Federal Ministry
for Economic Cooperation
and Development

Repository of Adaptation Indicators

Real case examples from national Monitoring and Evaluation Systems

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GIZ
As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.

IISD
The International Institute for Sustainable Development (IISD), established in 1990, is a non-partisan, charitable organization specializing in policy research and analysis to improve the well-being of the world's environments, economies and societies.

Contents

Context of the repository

The increasing importance of and spending on climate change adaptation has led to a growing interest in its monitoring and evaluation (M&E). Decision-makers want to be sure that investments in adaptation are justified, effective and sustainable, answering the question: 'are adaptation activities leading to expected outcomes?'

This **repository of adaptation indicators**, which draws from some of the latest experiences in adaptation M&E, is intended to illustrate possible adaptation indicators and their application context, thereby supporting the selection and context-specific formulation of indicators.

Specifically, this repository seeks to provide support to adaptation, development as well as M&E experts who are involved in developing and implementing adaptation M&E systems at regional, national and sub-national levels. It **systematically presents various indicators from a range of sectors that track different aspects of the adaptation context, process and results** to determine if adaptation strategies or investments are meeting their objectives. Since indicators utilised for adaptation M&E may draw upon established sector-based indicators or data sources, the repository offers details on a given indicator's specific relevance to adaptation. It also describes their calculation, limitations, and the information needed to use it. Users can conduct tailored searches within the repository looking for specific "sector" indicators or for indicators with a particular "adaptation focus". An Excel file of the indicator repository is attached to this document (click on the paper-clip on the sidebar to view it). It is also available on www.AdaptationCommunity.net under Monitoring & Evaluation: Repository of Adaptation Indicators.

The indicators presented in this repository are based on regional, national and sub-national M&E systems currently being piloted or implemented which have been reviewed in the study "Monitoring and Evaluating Adaptation at Aggregated Levels: A Comparative Analysis of Ten Systems". The study provides an overview of each national adaptation M&E system in form of a factsheet. By **presenting the individual indicator linked to its context of application**, the repository´s user gets an idea of the mutual conditionality of an M&E system´s objectives (e.g. focusing on measuring progress in implementing adaptation actions, like in the French M&E system) and the selection of indicators for an M&E system (e.g. focus on progress-based indicators in the French system). Indeed, this repository serves as the practical counterpart to the study, offering users numerous example indicators that might be used directly – or with some adjustments – for tracking climate adaptation in their particular context.

Progress in adaptation can be interpreted in different ways, cover a range of sectors, and focus on different types of activities. As such, the indicators selected for inclusion in this repository attempt to showcase this diversity. It strives to be representative rather than exhaustive. Moreover, because relatively few adaptation M&E systems are fully established and operational, experience with the application of these indicators is limited.

Finally, the **repository is not intended to be prescriptive** or trying to provide a basis for standardizing adaptation metrics. Rather, its contents should serve as a prompt or a reference point for practitioners who are involved in the formulation of adaptation indicators and M&E systems that best serve their own country-specific and decision-making contexts. Indeed, the level of functionality and detail contained in the repository is one of its biggest assets, as it strives to move beyond static and simplified indicator lists. Moreover, the accompanying Excel file offers an infrastructure for capturing, organising and presenting indicators. It also serves as a "living document" which will be periodically updated. If you would like to suggest adaptation indicators, please email Timo.Leiter@giz.de.

Selecting relevant indicators

The repository seeks to provide users with some **illustrative examples of adaptation indicators** that might be applied in their own M&E context. A relevant selection of indicators will depend on a number of factors, however, including:

- The **purpose** of using an indicator – i.e. what aspect of adaptation the user is trying to monitor and evaluate. Is it to track context – i.e. the climate parameters and climate change impacts that shape what kind of adaptation is needed and if/how it will succeed (e.g. M&E system of the Mekong River Commission)? Is it to track progress in implementing adaptation strategies or actions (e.g. M&E system of France)? Or the results of such actions (e.g. Kenyan M&E system)? Or some combination thereof? This means having **a clear idea of your information needs and key questions to be answered by the M&E system** is crucial for indicator selection.
- Relevance to the user's **specific context**: The indicators selected should be suited to the vulnerability and risk context that the user is trying to monitor and evaluate. Thus, for example, if an area is subject to sea level rise and accelerated coastal erosion, or human health is regularly affected by droughts, or access to mobile banking services is deemed critical to building adaptive capacity in rural areas, then these should be reflected in the final iteration and combination of indicators. Scale should also be taken into account, i.e. whether an indicator focuses at national, sectoral or local levels. Some indicators, for example the Pilot Programme for Climate Resilience's indicator "number of people supported to cope with the effects of climate change" are not worded to suit a particular geography, socio-economic activity, or stakeholder group, in order to be widely applicable across numerous countries. In such a case it is useful to have standardized guidelines on how to measure the indicator like the PPCR Monitoring and Reporting Toolkit.
- The **resources and capacities** available for developing and applying indicators – i.e. the relative ease of measurability, data availability, acquisition costs, etc. compared to the time, money, and personnel available. The more difficult or cumbersome an indicator is to track, the less likely it is actually going to be applied. This may mean accepting trade-offs, where simpler and less descriptive indicators are selected over more sophisticated and representative indicators. It may also be wise to start with a smaller number of indicators and build up the indicator set as experience with adaptation M&E grows (e.g. in case of the Moroccan M&E system).
- Alignment with **existing M&E systems**: Related to the previous point but worth mentioning, the user should also consider information that is already being gathered by existing M&E systems when selecting indicators. That is, there may be national or sub-national programmes in place that are gathering relevant data and information on demographic trends (i.e. census results), environmental conditions, economic performance, poverty indices, etc. These may feed relevant information into an adaptation M&E system.

Definitions and explanations

The detailed indicator tables include the following:

Sector: The sector(s) most relevant to the adaptation indicator. The sectors included in the repository are those that are most affected by climate change or relevant to climate adaptation. They are: Agriculture, Biodiversity, Building Sector, Coastal Zones, Energy, Financial Services, Fishery, Forestry, Human Health, Information/Communication, Tourism, Trade and Industry, Transport, Urban areas, and Water Resources. Those indicators that are associated with efforts to integrate adaptation into planning or to build capacity for adaptation in general (i.e. not sector-specific) are captured under "Mainstreaming/Capacity Building."

Focus of indicator: The aspect of adaptation the indicator is trying to capture. These are broadly divided into:

Climate parameters: Information about observed climatic conditions – e.g. temperature, rainfall, extreme events – that help track the climatic context within which adaptation strategies are being implemented.

Climate impacts: Information about the observed impacts of climate variability and change on socio-ecological systems – e.g. number of people displaced due to floods – to help track the climate context within which adaptation strategies are being implemented.

Adaptation action (implementation): Information to help track the implementation of adaptation strategies – e.g. number of awareness raising workshops organised, % of building codes updated, etc.

Adaptation results (outcome): Information to help monitor and evaluate the outcomes of adaptation strategies – e.g. % increase in crop yield per hectare during dry season, % of household income used to treat water-borne diseases following floods – where outcomes are broadly understood in terms of increased adaptive capacity (often framed as development outcomes), decreased sensitivity to climate stress, or some combination thereof.

Indicator: A general description of the adaptation indicator derived from the more specific example.

Unit of measurement: Unit of measurement for the indicator (e.g. °C, mm, number of households, %, etc.).

Adaptation relevance: Brief explanation of why the indicator is useful for tracking the adaptation context (i.e. climate parameters and climate impacts) or progress in adaptation (i.e. adaptation action and adaptation results.) For the latter, a brief explanation of a theory of change or adaptation hypothesis may be presented in order to highlight how particular adaptation outcomes address climate-related risks or vulnerabilities. Spelling out and scrutinising the adapgtation relevance is a useful exercise for any adaptation indicator.

Potential limitations: Brief descriptions of some of the limitations of the indicator, in terms of its assumptions and information it cannot provide.

Indicator example: A specific example of the adaptation indicator, drawn from an existing M&E system, which demonstrates how it could be applied in a given context.

Reference for the indicator: The resource or reference document from which the indicator example is drawn – e.g. national climate change policy, national adaptation plan, etc.

Data needs: Description of the kind of data that might be needed to calculate / apply the indicator.

Data sources: Description of the agencies and arrangements through which data relevant to the indicator might be obtained.

Calculation of the indicator: Method used to arrive at an indicator value – e.g. specific equation, simple summation, etc.

Spatial scale: The geographic scale most relevant to the application of the indicator – e.g. national, sub-national, regional (basin-wide), etc.

Disaggregation: The ways in which the indicator may be disaggregated to account for differences in gender, livelihood, climate hazards, etc.

These categories capture both the basic information needed for describing a given indicator, as well as supplemental information to illustrate how it can be applied in a real world context. The combination of these types of information, organised in a systematic and searchable manner, render the repository a useful information management tool.

Structure and navigation

The most important categories used to organise the indicators are "Sector" and "Focus" since this type of information will often serve as a basis for adaptation indicator development. In other words, users will likely consult the repository looking for indicators that are most relevant to a particular (or multiple) sector(s) of interest and/or that capture a specific aspect of the adaptation progress.

Below you will find a list of all indicators, grouped according to "focus of the indicator". By clicking on an indicator you can jump to its respective detailed table of information, which includes entries for relevant sectors. By clicking on those entries you can jump to overviews for all sectors at the end of the document.

Hyperlinks are provided so that users can access further resources that describe the decision-making context for an indicator example. These include links to the factsheets of ten M&E systems analysed in the study "Monitoring and Evaluating Adaptation at Aggregated Levels: A Comparative Analysis of Ten Systems" and relevant policy documents that are available online.

Indicator Factsheets: Eight factsheets have been prepared to describe the rationale, calculation and application of particular indicators. The purpose is to provide detailed and structured information for indicator development. The factsheets also present a format for documenting relevant information, or metadata, on indicators used in an M&E system. A detailed documentation of the information is necessary to warrant measurement or quantification of each indicator according to the same procedures and measurement techniques ensuring comparability over time. The format builds on the indicator factsheets developed by Germany's Vulnerability Network (Netzwerk Vulnerabilität) and used for the German vulnerability assessment conducted in the framework of the German Adaptation Strategy.

A practical example is provided for each indicator to demonstrate how it was applied in a given context and hopefully make it easier for the user to adjust or elaborate the indicator for use in their own context.

Note: Most of the information included in the repository is directly taken from documents outlining a particular indicator example. If information on a certain indicator category was not available, expert judgement was used to complete the indicator tables (entries in blue font colour).

If you prefer working with the accompanying spreadsheet, you can use the filter function to group information according to "Sector" and "Focus". In the spreadsheet, the categories described above are grouped in two sections:

i. basic information describing a particular adaptation indicator (blue headings) and
ii. supplemental information on the indicator, including an illustrative example from an existing M&E system (green headings).

List of indicators by focus area

Climate parameters

Change in **annual temperature**

Mean monthly temperature

Number of **hot days**

Change in **annual precipitation**

Monthly precipitation

Extreme precipitation events

Climate impacts

Number of **households affected by drought**

Percentage of total **livestock killed by drought**

Number of **surface water areas subject to declining water quality** due to extreme temperatures

Urban **Heat Island Effect** in summer

Number of people at high risk of **heat stress**

Reduced **work productivity** due to heat stress

Number of people living in **flood prone areas**

Number of **properties flooded per year**

Number of **properties located in river/coastal floodplain**

Number of **businesses located in areas of flood/coastal erosion risk**

Number of **hospitals** located in areas at risk from flooding/coastal erosion

Number of **households within most deprived communities** located in areas of flood/coastal erosion risk

Number of **properties lost due to coastal erosion** per year

Number of hectares of **productive land lost to soil erosion**

Percentage of area of **ecosystem** that has been disturbed or damaged

Total forest area impacted by **wildfire** per year

Annual **timber losses from pests and pathogens**

Areas covered by **vegetation affected by plagues or fires**

Distribution of climate sensitive species

Acidification of marine water

Distribution of warmth-adapted **marine species**

Decline in **fish habitats** due to temperature change

Decreased annual average **fish catch** as a result of temperature change

Shift of **agrophenological phases** of cultivated plants

Total length of **sewerage and drainage network at risk** from climate hazards

Weather-related disruption of electricity supply

Losses of GDP in percentage per year due to extreme rainfall

Financial losses to **businesses** due to extreme weather events

Number of cases of **water-borne diseases**

Number of **people permanently displaced** from homes as a result of flood, drought or sea-level rise

Adaptation action

Number of methodological guides produced to **assess impacts of** extreme weather events on transport systems

Number of **climate responsive tools** developed and tested

Number of vulnerable stakeholders **using climate responsive tools** to respond to climate variability or climate change

Number of **communication tools** that incorporate climate change adaptation

Number of **public awareness campaigns on water efficiency**

Number of visitors to the **national climate adaptation website**

Percentage of trade and industry chambers using and distributing climate information

Number of **urban adaptation best practices** disseminated

Percentage of population living in flood and/or drought-prone areas with **access to rainfall forecasts**

Number of government staff that have received **training on adaptation**

Degree of **integration of climate change** into development planning

Number of **policies and coordination mechanisms explicitly addressing climate change** and resilience

Number of policies, plans or programmes introduced or adjusted that **mainstream climate risks**

Percentage of municipalities with local regulations considering adaptation and vulnerability assessment results

Percentage of **new hydroelectric projects** that consider future climate risks

Existence of **interministerial/ intersectoral commissions working on adaptation**

Number of **financial mechanisms** identified to support climate change adaptation

Number of businesses with **risk management plans** considering climate change aspects/or adaptation options

Number of **people supported to cope with the effects of climate change through the availability of a service or facility**

Percentage of farmers and fisherfolk with **access to financial services**

Funding for climate-adapted construction and refurbishment

Total sum of **investments** in programmes for the **protection of livestock**

Number of inventories of **climate change impacts on biodiversity**

Conservation of **forest genetic resources**

Percentage of **transport infrastructure standards** revised

Green label for neighborhoods requiring climate change vulnerability assessments established

Number of **wave recorders** installed along coastal areas

Number of **existing meteorological stations per territorial unit**

Climate change vulnerability maps of coastal zone developed

Number of **properties** with **retrofitted** flood resilience measures; water meters; water efficiency measures; cooling measures

Number of **water efficiency measures** used in energy generation/extraction

Number of water companies **rationing water during droughts**

Number of businesses that have **changed their working hours**

Uptake of **early warning systems** (UV and air/water quality)

Uptake of measures to reduce **air pollution**

Uptake of **soil conservation measures**

Percentage of **climate resilient trees**

Proportion of **forest managers** taking action on adaptation

Area of land under **'landscape scale' conservation**

Uptake of **riparian tree planting**

Number of businesses with **insurance for extreme weather events**

Percentage of companies **assessing risks and opportunities** from extreme weather and reduced water availability to their supply chains

Percentage of treated wastewater

Percentage of agricultural land with improved irrigation

Percentage of **coastline under marine protection**

Number of **firebreaks** constructed

Number of farmers **involved in pilot irrigation messaging projects**

Number of **women organised in agricultural cooperatives**

Cultivation of varieties of **red wine which like warmth**

Compliance with **fishing quota**

Priority areas for precautionary flood protection

Energy Storage Capacity

Adaptation results

Percentage of **climate resilient roads** in the country

Percentage of poor people in drought-prone areas with **access to safe and reliable water**

Percentage of urban households with **access to piped water**

Number of **cubic metres of water conserved**

Volume of **water consumed by tourist facilities**

Percentage of **water demand** being met by existing supply

Percentage of households at reduced flood risk due to **construction of new or enhanced defences**

Reduction of **flood damage and disaster relief costs** in cities due to increased standards for flood protection and improved flood emergency preparedness

Number of **new major infrastructure projects** located in areas at risk

Percentage of livestock insured against death due to extreme and slow-onset weather events

Percentage of farmland **covered by crop insurance**

Percentage of **additional fodder** for grazing livestock

Increase in agricultural productivity through irrigation of harvested land

Increase in the percentage of **climate resilient crops** being used

Percentage of cultivated surface cultivated with **drought resistant varieties**

Turnover generated by agricultural cooperatives

Number of people with **diversified income**

Climate parameters

Indicator	Change in **annual temperature**
Sectors	Agriculture, Biodiversity, Building sector, Coastal zones, Energy, Financial services, Fishery, Forestry, Human health, Information & communication, Tourism, Trade & Industry, Transport, Urban areas, Water resources, Capacity building & mainstreaming
Focus of indicator	Climate parameters
Unit of measurement	Degree Celsius
Adaptation relevance	Climate change may lead to gradual change in average climatic conditions such as changes in annual temperature which will have profound impacts on ecosystems, livelihoods and businesses.
Potential limitations	This indicator requires a data series across decades (usually of at least 30 years) to be able to associate any observed trends in climate variables to climate change (versus climate variability).
Indicator example	Change in annual temperature (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Observed annual temperature changes
Data sources, collection methods	Meteorological office
Calculation of the indicator	Difference in annual temperature over a certain period of time
Spatial scale	Subnational
Disaggregation	By region

» list of indicators

Indicator	**Mean monthly temperature**
Sectors	Agriculture, Biodiversity, Building sector, Coastal zones, Energy, Financial services, Fishery, Forestry, Human health, Information & communication, Tourism, Trade & Industry, Transport, Urban areas, Water resources, Capacity building & mainstreaming
Focus of indicator	Climate parameters
Unit of measurement	Degree Celsius
Adaptation relevance	Climate change may lead to gradual change in average climatic conditions such as changes in mean monthly temperature which will have profound impacts on ecosystems, livelihoods and businesses.
Potential limitations	This indicator requires a data series across decades (usually of at least 30 years) to be able to associate any observed trends in climate variables to climate change (versus climate variability).
Indicator example	Mean monthly temperature (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Daily mean temperature, number of days per month
Data sources, collection methods	Meteorological office
Calculation of the indicator	Summation of daily mean temperatures for each day of a month / number of days in that month
Spatial scale	Subnational
Disaggregation	By region

