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Vulnerability Assessments

Experiences of GIZ with Vulnerability Assessments at the local level

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Vulnerability Assessments

Vulnerability Assessments (VAs) play an important role in adaptation to climate change – likewise there is a growing number of GIZ adaptation projects. Many of these projects implement adaptation activities on the local level. Due to the increasing amount of these projects, there is a need to increase awareness about the existing knowledge of methods and experiences with Vulnerability Assessments, especially with a focus at the local level. This notion is also supported by the results of a survey conducted in autumn 2012 regarding the needs of GIZ adaptation projects.

Therefore, the goal of this factsheet with additional descriptions of VA applications is to provide an overview of experiences with VAs gained in GIZ projects and make these experiences available to others. It has three sections. In the first section, the general concept of vulnerability assessments and different methodological approaches are explained. The second section provides an overview of examples of different VAs conducted within GIZ. The third section illustrates these examples in detail, including their context, steps and results.

What is Vulnerability and what are Vulnerability Assessments?

Vulnerability is a measure used to indicate a possible harm and has become a central concept in diverse fields ranging from international climate policy-making to local development planning.

There are various concepts of vulnerability used in different disciplines. The concept commonly referred to in the adaptation community is the one provided by IPCC: "Vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes." It is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity and its adaptive capacity (see Box 1). This is a wider concept than the framework of the disaster risk community that mainly focuses on biophysical vulnerability of people or property and sees vulnerability, alongside hazard, as a component of risk. Lately, the IPCC Special Report on Extreme Events has made an attempt to consolidate these two concepts that might in future replace the former concepts.

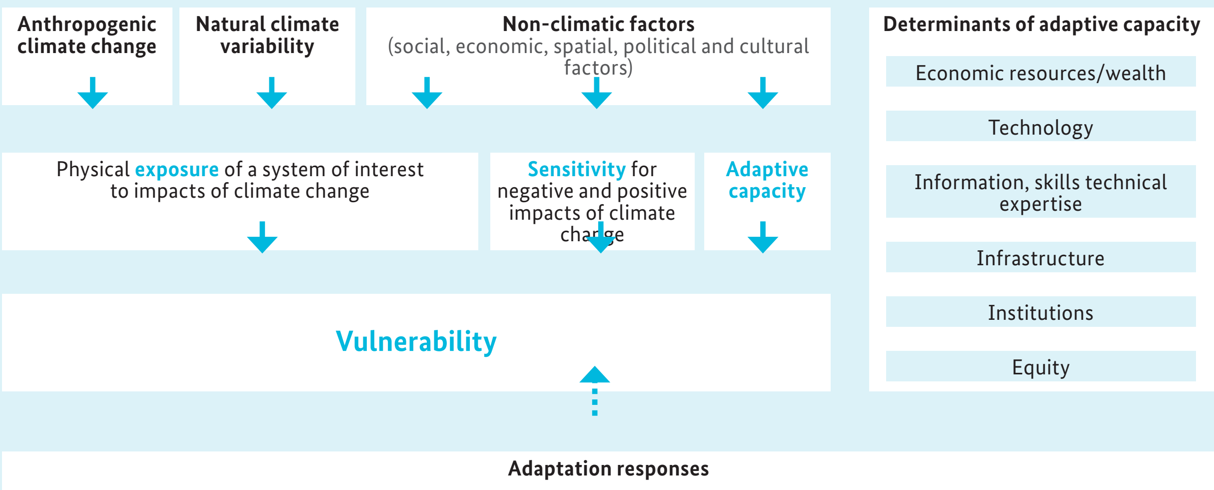
Vulnerability Assessments (VA) are methods that measure the vulnerability of an exposure unit or system, e.g. the vulnerability of a community or a natural system like watersheds or ecosystems. VAs identify, quantify and prioritize the vulnerabilities of that system. However, vulnerability cannot be measured or observed directly. It has to be deduced with the help of various variables for estimating the physical exposure, the sensitivity and the adaptive capacity.

Box 1: Important terms in climate change adaptation

Adaptive capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea-level rise).

Exposure is defined as the nature and degree to which a system is exposed to significant climatic variations.



Source: IPCC 2001, IPCC 2007, Füssel and Klein 2006, adapted by GIZ

Why is it necessary to undertake a Vulnerability Assessment?

By identifying vulnerabilities, VAs can help to improve adaptation planning, allocate resources and raise awareness about climate change at different levels.

- Internationally, VAs are often used for comparing vulnerabilities of countries, often in form of vulnerability indicators as the Climate Change Vulnerability Index (CCVI) or the Environmental Vulnerability Index (EVI).
- At national level, VAs support the setting of development priorities and monitor its progress. In addition, they are important components of National Communications submitted to the UNFCCC. They are frequently used for preparing Adaptation Strategies as well as in preparing National Adaptation Plans of Action (NAPAs) and National Adaptation Plans (NAPs).
- VAs on a sectoral level assist in setting strategic targets in development planning.
- At local level, VAs are used for developing local adaptation strategies or for mainstreaming adaptation into existing district or community plans. They are often the first step to be realized before designing and implementing an adaptation project. In addition, VAs help strengthening local capacity and integrating traditional knowledge in the planning process.

Box 2: Vulnerability Assessment and their uses for Monitoring and Evaluation (M&E)

VAs measure the vulnerability of an exposure unit or system. To do so, they make use of a range of quantitative and qualitative information, and often use a diverse set of indicators, variables and other forms of evaluations. If adaptation to climate change is done effectively, this should be reflected through reduced vulnerability of that unit or system, either by increasing the adaptive capacity or by decreasing the exposure or sensitivity. Therefore, it should be possible to use VAs in order to monitor and evaluate adaptation interventions. For this purpose, there are certain aspects that VAs should fulfill, e.g. objectivity, reliability, validity, and robustness. Pilot projects currently undertaken, will show to which degree repetitive VAs can be used for M&E adaptation policies and interventions.

