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Measuring progress : challenges, methodologies and relevant frameworks

Global Climate Change Alliance+ Training Course

Module 7

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Monitoring and Evaluation (M&E)

M&E systems are performance assessment tools to:

a) Improve ongoing programmes/projects by adjusting efforts, strategies and activities based on the findings of the periodic assessments;

b) Improve future programmes and projects through feedback of lessons learned;

c) Provide a basis for accountability, including the provision of information to the public (transparency);

d) Test assumptions and create opportunities for learning;

e) Inform policy and practice.

How is data collected?

Link with information systems?

Feedback into decision-making?

…. what is relevant M&E for climate action?

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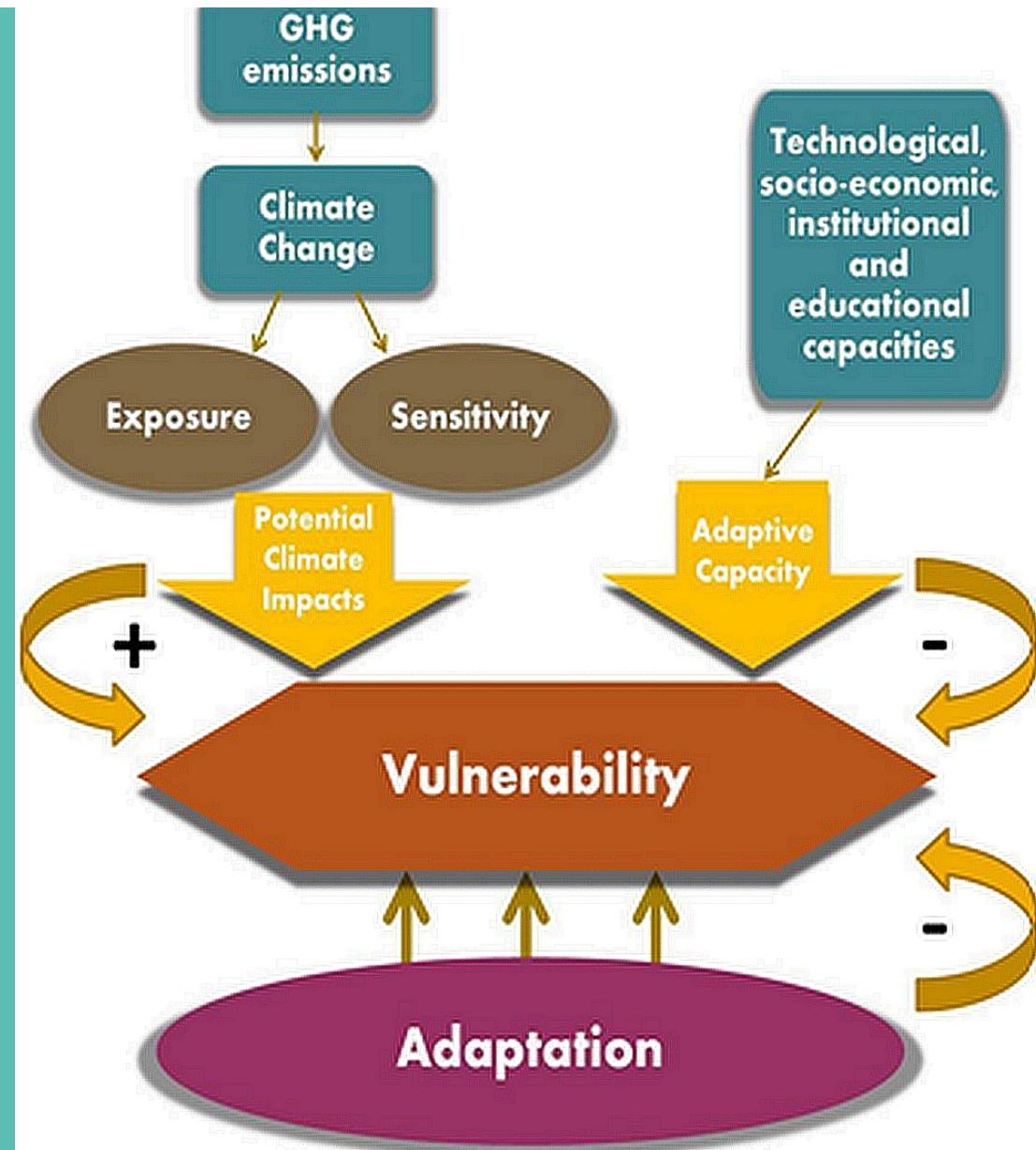the European Union

Challenges

Measuring adaptation

What should be measured?

- Hazard
- Risk
- Exposure
- Vulnerability
- Impacts
- Adaptation intervention
- Effectiveness of adaptation intervention
- …

What can be measured?

Monitoring performance of adaptation is challenging

Defining what is successful adaptation/climate resilience: climate resilience is not directly observable per se but must be placed in relation to a given climate related outcomes and identifiable shocks. This implies:

a) Defining and evaluating success against changing conditions. Resilience is necessarily specific to contexts - time, space, livelihood and shocks (resilience of who/what? to what?)

b) Determining time for M&E.

c) Determining contribution. The multi-scale, dynamic and multi-dimensional nature of adaptation means that many standard survey instruments are ill-suited to measuring resilience in a holistic way.

d) Identifying conclusive indicators. The nature of adaptation hinders the use of generic indicators and therefore makes aggregation and comaprisons difficult.