» list of indicators

Indicator	Number of **hot days**
Sectors	Agriculture, Biodiversity, Building sector, Coastal zones, Energy, Financial services, Fishery, Forestry, Human health, Information & communication, Tourism, Trade & Industry, Transport, Urban areas, Water resources, Capacity building & mainstreaming
Focus of indicator	Climate parameters
Unit of measurement	Days/year
Adaptation relevance	The frequency of very hot days is important for adaptation since very hot days impose the highest amount of stress on species, infrastructure and ecosystems.
Potential limitations	This indicator requires a data series across decades (usually of at least 30 years) to be able to associate any observed trends in climate variables to climate change (versus climate variability).
Indicator example	Number of hot days (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Number of hot days per year
Data sources, collection methods	Meteorological office
Calculation of the indicator	Summation of days above a certain day or night temperature.
Spatial scale	Subnational
Disaggregation	By region

» list of indicators

Indicator	Change in **annual precipitation**
Sectors	Agriculture, Biodiversity, Building sector, Coastal zones, Energy, Financial services, Fishery, Forestry, Human health, Information & communication, Tourism, Trade & Industry, Transport, Urban areas, Water resources, Capacity building & mainstreaming
Focus of indicator	Climate parameters
Unit of measurement	mm / year
Adaptation relevance	Climate change may lead to gradual change in average climatic conditions such as changes in annual precipitation which will have profound impacts on ecosystems, livelihoods and businesses.
Potential limitations	This indicator requires a data series across decades (usually of at least 30 years) to be able to associate any observed trends in climate variables to climate change (versus climate variability).
Indicator example	Change in annual precipitation (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Amount of precipitation per year
Data sources, collection methods	Meteorological office
Calculation of the indicator	Difference in annual precipitation over time
Spatial scale	Subnational
Disaggregation	By region

» list of indicators

Indicator	**Monthly precipitation**
Sectors	Agriculture, Biodiversity, Building sector, Coastal zones, Financial services, Fishery, Forestry, Human health, Information & communication, Tourism, Trade & Industry, Transport, Urban areas, Water resources, Capacity building & mainstreaming
Focus of indicator	Climate parameters
Unit of measurement	mm / month
Adaptation relevance	Climate change may lead to gradual change in average climatic conditions such as changes in monthly precipitation which will have profound impacts on ecosystems, livelihoods and businesses. Monthly or seasonal changes in precipitation are of particular importance for agriculture.
Potential limitations	This indicator requires a data series across decades (usually of at least 30 years) to be able to associate any observed trends in climate variables to climate change (versus climate variability).
Indicator example	Monthly precipitation (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Amount of rains per month
Data sources, collection methods	Meteorological office
Calculation of the indicator	Summation
Spatial scale	Subnational
Disaggregation	By region

» list of indicators

Indicator	**Extreme precipitation events**
Sectors	Agriculture, Biodiversity, Building sector, Coastal zones, Financial services, Fishery, Forestry, Human health, Information & communication, Tourism, Trade & Industry, Transport, Urban areas, Water resources, Capacity building & mainstreaming
Focus of indicator	Climate parameters
Unit of measurement	Number
Adaptation relevance	Climate change may lead to an increase in extreme weather events including extreme precipitation events which will have profound impacts on ecosystems, livelihoods and businesses.
Potential limitations	Definition of extreme required. Experiencing an extreme event in one season or year does not necessarily mean it will reoccur in the next. Associating any observed trends to climate change requires a data series across decades.
Indicator example	Extreme precipitation events (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Number of extreme precipitation events
Data sources, collection methods	Meteorological office
Calculation of the indicator	Summation of events (or days) above a certain amount of rainfall
Spatial scale	Subnational
Disaggregation	By region

» list of indicators

Climate impacts

Indicator	Number of **households affected by drought**
Sectors	Agriculture, Human health, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Climate change will bring more frequent, prolonged, and/or more intense drought events.
Potential limitations	This indicator could be completed with other indicators to assess households' vulnerability to multiple hazards (not just drought) since people are often affected by a combination of stresses and shocks.
Indicator example	Number of households affected by drought (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	List or map of areas declared as affected by drought; number of households present within drought-declared areas
Data sources, collection methods	Ministry/ies responsible for climate change and/or disaster risk reduction; Meteorological agency
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By sub-national units, by gender, by livelihoods

» list of indicators

Indicator	Percentage of total **livestock killed by drought**
Sectors	Agriculture, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Percentage
Adaptation relevance	Drought can impact livestock both directly (e.g. changes in water and fodder availability) and indirectly (e.g. increased livestock diseases), with negative impacts on livelihoods and economic sectors.
Potential limitations	This indicator could be completed with other indicators to capture loss in livestock productivity, reduced weight, increased health issues, etc. due to drought. Other factors than climate change may contribute to livestock death, even during drought periods (e.g. health of livestock).
Indicator example	Percentage of total livestock numbers killed by drought in the county (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Total number of livestock in target area; Total number of livestock killed by drought in target area; Number and severity of droughts over a period of time
Data sources, collection methods	Ministry of Agriculture and Livestock; national database, insurance records
Calculation of the indicator	Numerator = number of livestock killed by drought; Denominator = total number of livestock; Moving Average: Numerator = sum of annual measurements over the period; Denominator: number of years in the period
Spatial scale	National or sub-national
Disaggregation	By types of livestock, by region

» list of indicators

Indicator	Number of **surface water areas subject to declining water quality** due to extreme temperatures
Sectors	Agriculture, Biodiversity, Fishery, Forestry, Human health, Tourism, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Extreme temperatures in the context of climate change can lead to water quality degradation. Vulnerability maps can help identify hot-spots and support decision-making.
Potential limitations	This indicator only focuses on surface water quality (not quantity) due to one climate hazard (i.e. extreme temperatures).
Indicator example	Number of surface water areas at high risk of degradation in quality in the event of extreme temperatures mapped (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Geographical location of surface water area in the country; number of surface water areas exposed to extreme temperatures; number of surface water areas vulnerable to extreme temperatures
Data sources, collection methods	Water agencies
Calculation of the indicator	Geographical Information System (GIS) (overlapping maps of surface water areas exposed to extreme temperatures and those highly vulnerable to extreme temperatures)
Spatial scale	Subnational
Disaggregation	By region, by type of surface water (running, ...)

» list of indicators

Indicator	Urban **Heat Island Effect** in summer
Sectors	Human health, Urban areas
Focus of indicator	Climate impacts
Unit of measurement	Degree Celsius
Adaptation relevance	Climate change affects the urban climate in a way that can result in severe thermal stress with detrimental effects on people's health (well-being, mortality, morbidity).
Potential limitations	The Manifestation and magnitude of the heat island effect is not only due to changing climatic parameters but also influenced by architecture, building density and materials, urban planning and green spaces etc.
Indicator example	Heat Island Effect in Berlin (temperature difference to surrounding countryside)
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Temperatures of different points in the urban centre and in the surrounding hinterland
Data sources, collection methods	German Weather Service (DWD)
Calculation of the indicator	Temperature of hinterland minus temperature urban centre (Substraction)
Spatial scale	Local
Disaggregation	With respect to time (week, month)

» list of indicators

Indicator	Number of people at high risk of **heat stress**
Sectors	Human health
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Heat stress can be a serious health problem which can increase as a result of climate change.
Potential limitations	The number of people does not solely depend on climate factors but also demograhic and social factors (mobility, people moving to other regions and cities)
Indicator example	Number of people with cardiovascular/respiratory illnesses at risk of heat stress (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Location and number of people with cardiovascular/respiratory illnesses; areas exposed to heat stress
Data sources, collection methods	Health insurance companies; national health service; national census; national agencies responsible for climate risk management, heat stress maps; health records
Calculation of the indicator	Summation; requires definition of “high risk”
Spatial scale	National and sub-national
Disaggregation	By region; by gender; urban versus rural areas

» list of indicators

Indicator	Reduced **work productivity** due to heat stress
Sectors	Human health, Trade & Industry
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Increased warming and humidity can lead to reduced work productivity especially for outdoor activities.
Potential limitations	Reduced work productivity may be due to multiple causes other than just climate change.
Indicator example	Reduced work productivity due to heat stress (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of outputs completed; number of employees; hours paid in companies; periods of heat stress
Data sources, collection methods	Businesses
Calculation of the indicator	Number of outputs completed / number of employees x hours paid before and during a period of heat stress
Spatial scale	National and sub-national
Disaggregation	By types of activities, by gender, by regions

» list of indicators

Indicator	Number of people living in **flood prone areas**
Sectors	Building sector, Coastal zones
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	A high number of people living in flood prone areas shows a high exposure to flood risks.
Potential limitations	This indicator could be completed with other indicators to assess the impacts of floods on people living in flood prone areas (in terms of socio-economic impacts).
Indicator example	Number of people living in flood prone areas (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Total number of people living in flood prone areas in the country
Data sources, collection methods	National Bureau of Statistics; population census
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By sub-national unit, by socio-economic group

» list of indicators

Indicator	Number of **properties flooded per year**
Sectors	Building sector, Coastal zones, Trade & Industry, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Climate change increases the frequency and intensity of extreme weather events such as floods. It can also change the location and timing of floods.
Potential limitations	Attribution issue: the number of properties flooded per year may be due to other non-climatic factors (e.g. deforestation, rapid population growth, wetland degradation) or a combination of climatic and non-climatic factors.
Indicator example	Number of properties flooded per year (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Flood affected areas; Number of properties located within flood-affected areas
Data sources, collection methods	National land management agencies, private companies (e.g. insurance)
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By region, by types of properties

» list of indicators

Indicator	Number of **properties located in river/coastal floodplain**
Sectors	Building sector, Trade & Industry, Urban areas, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	A high number of properties in floodplains signifies a higher vulnerability (more houses exposed to risk). River and coastal floodplains serve as natural barriers to minimize the impacts of flood risks from climate change on properties. Properties should be located outside of the floodplains to prevent them from being destroyed or damaged by floods.
Potential limitations	This indicator does not capture the types of properties exposed to flood risk (e.g. public and private assets). Implications of removing properties from exposure zone are not considered; areas may still be sealed (which means reduced damage due to absence of properties but no positive effects on water retention)
Indicator example	Decreased number of properties located in river/coastal floodplain (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Location of designated river/coastal floodplains; Number of properties located in river/coastal floodplain
Data sources, collection methods	National land management agencies, private companies (e.g. insurance)
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By region, by types of properties

» list of indicators

Indicator	Number of **businesses located in areas of flood/coastal erosion risk**
Sectors	Coastal zones, Trade & Industry, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Climate change can lead to increased risks of coastal erosion and flood with negative impacts for businesses located in those areas. A reduced number of businesses located in areas of flood/coastal erosion risk shows a reduced exposure of businesses to those risks.
Potential limitations	This indicator only assess the exposure of the businesses to flood/coastal erosion risk. It could be completed with other indicators to assess the vulnerability of the businesses to flood/coastal erosion risk.
Indicator example	Number of businesses located in areas of flood/coastal erosion risk (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Location of current and future potential flood/coastal erosion risks; location of businesses
Data sources, collection methods	National agency responsible for the private sector; national agency responsible for climate change and disaster risk reduction
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By business type and size, by region

» list of indicators

Indicator	Number of **hospitals** located in areas at risk from flooding/coastal erosion
Sectors	Human health, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Essential services, such as hospitals should be located outside of the floodplains/coastal erosion areas to prevent them from being damaged and/or destroyed from floods/coastal erosion.
Potential limitations	This indicator only assess the exposure of hospitals to flood/coastal erosion risk. It could be completed with other indicators to assess the vulnerability (i.e. sensitivity and adaptive capacity) of hospitals to flood/coastal erosion risk.
Indicator example	Number of hospitals/walk-in centers located in areas at risk from flooding/coastal erosion (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Location and number of hospitals in a specific area; Distribution of flooding/coastal erosion risks
Data sources, collection methods	Health and environmental agencies, national census; flood/coastal erosion risk maps
Calculation of the indicator	Summation (or geographical information system)
Spatial scale	National and sub-national
Disaggregation	By region, by types of climate hazards

» list of indicators

Indicator	Number of **households within most deprived communities** located in areas of flood/coastal erosion risk
Sectors	Coastal zones, Human health, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	The most deprived communities lack resources to prepare, cope and recover from floods, thereby requiring government support.
Potential limitations	This indicator only assess the exposure of households within most deprived communities to flood/coastal erosion risk. It could be completed with other indicators to assess the vulnerability (i.e. sensitivity and adaptive capacity) of the households to flood/coastal erosion risk.
Indicator example	Number of household within most deprived communities located in areas of flood/coastal erosion risk (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Location and number of households with high poverty level; distribution of flooding/coastal erosion risks
Data sources, collection methods	Environmental agencies
Calculation of the indicator	Summation (or geographical information system)
Spatial scale	National and sub-national
Disaggregation	By types of climate hazards

» list of indicators

Indicator	Number of **properties lost due to coastal erosion** per year
Sectors	Building sector, Coastal zones, Trade & Industry, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Increasing sea levels and storms due to climate change can increase and intensify the rates of coastal erosion.
Potential limitations	Attribution issue: the number of properties lost due to coastal erosion per year may be due to other non-climatic factors (e.g. sand extraction) or a combination of climatic and non-climatic factors.
Indicator example	Number of properties lost due to coastal erosion per year (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of properties lost due to coastal erosion per year
Data sources, collection methods	National land management agencies, private companies (e.g. insurance)
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By region, by types of properties

» list of indicators

Indicator	Number of hectares of **productive land lost to soil erosion**
Sectors	Agriculture, Biodiversity, Coastal zones, Financial services, Transport, Urban areas, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Hectare
Adaptation relevance	Stable soils have great value in helping people adapt both in terms of agricultural productivity and ability to deliver other beneficial services (e.g. reduced flooding).
Potential limitations	Attribution issue: soil erosion may be due to a combination of factors (e.g. deforestation) and not just climate change.
Indicator example	Number of hectares of productive land lost to soil erosion (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Number of hectares of productive land in the country and/or region; number of hectares of productive land lost to soil erosion
Data sources, collection methods	Ministry of Agricultre
Calculation of the indicator	Summation
Spatial scale	Sub-national
Disaggregation	By region

» list of indicators

Indicator	Percentage of area of **ecosystem** that has been disturbed or damaged
Sectors	Agriculture, Biodiversity, Coastal zones, Fishery, Forestry, Tourism, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Percentage
Adaptation relevance	Healthier ecosystems are able to deliver ecosystem services that help people to adapt to climate change.
Potential limitations	This indicator does not capture the degree of disturbance / damage, nor the source of disturbance (can be climatic or non-climatic)
Indicator example	Percentage of area of natural terrestrial ecosystems in the county that have been disturbed or damaged (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Ecosystem types defined; total area (ha) of disturbed or damaged natural ecosystem; information on disturbance
Data sources, collection methods	Ministry of Environment; remote sensing/satellite observation of ecosystems
Calculation of the indicator	Numerator = area (ha) of disturbed or damaged ecosystem; Denominator = total area of ecosystem; definition of time interval required
Spatial scale	Regional or sub-national
Disaggregation	By ecosystem type

» list of indicators

Indicator	Total forest area impacted by **wildfire** per year
Sectors	Forestry, Tourism
Focus of indicator	Climate impacts
Unit of measurement	Hectare
Adaptation relevance	Increasing temperature due to climate change can lead to increase wildfire with negative impacts on forest resources.
Potential limitations	Attribution issue: wildfires may be due to various factors not just increasing temperatures due to climate change (e.g. land use changes)
Indicator example	Total forest area impacted by wildfire per year (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of wildfire per year; number of forest area damaged by wildfire per year
Data sources, collection methods	Environmental agencies
Calculation of the indicator	Enumeration
Spatial scale	National
Disaggregation	By types of forest area

» list of indicators

Indicator	Annual **timber losses from pests and pathogens**
Sectors	Forestry, Trade & Industry
Focus of indicator	Climate impacts
Unit of measurement	Hectare
Adaptation relevance	Changes in temperature and rainfall conditions can lead to changes in pests and pathogens with negative impacts on the timber industry.
Potential limitations	Attribution issue: pests and pathogens may be due to a combination of factors (e.g. aging trees, soil erosion, etc.) and not solely temperature and rainfall changes.
Indicator example	Annual timber losses from pests and pathogens (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Amount of hectares s of forest lost per year due to pests and pathogens
Data sources, collection methods	Forest department
Calculation of the indicator	Enumeration
Spatial scale	National
Disaggregation	By region, by forest type, by species

» list of indicators

Indicator	Areas covered by **vegetation affected by plagues or fires**
Sectors	Agriculture, Biodiversity, Coastal zones, Forestry, Human health, Tourism, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Hectare
Adaptation relevance	Higher temperatures due to climate change are expected to increase the risk for fires and plagues. Knowing the dispersion of plagues and fires on areas covered by vegetation gives insight into potential vulnerability increases of the affected ecosystems and can help identifying appropriate adaptation measures.
Potential limitations	The indicator does not give information on frequency of fire or plagues, neither on the concrete consequences for plant and animal populations, nor on carbon emissions resulting from fires. Besides, the indicator does not indicate what the causes for fires and plagues are and if they are related to climate change.
Indicator example	Areas covered by vegetation affected by plagues or fires in the country
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Areas (total number in ha) covered by vegetation; areas (number in ha) covered by vegetation affected by fires; areas (number in ha) covered by vegetation affected by plagues
Data sources, collection methods	Ministry for Environment and Natural Resources (SEMARNAT), National Forest Commission/ management of forest fires, National Institute for Environmental Information and Natural Resources (SNIARN)
Calculation of the indicator	Summation: Number of ha covered by vegetation affected by fires + Number of ha covered by vergetation affected by plagues
Spatial scale	National
Disaggregation	By federal state level

» list of indicators

Indicator: Distribution of climate sensitive species

Sectors	Biodiversity
Focus of indicator	Climate impacts
Unit of measurement	Hectare
Adaptation relevance	Changes in precipitation and temperatures due to climate change could shift the geographic ranges of some species.
Potential limitations	This indicator could be completed with other indicators to capture changes of species' composition, and functions.
Indicator example	Distribution of climate sensitive species (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Types of climate sensitive species; spatial location of climate sensitive species
Data sources, collection methods	Forest department
Calculation of the indicator	Enumeration
Spatial scale	National and sub-national
Disaggregation	By regions, by species