How to conduct a Vulnerability Assessment? Different approaches to assessing vulnerability

A common way to distinguish different approaches is to differentiate between top-down and bottom-up approaches.

The suitability and the choice of an approach may change with the underlying definition of vulnerability, with the purpose of the assessment, as well as the unit or system under evaluation. Units/systems can be socio-economic (e.g. group of people, health, livelihoods), biophysical (e.g. ecosystems, species, habitats, water) or combinations of the two (e.g. localities, sectors). The approach can also be determined by the scale (global-level, regional-level, country-level, community level, household level, individual level) and the availability and accessibility of data.

The shift from a larger to a smaller scale often, but not necessarily, goes along with a shift from top-down approaches to bottom-up approaches (see figure 1). Consequently, there is a diversity of methodologies. Nevertheless, all assessments have in common that vulnerability always has to be seen as place-based and context specific.

- **Top-down approaches**
  Top-down approaches usually refer to scenario-driven assessments that apply global or regional climate projections or modelling (e.g. by using General Circulation Models, GCM) to assess potential impacts on physical or natural exposure units, such as watersheds, infrastructure, or agricultural production systems. These approaches first simulate possible future states of the vulnerable system and then evaluate these states based on harm indicators. Therefore they are also called simulation-based and are mostly used for assessing biophysical vulnerability. Top-down approaches usually give an overview of what sort of environmental changes are likely to occur in the future. Due to the required data, software and methodological knowledge these approaches are usually more costly than bottom-up approaches.

- **Bottom-up approaches**
  For bottom-up approaches, the unit of analysis is typically smaller and more localised, such as communities. The emphasis is more on current and short-term time scales, where vulnerability to current climate variability serves as a starting point for understanding vulnerability to future climate conditions. A main challenge here is, that the smaller the scale of a VA, the more difficult it is to obtain down-scaled climate information from models and projections that suit the needs of a locally confined VA.

  Therefore, bottom-up approaches typically, but not necessarily, use other sources of data for instance from participatory processes. Participatory here means that the people are not only the subject of interest in the assessment. They also provide data and assist in analysing it. Such a process also assists in integrating local knowledge into planning. Hence, bottom-up approaches in the context of climate change are often associated with community-based adaptation (CBA).

Box 3: Common tools used in participatory bottom-up approaches to VAs:

Many tools for bottom-up approaches are known from Participatory Rural Appraisals (PRA) but for VAs they are focusing on climate change. Common tools are:

Hazard mapping, Hazard trend analysis, Hazard ranking, Hazard impact ranking, Climate hazard impacts on livelihood matrix, Transect walk for risk identification, Cognitive mapping, Seasonal calendars, Climate diaries, Rain calendars, Oral histories, Historical timeline, Participatory scenario development, Focus group discussions.

- **Integrated approaches**
  In order to capture the advantages and benefits of the different approaches, it seems most appropriate to use a combination of approaches for a given location. E.g. for a VA at local level, information from top-down approaches at the national can be taken and be supplemented with data and information gathered from bottom-up approaches at local level. Experience has shown that such an approach also increases the acceptance of the results.

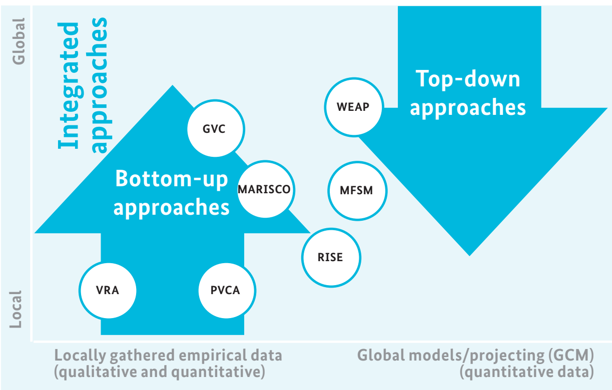


Figure 1: VA approaches conducted within GIZ, figure adapted from Dessai and Hulme 2004

Typical steps in conducting a Vulnerability Assessment

The steps to conduct a VA presented here are general steps and need refinement when a methodology is applied. They serve as a first indication on how VAs are being conducted.

1. Definition of the objective of the assessment; description of who should use the assessment for what, and definition of the exposure unit or system being assessed.
2. Analysis and description of the overall context in which the VA is being conducted.
3. Development of a methodology for measuring sensitivity, adaptive capacity, vulnerability (preferably with stakeholder consultation)
   - Selection of indicators/proxies,
   - Judging against time and finance budget.
4. Inventory of existing climate information (see Box 3) and assessing their reliability; based on that inventory, gathering of complementary information for being able to conduct 2.
5. Data (collection,) management and interpretation.
6. Conducting the actual assessment
7. Feedback to and verification by stakeholders, in order to be used in policy making.
8. Repetition of the VA after implementation of adaptation activities (generally because vulnerability is not static and, where appropriate, for M&E).

No matter which methodology is chosen, the following questions should always be answered in order to ensure that an effective assessment will be carried out:

Why? What is the objective of conducting the VA? How will the results be used?
Where? Where/what is the system of analysis?
Who? Who/what are the units of analysis, i.e. the scope of analysis?
To what? With respect to which stimuli or stressors is vulnerability being analysed?
When? What is the time horizon for which vulnerability is being analysed?