Challenges related to data

Example: Climate Change information system in the Philippines

Challenges:

- In general in the Philippines, only few data on climate change is available
- Data cuts across different sectors and requires expertise which official statisticians generally do not have, and is costly
- Lack of statistical framework
- Data needs to be more specific to location and time of observation
- Data must typically span longer time intervals for observation
- Requires standards to measure the impact, adaptation and mitigation of climate change.

Example: The Philippines

Agriculture & Food Security – existing M&E

Indicator	Manner of Data Dissemination	Frequency	Data Source/Agency
AGRICULTURE AND FOOD SECURITY			
1. Supply and demand of agricultural commodities 2. Food sufficiency ratio by type of food commodity	Publication, website, press release	Annual	NSCB (FBS)
3. Area planted/area harvested to palay, corn and other crops 4. Productivity (e.g., yield per hectare) - Palay, Corn, etc. 5. Livestock and Poultry Volume of Production and Growth Rates 6. Fishery Value of Production and Growth Rates	Publication, website	Quarterly, Annual	BAS

Example: The Philippines

Health Statistics – existing data (examples)

Life expectancy	Publication	Annual	NSO
Crude death rate			
Infant mortality rate	Web release, Publication, CD, Diskette	Every 5 years	NDHS, NSO
Child mortality rate			
Under-five mortality rate			
Maternal mortality ratio	Publication	Varying	NDHS, NSO
Incidence of specific notifiable diseases		Annual	DOH
Causes of morbidity			
Prevalence and death rates associated with malaria			
Prevalence and death rates associated with tuberculosis			

Examples of methodological solutions

| Nature of indicators	Input measurable indicators	Activity / outputs measurable indicators	Resilience capacity indicators	Effective resilience response indicators	Wellbeing indicators		Shock stressor indicators
	Input	**Activities/ outputs**	**Interm. outcomes**	**Outcomes**	**Impact**		**shock / Stressor**
Level of intervention	Programme level	Programme level	Individual, household, community or system levels	Individual, household, community or system levels	Individual level		Individual, household, community or system levels
Data collection frequency	As required	As required	baseline--endline	High Frequency	High Frequency		High Frequency
Examples of indicators	▪ Donor payments made in time ▪ Number of fieldtrips ▪ Number of NGO workers, etc.	▪ Training workshop organized in time (activity) ▪ Number of households attending (activity) ▪ Kilometres of road constructed (output) ▪ Number of kits distributed (output)	▪ Social cohesion ▪ Women empowerment ▪ Access to information ▪ Collective action ▪ Innovation taking up	▪ Reduction of coping strategies ▪ Adoption of sustainable adaptive strategies ▪ Adoption of sustainable transformative strategies	▪ CHANGE in Nutrition or food security indicators • z-scores ▪ CHANGE in wellbeing indicators • asset/income level • Quality of Life indicators		▪ Early warning system ▪ Environmental indicators • River flood data • Rainfall data

(from: Community Based Resilience Analysis – CoBRA, UNDP)

Logframe related solution :

How to see resilience interventions in a Logframe matrix

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The "Mixed level approach" methodology

QUALITATIVE

A. Community consultations, focus group discussions, use of existing information (research, assessments/evaluations, media articles, knowledge of local staff)

→ Define what resilience means locally, inform the planned household survey, and inform programme design

QUANTITATIVE

B. Household Survey – baseline

→ Measure assets, capacities and other indicators contributing to resilience; generate a baseline resilience index for households and livelihood zones (as well as descriptive statistics) that can inform programming and identify missing/interesting information, for further evaluation/research

QUALITATIVE

C. Consultations, focus group discussions, key informant interviews, other means

→ Validate, deepen, and go beyond the results of the quantitative baseline; inform the next generation quantitative survey (as well as programme design)

QUANTITATIVE

D. Household Survey – impact evaluation

→ Generate a 2nd index for households and livelihood zones, as well as granular statistics, that show how resilience of households and livelihoods has changed and the impact of interventions on this; shape and refine programming as well as an ongoing research agenda

Data related solution
Example: The Philippines. Which way forward?

Mainstreaming Climate Change & related statistics into the Philippine official statistics
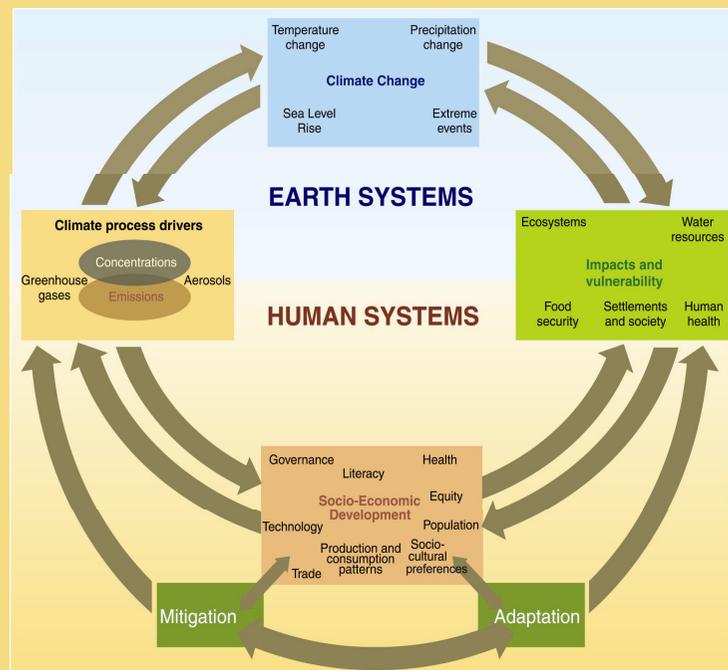
Source: Inter governmental Panel on Climate Change, Fourth Assessment Report. Climate Change 2007, Synthesis Report