» list of indicators

Indicator: Acidification of marine water

Sectors	Biodiversity, Coastal zones, Fishery, Human health, Tourism, Water resources
Focus of indicator	Climate impacts
Unit of measurement	pH
Adaptation relevance	More GHG emissions lead to higher acidification levels of marine waters that disturb sea habitats. Monitoring the increase of acidification trends gives an indication of the resilience of marine ecosystems (e.g. coral reefs, fish populations).
Potential limitations	The indicator does not give information to what extent the functioning of marine ecosystems affected by acidification is disturbed (further interpretation of acidification trends is necessary). Attribution issue: Acidification may be due to a combination of factors (human pollution) and not just due to climate change.
Indicator example	pH change of marine waters along Mexican coastlines
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Concentration of bases and hydroxide iones in marine water
Data sources, collection methods	National institute for environmental information and natural resources (SNIARN) and the National institute for statistics and geography (INEGI)
Calculation of the indicator	Complex: Panel of specialists has to be formed to develop standardized methodology for measuring systematically acidification in coastal sea areas.
Spatial scale	National
Disaggregation	By national level

» list of indicators

Indicator: Distribution of warmth-adapted marine species

Sectors	Coastal zones, Fishery, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Percentage of stock that has shifted
Adaptation relevance	The distribution of warmth-adapted marine species indicates changes in marine habitats. Shifts in distribution imply outmigration of commercially important cold-adapted fish species and necessitate the adaptation of fishing as different species proliferate. Commercial fisheries can be significantly affected by these changes in distribution.
Potential limitations	The distribution of warmth-adapted marine species also depends on other factors such as emissions or overfishing.
Indicator example	Habitats of thermophile fish species shifting
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Data on shifts within fisheries communities, dominance and occurence of fish species in the different fisheries communities
Data sources, collection methods	Long term surveys of the GSBTS (German Smallscale Bottom Trawl Survey) of the vTI (Institut für Seefischerei)
Calculation of the indicator	Comparison of distribution patterns; if known: percentage of commercial fish stock that has shifted
Spatial scale	National
Disaggregation	By species; protected vs. unprotected areas

» list of indicators

Indicator	Decline in **fish habitats** due to temperature change
Sectors	Biodiversity, Fishery
Focus of indicator	Climate impacts
Unit of measurement	Hectare
Adaptation relevance	Climate change can lead to sea and freshwater temperatures change. Fish habitats may become unsuitable for certain species as a result.
Potential limitations	Attribution issue: the decline in fish habitats may be due to a combination of factors and not just temperature change; temperature change may also be due to a combination of factors and not just climate change (e.g. impacts of land-use change).
Indicator example	Decline in fish habitats (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Total fish habitats areas per year; observed trends in temperature change
Data sources, collection methods	Ministry of Fisheries; Meteorological office
Calculation of the indicator	Compare total fish habitats areas per year with observed trends in temperature change
Spatial scale	National and sub-national
Disaggregation	By sub-national unit, protected versus unprotected area, marine versus limnic

» list of indicators

Indicator	Decreased annual average **fish catch** as a result of temperature change
Sectors	Biodiversity, Coastal zones, Fishery
Focus of indicator	Climate impacts
Unit of measurement	Currency
Adaptation relevance	Climate change can lead to sea and freshwater temperatures change. As a result, fish availability may reduce as some species may disappear or will move to different locations. Increased frequency and intensity of extreme weather events may prevent fishers going fishing.
Potential limitations	Attribution issue: the decrease in annual average capture fish availability may be due to a combination of factors and not just temperature change; temperature change may also be due to a combination of factors and not just climate change (e.g. impacts of land-use change).
Indicator example	Decreased annual average capture fish availability (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Average capture fish per year; Observed trends in temperature change
Data sources, collection methods	Ministry of Fisheries; Meteorological office
Calculation of the indicator	Compare average capture fish between normal years and abnormal years (an abnormal year is associated with temperature change)
Spatial scale	National and sub-national
Disaggregation	By sub-national units

» list of indicators

Indicator	Shift of **agrophenological phases** of cultivated plants
Sectors	Agriculture
Focus of indicator	Climate impacts
Unit of measurement	Days
Adaptation relevance	Climate change affects the timing of the different agrophenological phases of cultivated plants such as flowering and fruit development. Farmers need to adjust their cultivation to the prevailing climatic conditions.
Potential limitations	Natural climate variability also plays a role for agrophenological phases so long time spans are necessary to identify trends.
Indicator example	Shift of the start of flowering of winter rape in days. Winter rape has the special characteristic that its flowering time primarily depends on weather conditions.
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Data on time of flowering of winter rape
Data sources, collection methods	Farmers associations
Calculation of the indicator	Substraction (days difference from baseline)
Spatial scale	National and sub-national
Disaggregation	Different agri-ecological zones

» list of indicators

Indicator	Total length of **sewerage and drainage network at risk** from climate hazards
Sectors	Building sector, Trade & Industry, Urban areas, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Climate change may mean new and/or additional risks to sewerage and drainage neworks; inadequate preparation may mean flooding, water shortages, water quality issues, etc. as a result of climate hazards.
Potential limitations	A sewerage and drainage network may be vulnerable not only because of its location in a hazard-prone area but also its quality / condition. This indicator focuses on the former.
Indicator example	Total length of sewerage and drainage network at risk from climate hazards (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Spatial distribution of climate hazards; location and length of the sewerage and drainage network in the target area
Data sources, collection methods	National agencies responsible for climate risk management; national water agencies
Calculation of the indicator	Summation (or geographical information system)
Spatial scale	National and sub-national
Disaggregation	By types of climate hazards

» list of indicators

Indicator	**Weather-related disruption of electricity supply**
Sectors	Energy
Focus of indicator	Climate impacts
Unit of measurement	Hours
Adaptation relevance	Extreme weather events can increase in intensity and frequency due to climate change. They can result in interruptions of power supply, e.g. by damaging power lines.
Potential limitations	A blackout in a major city causes larger damages than in less populated areas. This is not accounted for in the indicator. The indicator could be modifed to include the number of households and companies affected. Furthermore, a single extreme weather event cannot be easily attributed to climate change alone.
Indicator example	Disruption of power supply due to weather
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Information in power outages, their duration and their causes. Information on extreme events.
Data sources, collection methods	Bundesnetzagentur (German Federal Agency for Networks)
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	Regions

» list of indicators

Indicator	**Losses of GDP in percentage per year due to extreme rainfall**
Sectors	Agriculture, Building sector, Energy, Financial services, Tourism, Trade & Industry, Transport
Focus of indicator	Climate impacts
Unit of measurement	Percentage
Adaptation relevance	Extreme precipitation can damage the economic infrastructure and value chains and cause losses in GDP. The indicator gives an indication as to the level of vulnerability of different sectors to extreme rainfalls (GDP losses in one sector compared to the sector´s GDP contribution).
Potential limitations	Attribution issue: The indicator does not consider whether extreme rainfall is due to climate change or natural variability. Furtehrmore, quantifying the indirect losses from extreme rainfall is challenging.
Indicator example	Losses of GDP in percentage per year due to extreme rainfall
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Definition criteria for extreme rainfall are required (when is rainfall extreme?); total costs provoked by extreme rainfalls per year; GDP
Data sources, collection methods	National Institute for Statistics and Geography (INEGI), National Centre for Disaster Prevention (CENAPRED), Ministry of the Interior (CEGOB)
Calculation of the indicator	Numerator = total amount of quantified losses and damages on economic infrastructure due to extreme rainfalls in one year; Denominator = GDP of the respective year; Result *100
Spatial scale	National
Disaggregation	By sectors

» list of indicators

Indicator	Financial losses to **businesses** due to extreme weather events
Sectors	Building sector, Financial services, Trade & Industry, Transport
Focus of indicator	Climate impacts
Unit of measurement	Currency
Adaptation relevance	Climate change can impact businesses negatively through the destruction of infrastructure and disruptions along their supply chains.
Potential limitations	Extreme weather events could or could not be linked to climate change (i.e. normal climate variability).
Indicator example	Costs of damages to businesses due to delays caused by flooding, storms and other extreme weather events per year (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Impacts of climate hazards on business operations and estimated costs due to delays incurred
Data sources, collection methods	Businesses internal budgets
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By types of climate hazards, by types of business

» list of indicators

Indicator	Number of cases of **water-borne diseases**
Sectors	Human health, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Number
Adaptation relevance	Changes in precipitation and temperature as well as low access to safe drinking water can increase the number of water-borne diseases. Adaptation measures targeting sanitation and water facilities or sewage could help keep diseases at bay.
Potential limitations	Water-borne diseases are affected by factors other than specific adaptation interventions (e.g. state of hospitals, medical facilities, general level of development and income...).
Indicator example	Number of cases of water-borne diseases
Reference for indicator example	Morocco 2014 Draft Version. Guide to establish an M&E system of vulnerability and adaptation to climate change in the regions of Souss Massa Drâa and Marrakech Tensift Al Haouz
Data needs	Total number of cases of waterborne diseases
Data sources, collection methods	Regional Directorate for Health (DRS) Marrakech
Calculation of the indicator	Summation
Spatial scale	Regional or province level
Disaggregation	Different kinds of diseases; gender

» list of indicators

Indicator	Number of **people permanently displaced** from homes as a result of flood, drought or sea-level rise
Sectors	Building sector, Coastal zones, Financial services, Transport, Urban areas, Water resources
Focus of indicator	Climate impacts
Unit of measurement	Person
Adaptation relevance	Floods and droughts can cause enough damage to property or livelihoods to make people permanently homeless. With sea level rise, salinisation of soil and /or ground water and loss of agriculture productivity or water supplies can cause displacement.
Potential limitations	This indicator assumes that it is climate events or trend that leads to permanent displacement. However, socio-economic conditions of people or housedholds will work in concert to determine when people move permanently.
Indicator example	Percentage of people (by gender) in the county permanently displaced from their homes as a result of flood, drought or sea-level rise (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Total number of people living in a target area; Total number of people permanently displaced from their homes and the reasons for their displacement
Data sources, collection methods	Migration and Resettlement department , National Bureau of Statistics
Calculation of the indicator	Numerator = number of people (men and/or women) permanently displaced from their homes as a result of flood, drought, or sea-level rise; Denominator: total number of people (men and/or women) living in target area
Spatial scale	National or sub-national
Disaggregation	By gender

» list of indicators

Adaptation action

Indicator	Number of methodological guides produced to **assess impacts of** extreme weather events on transport systems
Sectors	Building sector, Trade & Industry, Transport
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Climate change can lead to localized or widespread damage to physical infrastructures or operating systems. A methodology for vulnerability assessments of different types of infrastructures to climate change are needed to offer approaches common to different modes, types of network or particular component of a network.
Potential limitations	The number of guides is less important than their quality and uptake. This indicator could be completed with other indicators to assess if the methodological guides are used and to what extent.
Indicator example	Production of methodological guides for local authorities, network managers and transport operators to assess loss of functionality and transport use following extreme events leading to localized or widespread damage to physical infrastructure or operating systems (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Number of guides produced to assess functionality and transport use loss following extreme weather events
Data sources, collection methods	Relevant authorities responsible for public transport; major sea ports, airports, urban transport network operators, etc.
Calculation of the indicator	Summation
Spatial scale	Subnational
Disaggregation	By mode, types of transport nework

» list of indicators

Indicator	Number of **climate responsive tools** developed and tested
Sectors	Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	The use of tools that incorporate climate variability and change or that can be applied to enhance climate adaptation (e.g. climate scenarios, vulnerability assessments, weather information services, microfinance, irrigation) can help strenghten the adaptive capacity of relevant govrnment bodies and ultimately vulnerable stakeholders.
Potential limitations	This indicator could be completed with other indicators to assess the quality of these instruments, to what extent these instruments are being scaled up and their impacts on climate adaptation.
Indicator example	Quality and extent to which climate responsive instruments/investment models are developed and tested (Pilot Program for Climate Resilience)
Reference for indicator example	Pilot Program for Climate Resilience (PPCR) Monitoring and Reporting Toolkit. CIF, 2013
Data needs	List of climate responsive instruments/investment models developed and tested
Data sources, collection methods	Actual data from ongoing projects, including project/programme-specific surveys and data from national systems such as the census
Calculation of the indicator	Scorecard method using Microsoft Excel. Each scorecard lists 4 to 5 key questions that assess progress in implementing the PPCR activities using a score from 0 (no) to 10 (yes/completely). Qualitative self-assessments by the monitoring and evaluation team and relevant stakeholders.
Spatial scale	National and sub-national
Disaggregation	By sector, by gender, by vulnerable groups, by livelihoods, by climate hazards, by regions

» list of indicators

Indicator	Number of vulnerable stakeholders **using climate responsive tools** to respond to climate variability or climate change
Sectors	Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	The uptake of climate responsive tools, instruments, strategies, and activities can help build the adaptive capacity of key stakeholders in a particular region or country.
Potential limitations	This indicator could be completed with other indicators to assess the impacts of using those support tools, instruments and activities for climate adaptation.
Indicator example	Extent to which vulnerable households, communities, businesses, and public sector services use improved PPCR support tools, instruments, strategies, and activities to respond to climate variability or climate change (Pilot Program for Climate Resilience)
Reference for indicator example	Pilot Program for Climate Resilience (PPCR) Monitoring and Reporting Toolkit. CIF, 2013
Data needs	List of climate responsive instruments/investment models developed and tested; Number of target stakeholders/users using tools to respond to climate variability or climate change
Data sources, collection methods	Actual data from ongoing projects, including project/programme-specific surveys and data from national systems such as the census
Calculation of the indicator	Existing data summarized in a table using Microsoft Excel. The table lists the number of households, communities, businesses and public sector service entities for each improved PPRC supported tools, instruments, strategies and activities identified.
Spatial scale	National and sub-national
Disaggregation	By sector, by gender, by vulnerable groups, by livelihoods, by climate hazards, by regions

» list of indicators

Indicator	Number of **communication tools** that incorporate climate change adaptation
Sectors	Information & communication, Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Perceptions influence people's actions. Sensitizing people to climate change through various communication tools is therefore a pre-requisite to effective climate adaptation.
Potential limitations	This indicator could be completed with other indicators to capture the types of communications tools that mainstream adaptation, the target audience, how they are disseminated, or their effect on adaptation
Indicator example	Number of actions carried out [to incorporate an adaptation element into existing or future communication tools] (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Number of actions taken to integrate climate adaptation into existing or future communication tools
Data sources, collection methods	Government entity responsible for climate change (e.g. Ministry of Environment, Office of the Prime Minister)
Calculation of the indicator	Summation
Spatial scale	National and subnational
Disaggregation	By communication tools, by gender

» list of indicators

Indicator	Number of **public awareness campaigns on water efficiency**
Sectors	Information & communication, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Climate change can lead to more frequent and intense extreme events such as drought. General population should be aware of the importance of reducing their water consumption in order to adapt to the increasing risk of water shortages.
Potential limitations	This indicator could be completed with other indicators to capture the type of campaign, who is targeted, the messages conveyed, the impact (e.g. whether it leads to behavioural change). The latter is important because knowledge does not always translate into effective action.
Indicator example	Number of water companies carrying out public awareness campaigns on water efficiency (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of public awareness compaigns on water efficiency carried out by different actors
Data sources, collection methods	Water companies; government agencies;
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By size and type of business

» list of indicators

Indicator	Number of visitors to the **national climate adaptation website**
Sectors	Information & communication
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	The Internet has become one of the most important methods for communicating and disseminating information on climate impacts and adaptation at national level and it supports the increased coordination of activities.
Potential limitations	This indicator could be completed with other indicators to capture what kind of adaptation information is accessed, by whom, if/how it is applied, and the results (on awareness raising, increased coordination, etc.).
Indicator example	Number of visitors [to the Ministry's adaptation website] (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Number of website visitors
Data sources, collection methods	Government entity responsible for climate change (e.g. Ministry of Environment, Office of the Prime Minister), website visitor count
Calculation of the indicator	Enumeration
Spatial scale	National and subnational
Disaggregation	By sector, by region, by climate hazards

» list of indicators

Indicator	**Percentage of trade and industry chambers using and distributing climate information**
Sectors	Information & communication, Trade & Industry, Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Trade and industry chambers´ are uniquely positioned to distribute knowledge and develop capacities related to climate change adaptation in the private sector.
Potential limitations	The indicator only tracks how many trade and industry chambers use and distribute climate information, but it neither considers the quality of the distributed information, nor the effects of using and spreading them (e.g. number of enterprises using the given information, impacts on decision-making in the private sector). The indicator also does not specific what constitutes “use” of climate information.
Indicator example	Percentage of trade and industry chambers using and distributing climate information
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Number of trade and industry chambers using and distributing climate information Total number of trade and industry chambers
Data sources, collection methods	Ministry for Economics (SE), National system for information on enterprises (SIEM)
Calculation of the indicator	Numerator: number of trade and industry chambers using and distributing climate information; Denominator: total number of trade and industry chambers
Spatial scale	National
Disaggregation	By sector

» list of indicators

Indicator	Number of **urban adaptation best practices** disseminated
Sectors	Building sector, Information & communication, Urban areas
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	The dissemination of best practices supports the scaling up and replication of adaptation measures.
Potential limitations	This indicator could be completed with other indicators to capture the extent to which best practices are being adapted, scaled up and replicated and their impacts.
Indicator example	Number of adaptation best practices in cities disseminated (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Number of adaptation best practices targeting cities that have been distributed
Data sources, collection methods	City authorities, mayors, civil societies organizations
Calculation of the indicator	Summation
Spatial scale	National and subnational
Disaggregation	By cities, by sector (e.g. transport, health, etc)

» list of indicators

Indicator	Percentage of population living in flood and/or drought-prone areas with **access to rainfall forecasts**
Sectors	Building sector, Coastal zones, Financial services, Information & communication, Urban areas, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Access to rainfall forecasts can help the population living in areas at risk of floods and/or drought prepare and minimize the negative impacts on their lives and assets.
Potential limitations	This indicator could be completed with other indicators to assess the quality of the forecast, if people actually acted upon them and who is benefiting from improved access to rainfall forecasts.
Indicator example	Percentage of population by gender in areas subject to flooding and/or drought in the county who have access to Meteorological Department information on rainfall forecasts (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Information on designated drought- and flood-prone areas (e.g. hazard maps); number of people living there and their access to different information channels (radio, extension service etc.)
Data sources, collection methods	Ministry/ies responsible for climate change and/or disaster risk reduction; Meteorological agency; Community surveys on climate information provision and access
Calculation of the indicator	Numerator = number of people (men and/or women) living in drought- and/or flood-prone areas with access to rainfall forecasts; Denominator = total number of people (men and/or women) living in said drought- and/or flood-prone areas
Spatial scale	Sub-national
Disaggregation	By gender