Box 4: Possible sources of existing VAs and/ or climate information for VAs:

One of the main challenges in conducting VAs is to obtain specific information and reliable data. The following list indicates sources of information. Some include assessments that are on a larger scale, e.g. from UNFCCC or IPCC. They can be used as a starting point for VAs on a smaller e.g. local scale.

- National Communications to the UN Framework Convention on Climate Change (UNFCCC)
- Intergovernmental Panel on Climate Change (IPCC) Reports
- National Adaptation Program of Action (NAPA) and National Adaptation Plans (NAP) documents
- Professional and academic journals and university research centers
- Meteorological data on current climate trends from national or international sources
- Seasonal forecasts
- Maps showing topography, agro-ecological regions, infrastructure, etc.
- Hazard maps and disaster plans/statistics and existing risk assessments

Overview of GIZ experiences

Within GIZ, several VAs have already been conducted. The table represents experiences in a short form as a first step guidance. For more detailed information on the VAs, click on the name of the methodology.

Name	PVPA (Participatory Vulnerability Perception Assessment) in Kenya	MACAF (Measuring Adaptive Capacity with Farmers) in Kenya	MARISCO (Spanish: adaptive risk and vulnerability management at conservation sites) Peru	RISE (Response-Inducing Sustainability Evaluation) in Bolivia	PCVA (Participatory Capacity and Vulnerability Assessment) in India	GVC (Greening Value Chains) in Cambodia (part of Climate Proofing	MFSM (Multifactorial Spatial Modelling) in Tunisia	WEAP (Water Evaluation And Planning System) in Jordan
Short description	Assessment of community vulnerability perceptions applicable within a project cycle leading to an index	Classification of farmers into adaptive capacity levels based on standardized vulnerability indicator clusters, which allows for measurement of adaptive capacity changes over time	Participatory approach for integrating risk and vulnerability into the management of conservation sites to adapt management in the face of climate change.	Data is collected on national, regional and farm level and compared using a set of sustainability indicators.	Vulnerability Assessment of agriculture-based livelihoods to shifting rainfall patterns, erratic rainfall and micro-level water logging conditions.	Conducting of desk study and interviews, results presented and verified at workshop.	GIS based modelling approach complemented by a stakeholders exchange with government, science and civil society.	Decision Support System DSS for strategic water resource planning with the focus of allocation and resource management.
Sector/ scope	Communities/ groups	Communities/ groups	Management of conservation sites	Agriculture/ farms	Rural livelihoods and agricultural production systems.	Value chains, agriculture	Ecosystems	Water, Ministry and sub ordinaries
Type of approach	Bottom-up	Bottom-up	Bottom-up	Bottom-up	Bottom-up	Integrated	Integrated	Top down
Methodology	Focus group discussions	Focus group discussions	Desk study, focus group discussions, stakeholder workshops	Individual visits on farms; feedback can be on individual or community level	Participatory rural appraisal	Desk study on climate trends and value chains and focus group discussion for filing table on adaptation needs and adaptive capacity	Development of vulnerability maps based on ecosystem modelling combined with stakeholder exchange and peer-review of results	Modeling, on the job training, organizational change, networking
Tools used	Ranking, historical profile, problem tree, 'H-form' (table) to capture numerical scores and reasoning behind vulnerability perceptions	Standardized indicator checklist, farmer classification cards, community/ group tally sheets, classification analysis matrix	Impact chains, conceptual models	Universal RISE questionnaire, applied during "on farm" visit and interview	Focus group discussions, crop-, livelihood- and climate calendars, participatory mapping	- Table with adaptation needs and adaptive capacity - Risk Assessment Matrix	Software MAXENT GIS software discussions with stakeholders and peer groups	Modeling and information management - WEAP, MODFLOW, wikimedia etc.
Spatial scale/scope	Local	Local, potential for regional/national scale	Local, regional, possibly national	Local	Local, village	Local	Local up to regional	National, subnational

Table 1: GIZ Experiences with Vulnerability Assessments and vulnerability information gathering

Participatory Capacity and Vulnerability Assessment (PCVA) in India

Profile of PVPA	
Short description	Conducting a desk study and interviews, results presented and verified at workshop.
Sector/scope	Inhabitants of three villages in two districts of West Bengal
Spatial scale	Local, village
Temporal scale	Past ~27 years
Time needed	PRA session: 3 days per site
Type of approach	Bottom-up
Methodology	Participatory rural appraisal
Tools used	Focus group discussions, participatory crop-, livelihood- and climate calendars, participatory mapping
Purpose	Identification of vulnerability of local farming systems to shifting rainfall patterns, erratic rainfall, flooding and water logging.
Inputs and capacity required	PRA specialist, support from local NGOs in the form of logistics and location specific knowledge
Resource intensity	Stationary items (pens, papers, erasers, scotch tape, etc.) and other materials needed for participatory mapping and calendar construction, Material costs per PRA session: ~Rs. 2000
Outputs obtained	Qualitative information on local resources, livelihood options, crop seasons, seasonal variation of livelihoods, local climate pattern
Co-benefits	Stakeholder engagement, sensitizing, identification of adaptation options, selection of beneficiaries
Useful for M&E	Yes
Other (non-GIZ) resources	Participatory Capacity and Vulnerability Assessment (PCVA)

Frame in which the method was applied

The VA was carried out at the outset of a climate change adaptation project. It was conducted in January 2012 in three villages in West Bengal, India, which are particularly prone to flooding and waterlogging. Waterlogging, erratic rainfall, shifting rainfall patterns and insufficient agricultural development caused a decline in agricultural productivity.