- Relates changes in the natural environment to impacts on human systems and the related coping mechanisms

- Integrates of Climate Change issues into National & Local Development Plan & Policies

- Builds an interdisciplinary framework

Example: The Philippines, way forward

Conceptual Framework

Climate Change	Climate Process Drivers	Impacts and Vulnerability	Socio-Economic Development	
			Mitigation	**Adaptation**
Temperature Change	**GHG Emissions / Concentration sources**	**Ecosystem (terrestrial and Marine)**	**Health**	**Health**
	Industries:	Proliferation, depletion and extinction of species		
Precipitation Change	Transport			
	Cement	Depletion/growth of growth resources	**Technology**	**Technology**
	Metal and non-metallic production		Clean Energy Development Mechanism	Clean Energy Development Mechanism
Sea Level Rise		Introduction of exotic species		
	Chemical and chemical	Changes of habitat/ecosystem		
	paper and pulp			
	etc	**Water Resources (fresh and Marine water)**		
Extreme Events		Water Depletion	**Production and Consumption Pattern**	**Production and Consumption Pattern**
	Agriculture/Forestry	Water quality		
	Rice and corn production			
	Agricultural Residue Burning			
	Grassland/Forest burning/fire	**Food Security/Safety**		
	Agricultural soils	Food Production (crops and fishery)		
			Trade	**Trade**
	Energy/electricity	Occurrence of Harmful Algal	Carbon trading	Carbon trading
	Fossil Fuel Production	Nutritional food Intake		
	Biomass burned for energy	Occurrence of crop/fishery disease and infestation		
	Grassland Burning/Kaingin (slash and Burn)			

Example: The Philippines, way forward

Statistical Framework: Climate Process Drivers Change

| Topic	Variables	Measurement
GHG Emissions / Concentration sources		
Industries:	(can be sourced from environemental accounts)	
Transport	total emissions by type of vehicles	tons/year
Cement	total emissions by type of industry	tons/year
Metal and non-metallic production	toxic air contaminants	tons/year
Chemical and chemical products		
paper and pulp		
etc		
AgricultureForestry		
rice and corn production	Rice and corn production	tons/year
	Area of production (provincial, municipal)	Gg
	Total Ghg emission from rice and corn produciton	hectare
Agricultural Residue Burning	Area burned/kaingin areas	hectare
Grassland Burning	Forest Fires	hectare
Agricultural soils		
Energy/electricty		
Fossil Fuel Production	energy resources production (by sector, by utility)	by capacity (gwh)
	Depletion of energy resources	volume (thousand metric tonnes)
	Energy conversion (by plant, utility)	by capacity (gwh)
Biomass burned for energy	Energy Consumption (by sector, source)	by capacity (gwh)
Waste		
Solid wastes	solid waste disposal/ generation	tons per year, kilogram per capita
Domestics and Commercial Waste Water	toxic waste generated	tons per year, kilogram per capita
Industrial Wastewater	waste disposal in landfill	tons per year, kilogram per capita
Human Sewage	Volume of human sewage	tons per year, kilogram per capita
Hazardous Production	volume of hazardous waste	tons per year, kilogram per capita

Example: The Philippines, way forward

Statistical Framework: Climate Change Impact & Vulnerability

| Topic	Variables	Measurement
Ecosystem (terrestrial and marine)		
Proliferation, depletion and extinction of species	Number/types of extinct, endangered, vulnerable, etc species	
	Number/types of introduced species	
Depletion/growth of growth resources	Forest area cleared for agricultural production	Hectare
	Area harvested/used in kaingin	Hectare
	Volume of log production	Cubic meter/year
	Area of change	Percent change
	Fish Production (marine, inland municipal and aquaculture)	Tons, kg
Changes of habitat/ecosystem	Mangrove areas converted for aquaculture production	Hectare, km^2, pesos
	Loss of Seagrass Beds	
Water Resources (fresh and Marine water)		
Water Depletion	Amount of surface (by source, rivers, lakes) and groundwater abstraction	Cubic meters per year, liters per second
	Amount of surface (by source, rivers, lakes) and groundwater abstraction for use in irrigation, commercial, domestic and industrial	Cubic meters per year, liters per second
	Average stream flow	Cubic meters per second
	(Can be sourced from environmental accounts)	
	Number of sites used for inland, municipal fishery	Number of sites
Water quality	Water quality of receiving water bodies	Concentration (mg/l)
	Number of areas affected by flood	Number, hectares, depth
	Number of rivers, lakes, open waters affected by sedimentation	Number of rivers and lakes affected