» list of indicators

Indicator	Number of government staff that have received **training on adaptation**
Sectors	Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Person
Adaptation relevance	Government capacity to deliver adaptation is essential for the integration of adaptation into planning and for the roll-out of adaptation actions and associated monitoring and evaluation.
Potential limitations	This indicator does not capture the results of the training – only that people attended a training session. This indicator could be combined with other indicators to assess the impacts of the training on government staff's perceptions and practices (i.e. is there any changes in perceptions or behaviours as a result of receiving training?)
Indicator example	Number of ministries at county level that have received training for relevant staff on the costs and benefits of adaptation, including valuation of ecosystem services (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Participation lists from training workshops
Data sources, collection methods	Government departments
Calculation of the indicator	Simple summation
Spatial scale	Sub-national
Disaggregation	By gender

» list of indicators

Indicator	Degree of **integration of climate change** into development planning
Sectors	Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	The integration of climate change concerns into planning processes (i.e. strategies, policies, plans, laws, regulations and institutional arrangements) at national and sectoral levels supports climate adaptation.
Potential limitations	This indicator does not measure how the strategic documents are being implemented and their effects on reducing the negative impacts of climate change.
Indicator example	Degree of integration of climate change in national, including sector, planning (PPCR)
Reference for indicator example	Pilot Program for Climate Resilience (PPCR) Monitoring and Reporting Toolkit. CIF, 2013
Data needs	Number of planning documents that incorporate climate change concerns
Data sources, collection methods	Existing national data and information (e.g. national policy planning documents, national repositories from the civil society, program documents, recent data sources, etc.)
Calculation of the indicator	Scorecard method using Microsoft Excel. Each scorecard lists 4 to 5 key questions that assess progress in implementing the PPCR activities using a score from 0 (no) to 10 (yes/completely). Qualitative self-assessments by the program team together with relevant stakeholders of the various strategies, policies, plans and documents to observe changes in terms of integration of climate change priorities.
Spatial scale	National
Disaggregation	By sector

» list of indicators

Indicator	Number of **policies and coordination mechanisms explicitly addressing climate change** and resilience
Sectors	Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Climate adaptation requires that institutions and institutional frameworks for mainstreaming climate change are in place (i.e. political will).
Potential limitations	This indicator could be completed with other indicators to assess how increased mainstreaming capacity and coordination lead to enhanced climate adaptation (for whom, where, etc.).
Indicator example	Evidence of strenghtened government capacity and coordination mechanism to mainstream climate resilience (Pilot Program for Climate Resilience)
Reference for indicator example	Pilot Program for Climate Resilience (PPCR) Monitoring and Reporting Toolkit. CIF, 2013
Data needs	Data on adjusted policies and coordination mechanism, for example: number of policies integrating climate change, number of climate change focal points appointed etc.
Data sources, collection methods	National repositories (incl. meeting documents, workshop and budget reports), policy papers, other relevant reports
Calculation of the indicator	Scorecard method using Microsoft Excel. Each scorecard lists 4 to 5 key questions that assess progress in implementing the PPCR activities using a score from 0 (no) to 10 (yes/completely). Qualitative self-assessments by the monitoring and evaluation team together with relevant stakeholders
Spatial scale	National
Disaggregation	By sector

» list of indicators

Indicator	Number of policies, plans or programmes introduced or adjusted that **mainstream climate risks**
Sectors	Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Climate change is an overarching issue and can affect all sectors and levels. As such it should be considered in all government planning processes.
Potential limitations	This indicator could be combined with other indicators to assess the level of implementation and associated impacts of those policies, plans and programs.
Indicator example	Number of policies, plans or programmes introduced or adjusted to incorporate climate change risks (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Total number of climate sensitive policies, plans and programmes in the country
Data sources, collection methods	Sectoral ministries
Calculation of the indicator	Summation
Spatial scale	National
Disaggregation	By sectors, by levels of governance

» list of indicators

Indicator	**Percentage of municipalities with local regulations considering adaptation** and vulnerability assessment results
Sectors	Urban areas, Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Orientating urban planning and local regultations (e.g. urban development plans, building permits) at climate risks indicates a high level of mainstreaming of adaptation at local level and allows local decision-makers to consider existing vulnerabilities to climate change systematically.
Potential limitations	The indicator only tracks the existence of regulatory instruments that systematically consider adaptation criteria and vulnerabilities to climate change, but neither their quality of performance, nor their implementation status.
Indicator example	Total number of municipalities with local ordinances (e.g. urban development plans, building permits) considering adaptation criteria and vulnerability assessment results
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Number of municipalities with climate resilient local regulations, Total number of municpalities
Data sources, collection methods	Ministry for Environment and Natural Resources (SEMARNAT), Ministry for territorial and urban development (SEDATU), ordinances from municipalities
Calculation of the indicator	Numerator = number of municipalities considering climate change adaptation in their local regulations; Denominator = total number of municipalities
Spatial scale	National and subnational
Disaggregation	By municipalities

» list of indicators

Indicator	Percentage of **new hydroelectric projects** that consider future climate risks
Sectors	Energy, Trade & Industry, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Any new hydroelectric project that does not account for future potential impacts of climate change (in terms of location, design and composition of the hydroelectric system) could face important damages or be destroyed.
Potential limitations	This indicator could be completed with other indicators to assess the effectiveness of any new hydroelectric projects that consider future climate risks.
Indicator example	Percentage of new hydroelectric projects in the county that have been designed to cope with climate change risk (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Total number of new hydroelectric projects in country; number of new hydroelectric projects that consider climate risk / uncertainty
Data sources, collection methods	Ministry of Energy
Calculation of the indicator	Numerator = number of new projects that have been designed to cope with climate change risk; Denominator = total number of new projects in the target area
Spatial scale	National or sub-national
Disaggregation	By types of hydroelectric projects, by regions

» list of indicators

Indicator	Existence of **interministerial/ intersectoral commissions working on adaptation**
Sectors	Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	The existence of intersectoral coordination mechanisms on adaptation can support coherent planning and coordination across government departments and can faciliate mainstreaming. It is also an expression of political will.
Potential limitations	The indicator does not indicate the quality or resulting impacts of the coordination processes on adaptation.
Indicator example	Number of interministerial commissions dealing with adaptation to climate change at federal state level
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Number of commissions, definition of interministerial commission (e.g. interministerial commission/ working group comprises at minimum two or more representatives from two or more different sectors)
Data sources, collection methods	Directorate General for Climate Change policies in the SEMARNAT
Calculation of the indicator	Counting of total number of inter-ministerial commissions/ working groups on adaptation with respective work plans
Spatial scale	Sub-national
Disaggregation	By federal state level

» list of indicators

Indicator	Number of **financial mechanisms** identified to support climate change adaptation
Sectors	Financial services
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Climate adaptation will require additional money; funding can be mobilized in various ways - e.g. tax contributions from activities which generate greenhouse gases;levies on activities or people settling in high risk areas.
Potential limitations	This indicator provides information on the existence of financial mechanisms but not on which ones are most appropriate, if they are sufficient and easily accessible.
Indicator example	Number of mechanisms identified which could potentially fund adaptation (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Number of climate adaptation financial mechanisms in the country
Data sources, collection methods	Ministry of Finance, donor agencies, private sector, civil society organizations involved in climate change adaptation
Calculation of the indicator	Summation
Spatial scale	National
Disaggregation	By sector, by livelihoods

» list of indicators

Indicator	Number of businesses with **risk management plans** considering climate change aspects/or adaptation options
Sectors	Trade & Industry
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Businesses can respond to climate change by integrating risks from climate change (direct and indirect effects) into their corporate risk management plans and procedures.
Potential limitations	This indicator could be completed with other indicators to capture the quality of the risk management plans, their level of implementation and effectiveness.
Indicator example	Number of businesses with continuity plans that cover climate risks (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of business risk management plans with a climate risk component
Data sources, collection methods	Businesses
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By business type and size

» list of indicators

Indicator	Number of **people supported to cope with the effects of climate change through the availability of a service or facility**
Sectors	Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Support (e.g. capacity building, subsidies) by development partners, government and business can facilitate adaptation to climate change.
Potential limitations	This indicator could be completed with other indicators to assess the impacts of those supporting activities on people's vulnerability to climate change.
Indicator example	Number of people supported by the PPCR (via the availability of a service or a facility) to cope with the effects of climate change (Pilot Program for Climate Resilience)
Reference for indicator example	Pilot Program for Climate Resilience (PPCR) Monitoring and Reporting Toolkit. CIF, 2013
Data needs	Number of people supported to cope with the effects of climate change
Data sources, collection methods	Actual data from ongoing projects, including project/programme-specific surveys and data from national systems such as the census
Calculation of the indicator	Existing data summarized in a table using Microsoft Excel. The table identifies a) the total number of people ; b) the number of people below the national poverty line and c) females supported by the PPCR per year directly and indirectly.
Spatial scale	National and sub-national
Disaggregation	By gender, by vulnerable groups, by livelihoods, by climate hazards, by regions (whenever social baseline surveys and analysis are available)

» list of indicators

Indicator	Percentage of farmers and fisherfolk with **access to financial services**
Sectors	Agriculture, Biodiversity, Coastal zones, Financial services, Fishery
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Improving farmers and fisherfolks' access to finance can help them build their assets (e.g. drought resistant seeds, quality houses) and therefore reduce their vulnerability to climate hazards in the context of climate variability and change.
Potential limitations	Improved access to financial services alone is not sufficient to support the adaptation of farmers and fisherfolk to climate change. This indicator could be completed with other indicators to assess the quality or effectiveness of these services.
Indicator example	Percentage of poor farmers and fishermen in the county with access to credit facilities or grants (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Total number of people (men and/or women, farmers and or fisherfolk) living in a target area; total number of people with access to financial services (credit, savings, insurance)
Data sources, collection methods	Ministry of Planning; Ministry of Agriculture; Ministry of Fisheries; financial institutions; surveys (of credit granting facilities, local cooperatives etc.)
Calculation of the indicator	Numerator = number of farmers and/or fisherfolk (men and/or women) in the target area with access to financial services; Denomintaor: total number of farmers and/or fisherfolk (men and/or women) in target area
Spatial scale	Sub-national
Disaggregation	By livelihood and/or by gender

» list of indicators

Indicator: Funding for **climate-adapted construction and refurbishment**

Sectors	Building sector, Urban areas
Focus of indicator	Adaptation action
Unit of measurement	Currency (e.g. Euros)
Adaptation relevance	Climate-adapted construction and refurbishment can prevent or minimise damage resulting from higher temperatures or extreme climatic events and can contribute to climate protection, e.g. via energy savings. Incentives and/or funding can be prerequisites for people or businesses to undertake climate-adapted construction work.
Potential limitations	Without any further regulations/stipulations and assessment it is not self-evident that funds are effectively used for construction which is really climate-adapted. It is not clear whether the funds target the most vulnerable areas, properties or people. Funds for refurbishment need not necessarily be spent on work that enhances adaptation.
Indicator example	Subsidies for climate-adapted construction and refurbishment
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Data on provision of funds
Data sources, collection methods	Subsidy statistics of KfW
Calculation of the indicator	Summation
Spatial scale	National
Disaggregation	By administrative unit; by target group (private vs. corporate); by target area (urban vs. rural); by purpose (new construction vs. refurbishment)

» list of indicators

Indicator: Total sum of **investments** in programmes for the **protection of livestock**

Sectors	Agriculture, Financial services
Focus of indicator	Adaptation action
Unit of measurement	Currency
Adaptation relevance	Livestock is an important source of livelihood and income. Investing in adaptation measures increase the farmers' adaptive capacity can offset the negative repercussions of climate change.
Potential limitations	This indicator does not capture the quality of the programmes that are set up to protect livestock or the effectiveness of the investments (targeted to most vulnerable groups? Corruption?).
Indicator example	Total sum of investments in the programme for the protection of livestock
Reference for indicator example	Morocco 2014 Draft Version. Guide to establish an M&E system of vulnerability and adaptation to climate change in the regions of Souss Massa Drâa and Marrakech Tensift Al Haouz
Data needs	Total sum of investments in the programme for the protection of livestock
Data sources, collection methods	DRA MTH Marrakech
Calculation of the indicator	Summation
Spatial scale	Regional level
Disaggregation	By region

» list of indicators

Indicator: Number of inventories of **climate change impacts on biodiversity**

Sectors	Agriculture, Biodiversity, Coastal zones, Fishery, Forestry, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Changes in biodiversity result from the complex interaction between species, habitats and anthropic pressures. The impacts of climate change in combination with other changes need to be monitored to understand these complex relations.
Potential limitations	This indicator only captures that an inventory has been completed. It could be completed with other indicators to capture the quality of the analysis, its scope, scale and how the inventories are being used.
Indicator example	Regular inventories of the impacts of climate change on biodiversity conducted (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Number of inventories conducted
Data sources, collection methods	Ministry of Environment, civil society organizations working on biodiversity conservation, national databases
Calculation of the indicator	Summation
Spatial scale	National
Disaggregation	By region; marine/terrestrial/limnic; fauna/flora

» list of indicators

Indicator — Conservation of **forest genetic resources**

Sectors	Forestry
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Safeguarding the largest possible diversity of genetic resources is important as to have genetic varieties available which are suitable for a broad range of climatic conditions.
Potential limitations	The conservation of forest genetic resources on its own is insufficient because the success of growing the trees is not self-evident. In addition, the indicator does not cover whether adapted tree varieties are actually planted, i.e., whether adapted forest management using adapted species is really implemented.
Indicator example	Conservation of forest genetic resources
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Inventory of forest species which are permenantly preserved
Data sources, collection methods	Inventory of the federal states; Federal-State-Working Group is compiling the data.
Calculation of the indicator	Counting
Spatial scale	National and sub-national
Disaggregation	States, coniferous/broad-leaf

» list of indicators

Indicator — Percentage of **transport infrastructure standards** revised

Sectors	Building sector, Trade & Industry, Transport
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Transport infrastructure has a long lifespan: it is important that technical standards respond to current and future potential impacts of climate change. A review and adaptation of technical standards for transport networks (infrastructures and equipment) is therefore needed to support climate adaptation in this sector.
Potential limitations	This indicator does not capture the quality of the revised standards, if they have been implemented, or their effectiveness.
Indicator example	Percentage of reference standards identified which are vulnerable and where changes are proposed; percentage of reference standards which have actually been modified (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Total number of standards for transport networks vulnerable to climate change; total number of revised standards for transports networks that are vulnerable to climate change
Data sources, collection methods	Relevant authorities responsible for public transport; major sea ports, airports, urban transport network operators, etc.
Calculation of the indicator	Numerator = total number of revised standards for transports networks that are vulnerable to climate; Denominator = total number of standards for transport networks vulnerable to climate change
Spatial scale	National and subnational
Disaggregation	By mode of transport, by region

» list of indicators

Indicator — **Green label for neighborhoods** requiring climate change vulnerability assessments established

Sectors	Building sector, Information & communication, Urban areas
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Adaptation actions could be incentivized through Green labels that broaden their scope beyond energy saving criteria. For example, an additional crierion could be to complete a vulnerability assessment.
Potential limitations	This indicator could be completed with other indicators to monitor the implementation of the label and its impacts on climate adaptation.
Indicator example	Award of the EcoQuartier 2012 label [which includes a diagnosis of vulnerability to climate change as an assessment criterion] (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Evidence of the establishment of a green label
Data sources, collection methods	City authorities, mayors
Calculation of the indicator	Enumeration
Spatial scale	National and subnational
Disaggregation	By urban areas

» list of indicators

Indicator	Number of **wave recorders** installed along coastal areas
Sectors	Coastal zones
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Understanding the long-term evolution and impact of climate change on coastal areas through long and continuous observation periods is important for monitoring sea level rise.
Potential limitations	This indicator provides information on the existence of wave recorders. It could be completed with other indicators to assess if the wave recorders are functioning or the measurements they are recording.
Indicator example	Number of wave recorders installed (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Number of wave recorders installed in coastal areas
Data sources, collection methods	Research institutes specialized in climate change and coastal zones; meteorology office
Calculation of the indicator	Summation
Spatial scale	National and subnational
Disaggregation	By region

» list of indicators

Indicator	Number of **existing meteorological stations per territorial unit**
Sectors	Information & communication, Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	A higher density and better coverage of climate information per territorial unit helps producing better climate projections and reducing insecurity related to climate change impacts (e.g. territorial and temporal comparisons). All in all it provides decision-makers a better information basis for strategic policy planning of adaptation.
Potential limitations	The indicator does not capture the quality of the generated climate data. It further does not consider climate information from ocean weather stations or from space stations in the atmospheric layers and neither if and how the informaton are combined/ analyzed for policy planning.
Indicator example	Number of existing meteorological stations per territorrial unit in the country
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Total number of existing meteorological stations and their geographical coordinates Common definition for territorial unit and total number of territorial units
Data sources, collection methods	National Meteorological Service (SMN), World Meteorological Organization (WMO), National institute for statistics and geography (INEGI)
Calculation of the indicator	Numerator = total number of existing meteorological stations; Denominator = number of territorial units. Develop maps/networks of climate information coverage by using geopraphic coordinates of meteorological stations.
Spatial scale	National and sub-national
Disaggregation	By territorial unit

» list of indicators

Indicator	**Climate change vulnerability maps** of coastal zone developed
Sectors	Coastal zones
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Climate change vulnerability maps depict the classification of coastal areas – i.e. identifying areas based on their exposure and vulnerability to different hazards – and support different decisions regarding the development in/around these areas.
Potential limitations	This indicator indicates whether or not vulnerability maps have been developed. It could be completed with other indicators to assess the quality of the maps, whether they are used, and with what results.
Indicator example	Production of [vulnerability] maps on a national scale for three regions (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Number of climate change vulnerability maps for coastal zones
Data sources, collection methods	Research institutes specialized in climate change and coastal zones, national and regional databases
Calculation of the indicator	Summation
Spatial scale	National and subnational
Disaggregation	By climate hazards