The **objective of the climate change adaptation project** is to diversify livelihoods through the introduction of integrated agricultural production systems, alternative cropping arrangements (e.g. alley/rotation cropping) and re-shaping of agricultural lands. These measures shall increases the livelihood base of farmers, reduce their vulnerability to climatic variability by decreasing their sensitivity and increase their adaptive capacity. Eventually, these measures will help making the communities more resilient.

The **purpose** of the applied PRA tools was to identify adaptation needs, constraints and priorities. The PRA tools were used to gather information on resources (social, human, institutional, natural and economic), livelihood options and risks and perceived changes in climate.

Steps

- Literature review and climate data analysis
- Socio-economic baseline survey
- Three-day PRA sessions (4 – 5 hours per day)
  - Mutual introduction and discussion about project background
  - **Participatory mapping** exercise to identify spatial features, resources, frequently flooded and waterlogged areas
  - Participatory development of **crop calendar**
  - Identification of **seasonal livelihood options** and their changes in time
  - **Problem identification and ranking** by community members during focus group discussion

Results and lessons learned

Results

- Villagers depend mainly on agriculture. Still, the importance of agriculture has decreased, farmers attribute this to decreasing productivity due to waterlogging and erratic rainfall
- Number of day labourers has increased
- People strongly depend on buying food from the market
- HYV (High Yielding Varieties) and erratic rainfall have increased the cost of production
- Low agricultural productivity increases communities' sensitivity and decreases adaptive capacity, thus making them more vulnerable to climate change

Use of results

- Process was used to identify characteristics of farm household that are suitable to be included in the demonstration projects
- Identification and selection of beneficiaries
- Women groups were identified as potential partners for implementation of some of the proposed interventions
- Results were used to identify and adapt the proposed adaptation options to local conditions in the selected villages, e.g. intercropping of jute and plants resistant to waterlogging

Lessons learned

- PRA is a useful method for assessing vulnerability and greatly helps in devising adaptation options
- Different PRA tools require different group size and composition
- Discussions with villagers should be kept short to avoid that villagers loose interest

Picture: Ranking of livelihood problems and risks in Murshidabad. © Climate Change Adaptation in Rural Areas of India (CCA RAI) .

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Greening Value Chains (GVC) as part of a Climate Proofing approach in Cambodia

Profile of GVC	
Short description	Conducting a desk study and interviews, results presented and verified at workshop.
Sector/scope	Value chains
Spatial scale	Local
Temporal scale	The method takes vulnerability to current climate variability as a starting point and takes into account additional risks from future long term climate change based on available climate projections.(i.e. the method has a prospective orientation towards the next 40 – 90 years)
Time needed	• Timeframe depends on the number of value chains regions, and stakeholders included • A quick assessment of one value chain could be realized with around 20 consultant days, excluding the logistical support and preparation by GIZ
Type of approach	Integrated approach
Methodology	Desk study and focus group discussions
Tools used	Table with adaptation needs, guiding questions for desk study on climate trends and value chains, Risk Assessment Matrix, Table of adaptive capacity.
Purpose	The VA was conducted as part of a Climate Proofing process in order to sensitize on adaptation topics and identify vulnerabilities of current value chain upgrading efforts as well as potential future activities
Inputs and capacity required	Skilled facilitators (with knowledge about climate issues, the value chains at stake, the country context, standard interview techniques and moderation of stakeholder workshops), Science-based information.
Resource intensity	• Two international consultants and two national consultants were recruited with an overall budget of 57 days in order to assess three value chains in one administrative region
Outputs obtained	Overview of climate impacts on the value chain, overview of adaptive capacities of value chain actors, prioritized adaptation options
Co-benefits	Screening of mitigation potential
Useful for M&E	Assessment of climate impacts and adaptive capacities can feed into M&E system to be developed
Further information on this GIZ experience	• Value Chain Climate Proofing Tool • Full Climate Proofing report

Frame/environment in which the method was applied

- The primary users of the mission´s outputs were the GIZ programme Regional Economic Development (RED) Green Belt Siem Reap, and GIZ Climate protection programme (SV Klima).
- The climate proofing of value chains had been proposed by a previous mission (climate advisory service) that screened the GIZ portfolio in Cambodia more generally.
- The climate advisory service had identified the value chain development activities (VCD) of RED programme to be particularly vulnerable to climate change. The GVC method was thus employed to analyse the vulnerabilities in greater detail and suggest changes in the intervention strategy if necessary.

Steps

- Preparation of scientific and technical information in a desk study
- Assessment of adaptation needs
- Selection of adaptation options
- Integration of adaptation options into value chain upgrading
- Rapid assessment of the mitigation potential of the value chain

Results and lessons learned

RED should take the mission as a starting point to progressively include the topic of climate change into its activities through additional validation and fine-tuning of climate proofing results regarding the introduction of resilient varieties, water management, land preparation and post-harvest techniques as well as crop insurance possibilities. According to this follow-up, the content of extension services can be enhanced, climate change topics can be integrated into awareness raising activities and cooperation with other partners can be screened towards a joint implementation of climate change related activities.

