at reducing the emission of greenhouse gases (GHG) at the source or at enhancing carbon sinks (IPCC, 2001)
No regrets	Measures that will provide benefits regardless of climate change.
Preparedness	The knowledge and capacities developed by governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions (UN ISDR).
Prevention	The outright avoidance of adverse impacts of hazards and related disasters (UN ISDR).
Resilience	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions. (UN ISDR)
Risk	The combination of the probability of an event and its negative consequences (UN ISDR).
Vulnerability	The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. The vulnerability is lower when there are positive factors, which increase the ability of people to cope with hazards (coping capacity or adaptive capacity) (SDC 2008).

2.2. Literature

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