» list of indicators

Indicator	Number of **properties** with **retrofitted** flood resilience measures; water meters; water efficiency measures; cooling measures
Sectors	Building sector, Trade & Industry
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Property designs need to account for extreme weather events (e.g. floods) and changes in water availability and temperature due to climate change.
Potential limitations	This indicator could also be combined with other indicators to assess the quality or effectiveness of retrofitting measures on climate risk management and the extent to which the properties are actually exposed to flood, higher temperatures, etc. now and in the future.
Indicator example	Number of properties retrofitting flood resilience measures; water meters; water efficiency measures; cooling measures (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of retroffited properties
Data sources, collection methods	Local government agencies responsible for tax collection and utility companies
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By region, by types of properties

» list of indicators

Indicator	Number of **water efficiency measures** used in energy generation/extraction
Sectors	Energy, Trade & Industry, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Climate change reduces water availability in many regions and particularly in dry seasons: energy generation/extraction needs to promote water saving to remain profitable.
Potential limitations	This indicator could be combined with other indicators to capture the type of water efficiency measures and to assess their impacts (e.g. do they lead to the expected outcome, for how long, under what conditions, etc.) on water conservation.
Indicator example	Increased uptake of water efficiency measures for energy generation/extraction (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of water efficiency measures adopted by the public and private sector
Data sources, collection methods	National energy agency, private sector working on energy generation/extraction
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By types of activities, by region

» list of indicators

Indicator	Number of water companies **rationing water during droughts**
Sectors	Trade & Industry, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	During extended periods with little or no rainfall, water rationing can help businesses and households manage the negative impacts of water availability.
Potential limitations	This indicator could be completed with other indicators capture the number of water rationing measures, their timing or duration and to assess the impacts of water rationing during droughts period (it is effective, for whom, for how long, what are the associated costs, etc.)
Indicator example	Number of water companies issuing drought orders (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of companies who issue water rationing measures
Data sources, collection methods	Water companies
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By size and type of business

» list of indicators

Indicator	Number of businesses that have **changed their working hours**
Sectors	Human health, Trade & Industry
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Rising temperatures and seasonal changes in the context of climate change call for a change in working hours, for example, to reduce exposure of construction workers to extreme heat during mid day or to reduce the consumption of air conditioning.
Potential limitations	This indicator could be completed with other indicators to assess the effectiveness of changed working hours for resources efficiency in the context of rising temperatures and seasonal changes. In addition, changes in working hours may be due to other reasons than climate change (e.g. adoption of gender sensitive policies).
Indicator example	Uptake of changed working hours by businesses (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of businesses adopting changed working hours
Data sources, collection methods	Businesses
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By types of businesses

» list of indicators

Indicator	Uptake of **early warning systems** (UV and air/water quality)
Sectors	Human health, Information & communication, Trade & Industry
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Early warning systems can help people and businesses prepare for and minimize the negative impacts of climate hazards on their activities.
Potential limitations	This indicator could be completed with other indicators to assess the effectiveness of early warning systems. The indicator does not consider whether contingency plans are in place. In addition, air and water quality deterioration may be due to other factors than climatic changes.
Indicator example	Uptake of early warning systems (UV and air/water quality) (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of early warning systems for UV and air/water quality adopted
Data sources, collection methods	Environmental agencies
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By types of early warning systems, by region, by hazard types

» list of indicators

Indicator	Uptake of measures to reduce **air pollution**
Sectors	Human health, Tourism, Trade & Industry
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Air pollution is strongly influenced by shifts in the weather (e.g. heat waves or droughts); adopting air pollution measures will reduce the impact of such shifts on health.
Potential limitations	Other factors than climate change have a strong influence on air pollution. This indicator could be completed with other indicators to capture the type, scale or effectiveness of air pollution measures.
Indicator example	Uptake of measures to reduce air pollution (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of measures for air pollution reduction adopted
Data sources, collection methods	Environmental agencies
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By types of measures, by region, by hazard types

» list of indicators

Indicator: Uptake of **soil conservation measures**

Sectors	Agriculture, Biodiversity, Forestry
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Preserving good ecosystem services, including productive soil, is essential to promoting sustainable agriculture in a changing climate, though climate change is only one driver of erosion.
Potential limitations	This indicator could be completed with other indicators to capture the effectiveness of soil conservation measures in a changing climate.
Indicator example	Uptake of soil conservation measures (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of soil conservation measures adopted
Data sources, collection methods	Environmental agencies, NGOs, private sector (agro-food business)
Calculation of the indicator	Summation
Spatial scale	Sub-national
Disaggregation	By region

» list of indicators

Indicator: Percentage of **climate resilient trees**

Sectors	Biodiversity, Forestry
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Different tree types and varieties have different sensitivity level to climatic changes. New tree plantations need to account for future potential climate change impacts at the regional level.
Potential limitations	Climate resilient tree species may be associated with trade-offs – e.g. reduced market value, increased sensitivity to pests and diseases, or unexpected, long-term impacts on the ecosystem by introducing alien species into ecosystems.This indicator could be completed with other indicators to assess which tree or combination of tree species is most appropriate under future climatic changes.
Indicator example	Proportion of timber trees planted in areas likely to be climatically suitable in 2050 (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Total number of timber trees planted in the country; total number of timber trees planted in areas likely to be climatically suitable in the long term
Data sources, collection methods	Forest department; Meteorology agency
Calculation of the indicator	Numerator: total number of timber trees planted in areas likely to be climatically suitable in the long term; Denomiator: total number of timber trees planted in the country
Spatial scale	National
Disaggregation	By eco-region

» list of indicators

Indicator: Proportion of **forest managers** taking action on adaptation

Sectors	Forestry
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Climate change can affect the growth and productivity of forests and alter the frequency and intensity of forest disturbances (e.g. insect outbreaks, invasive species, wildfires, storms).
Potential limitations	This indicator could be completed with other indicators to capture the type and effectiveness of the adaptation measures adopted by forest managers.
Indicator example	Proportion of forest managers taking some form of action on adaptation (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Total amount of forest managers; Total amount of forest managers taking some form of action on climate adaptation
Data sources, collection methods	Forest department
Calculation of the indicator	Numerator:Total amount of forest managers taking some form of action on climate adaptation; Denominator: total amount of forest managers
Spatial scale	Subnational
Disaggregation	By regions, by forest types

» list of indicators

Indicator — Area of land under **'landscape scale' conservation**

Sectors	Biodiversity
Focus of indicator	Adaptation action
Unit of measurement	Hectare
Adaptation relevance	Protecting large landscapes can help conserve biodiversity in the face of climate change as they provide corridors for species migration and allow for holistic solutions adapted to a specific landscape.
Potential limitations	This indicator could be completed with other indicators to assess the effectiveness of the conservation measures in the context of climate change.
Indicator example	Area of land under 'landscape scale' conservation (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Area of land classified under 'landscape scale' conservation
Data sources, collection methods	National agency responsible for the environment
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By regions, by types of landscape

» list of indicators

Indicator — Uptake of **riparian tree planting**

Sectors	Coastal zones, Urban areas, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Planting trees along rivers can provide multiple co-benefits in the context of climate change (i.e. flood mitigation, water quality and/or river cooling benefits).
Potential limitations	This indicator could be completed with other indicators to capture the effectiveness of riparian tree planting in a changing climate.
Indicator example	Uptake of riparian tree planting (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Amount of forested riparian area; amount of unforested riparian area
Data sources, collection methods	Agency responsible for riparian area; forest department
Calculation of the indicator	Enumeration
Spatial scale	National and sub-national
Disaggregation	By region, by riparian area

» list of indicators

Indicator — Number of businesses with **insurance for extreme weather events**

Sectors	Trade & Industry
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Insurance products can help businesses to spread the costs associated with the negative impacts of climate change .
Potential limitations	Does not capture the type of insurance coverage; it may also create a disincentive for adaptation. This indicator should be linked with indicators capturing whether adaptation activities are taking place.
Indicator example	Number of businesses with insurance for extreme weather events (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Number of insurance for extreme weather events delivered to businesses
Data sources, collection methods	Insurance companies, businesses
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	By business type and size

» list of indicators

Indicator	Percentage of companies **assessing risks and opportunities** from extreme weather and reduced water availability to their supply chains
Sectors	Trade & Industry
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Extreme weather events and reduced water availability due to climate change can lead to new risks and opportunities for businesses.
Potential limitations	This indicator could be completed with other indicators to capture the quality of the assessments and if they lead to changes in supply chain management .
Indicator example	Percentage of companies assessing risks and opportunities to their supply chains from extreme weather and reduced water availability (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Total number of companies; number of companies conducting climate risk assessments
Data sources, collection methods	Businesses' risk management plans
Calculation of the indicator	Numerator: number of companies conducting climate risk assessments; Denomiator: total number of companies
Spatial scale	National and sub-national
Disaggregation	By types of business

» list of indicators

Indicator	**Percentage of treated wastewater**
Sectors	Agriculture, Biodiversity, Coastal zones, Fishery, Human health, Trade & Industry, Urban areas, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Higher temperatures and water scarcity increase the need for treating and reutilizing wastewater. By treating wastewater the potential use of contaminated water (e.g. in agricultural sector) will be avoided which could result in positive impacts on the natural water balance, soil fertility and human health .
Potential limitations	The indicator neither considers which type of water is treated (e.g. industrial, etc.), nor the water´s level of contamination. It does not measure savings or efficiency gains by treating and re-using the water either.
Indicator example	Percentage of treated wastewater from municipal wastewater collection systems
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Total wastewater supply in municipal wastewater collection systems in m^3 Total wastewater supply that has been treated in municipal wastewater collection systems in m^3
Data sources, collection methods	National Commission for Water (CONAGUA)
Calculation of the indicator	Numerator = total wastewater supply in municipal wastewater collection systems in m^3; Denominator = total wastewater supply that has been treated in municipal wastewater collection systems in m^3; Result *100
Spatial scale	National and sub-national
Disaggregation	By municipalities

» list of indicators

Indicator	**Percentage of agricultural land with improved irrigation**
Sectors	Agriculture, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Percentage
Adaptation relevance	Improved irrigation systems are more water efficient and more precise. Crops are more likely to be irrigated with an appropriate amount of water which can increase yields. Lower water consumption favours sustainability and supply security and helps prevent salinisation and save costs.
Potential limitations	This indicator could be combined with indicators covering costs and benefits of improved irrigation. If improved irrigation implies more irrigation, there can be problems concerning overexploitation of groundwater resources and salinisation. This would entail maladaptation.
Indicator example	Change in share of agricultural land with improved irrigation systems (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Total amount of agricultural land in the country per year; total amount of agricultural land with improved irrigation systems per year
Data sources, collection methods	Ministry of Agriculture; Ministry of Water; agricultural census
Calculation of the indicator	Numerator = total amount of agricultural land with improved irrigation systems per year; Denominator = total amount of agricultural land in the country per year
Spatial scale	National and sub-national
Disaggregation	By sub-national unit, by crop type (cereals, vegetables,...), by irrigation system (border, furrow, drip)

» list of indicators

Indicator	Percentage of **coastline under marine protection**
Sectors	Biodiversity, Coastal zones, Fishery, Tourism, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Hectare
Adaptation relevance	Higher temperatures and more GHG emissions lead to higher water temperatures and acidification levels in the sea that disturb marine habitats. By protecting marine zones their ecosystem services and biodiversity can be conserved which can contribute to enhance their resilience to climate change.
Potential limitations	The indicator neither measures the effectiveness of the nature conservation activities, nor the extent to which the marine ecosystems´ resilience is enhanced.
Indicator example	Area of protected marine zones compared to extension of Mexican coast line
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Total number of hectares of marine zones officially protected, total number of hectares of territorial sea in Mexico
Data sources, collection methods	National Commission for Protected Nature Areas (CONANP) and National Commission for the Knowledge and Use of Biodiversity (CONABIO)
Calculation of the indicator	Numerator = total number of hectares of marine zones officially protected Denominator = total number of hectares of territorial sea in Mexico
Spatial scale	National
Disaggregation	National level

» list of indicators

Indicator	Number of **firebreaks** constructed
Sectors	Biodiversity, Forestry
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	The construction of firebreaks is important to adapt to the increasing risk of forest fires since they prevent forest fires from spreading.
Potential limitations	This indicator does not cover whether or not the firebreaks are effective, e.g. whether they are wide enough and maintained (cleared) regularly.
Indicator example	Number of firebreaks constructed
Reference for indicator example	Morocco 2014 Draft Version. Guide to establish an M&E system of vulnerability and adaptation to climate change in the regions of Souss Massa Drâa and Marrakech Tensift Al Haouz
Data needs	Total number of firebreaks constructed. Total number already existing firebreaks.
Data sources, collection methods	DREFLCD HA - Marrakech; Annual Report on Forest Fires
Calculation of the indicator	Summation
Spatial scale	Regional or province level
Disaggregation	By region, by predominant land use

» list of indicators

Indicator	Number of farmers **involved in pilot irrigation messaging projects**
Sectors	Agriculture, Information & communication, Water resources, Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	A messaging service for farmers can support adaptation to changing weather conditions. Knowledge on local weather conditions helps farmers to determine the time for irrigation. A more efficient irrigation system saves scarce water resures. Moreover, the crops are more likely to obtain the optimal amount of water which increases yields and thus positively affects the farmers' livelihoods.
Potential limitations	This indicator does not capture whether and how farmers use this service nor whether the forecasts are reliable (they would otherwise lead to sub-optimal irrigation).
Indicator example	Number of farmers who are members of the service of pilot irrigation messaging projects
Reference for indicator example	Morocco 2014 Draft Version. Guide to establish an M&E system of vulnerability and adaptation to climate change in the regions of Souss Massa Drâa and Marrakech Tensift Al Haouz
Data needs	Total number of farmers who are a member of the pilot irrigation project service
Data sources, collection methods	Agrotech SMD – Action report
Calculation of the indicator	Summation
Spatial scale	Sub-regional level
Disaggregation	By region, gender, small-scale vs. Large-scale farmers

» list of indicators

Indicator: Number of **women organised in agricultural cooperatives**

Sectors	Agriculture, Trade & Industry, Capacity building & mainstreaming
Focus of indicator	Adaptation action
Unit of measurement	Number
Adaptation relevance	Being organized in agricultural cooperatives can improve the adaptive capacity of women, e.g. through better marketing of products, better market access, and support from the cooperative in case of yield losses.
Potential limitations	This indicator does not capture whether the cooperatives are fully operational, nor whether women e.g. in male dominated societies really benefit. It is not clear to what extent the organisation presents support in the face of climate change (e.g. is there a form of risk sharing mechanism?). If it does not, then the indicator has no direct adaptation relevance.
Indicator example	Number of women organised in argan cooperatives
Reference for indicator example	Morocco 2014 Draft Version. Guide to establish an M&E system of vulnerability and adaptation to climate change in the regions of Souss Massa Drâa and Marrakech Tensift Al Haouz
Data needs	Total number of argan cooperatives. The total number of women organised in argan cooperatives
Data sources, collection methods	ODECO Marrakech and ODECO Agadir
Calculation of the indicator	Summation
Spatial scale	Regional or province level
Disaggregation	By region

» list of indicators

Indicator: Cultivation of varieties of **red wine which like warmth**

Sectors	Agriculture
Focus of indicator	Adaptation action
Unit of measurement	Acres
Adaptation relevance	Cultivation systems may need to be adjusted to changing climatic conditions. One adaptation strategy is selecting specific crop varieties that are better adapted to higher temperatures.
Potential limitations	The indicator does not capture the impact on the wine-makers income (challenges regarding sales of the new variety, scepticism of consumers, competition, marketing, susceptability to pests and diseases etc.).
Indicator example	Cultivation of varieties of red wine which like warmth in Germany
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Compilation of areas and the wine varieties which are cultivated there
Data sources, collection methods	Wine-maker associations, agricultural agencies; GIS-based assessment
Calculation of the indicator	Summation
Spatial scale	National and sub-national
Disaggregation	Regions; organic and conventional cultivation

» list of indicators

Indicator: Compliance with **fishing quota**

Sectors	Biodiversity, Fishery
Focus of indicator	Adaptation action
Unit of measurement	Fish catch in tons or percentage of discrepency from quota
Adaptation relevance	Regulation of allowable catches to prevent overexploitation of fisheries resources is important to sustain fish population. Reducing stress from overexploitation may allow the fis to better cope with additional stress due to climatic change like changes in water temperature.
Potential limitations	Avoiding overexploitation of fish is important irrespective of climate change. Thus, this indicator is only a proxy to measure reduced stress on fish populations assuming this creates a higerh capacity for it to adapt to environmental changes.
Indicator example	Conformity of total allowable catch with scientific recommendations
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Total allowable catch as determined by authorities; recommendations with regard to total allowable catch of legitimate scientific body
Data sources, collection methods	ICES publications; EU regulations/ official fishing quota
Calculation of the indicator	Substraction: discrepancy in tons of catch
Spatial scale	National
Disaggregation	Individual fish species; fresh water versus salt water species

» list of indicators

Indicator	Priority areas for precautionary flood protection
Sectors	Urban areas, Water resources
Focus of indicator	Adaptation action
Unit of measurement	Degree of integration into land use planning (qualitative); acres (quantitative)
Adaptation relevance	Vulnerability assessments or flood risk modelling can indicate areas which are particularly at risk and point to areas for precautionary flood protection. This needs to be translated into the land use planning to enable adaptation to take place.
Potential limitations	Definition of such priority areas in spatial planning does not necessarily mean that the areas in question are really used as water retention sites: overriding competing interests may result in different land use options being given preference (not completely binding).
Indicator example	Priority areas for precautionary measures against flooding
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Regional land use plans
Data sources, collection methods	German Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). Raumordnungsmonitor (countrywide GIS-based planning information system containing all spatial plans)
Calculation of the indicator	Summation
Spatial scale	National
Disaggregation	Administrative district; catchment area; high risk versus low risk area

» list of indicators

Indicator	Energy Storage Capacity
Sectors	Energy
Focus of indicator	Adaptation action
Unit of measurement	Kilowatt hours
Adaptation relevance	Extreme weather events such as heat waves can lead to peaks in energy demand which necessitate the storage of energy; renewable energies also require storage capacity due to fluctuations in supply.
Potential limitations	The indicator only assesses the availability of facilities for storage but does no consider whether they are sufficient and well connected to the grid. To be directedly adaptation-related the energy would need to be used for adaptation activities or contribute to adaptive capacity.
Indicator example	Facilities for electricity storage
Reference for indicator example	Schönthaler, K. et al. (2011). Establishment of an Indicator Concept for the German Strategy on Adaptation to Climate Change. German Federal Environment Agency
Data needs	Storage capacity at the time of the baseline. Storage capacity at the time of interest.
Data sources, collection methods	Powerplant database of the UBA (Federal Environmental Agency of Germany)
Calculation of the indicator	Substraction
Spatial scale	National and sub-national
Disaggregation	Federal state level