Supporting decision making
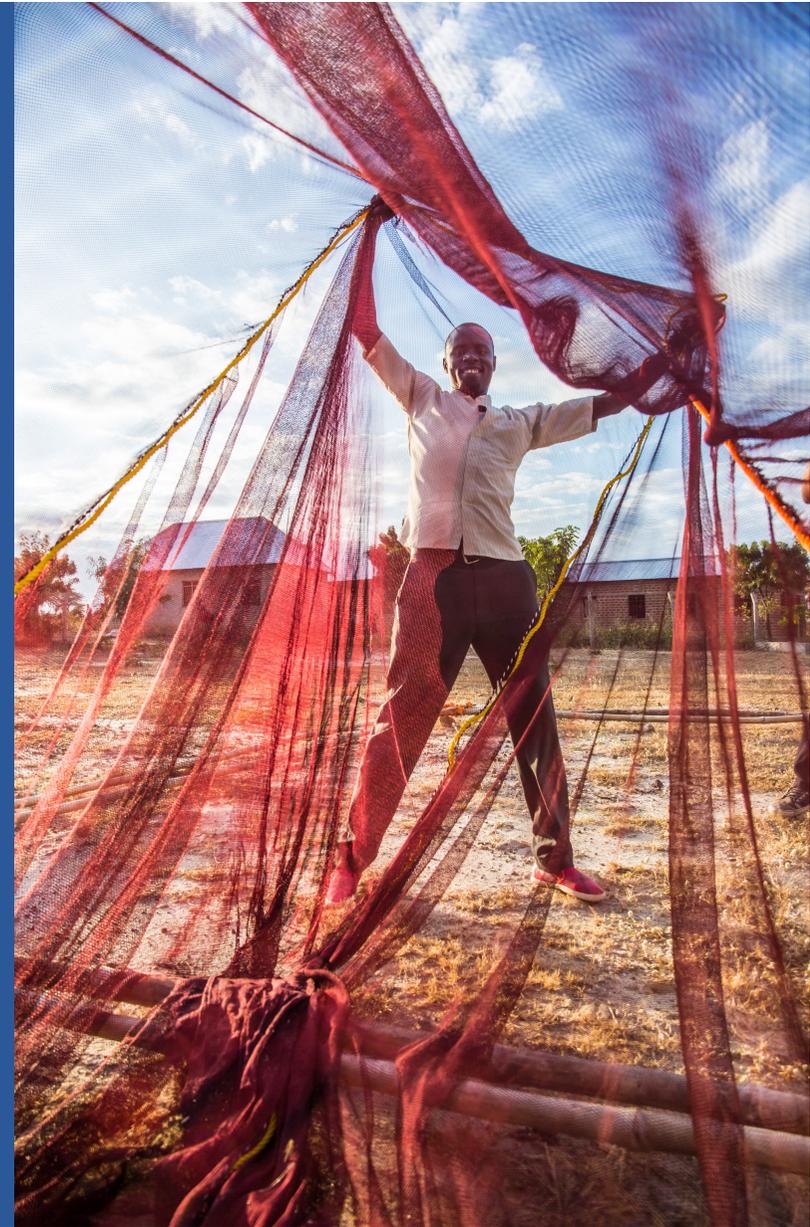
Supporting decision making

- Analysing observed or expected impacts of climate change (e.g., with and without adaptation). Tasks and methods associated with this sub-task will be called **impact-analytical approaches**.

- Analysing the capacity to prevent, moderate or adapt to these impacts requires a diverse range of approaches including **indicators**, but also **institution-analytical approaches** and **behavior/social analysis**

Impact-analytical approaches: example A, using a matrix

Method Type	Potential Impact Projection (PIP)	Residual Impact Projection (RIP)
Task	Project future impacts of climate change	
Characteristics of Adaptation Strategies	Interaction between the drivers and the study unit can be formally represented as a computational model. Given a scenario , impacts can be computed	
Theoretical assumptions	People affected do not adapt.	People affected adapt Adaptation can be formally represented by a computational model
Steps taken	1. Selection of climate and socio-economic scenarios 2. Computation of the potential impacts of those scenarios 3. Evaluation of impacts using impact indicators	1. Selection of climate and socio-economic scenarios 2. Selection of adaptation options and strategies 3. Computation of the impacts of the scenarios and the adaptation strategies 4. Evaluation of impacts using impact indicators
Results achieved	A list of propositions that map each scenario to an impact. Each proposition is interpreted in the following way: "When the world evolves according to scenario S and people don't adapt, the impact on will be I"	A list of propositions that map each scenario to a residual impact. Each proposition is interpreted: "When the world evolves according to scenario S and one uses adaptation strategy A, the impact on the vulnerable system will be I"