Compared to other options…	Scores for selected Adaptation Options (AO) Score each adaptation option and each question from 1-5				
	AO 1: Improve farming skills and extension	AO 2: Promote to grow additional resilient crops (diversify crops)	AO 3: Promote improved integrated agricultural water management	AO 4: Promote resilient short duration varieties	AO 5: Promote flood and drought resistant varieties
…does this option **adapt better** to CC impacts? *[1 = not good … 5 = very good]*	4	5	5	5	5
…is this option **cheaper**? *[1 = expensive … 5 = very cheap]*	3	4	1	3	3
…is this option **more environmental friendly?** *[1 = not environmental friendly … 5 = very environmental friendly]*	5	3	4	3	3
…is this option an activity already included in the program that needs to be **adjusted**? How do we need to adjust it? *[1 = adjusted a lot … 5 = slightly adjusted]*	3	1	2	1	1
Total Score	15	13	12	12	12
Rank	1	2	3	3	3

Figure 2: Prioritized adaptation options for rice

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Response Inducing Sustainability Evaluation (RISE) within the *Programa de Desarrollo Agropecuario Sustentable* (PROAGRO) project in Bolivia

Profile of RISE	
Short description	Data is collected on national, regional and farm level and compared using a set of sustainability indicators
Sector/scope	Agriculture, farm level
Spatial scale	Local
Temporal scale	10 years
Time needed	½ day per farm; 3 months for 200 farms
Type of approach	Bottom-up
Methodology	Individual visits on farms; feedback can be on individual or community level
Tools used	Universal RISE questionnaire, applied during 'on farm' visit and interview
Purpose	Evidence based advice for improving sustainability and resilience on farm level & evidence for policy and program development.
Inputs and capacity required	Certified RISE interviewer (certification course duration: 5 days), good interview techniques and knowledge of the local context.
Resource intensity	Low-medium, i.e. Initial on-site training for inter-viewers (5 days); 3-4 hours on farm assessment (including farm visits and individual feedbacks); plus statistical analyses and report writing
Outputs obtained	Qualitative and quantified information for each farm, sub-region and region on 10 sustainability parameters and 50 specific indicators (on the RISE scale)
Co-benefits	Direct technical assistance to all participat-ing farms; evidence for agricultural programs; evidence for program indicators; base line for complementary vulnerability and resilience studies
Useful for M&E	yes, with restrictions
Further infor-mation on this GIZ experience	RISE Handbuch (in German) PROAGRO report on RISE application (available in 2013)
Other (non-GIZ) resources	RISE Manual (www.hafl.bfh.ch)

Frame/environment in which the method was applied

- PROAGRO applied RISE with a two-fold objective: a) for establishing a base-line on sustainability/resilience of the final beneficiaries of the program (agricultural farms), and b) for developing an evidence based tool for agricultural advisory services.
- The first application of RISE provided a diverse and sound base-line, a second application will allow an assessment of improved sustainability on farm level. The results allow a reflection on effectiveness of program measures, as well as public programs.
- Key function in Bolivia is the availability of data that allows customized advice for farm management, identification of sustainability hot-spots, identification and prioritize of adap-tation needs.

Steps

- Preparation of science based and regional information as basis for RISE study
- Contract RISE certified persons or build up own capacity (3 – 5 day in country training)
- Visits on farms for gathering data (interviews with farm owner & his family)
- Feedback for each farmer or during focus group discussion
- Statistical analysis of data for establishing a program base line, and elaboration of a report for influencing local and national policy

Results and lessons learned

Specific data on sustainability of final beneficiaries of the program; evidence for improving program measures and policy dialogue on local and national level.

The results are being re-shaped for improved policy dialogue during 2013.

RISE is especially relevant within its application focus (the farm level); the technical data has to be reshaped in order to be used for policy dialogue. RISE does only substitute Vulnerability Analysis to a certain degree – we suggest a complementary use of other VA (i.e. for defining exposure to climate change risk within a region, or the sensitivity within a system). RISE assesses the current status of sustainability and provides a basis for pri-oritizing improvement measures; however, it does not automati-cally link the analysis with future scenarios of climate change.

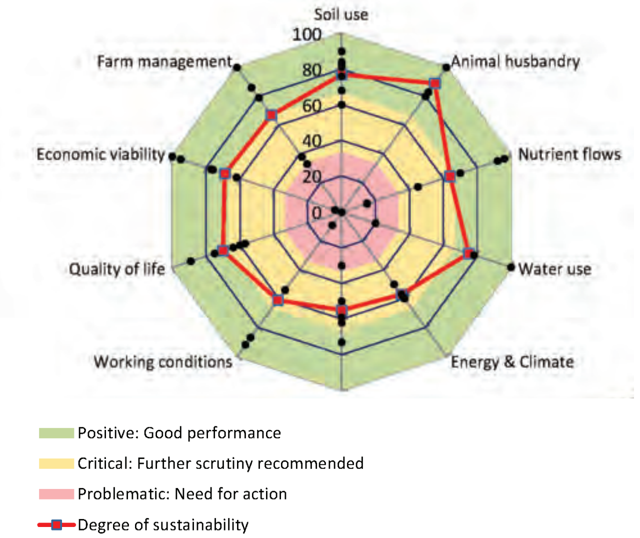

Figure 3: Spider diagram showing the sustainability parameters

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Measuring Adaptive Capacity with Farmers (MACAF) within the Adaptation to Climate Change and Insurance (ACCI) project in Kenya

Profile of MACAF	
Short description	Classification of farmers into adaptive capacity levels based on standardized vulnerability indicator clusters, which allows for measurement of adaptive capacity changes over time.
Sector/scope	Communities/groups
Spatial scale	Location specific/potential for regional/national scale
Temporal scale	Project lifetime (and beyond)
Time needed	One day per community group
Type of approach	Bottom-up
Methodology	Focus group discussions
Tools used	Standardized indicator checklist, farmer classification cards, community/group tally sheets, classification analysis matrix
Purpose	Assessment of status of adaptive capacity in a community/group; quantification of change in farmer adaptive capacity.
Inputs and capacity required	Good facilitators (2 people for one day, prior mobilization), visual aids
Resource intensity	Low – medium
Outputs obtained	Adaptive capacity indicators (indices); tallies of status and progressive change in the farmer adaptive capacity (% of farmers in various adaptive capacity classes)
Co-benefits	Inter-sectoral coordination
Useful for M&E	yes
Further information on this GIZ experience	www.acci.co.ke Measuring Adaptation Capacity with Farmers (MACAF Tool)
Other (non-GIZ) resources	Adapted from Participatory Learning and Action Research – Integrated Soil Fertility Project (Western Kenya 1999–2000).