» list of indicators

Adaptation results

Indicator	Percentage of **climate resilient roads** in the country
Sectors	Trade & Industry, Transport
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	Roads are vital to economic and social well-being. Damage by heavy rains, flooding and extreme heat can cause disruptions of the transport system with further negative consequences. Poor infrastructure unable to accommodate water flows can exacerbate flooding.
Potential limitations	This indicator could be completed with other indicators to assess the quality and effectiveness of climate resilient roads to climate hazards. Interpretation of this indicator should also take the nature of roads (paved or unpaved) and any changes in the total length of roads into account.
Indicator example	Percentage of county roads that have been made "climate resilient" or that are not considered to be vulnerable (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Total length of roads in country (km); length of roads not at risk by virtue of its design and location; length of roads not at risk because it has been subject to a vulnerability assessment and improvement.
Data sources, collection methods	Ministry of Transport
Calculation of the indicator	Numerator = length of road that is not at risk + lengh of road that is at risk but has been subject to relevant improvements (km); Denominator = total length of road in the target area (e.g. district, country, etc.) (km)
Spatial scale	National or sub-national
Disaggregation	By region, by types of road infrastructures

» list of indicators

Indicator	Percentage of poor people in drought-prone areas with **access to safe and reliable water**
Sectors	Agriculture, Human health, Trade & Industry, Urban areas, Water resources
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	Poor people are especially vulnerable during droughts as they often lack the resources to buy water or rights to access supplies.
Potential limitations	This indicator could be completed with other indicators to assess who is benefiting from increased access to safe and reliable water (e.g. lack of maintenance of water infrastructures may restrict benefits).
Indicator example	Percentage of poor people (by gender) in drought prone areas in the county with access to reliable and safe water supplies (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Number of people with access to safe and reliable water supplies; number of people (men and women) living in areas subject to drought
Data sources, collection methods	Ministry of Water and Irrigation; Bureau of statistics for information on poverty
Calculation of the indicator	Numerator = number of people (men and/or women) in drought-prone areas with access to safe and reliable water supplies; Denominator = number of people (men and/or women) in drought-prone area
Spatial scale	Sub-national
Disaggregation	By gender

» list of indicators

Indicator	Percentage of urban households with **access to piped water**
Sectors	Human health, Trade & Industry, Urban areas, Water resources
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	Urban households without access to piped water spend time fetching water and face increased risks of waterborne diseases from contaminated sources.
Potential limitations	This indicator assumes that access to piped water leads to a reduction of vulnerability to climate change. It could be combined with other indicators to to assess the exact adaptation benefits (e.g. health improvements, increased economic productivity) and to assess who benefits from the improved access to piped water (e.g. is it the healthiest urban households?)
Indicator example	Percentage of urban households with access to piped water (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Number of people with access to piped water in urban areas; number of people living in urban areas
Data sources, collection methods	Ministry of Urban Development; national agricultural census
Calculation of the indicator	Numerator = number of people with access to piped water in urban areas; Denominator = number of people living in urban areas
Spatial scale	Sub-national
Disaggregation	By region

» list of indicators

Indicator	Number of **cubic metres of water conserved**
Sectors	Agriculture, Trade & Industry, Urban areas, Water resources
Focus of indicator	Adaptation results
Unit of measurement	Cubic metre
Adaptation relevance	Climate change puts additional pressures on water resources; promoting water-saving across all sectors and uses, particularly in region experiencing shortages can support climate adaptation.
Potential limitations	Attribution problem: water savings may be due to a combination of factors (e.g. period of temperate climate, technology). The indicator does not provide information on whether the water conservation is enough to offset limited water availability.
Indicator example	Estimation of water savings achieved via communications operations and funding (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Total amount of water consumption before and after communication campaigns
Data sources, collection methods	Water agencies
Calculation of the indicator	Difference in water consumption before and after communication campaigns
Spatial scale	Subnational
Disaggregation	By region

» list of indicators

Indicator	Volume of **water consumed by tourist facilities**
Sectors	Tourism, Water resources
Focus of indicator	Adaptation results
Unit of measurement	Litre
Adaptation relevance	Harmonising use and availability of water in the tourist sector is crucial to cope with reduced water availability due to climate change. Water efficiency proves vital for both security of supply (economic sustainability) and ecological balance (environmental sustainability).
Potential limitations	This indicator only includes the volume of water consumed in tourist facilities for which tourist facilities are invoiced (drinking water) and does not take any other supplies of water into account. It does not consider the amount of tourists (water use per head).
Indicator example	Volume of water consumed by tourist facilities
Reference for indicator example	Morocco 2014 Draft Version. Guide to establish an M&E system of vulnerability and adaptation to climate change in the regions of Souss Massa Drâa and Marrakech Tensift Al Haouz
Data needs	Total quantity of drinking water consumed by tourist facilities
Data sources, collection methods	Régie Autonome Multi-Services Agadir (RAMSA)
Calculation of the indicator	Summation
Spatial scale	Regional or province level
Disaggregation	By region; by area; by facility; eco-tourism vs. conventional tourism

» list of indicators

Indicator	Percentage of **water demand** being met by existing supply
Sectors	Agriculture, Human health, Trade & Industry, Urban areas, Water resources
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	Climate change combined with other changes (e.g. population growth) brings additional pressures on water resources, threatening the viability of its supply. To get a complete picture of adaptation it is important to consider both the supply and the demand side, i.e. if supply falls short demand may need to be reduced.
Potential limitations	Must be clear on what is included under water supply and demand. Does not capture if demand that is met is satisfactory. Also does not capture water quality, or reliability of provision.
Indicator example	Percentage of water demand that is supplied in the county (Kenya)
Reference for indicator example	Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)
Data needs	Volume of water supplied to households, farmers (for irrigation), and industry (in cubic metres); water demand (in cubic metres)
Data sources, collection methods	Ministry of Water and Irrigation
Spatial scale	Sub-national
Disaggregation	By sector (private households, agriculture, industry)

» list of indicators

Indicator	Percentage of households at reduced flood risk due to **construction of new or enhanced defences**
Sectors	Building sector, Coastal zones, Water resources
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	Flood defences construction can minimize the negative impacts of floods on properties in the context of climate change.
Potential limitations	Does not capture the type of defense, its quality or state of repair, and effectiveness.
Indicator example	Increased number of households at reduced flood risk due to construction of new or enhanced defences (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Flood hazard maps; location of new or enhanced flood defences; location of properties
Data sources, collection methods	National land management agencies, private companies (engineering, insurance), surveys to identify new or enhanced defences
Calculation of the indicator	Numerator = number of properties with new or enhanced flood defenses Denominator = total number of properties in flood prone areas
Spatial scale	National and subnational
Disaggregation	By region

» list of indicators

Indicator	Reduction of **flood damage and disaster relief costs** in cities due to increased standards for flood protection and improved flood emergency preparedness
Sectors	Building sector, Urban areas
Focus of indicator	Adaptation results
Unit of measurement	Currency
Adaptation relevance	Standards for flood protection and flood emergency preparedness in cities can incenticize the adoption of common, coordinated adaptation measures.
Potential limitations	Reduced flood damage and disaster relief costs can be attributed to multiple factors.
Indicator example	Annualized flood damage and disaster relief costs are reduced in cities as a result of increased standards for flood protection works and improved flood emergency preparedness (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Total costs of flood damage and disaster relief in cities per year; number of flood and disaster relief standards implemented per year
Data sources, collection methods	Ministry of Urban Development; Ministry/ies responsible for climate change and disaster risk reduction
Calculation of the indicator	Compare trend in the number of standards released with the trend in the total costs of flood damage and disaster relief per year
Spatial scale	National
Disaggregation	By cities

» list of indicators

Indicator	Number of **new major infrastructure projects** located in areas at risk
Sectors	Building sector, Coastal zones, Energy, Tourism, Trade & Industry, Transport, Urban areas, Water resources
Focus of indicator	Adaptation results
Unit of measurement	Number
Adaptation relevance	Reducing the amount of infrastructure in or near areas that are/will be subject to climate impacts will help reduce the economic costs of climate change.
Potential limitations	Attribution issue: the number of infrastructure projects located in areas at risk may be due to other reasons than policy implementation. For example, a lack of public and private funding may prevent the development of new infrastructure.
Indicator example	Reduced number of approved new major infrastructure projects located in areas at risk (UK)
Reference for indicator example	UK Adaptation Monitoring and Evaluation Framework (draft, 2013)
Data needs	Areas at risks from climate hazards; number of approved new major infrastructure projects
Data sources, collection methods	National agency responsible for infrastructures; national agency responsible for climate risk management, maps of climate hazards and maps of recent infrastructures
Calculation of the indicator	Superposition (mapping)
Spatial scale	National and sub-national
Disaggregation	By types of climate hazards, by types of infrastructure (e.g. road network, houses)

» list of indicators

Indicator	**Percentage of livestock insured** against death due to extreme and slow-onset weather events
Sectors	Agriculture, Financial services, Trade & Industry
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	The indicator provides information on the progress in implementing insurance schemes for the livestock sector and allows for temporal and territorial comparisons.
Potential limitations	The indicator does not provide information on whether the amount of insurance per animal is sufficient.
Indicator example	Number of livestock insured against death due to extreme and slow-onset weather events
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Insured number of livestock per lifestock type, total number of livestock type
Data sources, collection methods	Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) and the component on natural disasters (CADENA) of the SAGARPA, Information service on agri-food and fish industry (SIAP), Ministry of Finance (SHCP)
Calculation of the indicator	Numerator = number of insured livestock per livestock type; Denominator = total number of livestock type; Result *100
Spatial scale	National and subnational
Disaggregation	By regions, federal state; by livestock type

» list of indicators

Indicator	Percentage of farmland **covered by crop insurance**
Sectors	Agriculture, Financial services
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	Crop insurance mechanisms against climate risks can help farmers cope against the negative impacts of climate hazards. By showing farmers the level of exposure to climate risk of their crops through their insurance premium, this mechanism encourages them to give greater consideration to this risk factor in decisions making.
Potential limitations	Crop insurance does not directly prevent or minimize damages from climate change. It helps share potential losses between farmers and insurers. This indicator could be completed with other indicators to evaluate changes in farming practices aimed at preventing losses from climate change (e.g. switching to different, more climate resilient crops).
Indicator example	Proportion of the total surface area insured by crop type (France)
Reference for indicator example	French National Climate Change Impact Adaptation Plan 2011-2015. Annex II. Detailed action sheets
Data needs	Total surface area for agricultural production; total surface areas insured by crop type
Data sources, collection methods	Ministry of Agriculture and Livestock; insurance companies
Calculation of the indicator	Numerator = total surface areas insured by crop type; Denominator = total surface area for agricultural production by crop types
Spatial scale	National
Disaggregation	By crop types

» list of indicators

Indicator	Percentage of **additional fodder** for grazing livestock
Sectors	Agriculture
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	Building food reserves for livestock helps to adapt to situations in which grazing does not provide sufficient fodder due to unfavourable weather conditions.
Potential limitations	It does not capture from which type of adaptation activities the additional fodder comes from. Possible adverse effects are unclear and neglected (overfertilisation to obtain the additional fodder, debt accumulation, deforestation, soil erosion)
Indicator example	Percentage of additional fodder for grazing livestock
Reference for indicator example	"Morocco: Adaptation monitoring as part of the Regional Environmental Information System" Factsheet in GIZ (2014) "Monitoring and Evaluating Adaptation at Aggregated levels: A Comparative Analysis of Ten Systems"
Data needs	Total amount of fodder. Then compare to baseline.
Data sources, collection methods	Ministry of Agriculture and Fisheries (MAPM)
Calculation of the indicator	Numerator = difference of baseline year (year 1) and year 2; Denominator = baseline year (year 1)
Spatial scale	National and sub-national
Disaggregation	By region

» list of indicators

Indicator	**Increase in agricultural productivity through irrigation** of harvested land
Sectors	Agriculture, Trade & Industry, Water resources
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	The indicator provides information on potential increases in productivity resulting from irrigating agricultural land as an adaptation measure (efficiency of adaptation action). The generated data allows to make temporal and territorial comparisons of productivity levels.
Potential limitations	The indicator does not provide information on the concrete causes or combination of causes leading to a higher productivity apart from irrigation, e.g. efficient use of other natural resources, like soil – or the use of agrochemicals or transgenic crops. If water shortage is an issue, increased irrigation could lead to maladaptation.
Indicator example	Increase in agricultural productivity through irrigation of harvested land
Reference for indicator example	Adaptation M&E indicator system of Mexico
Data needs	Real crop production in tons (e.g. corn) per harvested land in ha Potential crop production in tons per harvested land in ha
Data sources, collection methods	Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA)
Calculation of the indicator	Numerator = real crop production output in tons (e.g. corn) per harvested land in ha; Denominator = Potential crop production output in tons per harvested land in ha; Result *100; models for calculating potential crop production output under climate variations have to be developed/ improved.
Spatial scale	National and sub-national
Disaggregation	National, federal state, irrigation district, municipalities

» list of indicators

Indicator	Increase in the percentage of **climate resilient crops** being used
Sectors	Agriculture
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	Drought and flood resistant crops can help farmers adapt to a changing climate.
Potential limitations	This indicator could be completed with other indicators to assess the impacts (and potential trade-offs) associated with the production of climate resilient crops. For example, in some instances climate resilient crops may be more prone to pests and diseases or they may not find a market due to changes in taste and/or color which does not match socio-cultural habits of consumption.
Indicator example	Share of more climate resilient crops (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Total amount of crops cultivated per crop types per year; total amount of climate sensitive crops cultivated per year
Data sources, collection methods	Ministry of Agriculture, national agricultural census
Calculation of the indicator	Numerator = total amount of climate sensitive crops cultivated per year; Denominator = total amount of crops cultivated per crop types per year
Spatial scale	National and sub-national
Disaggregation	By sub-national unit, by crop types

» list of indicators

Indicator	Percentage of cultivated surface cultivated with **drought resistant varieties**
Sectors	Agriculture, Biodiversity, Water resources
Focus of indicator	Adaptation results
Unit of measurement	Percentage
Adaptation relevance	Farm land which is cultivated with drought resistant varieties helps to sustain the livelihoods of farmers and their families. It makes them less vulnerable to the adverse effects of severe droughts.
Potential limitations	Drought resistant varieties might not be adapted to other environmental conditions in the area such as lower temperature and pests. Higher yields are not guaranteed; drought resistant varieties might yield less on average due to different reasons and might only be the best option in the case of severe drought. In addition, the seeds may be expensive or require adjusted farming techniques.
Indicator example	Percentage of cultivated surface with drought resistant varieties
Reference for indicator example	"Morocco: Adaptation monitoring as part of the Regional Environmental Information System" Fact-sheet in GIZ (2014) "Monitoring and Evaluating Adaptation at Aggregated levels: A Comparative Analysis of Ten Systems"
Data needs	Total surface of land which is cultivated with drought resistant varieties
Data sources, collection methods	Ministry of Agriculture and Fisheries (MAPM)
Calculation of the indicator	Numerator = total amount of hectares of cultivated surface with drought resistant varieties; Denominator = total amount of hectares of cultivated surface
Spatial scale	National and sub-national
Disaggregation	By region; organic vs. Conventional farming; by variety; by broad crop type (cereal, vegetable, fruit,….)