Impact-analytical approaches
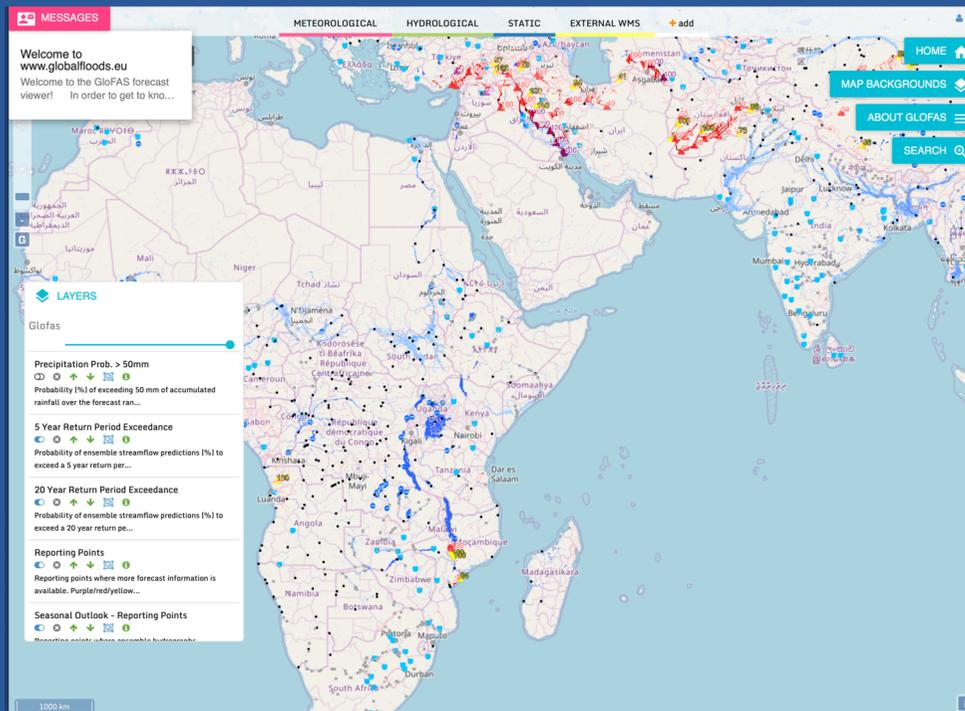
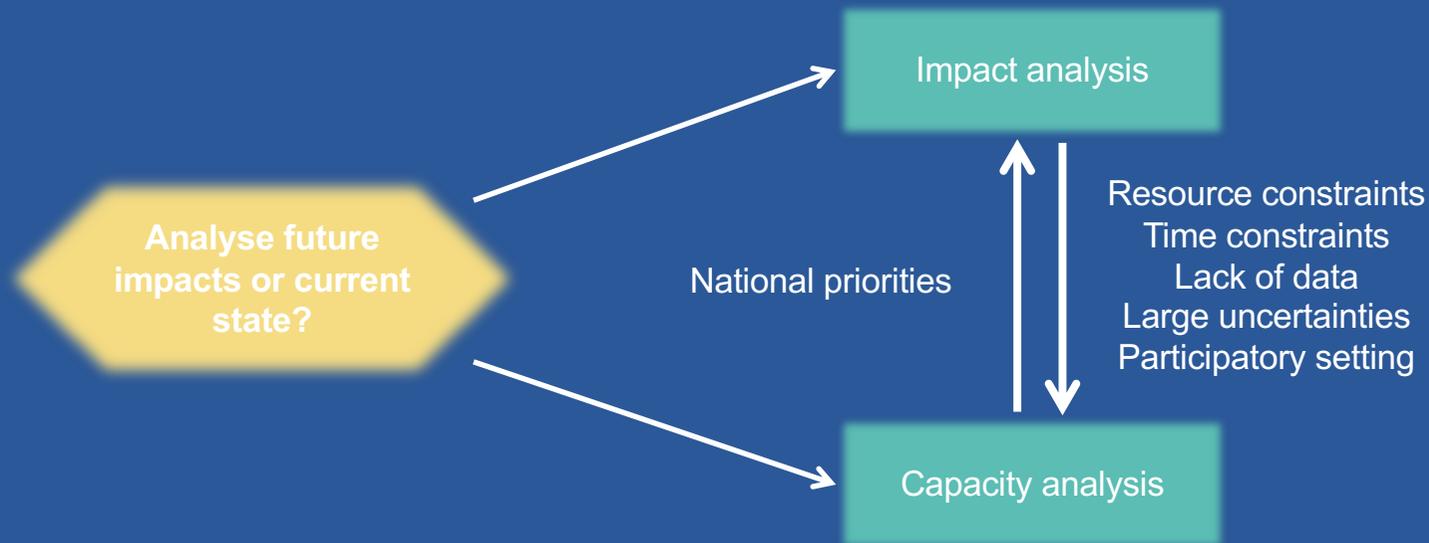Example B
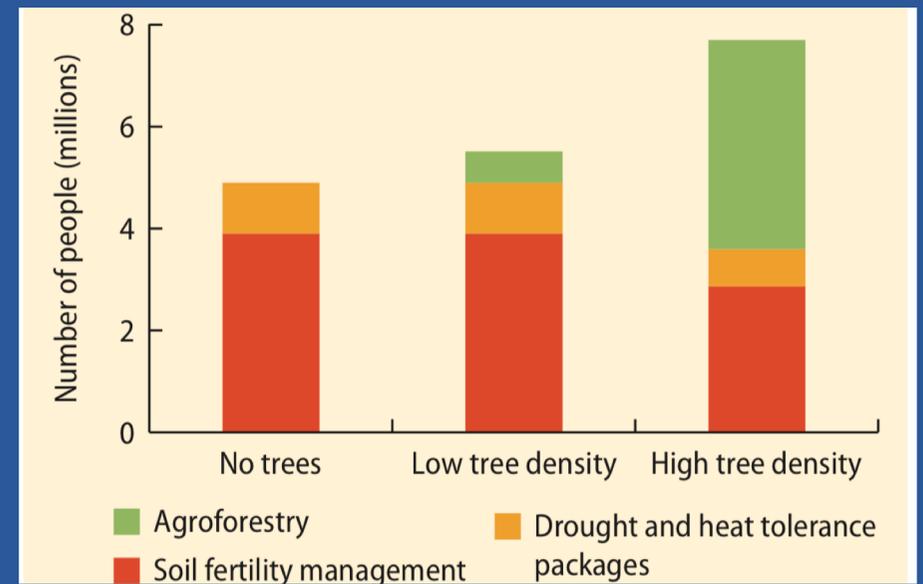
Example C