Frame/environment in which the method was applied

- Applied in Busia and Homa Bay counties in Western Kenya, involving the District Agriculture Extension Officers in October 2012.
- During seasonal planning of activities with farmers for the short rains of October, 2012.
- Measures the change in farmer adaptation capacity.

Steps

1. Brainstorming on local understanding of climate change.
2. Situational analysis of local farming practices and challenges associated with each.
3. Explanation of the tool to clarify expectations and to avoid classification biases.
4. Validation of adaptive capacity indicators.
5. Classification of farmers based on indicators.
6. Farmer adaptation planning per class (possibly leading to interventions).

Results and lessons learned

MACAF has been used to establish an adaptive capacity baseline, to decide on and plan for interventions. It will be used to document changes, including those influenced by these measures. So far the tool has been applied within a project context. Lessons:

- Farmer classification is very sensitive unless clearly introduced and properly explained to avoid misconception that farmers in different classes may be given differential attention.
- MACAF sensitizes participants about climate change and reflects on indicators/proxy-indicators influencing adaptive capacity.
- It assists in identification of particularly farm households for interventions, allowing for targeted interventions.
- The tool can be used to measure changes in adaptive capacity over time, and provides for an analysis of underlying factors causing these changes.
- Indicators can be defined and standardized and therefore results are comparable for different groups/communities/locations.
- If the selection of communities is representative and data management systematic, the tool allows for a spatial/national database on adaptive capacity, relevant to the proposed MRV+ system for Kenya.
- The documentation of changes per community/group down to individual farm household level allows for verification at any time.

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Picture: Facilitation of a farmer discussion in Western Kenya (ACCI)

Participatory Vulnerability Perception Assessment (PVPA) wihtin the Adaptation to Climate Change and Insurance (ACCI) project in Kenya

Profile of PVPA	
Short description	Assessment of community vulnerability perceptions applicable within a project cycle leading to an index
Sector/scope	Communities/groups
Spatial scale	Location specific
Temporal scale	Project lifetime
Time needed	One day per community/group
Type of approach	Bottom-up
Methodology	Focus group discussions
Tools used	Ranking, historical profile, problem tree, 'H-form' (table) to capture numerical scores and reasoning behind vulnerability perceptions
Purpose	Community sensitization on climate change; quantitative analysis of community perceptions on climate risks; identification of adaptation options
Inputs and capacity required	Good facilitators (2 people for one day, prior mobilization), climate change background information, visual aids
Resource intensity	Low – medium
Outputs obtained	Ranked climate risks, reasons for vulnerability, vulnerability scores, coping strategies
Co-benefits	Inter-sectoral coordination
Useful for M&E	yes
Further information on this GIZ experience	www.acci.co.ke
Other (non-GIZ) resources	UNDP Toolkit for Practitioners

Frame in which the method was applied

- Tool was tested in Busia and Homa Bay Counties in Western Kenya with Ministry of Agriculture extension staff and local NGOs and applied between October 2011 till April 2012.
- Used as entry point for project interventions with communities/groups.
- Results provided a baseline of community/group vulnerability.

Steps

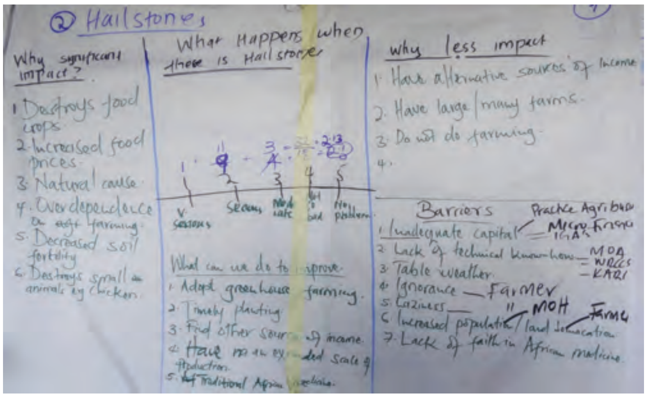
1. Brainstorming on local understanding of climate change.
2. Situational analysis of local farming practices and challenges associated with each.
3. Listing and ranking of climate risks (timelines/trendlines, causes and effects).
4. Scoring of community perceptions on impacts of identified climate risks (resulting in PVPA index).
5. Brainstorming on reasons for vulnerabilities.
6. Listing of coping strategies and possible external support (can lead into adaptation planning).

Results and Lessons learnt

Results: Communities aware of climate change and its impacts and prepared for adaptation action.

Listed coping strategies formed the basis for designing adaptation plans.

- The PVPA tool is strong on sensitizing participants about climate change and gives a good (first) impression about the perception of risks and the effects on participants
- The tool can be used to mainstream climate change in other rural/agricultural development interventions and is action oriented
- Results are context-specific as there is no standard definition of the scores; comparability between locations might be limited.
- The tool provides a simple method to spot-check changes in perceptions over time, but the reasons behind the perceptions are not verifiable.