» list of indicators

Indicator	**Turnover generated by agricultural cooperatives**
Sectors	Agriculture, Financial services, Trade & Industry
Focus of indicator	Adaptation results
Unit of measurement	Quantity or value of traded goods
Adaptation relevance	The turnover of agricultural cooperatives increases or is stable if the adaptation process of agricultural production to the specific climatic conditions has been successful.
Potential limitations	The turnover of agricultural cooperatives is influenced by a range of external factors such as political framework conditions, world market prices, competition, macroeconomic shocks. All these factors need to be taken into account when interpreting the indicator. The indicator could otherwise be misleading.
Indicator example	Turnover realised by argan cooperatives
Reference for indicator example	Morocco 2014 Draft Version. Guide to establish an M&E system of vulnerability and adaptation to climate change in the regions of Souss Massa Drâa and Marrakech Tensift Al Haouz
Data needs	Total turnover of argan cooperatives
Data sources, collection methods	ODECO Agadir
Calculation of the indicator	Summation
Spatial scale	Regional or province level
Disaggregation	By region, by gender, conventional vs. organic farming

» list of indicators

Indicator	Number of people with **diversified income**
Sectors	Capacity building & mainstreaming
Focus of indicator	Adaptation results
Unit of measurement	Number
Adaptation relevance	Diversified income supports climate adaptation: if one activities is negatively impacted by climate change, people can still rely on other less climate sensitive activities for a living.
Potential limitations	This indicator could be completed with other indicators to capture the sustainability, desirability and impact of alternative income sources.
Indicator example	Number of people with diversified income (Mekong River Commission)
Reference for indicator example	Mekong River Commission: Lower Mekong basin-wide monitoring and reporting system on climate change and adaptation (draft, 2013)
Data needs	Number of people with more than one source of income
Data sources, collection methods	National Bureau of Statistics, population census
Calculation of the indicator	Summation
Spatial scale	National and subnational
Disaggregation	By region; by gender; by age; by household type (e.g. women headed); by income level

» list of indicators

Lists of indicators by sector

Agriculture

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of households affected by drought
	Percentage of total livestock killed by drought
	Number of surface water areas subject to declining water quality due to extreme temperatures
	Number of hectares of productive land lost to soil erosion
	Percentage of area of ecosystem that has been disturbed or damaged
	Areas covered by vegetation affected by plagues or fires
	Shift of agrophenological phases of cultivated plants
	Losses of GDP in percentage per year due to extreme rainfall
Adaptation action	Percentage of farmers and fisherfolk with access to financial services
	Total sum of investments in programmes for the protection of livestock
	Number of inventories of climate change impacts on biodiversity
	Uptake of soil conservation measures
	Percentage of treated wastewater
	Percentage of agricultural land with improved irrigation
	Number of farmers involved in pilot irrigation messaging projects
	Number of women organised in agricultural cooperatives
	Cultivation of varieties of red wine which like warmth
Adaptation results	Percentage of poor people in drought-prone areas with access to safe and reliable water
	Number of cubic metres of water conserved
	Percentage of water demand being met by existing supply
	Percentage of livestock insured against death due to extreme and slow-onset weather events
	Percentage of farmland covered by crop insurance
	Percentage of additional fodder for grazing livestock
	Increase in agricultural productivity through irrigation of harvested land
	Increase in the percentage of climate resilient crops being used
	Percentage of cultivated surface cultivated with drought resistant varieties
	Turnover generated by agricultural cooperatives

Biodiversity

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of surface water areas subject to declining water quality due to extreme temperatures

	Number of hectares of productive land lost to soil erosion
	Percentage of area of ecosystem that has been disturbed or damaged
	Areas covered by vegetation affected by plagues or fires
	Distribution of climate sensitive species
	Acidification of marine water
	Decline in fish habitats due to temperature change
	Decreased annual average fish catch as a result of temperature change
Adaptation action	Percentage of farmers and fisherfolk with access to financial services
	Number of inventories of climate change impacts on biodiversity
	Uptake of soil conservation measures
	Percentage of climate resilient trees
	Area of land under 'landscape scale' conservation
	Percentage of treated wastewater
	Percentage of coastline under marine protection
	Number of firebreaks constructed
	Compliance with fishing quota
Adaptation results	Percentage of cultivated surface cultivated with drought resistant varieties

Building sector

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of people living in flood prone areas
	Number of properties flooded per year
	Number of properties located in river/coastal floodplain
	Number of properties lost due to coastal erosion per year
	Total length of sewerage and drainage network at risk from climate hazards
	Losses of GDP in percentage per year due to extreme rainfall
	Financial losses to businesses due to extreme weather events
	Number of people permanently displaced from homes as a result of flood, drought or sea-level rise
Adaptation action	Number of methodological guides produced to assess impacts of extreme weather events on transport systems
	Number of urban adaptation best practices disseminated
	Percentage of population living in flood and/or drought-prone areas with access to rainfall forecasts
	Funding for climate-adapted construction and refurbishment
	Percentage of transport infrastructure standards revised
	Green label for neighborhoods requiring climate change vulnerability assessments established
	Number of properties with retrofitted flood resilience measures; water meters; water efficiency measures; cooling measures
Adaptation results	Percentage of households at reduced flood risk due to construction of new or enhanced defences
	Reduction of flood damage and disaster relief costs in cities due to increased standards for flood protection and improved flood emergency preparedness
	Number of new major infrastructure projects located in areas at risk

Coastal zones

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of people living in flood prone areas
	Number of properties flooded per year
	Number of businesses located in areas of flood/coastal erosion risk
	Number of households within most deprived communities located in areas of flood/coastal erosion risk
	Number of properties lost due to coastal erosion per year
	Number of hectares of productive land lost to soil erosion
	Percentage of area of ecosystem that has been disturbed or damaged
	Areas covered by vegetation affected by plagues or fires
	Acidification of marine water
	Distribution of warmth-adapted marine species
	Decreased annual average fish catch as a result of temperature change
	Number of people permanently displaced from homes as a result of flood, drought or sea-level rise
Adaptation action	Percentage of population living in flood and/or drought-prone areas with access to rainfall forecasts
	Percentage of farmers and fisherfolk with access to financial services
	Number of inventories of climate change impacts on biodiversity
	Number of wave recorders installed along coastal areas
	Climate change vulnerability maps of coastal zone developed
	Uptake of riparian tree planting
	Percentage of treated wastewater
	Percentage of coastline under marine protection
Adaptation results	Percentage of households at reduced flood risk due to construction of new or enhanced defences
	Number of new major infrastructure projects located in areas at risk

Energy

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
Climate impacts	Weather-related disruption of electricity supply
	Losses of GDP in percentage per year due to extreme rainfall
Adaptation action	Percentage of new hydroelectric projects that consider future climate risks
	Number of water efficiency measures used in energy generation/extraction
	Energy Storage Capacity
Adaptation results	Number of new major infrastructure projects located in areas at risk

Financial services

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days

	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of hectares of productive land lost to soil erosion
	Losses of GDP in percentage per year due to extreme rainfall
	Financial losses to businesses due to extreme weather events
	Number of people permanently displaced from homes as a result of flood, drought or sea-level rise
Adaptation action	Percentage of population living in flood and/or drought-prone areas with access to rainfall forecasts
	Number of financial mechanisms identified to support climate change adaptation
	Percentage of farmers and fisherfolk with access to financial services
	Total sum of investments in programmes for the protection of livestock
Adaptation results	Percentage of livestock insured against death due to extreme and slow-onset weather events
	Percentage of farmland covered by crop insurance
	Turnover generated by agricultural cooperatives

Fishery

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of surface water areas subject to declining water quality due to extreme temperatures
	Percentage of area of ecosystem that has been disturbed or damaged
	Acidification of marine water
	Distribution of warmth-adapted marine species
	Decline in fish habitats due to temperature change
	Decreased annual average fish catch as a result of temperature change
Adaptation action	Percentage of farmers and fisherfolk with access to financial services
	Number of inventories of climate change impacts on biodiversity
	Percentage of treated wastewater
	Percentage of coastline under marine protection
	Compliance with fishing quota

Forestry

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of surface water areas subject to declining water quality due to extreme temperatures
	Percentage of area of ecosystem that has been disturbed or damaged
	Total forest area impacted by wildfire per year
	Annual timber losses from pests and pathogens
	Areas covered by vegetation affected by plagues or fires

Adaptation action	Number of inventories of climate change impacts on biodiversity
	Conservation of forest genetic resources
	Uptake of soil conservation measures
	Percentage of climate resilient trees
	Proportion of forest managers taking action on adaptation
	Number of firebreaks constructed

Human health

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of households affected by drought
	Number of surface water areas subject to declining water quality due to extreme temperatures
	Urban Heat Island Effect in summer
	Number of people at high risk of heat stress
	Reduced work productivity due to heat stress
	Number of hospitals located in areas at risk from flooding/coastal erosion
	Number of households within most deprived communities located in areas of flood/coastal erosion risk
	Areas covered by vegetation affected by plagues or fires
	Acidification of marine water
	Number of cases of water-borne diseases
Adaptation action	Number of businesses that have changed their working hours
	Uptake of early warning systems (UV and air/water quality)
	Uptake of measures to reduce air pollution
	Percentage of treated wastewater
Adaptation results	Percentage of poor people in drought-prone areas with access to safe and reliable water
	Percentage of urban households with access to piped water
	Percentage of water demand being met by existing supply

Information & communication

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Adaptation action	Number of communication tools that incorporate climate change adaptation
	Number of public awareness campaigns on water efficiency
	Number of visitors to the national climate adaptation website
	Percentage of trade and industry chambers using and distributing climate information
	Number of urban adaptation best practices disseminated
	Percentage of population living in flood and/or drought-prone areas with access to rainfall forecasts
	Green label for neighborhoods requiring climate change vulnerability assessments established

	Number of existing meteorological stations per territorial unit
	Uptake of early warning systems (UV and air/water quality)
	Number of farmers involved in pilot irrigation messaging projects

Tourism

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of surface water areas subject to declining water quality due to extreme temperatures
	Percentage of area of ecosystem that has been disturbed or damaged
	Total forest area impacted by wildfire per year
	Areas covered by vegetation affected by plagues or fires
	Acidification of marine water
	Losses of GDP in percentage per year due to extreme rainfall
Adaptation action	Uptake of measures to reduce air pollution
	Percentage of coastline under marine protection
Adaptation results	Volume of water consumed by tourist facilities
	Number of new major infrastructure projects located in areas at risk

Trade & Industry

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Reduced work productivity due to heat stress
	Number of properties flooded per year
	Number of properties located in river/coastal floodplain
	Number of businesses located in areas of flood/coastal erosion risk
	Number of properties lost due to coastal erosion per year
	Annual timber losses from pests and pathogens
	Total length of sewerage and drainage network at risk from climate hazards
	Losses of GDP in percentage per year due to extreme rainfall
	Financial losses to businesses due to extreme weather events
Adaptation action	Number of methodological guides produced to assess impacts of extreme weather events on transport systems
	Percentage of trade and industry chambers using and distributing climate information
	Percentage of new hydroelectric projects that consider future climate risks
	Number of businesses with risk management plans considering climate change aspects/or adaptation options
	Percentage of transport infrastructure standards revised
	Number of properties with retrofitted flood resilience measures; water meters; water efficiency measures; cooling measures
	Number of water efficiency measures used in energy generation/extraction
	Number of water companies rationing water during droughts

	Number of businesses that have changed their working hours
	Uptake of early warning systems (UV and air/water quality)
	Uptake of measures to reduce air pollution
	Number of businesses with insurance for extreme weather events
	Percentage of companies assessing risks and opportunities from extreme weather and reduced water availability to their supply chains
	Percentage of treated wastewater
	Number of women organised in agricultural cooperatives
Adaptation results	Percentage of climate resilient roads in the country
	Percentage of poor people in drought-prone areas with access to safe and reliable water
	Percentage of urban households with access to piped water
	Number of cubic metres of water conserved
	Percentage of water demand being met by existing supply
	Number of new major infrastructure projects located in areas at risk
	Percentage of livestock insured against death due to extreme and slow-onset weather events
	Increase in agricultural productivity through irrigation of harvested land
	Turnover generated by agricultural cooperatives

Transport

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of hectares of productive land lost to soil erosion
	Losses of GDP in percentage per year due to extreme rainfall
	Financial losses to businesses due to extreme weather events
	Number of people permanently displaced from homes as a result of flood, drought or sea-level rise
Adaptation action	Number of methodological guides produced to assess impacts of extreme weather events on transport systems
	Percentage of transport infrastructure standards revised
Adaptation results	Percentage of climate resilient roads in the country
	Number of new major infrastructure projects located in areas at risk

Urban areas

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Urban Heat Island Effect in summer
	Number of properties located in river/coastal floodplain
	Number of hectares of productive land lost to soil erosion
	Total length of sewerage and drainage network at risk from climate hazards
	Number of people permanently displaced from homes as a result of flood, drought or sea-level rise

Adaptation action	Number of urban adaptation best practices disseminated
	Percentage of population living in flood and/or drought-prone areas with access to rainfall forecasts
	Percentage of municipalities with local regulations considering adaptation and vulnerability assessment results
	Funding for climate-adapted construction and refurbishment
	Green label for neighborhoods requiring climate change vulnerability assessments established
	Uptake of riparian tree planting
	Percentage of treated wastewater
	Priority areas for precautionary flood protection
Adaptation results	Percentage of poor people in drought-prone areas with access to safe and reliable water
	Percentage of urban households with access to piped water
	Number of cubic metres of water conserved
	Percentage of water demand being met by existing supply
	Reduction of flood damage and disaster relief costs in cities due to increased standards for flood protection and improved flood emergency preparedness
	Number of new major infrastructure projects located in areas at risk

Water resources

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Climate impacts	Number of households affected by drought
	Percentage of total livestock killed by drought
	Number of surface water areas subject to declining water quality due to extreme temperatures
	Number of properties flooded per year
	Number of properties located in river/coastal floodplain
	Number of businesses located in areas of flood/coastal erosion risk
	Number of hospitals located in areas at risk from flooding/coastal erosion
	Number of households within most deprived communities located in areas of flood/coastal erosion risk
	Number of properties lost due to coastal erosion per year
	Number of hectares of productive land lost to soil erosion
	Percentage of area of ecosystem that has been disturbed or damaged
	Areas covered by vegetation affected by plagues or fires
	Acidification of marine water
	Distribution of warmth-adapted marine species
	Total length of sewerage and drainage network at risk from climate hazards
	Number of cases of water-borne diseases
	Number of people permanently displaced from homes as a result of flood, drought or sea-level rise
Adaptation action	Number of public awareness campaigns on water efficiency
	Percentage of population living in flood and/or drought-prone areas with access to rainfall forecasts
	Percentage of new hydroelectric projects that consider future climate risks
	Number of inventories of climate change impacts on biodiversity
	Number of water efficiency measures used in energy generation/extraction
	Number of water companies rationing water during droughts

	Uptake of riparian tree planting
	Percentage of treated wastewater
	Percentage of agricultural land with improved irrigation
	Percentage of coastline under marine protection
	Number of farmers involved in pilot irrigation messaging projects
	Priority areas for precautionary flood protection
Adaptation results	Percentage of poor people in drought-prone areas with access to safe and reliable water
	Percentage of urban households with access to piped water
	Number of cubic metres of water conserved
	Volume of water consumed by tourist facilities
	Percentage of water demand being met by existing supply
	Percentage of households at reduced flood risk due to construction of new or enhanced defences
	Number of new major infrastructure projects located in areas at risk
	Increase in agricultural productivity through irrigation of harvested land
	Percentage of cultivated surface cultivated with drought resistant varieties

Capacity building & mainstreaming

Climate parameters	Change in annual temperature
	Mean monthly temperature
	Number of hot days
	Change in annual precipitation
	Monthly precipitation
	Extreme precipitation events
Adaptation action	Number of climate responsive tools developed and tested
	Number of vulnerable stakeholders using climate responsive tools to respond to climate variability or climate change
	Number of communication tools that incorporate climate change adaptation
	Percentage of trade and industry chambers using and distributing climate information
	Number of government staff that have received training on adaptation
	Degree of integration of climate change into development planning
	Number of policies and coordination mechanisms explicitly addressing climate change and resilience
	Number of policies, plans or programmes introduced or adjusted that mainstream climate risks
	Percentage of municipalities with local regulations considering adaptation and vulnerability assessment results
	Existence of interministerial/ intersectoral commissions working on adaptation
	Number of people supported to cope with the effects of climate change through the availability of a service or facility
	Number of existing meteorological stations per territorial unit
	Number of farmers involved in pilot irrigation messaging projects
	Number of women organised in agricultural cooperatives
Adaptation results	Number of people with diversified income

Adaptation indicator and data factsheets

Kenya: Percentage of population with access to rainfall forecasts

Kenya: Percentage of climate resilient roads

Pilot Program for Climate Resilience (PPCR): Use of support tools

Pilot Program for Climate Resilience (PPCR): Degree of integration of climate change in national, including sector, planning

Mexico: Existing meteorological stations

Mexico: Percentage of livestock insured against climate-induced risks

Morocco: Farmers involved in irrigation projects

Morocco: Women organised in agricultural cooperatives

Kenya: Percentage of population with access to rainfall forecasts

Indicator

Name of the indicator	**% of population by gender in areas subject to flooding and/or drought in the county who have access to Kenya Meteorological Department information on rainfall forecasts (Kenya)**
Focus of the indicator	**Which aspect of adaptation is described by the indicator?** Adaptation action
Adaptation relevance	**Further description of the indicator** A growing number of people in Kenya are directly affected by flooding or drought. Access to rainfall forecasts can increase the capacity of these people to prepare for these events, minimizing harm and losses. Access to climate information and responses to climate disasters l vary depending on the gender of those affected. For instance, in societies in which largely women stay at home or on family plot, where often no radios and consequently no rainfall forecasts are available, it will be more difficult for them to take appropriate action implying a lower adaptive capacity for these women.
Relevant sectors	Building sector, Coastal zones, Financial services, Information & communication, Urban areas, Water resources
Limitations of indicator	The indicator only measures the number of people with access to rainfall forecasts but not the quality of the forecasts or if people actually acted upon them. Access to rainfall forecasts is assumed to take place via community radio stations; other media may be relevant and should be included in the calculation of this indicator

Data

Data sources	**Who provides data?** • Kenya Meteorological Department (KMD) • Department of Resource Surveys and Remote Sensing (DRSRS)/ National Drought Management Authority (NDMA) • Kenya National Bureau of Statistics • Community radio stations
Data availability	**What are the conditions to obtain the data?** KMD is responsible for measuring this indicator. Data supply is facilitated through Data Supply and Reporting Obligation Agreements, which are issued to all organisations that are required to supply data or information to the M&E system.
Data needs	**What kind of data and information is needed?** • Provision of rainfall forecast information via community radio stations • Designation of drought affected areas • Designation of flood affected areas • Population size • Number of people with access to radios

Spatial level	**Coverage and scale of the data** County level, up to 4 values per county (depending on the number of hazards affecting the county)
Unit of measurement	**In which unit is the indicator presented?** %
Method of calculation	**Which method has been applied for calculation?** Numerator = number of people living in areas subject to flooding and drought with access to KMD rainfall forecasts Denominator = total number of people living in areas subject to flooding and drought
Sub-indicators	**Are sub-indicators needed? Which?** Four sub-indicators can be calculated (i.e. disaggregated by gender and hazard) **Sub-indicator 1:** Numerator = number of females living in areas subject to flooding with access to rainfall forecasts Denominator = total female population in areas subject to flooding **Sub-indicator 2:** Numerator = number of males living in areas subject to flooding with access to rainfall forecasts Denominator = total male population in areas subject to flooding **Sub-indicator 3:** Numerator = number of females living in areas subject to drought with access to rainfall forecasts Denominator = total female population in areas subject to drought **Sub-indicator 4:** Numerator = number of males living in areas subject to drought with access to rainfall forecasts Denominator = total male population in areas subject to drought
Time reference and frequency of measurement	**For which year(s) are the data available?** Baseline year: 2014 Frequency of measurement: Annual Duration of measurement: Long-term
Expected trend with adaptation	**As adaptation takes place, the value will ...** Increase

Source: Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)

Kenya: Percentage of climate resilient roads

Indicator

Name of the indicator	**% of county roads that have been made "climate resilient" or that are not considered to be vulnerable**
Focus of the indicator	**Which aspect of adaptation is described by the indicator?** Adaptation result
Adaptation relevance	**Further description of the indicator** Roads (particularly dirt roads) are damaged by heavy downpours and flooding. Culverts that are unable to accommodate water flows due to under-specification or poor maintenance can exacerbate flooding. Bridges and embankments may also be damaged, making roads impassable. Roads are vital to the economic and social well-being of the country and damage to them impacts multiple sectors, including agriculture, transport, trade and industry and tourism.
Relevant sectors	Trade & industry; Transport
Limitations of indicator	The indicator includes in its measurement the proportion of the road network that has been subject to a vulnerability assessment and improvement (e.g. moving roads further inland, increasing culvert capacity), but the amount and quality of the improvement cannot be captured (i.e. do not know how much improvement took place relative to a baseline level of vulnerability or if it led to greater economic and social well-being in the face of floods).To achieve such understanding, this indicator could be considered alongside results of regular vulnerability assessments that measure vulnerability levels over time, relative to a baseline. The definition of what constitutes a road is important, as smaller roads may actually be more important to peoples' livelihoods than larger roads. As such, the definition should be clarified before applying the indicator. Besides, the extent to which these small roads are captured by the database (Kenya Roads Board) used for calculating the indicator should also be considered in terms of data representativeness.