Impact and Capacity Analysis

The focus on impact analysis or capacity analysis, is often not determined by clear-cut criteria:

- Impact analysis may be more appropriate to identify priorities for national or regional adaptation interventions or deeper analysis
- Capacity analysis may be more appropriate to identifying and designing actions at local levels.

Social analysis, gender lens

- Identifying gendered impacts of climate change. How do beneficiaries deal with the burden created by climate change?

- Is access to natural resources affected by climate change?

- Does the climate action include specific, measurable results and deliverables related to gender mainstreaming, gender equality and women's empowerment?

- Has the project/programme assessed potential for contributing to gender equality and women's empowerment through planned activities?

- Has sex-disaggregated baseline data been collected?

- Have gender specialists or representatives from women's stakeholders groups participated in all steps of the programme or project cycle?

- Have all possible steps been taken to ensure gender equity in the recruitment of project staff and consultants?

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Technicalities of transparency & results frameworks

UNFCCC MRV systems

data accuracy

completeness

transparency

attracts
international funds

Monitoring

- Indicators for set objectives, including co-benefits
- Estimation approaches for indicators, data sources, data collection approaches, data QA
- Capacity for monitoring activities
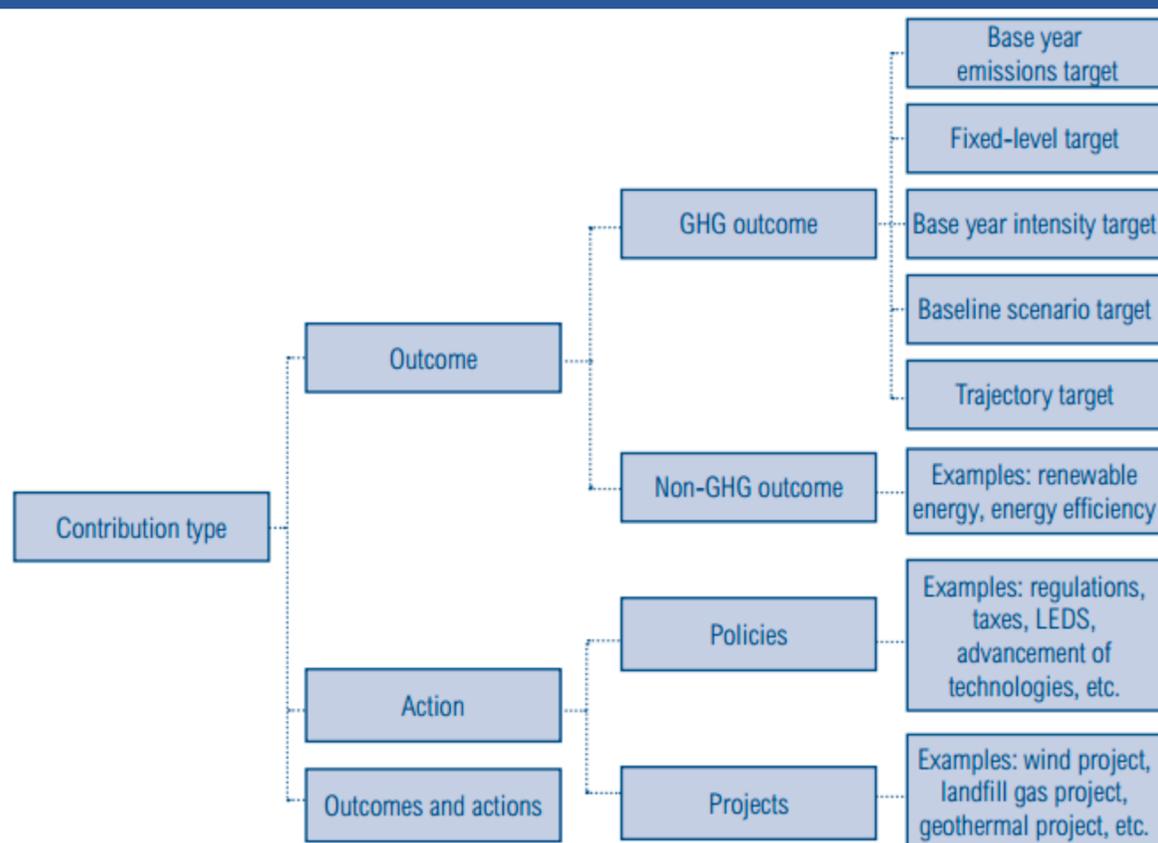- Responsibilities / Process for monitoring