Picture: PVPA scoring for Hailstones in Western Kenya (ACCI)

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Multifactorial Spatial Modeling (MFSM) in Tunisia

Profile of MFSM	
Short description	MFSM is a GIS based modelling approach delivering vulnerability maps. In Tunisia, MFSM was complemented by an exchange with stakeholders in government, science and civil society. The MFSM is applied as a second more detailed step after the Ecological Niche Modelling (ENM) approach conducted on national level.
Sector/scope	Ecosystems
Spatial scale	Regional/local
Temporal scale	It models vulnerability for the years 2020 and2050
Time needed	Several weeks up to several months (depending on the availability and accessibility of data as well as on the degree of participation of different stakeholders).
Type of approach	Integrated approach
Methodology	Development of vulnerability maps based on ecosystem modelling combined with stakeholder exchange and peer-review of results
Tools used	• GIS software • Official and informal meetings with stakeholders
Purpose	• identifying vulnerability of ecosystems • estimating direct and indirect impacts on ecosystems • identification of adaptation options
Inputs and capacity required	• Experts on GIS, ecosystems and enviro. economics • Science-based information
Resource intensity	High (staff, time and biophysical information)
Outputs obtained	• Vulnerability maps for each factor • Overall vulnerability combining all factors • Adaptive options map • Report explaining how to interpret the maps, indicating adaptation options and availability of data
Co-benefits	Inter-institutional/inter-sectorial coordination, awareness raising
Useful for M&E	Vulnerability maps may be used as indicators
Further information on GIZ experience	"Manual for conducting Vulnerability assessments using the MFSM approach" • Factsheet on ecosystem VA of alfa grass (in French) • Factsheet on ecosystem VA of cork oak (in French) • Results report on ecosystem VAs Tunisia (in French)

Frame in which the method was applied

- After having identified the most affected ecosystems/vegetation types in Tunisia on national level (by using the ENM method), with the participation of the relevant national authorities and organizations (Tunisian Ministry of Environment, Agriculture and subsidiary agencies, national and regional research institutions, national NGOs, 2009/2010), regional stakeholder groups were established additionally to accompany the MFSM.
- The results of MFSM were taken into account within the National Climate Strategy.
- Presentation of the planned assessment, of interim and final results facilitate the participatory discussion process, coordination for data exchange, brings together different know-how and interests (national, regional, local; scientific – applied, etc.).

Steps

- Creation of a group of interested stakeholders who are going to accompany the process, provide or support finding necessary data, are involved in discussions, help to interpret results, etc. (for example, research institutions, governmental authorities, environmental NGOs)
- Preparation of science based information and modelling (by a team of experts)
- Presentation and discussion of the results drawing necessary conclusions (possible adaptation measures, next steps, necessary decision-making, involvement of additional stakeholders, necessary advocacy, awareness raising activities, etc.)

Results and lessons learned

Results:

- On the bases of the VA of Ecosystems, a review of the terms of reference for the establishment of forest management plans has been conducted with the support of GIZ in order to take into account adaptation to climate change aspects and the production of goods and services of forest ecosystems.
- The new forestry development strategy 2014 – 2023 will integrate mitigation and adaptation to climate change aspects and take into account the economic value of ecosystems services within a sustainable development perspective of forest resources.

Lesson learnt:

- There is a need to involve stakeholders from all levels.
- For reliable results very accurate biophysical data is needed.

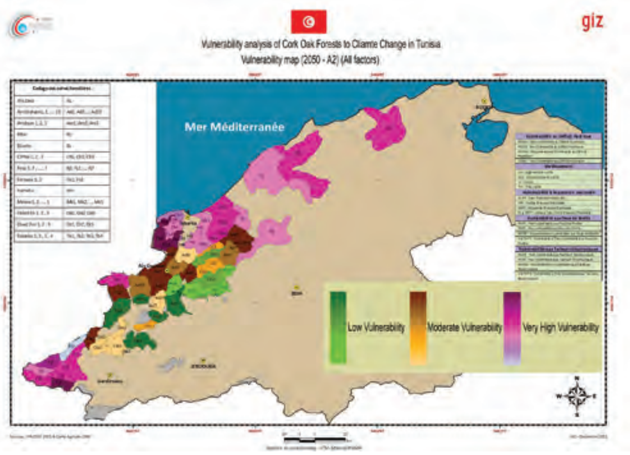

Figure 4: Vulnerability of cork oak to climate change (Timeframe 2050, A2 scenario).

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Adaptive management of vulnerability and risk at conservation sites (MARISCO) in Peru

Profile of MARISCO[1]	
Short description	MARISCO is a participatory approach with the objective of facilitating the integration of risk and vulnerability perspective into the management of conservation sites to adapt management in the face of climate change. It was developed by the Centre for Econics and Ecosystem Management at Eberswalde University for Sustainable Development as a result of projects and workshops carried out in several countries
Sector/ scope	Management of conservation sites ((ecosystems, protected areas, ecosystem services, socio-economic systems)
Spatial scale	Local, regional, possibly national
Temporal scale	Depends on scope, e.g. lifetime of a management plan
Time needed	2 – 6 months
Type of approach	Bottom-up
Methodology	Desk study, focus group discussions, stakeholder workshops MARISCO is adaptable to different workshop and project settings, and does not rely on specific types or amounts of data, but utilizes different forms of available data.
Tools used	Impact chains, conceptual models MARISCO is derived from the Conservation Measures Partnership Open Standards for the Practice of Conservation
Purpose	Facilitating the integration of risk and vulnerability perspective into the management of conservation sites
Inputs and capacity required	MARISCO coach
Resource intensity	(see also methodology)
Outputs obtained	Reasonably comprehensive and complex systemic analysis, displaying results (ecological vulnerability and other factors influencing the management plans, such as socio-economic factors) and a vision and concrete recommendations on future changes to existing management plans.
Co-benefits	Improved understanding of status and trends of conservation site, improved management skills, sensitizing, intersectorial coordination for biodiversity conservation
Useful for M&E	Yes (e.g. indicators can be included in the updated management plan)
Further information on this GIZ experience	• MARISCO factsheet (GIZ 2012) • Vulnerability analysis and strategies for climate change adaptation in the El Sira Community Reserve. Experiences using the methodology. Peru, December 2011 • Workshop documentation China, Costa Rica, Peru • Handbook (in preparation)
Other (non-GIZ) resources	Short film about the approach http://www.youtube.com/watch?v=Yb_YDLNJrE4