Data

Data sources	**Who provides data?** Kenya Roads Board
Data availability	**What are the conditions to obtain the data?** Kenya Roads Board is responsible for measuring this indicator. Data supply is facilitated through Data Supply and Reporting Obligation Agreements, which are issued to all organisations that are required to supply data or information to the M&E system.

Data needs	**What kind of data and information is needed?** • Information on total length of road in the county • Location of roads in relation to flood risk • Design and condition of roads in the county • Number / length of roads that have been subject to climate vulnerability assessments and subsequent improvements
Spatial level	**Coverage and scale of the data** County level
Unit of measurement	**In which unit is the indicator presented?** Percentage
Method of calculation	**Which method has been applied for calculation?** Numerator = length of road that are not at risk + length of road that are at risk but that have been subject to relevant improvements (km) Denominator = total length of road in the county (km)
Sub-indicators	**Are sub-indicators needed? Which?** N/A
Time reference and frequency of measurement	**For which year(s) are the data available?** Baseline year: 2014 Frequency of measurement: Annual Duration of measurement: Long-term
Expected trend with adaptation	**As adaptation takes place, the value will ...** Increase
Additional comments	This indicator measures the proportion of the road network that is not at risk, either by virtue of its design and location, and hence lack of susceptibility to climate related damage, or because it has been subject to adaptation (vulnerability assessment and improvement) that has increased its resilience.

Source: Kenya National Climate Change Action Plan, Subcomponent 6: Section B (Annex 6)

Pilot Program for Climate Resilience (PPCR): Use of support tools

Indicator

Name of the indicator	**Extent to which vulnerable households, communities, businesses, and public sector services use improved PPCR supported tools, instruments, strategies, and activities to respond to climate variability or climate change**
Focus of the indicator	**Which aspect of adaptation is described by the indicator?** Adaptation action
Adaptation relevance	**Further description of the indicator** Indicator is based on the assumption that if vulnerable stakeholders use high quality climate responsive tools, strategies or activities (referred to as 'tools/etc.') to a greater extent, this will strengthen their adaptive capacities. These 'tools/etc.' include investments in technologies and infrastructure (e.g. improved buildings, transport systems), information and knowledge assets (e.g. forecasts and risk assessments), public awareness platforms (e.g. media campaigns, websites), financial instruments (e.g. insurance), and public/community services (e.g. social protection, early warning.) Thus, the indicator tries to capture whether developed tools, policies or strategies – depending on the project context – are actually used/implemented by the target group.
Relevant sectors	Capacity building & mainstreaming
Limitations of indicator	The indicator measures the number of stakeholders (i.e. households, communities, businesses, and public sector services) who have used PPCR tools but not the results of this use – i.e. if it led to different decisions, behaviours, improved capacities, etc. and if the tools were effective in reducing vulnerability.

Data

Data sources	**Who provides data?** Data obtained from existing project/program documentation and other relevant reports available from civil society and the PPCR stakeholder community
Data availability	**What are the conditions to obtain the data?** • PPCR project/program implementation units/teams collect project/programme-level data on PPCR supported tools/etc. and enter it into the relevant Monitoring and Reporting Table • Strategic Program for Climate Resilience (SPCR – country program level) management unit/team compiles and aggregates project/program-level data for a country program-level synthesis

Data needs	**What kind of data and information is needed?** • List (number and type) of climate responsive tools, instruments, strategies or activities improved and supported by the PPCR • Number of target stakeholders or users for each tool/etc. (i.e. number of households, communities, businesses, and/or public sector services deemed climate vulnerable in project/program baseline documentation) • Number of target stakeholders that have used each tool/etc. • Description of how users have used each tool/etc.
Spatial level	**Coverage and scale of the data** Measurement at individual project/program level, aggregated at the level of the SPCR (usually country level)
Unit of measurement	**In which unit is the indicator presented?** Number of target stakeholders / users (specifically, number of households, businesses, communities, and public sector services)
Method of calculation	**Which method has been applied for calculation?** Counting. (The number of households / communities / businesses / public sector services that have used a particular tool during a reporting period measured against the number that was originally targeted in the PPCR project/program.) (Where a target user uses an improved PPCR-supported tool/etc. more than once in a reporting period, they should only be counted once. Where a user is the target of several tools/etc. they should be counted once for each tool they use during the reporting period.)
Sub-indicators	**Are sub-indicators needed? Which?** N/A
Time reference and frequency of measurement	**For which year(s) are the data available?** Baseline year: 2013 Frequency of measurement: Annual Duration of measurement: Duration of project/programme
Expected trend with adaptation	**As adaptation takes place, the value will ...** Increase

Sources: PPCR Results Framework and Monitoring and Reporting Toolkit

PPCR Factsheet (GIZ, 2014)

Pilot Program for Climate Resilience (PPCR): Degree of integration of climate change in national, including sector, planning

Indicator

Name of the indicator	**Degree of integration of climate change in national, including sector, planning**
Focus of the indicator	**Which aspect of adaptation is described by the indicator?** Adaptation action
Adaptation relevance	**Further description of the indicator** Countries that have systematically integrated climate resilience (risks and opportunities) into their planning processes at national and sectoral levels will have a greater capacity to respond or adapt to the impacts of climate change. This indicator tries to capture the extent to which a country has integrated climate resilience into national, ministry, and sector planning.
Relevant sectors	Capacity Building and Mainstreaming
Limitations of indicator	The indicator measures the existence of specific documents, (e.g. sectoral strategy that considers climate resilience), processes (e.g. risk screening) and people (e.g. climate coordinator), but not their quality and effectiveness – i.e. if countries are better responding to climate risks.

Data

Data sources	**Who provides data?** • Climate change coordination units, secretariats • Sectoral ministries and planning departments • Civil society and PPCR stakeholder community
Data availability	**What are the conditions to obtain the data?** • Official policy planning documents made publicly available • National repositories • Accessibility of meeting documents, workshop and budget reports, policy papers, and other relevant reports
Data needs	**What kind of data and information is needed?** Using official planning documents, meeting reports, workshop and budget reports, policy papers and other relevant reports, indicator will capture if the following criteria are to determine the degree of integration : • Existence or status of a specific climate change policy, plan for the country/ sectors • Resilience strategies embedded in national government / sector principal planning documents • Responsibility assigned to coordinate the integration of climate resilience into planning (e.g. inter-ministerial steering group) • Identification and prioritization of specific measures for addressing climate resilience – e.g. laws, regulations, investments, programs • Routine screening for climate risk in all planning processes

Spatial level	**Coverage and scale of the data** Data scored at the country level
Unit of measurement	**In which unit is the indicator presented?** Score between 0 and 10 0 = No integration, 5 = halfway, 10= Yes, complete integration.
Method of calculation	**Which method has been applied for calculation?** Qualitative scoring. Meeting organised with the Strategic Programs for Climate Resilience (SPCR – country-level program of PPCR) Management Unit / Team; at least two representative from each identified sector; government, private sector and civil society. These representatives should be knowledgeable about climate resilience programs in the country and represent both women and men. In the meeting, each participant would complete the relevant PPCR Monitoring and Reporting Scorecard individually. The scores would be aggregated or negotiated through discussion to arrive at one score for each cell in the scorecard by consensus.
Sub-indicators	**Are sub-indicators needed? Which?** For each priority sector, five questions must be answered with a score between 0 and 10: • Is there an approved climate change plan for the nation / sector? • Have climate resilience strategies been embedded in the central government's / sector's principal planning documents? • Has responsibility been assigned to institutions or persons to integrate climate resilience planning? • Have specific measures to address climate resilience been identified and prioritized? E.g. investments and programs. • Do all planning processes routinely screen for climate risks?
Time reference and frequency of measurement	**For which year(s) are the data available?** Baseline year: 2013 Frequency of measurement: Annual Duration of measurement: Duration of project/programme
Expected trend with adaptation	**As adaptation takes place, the value will ...** Increase
Additional comments	The methodology is subjective and PPCR recommends that results be vetted by a wider stakeholder group to ensure that they are as proximate as possible to the reality being experienced on the ground.

Sources: PPCR Results Framework and Monitoring and Reporting Toolkit

PPCR Factsheet (GIZ, 2014)

Mexico: Existing meteorological stations

Indicator

Name of the indicator	**Number of existing meteorological stations per territorial unit in the country**
Focus of the indicator	**Which aspect of adaptation is described by the indicator?** Adaptation action
Adaptation relevance	**Further description of the indicator** A higher density and better coverage of climate information per territorial unit helps producing better climate projections and reducing insecurity related to climate change impacts (e.g. territorial and temporal comparisons). All in all it provides decision-makers a better information basis for strategic policy planning of adaptation relevant for all sectors.
Relevant sectors	Information & communication, Capacity building & mainstreaming
Limitations of indicator	The indicator does not capture the quality of the generated climate data. It further does not consider climate information from ocean weather stations or from space stations in the atmospheric layers and neither if and how the information is combined/ analysed, for example with regard to policy planning.

Data

Data sources	**Who provides data?** • National Meteorological Service (SMN) • World Meteorological Organization (WMO) • National institute for statistics and geography (INEGI)C • Complementary: • Weather/ climate stations from Federal Commission for Electricity (CFE), Ministry of Marine Affairs (SEMAR), Ministry of Defence (SEDENA), Mexican Petrol company (PEMEX)
Data availability	**What are the conditions to obtain the data?** The data is available in the sub-directorate of the medium and long term projections of the National Meteorological Service (SMN)
Data needs	**What kind of data and information is needed?** • Total number of existing meteorological stations and their geographic coordinates • Total number of territorial units
Spatial level	**Coverage and scale of the data** National and sub-national (disaggregation by territorial unit)
Unit of measurement	**In which unit is the indicator presented?** Number per territorial unit

Method of calculation	**Which method has been applied for calculation?** Numerator = Total number of existing meteorological stations Denominator = Number of territorial units
Sub-indicators	**Are sub-indicators needed? Which?** No sub-indicators are needed, but a common definition for territorial unit has to be determined. In addition maps/ networks of climate information coverage can be developed by using geographic coordinates of meteorological stations.
Time reference and frequency of measurement	**For which year(s) are the data available?** Baseline year: 2013 Frequency of measurement: Annual Duration of measurement: Long-term
Expected trend with adaptation	**As adaptation takes place, the value will ...** Increase
Additional comments	Support for measuring this indicator can be requested from National Meteorological Service (SMN) , National Commission for Water (CONAGUA), Mexican institute for water technologies (IMTA), National autonomous university of Mexico (UNAM)

Sources: Modernization projects of National Meteorological Service (MoMet)

Technical reports by the World Meteorological Organization (WMO)

Assessment reports by IPCC Working group I

Mexico: Percentage of livestock insured against climate-induced risks

Indicator

Name of the indicator	**Percentage of livestock insured against death due to extreme and slow-onset weather events**
Focus of the indicator	**Which aspect of adaptation is described by the indicator?** Adaptation results
Adaptation relevance	**Further description of the indicator** The indicator gives information on the progress in implementing insurance schemes for the livestock sector and allows for temporal and territorial comparisons. The insurance schemes protect livestock breeders from potential production losses due to climate risks, in this case the death of livestock due to extreme heat stress, drought, etc. The indicator is especially relevant for the agricultural sector and the financial sector in which the respective insurance products are developed.
Relevant sectors	Agriculture, Financial services, Trade & Industry
Limitations of indicator	The indicator does not take into account the amount of livestock privately insured by producers. It further does not give information on the amount of insurance per animal, e.g. if the insurance amount is cost covering for producers and if the insurance scheme takes all climate risks into account.

Data

Data sources	**Who provides data?** • Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) • Ministry of Finance (SHCP) • Mexican information service on agri-food and fish industry (SIAP)
Data availability	**What are the conditions to obtain the data?** The data is available at the component of natural disasters (CADENA) of the SAGARPA and at the Mexican information service on agri-food and fish industry (SIAP).
Data needs	**What kind of data and information is needed?** • Insured number of livestock per livestock type • Total number of livestock type
Spatial level	**Coverage and scale of the data** National and sub-national level; disaggregation of data by regions, federal state or by livestock type
Unit of measurement	**In which unit is the indicator presented?** Percentage

Method of calculation	**Which method has been applied for calculation?** Numerator = Number of insured livestock per livestock type Denominator = Total number of livestock type Result *100
Sub-indicators	**Are sub-indicators needed? Which?** No sub-indicators are needed.
Time reference and frequency of measurement	**For which year(s) are the data available?** Baseline year: 2012 Frequency of measurement: Annual Duration of measurement: Long-term
Expected trend with adaptation	**As adaptation takes place, the value will ...** Increase (Based on monitored increase from 2001 to 2010, it is expected that in 2018 10% of livestock will be insured against death due to climate risks)
Additional comments	Support for measuring this indicator can be requested from the component on natural disasters (CADENA) of the Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) and from the Ministry for Environment and Natural Resources (SEMARNAT)/ the National institute for ecology and climate change/ INECC

Sources: Climate Change General law in Mexico

National Communications of Mexico to the Framework Convention of the United Nations on Climate Change (UNFCCC)

National Strategy for Climate Change

Morocco: Farmers involved in irrigation projects

Indicator

Name of the indicator	**Number of farmers who are members of the service of pilot irrigation messaging projects**
Focus of the indicator	**Which aspect of adaptation is described by the indicator?** Adaptation action
Adaptation relevance	**Further description of the indicator** A messaging service to farmers can facilitate adaptation to changing weather conditions. Knowledge on short-term changes in local climate helps farmers to determine at what time to irrigate their crops. A therefore more efficient irrigation system protects water resources as water can be saved or used for other pressing needs. Moreover, the crops get the optimal amount of water which increases yields and thus positively affects the farmers' livelihoods.
Relevant sectors	Agriculture, Information & communication, Water resources, Capacity building & mainstreaming
Limitations of indicator	This indicator does not capture whether and how farmers use this service. Moreover, the weather forecasts might be wrong leading to sub-optimal irrigation.

Data

Data sources	**Who provides data?** • Agrotech SMD • Agrotech SMD – Action Report
Data availability	**What are the conditions to obtain the data?** Agrotech SMD is responsible for data collection. Data is supplied by the official partners of the project: COPAG, Agrumar Souss, Zaouia, Mabrouka, Elboura, Kabbage Souss, Pack Souss, Priagrus
Data needs	**What kind of data and information is needed?** Total number of farmers who are a member of the pilot irrigation project service
Spatial level	**Coverage and scale of the data** Sub-regional level of the Region Sous Massa Drâa
Unit of measurement	**In which unit is the indicator presented?** Number
Method of calculation	**Which method has been applied for calculation?** Summation

Sub-indicators	**Are sub-indicators needed? Which?** No sub-indicators are needed.
Time reference and frequency of measurement	**For which year(s) are the data available?** Baseline year: 2008 Frequency of measurement: Annual Duration of measurement: Long-term
Expected trend with adaptation	**As adaptation takes place, the value will ...** Increase
Additional comments	Additionally to the number of farmers who are member of this pilot irrigation service project, data on the number of messages per day that are directly sent to farmers is available

Sources: Morocco 2014 Draft Version. Guide to establish an M&E system of vulnerability and adaptation to climate change in the regions of Souss Massa Drâa and Marrakech Tensift Al Haouz

Official website of the Association of Agrotechnologies of the region Souss Massa Drâa: www.agrotech.ma

Access to the pilot system for irrigation: http://yobeen.phytoconsulting.com/

Web-based "Platform of Solutions" established by the 6th World Water Forum: www.solutionsforwater.org

Morocco: Women organised in agricultural cooperatives

Indicator

Name of the indicator	**Number of women organised in agricultural cooperatives**
Focus of the indicator	**Which aspect of adaptation is described by the indicator?** Adaptation action
Adaptation relevance	**Further description of the indicator** Being organized in agricultural cooperatives can improve the adaptive capacity of women, e.g. through better marketing of products, better market access, and support from the cooperative in case of yield losses.
Relevant sectors	Agriculture, Trade & Industry, Capacity building & mainstreaming
Limitations of indicator	This indicator gives evidence on whether women are organised in agricultural cooperatives or not. However, it does not capture whether the cooperatives are fully operational and if women really benefit. Most importantly, the indicator does not specifiy to what extent the organisations present support in the face of climate change (e.g. is there a form of risk sharing mechanism?). If they do not facilitate adaptation, than the indicator has no direct adaptation relevance. Additionally, this indicator is limited to the sub-regional level as argan oil production and thus argan cooperatives do not cover the whole area of the two regions MTH and SMD.

Data

Data sources	**Who provides data?** Regional Delegation of the Office of Development of Cooperation (ODECO)
Data availability	**What are the conditions to obtain the data?** Data is available in the regional delegation offices of ODECO Marrakech and ODECO Agadir
Data needs	**What kind of data and information is needed?** • Total number of argan cooperatives • Total number of women organised in argan cooperatives
Spatial level	**Coverage and scale of the data** Regional level (Region SMD and Region MTH)
Unit of measurement	**In which unit is the indicator presented?** Number
Method of calculation	**Which method has been applied for calculation?** Summation
Sub-indicators	**Are sub-indicators needed? Which?** No sub-indicators are needed.

Time reference and frequency of measurement	**For which year(s) are the data available?** Baseline year: 2003-2013 (Region MTH) Baseline year: 2000-2013 (Region SMD) Frequency of measurement: Annual Duration of measurement: Long-term
Expected trend with adaptation	**As adaptation takes place, the value will ...** Increase

Source: Morocco 2014 Draft Version. Guide to establish an M&E system of vulnerability and adaptation to climate change in the regions of Souss Massa Drâa and Marrakech Tensift Al Haouz

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