Reporting

- Whom to report to, and how
- Requested information and level of aggregation
- Reporting format, reporting date
- Responsibilities/processes for report compilation and review

Verification

- Which info is to be verified, verification approaches
- Independency and qualification required for verifiers
- Verification reports, feedback of findings from verification into MRV process
- Structure for assessment and coordination of verifiers

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Monitoring measures mainly depend on foreseen mitigation activities (NDC)

Examples of measuring methods

Main monitoring objective	Methods
Targets	• GHG Protocol Mitigation Goal Standard (for Governements)
Policies / Projects & GHG effects	• GHG Protocol Policy and Action Standard (policies) • CDM; GHG Protocol Project Standard; Goal Standard; VCS (projects) • Ex Ante Carbon-balance Tool (ExACT, FAO)
Policies/ Projects & SD effects	• Nationally Appropriate Mitigation Action and related sustainable development evaluation tools • CDM sustainable Development co-benefits tool • Methods specific to the sustainable Development effect concerned • May use guidance from relevant standards e.g., GHG Protocol Policy and Action standard
Progress of implementation	• No internationally accepted standard • WRI Policy Implementation Framework

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Quality Assurance / Quality Control Goals

- MRV needs to be a robust system. QA/QC and verification contribute to the objectives of good practice in inventory development, namely to improve:

  - Transparency
  - Accuracy
  - Consistency
  - Comparability
  - Completeness.

QA/QC and verification activities should be integral parts of the inventory process.

Practical considerations

To take into account:

- **Resources and time** allocated to QA/QC plan
- **Frequency** of QA/QC checks and reviews
- **Appropriate level** of QA/QC for each category
- **Availability and access to information**
- Need to acquire/collect **additional data**
- Procedures to ensure **confidentiality**
- **Requirements** for documenting and archiving information
- Whether **increased effort** on QA/QC will result in improved estimates and reduced uncertainties
- Whether **sufficient independent data and expertise** are available to conduct verification activities.

Example of general QC procedures (Tier 1) – Table 5.5.1 of the IPCC GPG for LULUCF

Generic quality checks related to calculations, data processing, completeness and documentation that are applicable to all inventory source and sink categories.

TABLE 5.5.1
TIER 1 GENERAL INVENTORY LEVEL QC PROCEDURES

QC Activity	Procedures
Check that assumptions and criteria for the selection of activity data, emission factors and other estimation parameters are documented.	• Cross-check descriptions of activity data, emission factors and other estimation parameters with information on source and sink categories and ensure that these are properly recorded and archived.
Check for transcription errors in data input and reference.	• Confirm that bibliographical data references are properly cited in the internal documentation. • Cross-check a sample of input data from each source category (either measurements or parameters used in calculations) for transcription errors.
Check that emissions and removals are calculated correctly.	• Reproduce a representative sample of emission or removal calculations. • Selectively mimic complex model calculations with abbreviated calculations to judge relative accuracy.
Check that parameter and units are correctly recorded and that appropriate conversion factors are used.	• Check that units are properly labelled in calculation sheets. • Check that units are correctly carried through from beginning to end of calculations. • Check that conversion factors are correct. • Check that temporal and spatial adjustment factors are used correctly.
Check the integrity of database files.	• Confirm that the appropriate data processing steps are correctly represented in the database. • Confirm that data relationships are correctly represented in the database. • Ensure that data fields are properly labelled and have the correct design specifications. • Ensure that adequate documentation of database and model structure and operation are archived.
Check for consistency in data between categories.	• Identify parameters (e.g., activity data, and constants) that are common to multiple categories of sources and sinks, and confirm that there is consistency in the values used for these parameters in the emissions calculations.
Check that the movement of inventory data among processing steps is correct.	• Check that emission and removal data are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries. • Check that emission and removal data are correctly transcribed between different intermediate products.
Check that uncertainties in emissions and removals are estimated or calculated correctly.	• Check that qualifications of individuals providing expert judgement for uncertainty estimates are appropriate. • Check that qualifications, assumptions and expert judgements are recorded. Check that calculated uncertainties are complete and calculated correctly. • If necessary, duplicate error calculations on a small sample of the probability distributions used by Monte Carlo analyses.

Category-specific QC: Calculations-related Checks

- Checks of the calculation method
  - Can be simple calculations.

- All calculations leading to emission or removal estimates should be fully reproducible:
  - Discriminate between input data, the conversion algorithm and the output.

- When using spreadsheets:
  - Clearly reference to the data source of any numbers typed into the spreadsheet
  - Provide subsequent calculations, in the form of formulas, so that auditing tools can be used
  - Clearly mark cells in the spreadsheet containing derived data as "results" and annotate them as to how and where they are then used
  - Document the spreadsheet itself specifying its name, version, authors, updates, intended use and checking procedures.

Example of check list for category-specific QC

Category-specific checklist – Part B: Secondary data and direct emission measurement

Item		Check completed			Corrective action		Supporting documents (provide reference)
		Date	Individual (first initial, last name)	Errors (Y/N)	Date	Individual (first initial, last name)	
SECONDARY DATA: SAMPLE QUESTIONS REGARDING THE QUALITY OF INPUT DATA							
1.	Are QC activities conducted during the original preparation of the data (either as reported in published literature or as indicated by personal communications) consistent with and adequate when compared against (as a minimum), general QC activities?						
2.	Does the statistical agency have a QA/QC plan that covers the preparation of the data?						
3.	For surveys, what sampling protocols were used and how recently were they reviewed?						
4.	For site-specific activity data, are any national or international standards applicable to the measurement of the data? If so, have they been employed?						
5.	Have uncertainties in the data been estimated and documented?						
6.	Have any limitations of the secondary data been identified and documented, such as biases or incomplete estimates? Have errors been found?						
7.	Have the secondary data undergone peer review and, if so, of what nature?						
8.	Other (detailed checks)						
DIRECT EMISSION MEASUREMENT: CHECKS ON PROCEDURES TO MEASURE EMISSIONS							
9.	Identify which variables rely on direct emission measurement						
10.	Check procedures used to measure emissions, including sampling procedures, equipment calibration and maintenance.						
11.	Identify whether standard procedures have been used, where they exist (such as IPCC methods or ISO standards).						
12.	Other (detailed checks)						

EU Result framework SWD(2018) 444 final

- Results-based culture within DEVCO

- Complements existing monitoring and reporting frameworks set at sector level and/or in the context of specific initiatives or programmes

- Fully aligned with the SDGs

- Level 1 corresponds to development progress of partner countries

- Level 2 corresponds to outcomes and outputs of EU funded interventions illustrating the EU contribution to such progress in partner countries

SDGs	Result statement	Level 1 indicator	Level 2 indicator
SDG13	Implement the 2030 Agenda and the Paris Climate Change Agreement through coordinated and coherent action that promote resilience, reduce climate risk, and contribute to reduce greenhouse gas emissions	1.23 - SDG 9.4.1 CO_2 emission per unit of value added	2.21 - Greenhouse Gas (GHG) emissions avoided (tonnes CO_2eq) with EU support

Other EURF indicators of interest (examples)

SDGs	Result statement	Level 1 indicator	Level 2 indicator
SDG 2	Support sustainable agriculture and fisheries, especially for smallholders	1.4 - Value added of agriculture as % of GDP (WDI data)	2.3 - Number of smallholders reached with EU supported interventions aimed to increase their sustainable production, access to markets and/or security of land
			2.4 - *Agricultural and pastoral ecosystems where sustainable management practices have been introduced with EU support (ha)
SDG 6	Improved access to water, sanitation and hygiene	1.9 - *SDG 6.1.1 Proportion of population using safely managed drinking water services / sanitation systems (SDG 6.2.1)	2.8 - Number of individuals with access to improved drinking water source and/or sanitation facility with EU support
SDG 7	Improved access to energy for all, and increased energy efficiency and renewable energy generation	1.11 - *SDG 7.1.1 Proportion of population with access to electricity	2.9 - *Number of individuals with access to electricity with EU support through: a) new access, b) improved access
		1.12 - SDG 7.2.1 Renewable energy share in the total final energy consumption	2.10- Renewable energy generation capacity installed (MW) with EU support
SDG 11	Build cities resilience to shocks and harness opportunities for low-emission and climate resilient economy	1.21 -*SDG 11.5.2: Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters	2.19 - *Number of countries and cities with climate change and/or disaster risk reduction strategies: a) developed, b) under implementation with EU support
SDG 12	Promote resource efficiency and sustainable consumption and production	1.22 - SDG 12.2.2: Domestic material consumption, domestic material consumption per capita, and domestic material consumption by GDP	2.20 - *Number of Micro, Small and Medium Enterprises applying Sustainable Consumption and Production practices with EU support
SDG 14	Promote the protection and restoration of marine ecosystems and the sustainable management of ocean resources	1.24 - SDG 14.5.1: Coverage of protected areas in relation to marine areas	2.22 – Marine areas under a) protection, b) sustainable management with EU support (km2)
SDG 15	Support the conservation and sustainable management and use of natural resources, biodiversity and ecosystems	1.25 - SDG 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected area.	2.23 - *Areas of terrestrial and freshwater ecosystem b) sustainable management with EU support (ha)

GCCA+ Result framework

- Shows a summary of GCCA+ contribution to DEVCO results and objectives and to the United Nations Agenda 2030 for sustainable development

- Provides an overview of GCCA+ achievements at country level and across countries by proposing to EU Delegations, some indicators for both type of GCCA+ projects, on climate change mitigation and adaptation;

- Provides information on the performance of the implementation of the GCCA+, and notably of the GCCA+ Support Facility

- Its main references are:
    - The implementation framework of the GCCA - ref: SEC(2008) 2319
    - Global Public Goods and Challenges 2014-2020
    - The GCCA+ concept note
    - The EURF

GCCA+ Result framework

Type of Action	GCCA+ proposed indicator
Mitigation	Greenhouse Gas (GHG) emissions avoided or sequestered (tonnes CO2eq) with EU support Or sequestered
Adaptation	Number of final beneficiaries (disaggregated by sex) of climate adaptation measures (disaggregated by adaptation measure) supported by GCCA+

- GCCA+ results in key sectors related to adaptation (e.g., agriculture, water, DRR, environmental protection, infrastructure, energy) should be partially captured through the knowledge management system (collaborative platform)

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