Frame in which the method was applied

At three workshops held between April and September 2011, some 45 participants conducted a systemic vulnerability analysis of the El Sira Community Reserve and the surrounding area in the context of promoting biodiversity conservation and climate protection in the reserve and its buffer area and the management plan update process. The participants were representatives from indigenous communities, ECOSIRA, local governments, Ucayali regional government, SERNANP, universities, NGOs, Eberswalde University and GIZ.

Steps (summary)

Definition of the conservation targets, with regard to biodiversity and human well-being.

- Identification and assessment of current and future threats and stresses and underlying processes
- Illustration of the systemic effects in a conceptual model
- Identification and prioritization of vulnerability-decreasing and low-risk strategies

Results and lessons learned

The participants engaged in a collective learning process to improve their knowledge of climate change, vulnerability concepts and risk, taking into account the current situation of the reserve and potential future scenarios, including anticipated climate and socioeconomic changes. The most stressed and threatened conservation targets were identified for El Sira Community Reserve, furthermore a look at how current conservation strategies related to the threats and risks and how vulnerability is increasing, led to the identification of significant strategic gaps. The participants detected potential options for the development of complementary strategies to improve the effectiveness of the reserve's ecosystem functions and, in particular, to reduce vulnerability to the anticipated changes. Recommendations are being included inter alia in the updated version of the management plan.

Some remarks based on the application of MARISCO (in Peru and other countries):

High feasibility with little resources (personal, financial, technical, data available, time)

- Deals with complex systems, high levels of uncertainties and newly gained knowledge (adaptive approach).
- Applicable to different types of target systems (ecosystems, protected areas, ecosystem services, socio-economic systems) on different spatial scales (local, regional, possibly national) and to different issues of concern (e.g. climate change, land-use change, pollution). Applicable with all levels of data (e.g. scientific, local/traditional).
- Holistic approach including biophysical, spatial and institutional vulnerabilities – Results in precise advises.
- High acceptance, accessibility and plausibility for local stakeholders due to participatory approach.

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[1] Acronym of the Spanish name for the approach: Manejo Adaptativo de RIesgo y vulnerabilidad en Sitios de COnservación – adaptive risk and vulnerability management at conservation sites.

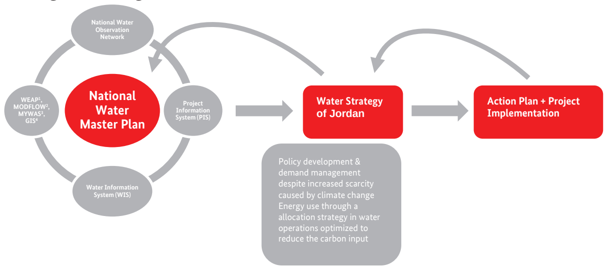
Multilevel analyses and vulnerability assessments of the water system using Water Evaluation And Planning (WEAP) in Jordan

Profile of WEAP	
Short description	Implementing a Decision Support System DSS for strategic water resource planning with the focus of allocation and resource management within the Ministry of Water and irrigation.
Sector/scope	Water, Ministry and sub ordinaries
Spatial scale	National, sub national
Temporal scale	3 years
Time needed	Depends on the regional extension, the focus of the analysis and the availability of the data.
Type of approach	Top down
Methodology	Modeling, on the job training, organizational change, networking
Tools used	Modeling and information management – WEAP, MODFLOW, wikimedia etc.
Purpose	Strategic water resource planning within the framework of scare resources, identify supply shortages in the future (quantities and location), develop adaptation strategies
Inputs and capacity required	Solid data base on hydro-geological, water demand and agricultural data, deep scientific knowledge of multilevel analyses with modeling software.
Resource intensity	Relatively high due to purchase of data management tools and training of managers
Outputs obtained	Water balances for the entire water system under different planning scenarios like (climate change, influx of refugees, different investment alternatives, optimization of energy consumption etc.)
Co-benefits	Networking, donor coordination
Useful for M&E	yes
Further information on this GIZ experience	Huber M., 2012, Development of WEAP-Models in Jordan, Technical Documentation. Abbas Al-Omari, 2009, Implementation of the Water Resource Planning Tool (WEAP) to Amman Zarqa Basin in Jordan. Huber M. 2009, Development of a WEAP-Model for Amman-Zarqa Basin, Jordan.
Other (non-GIZ) resources	GLOWA Jordan River, 2009. An integrated approach to sustainable management of water resources under global change. BGR,2010. DSS Workshop Scenario Management, Summary of Results.

Frame/environment in which the method was applied

- Entire country, Ministry of Water and Irrigation (MWI) and its sub ordinaries, since 2009 ongoing
- The development of the WEAP models are part of the update of the National Water Master Plan which is partly reflected in the National Water Strategy.

Strategic Planning Process in MWI



[1]Water Evaluation and Planning System ; [2]Groundwater flow model; [3]Multi-Year Water Allocation System; [4]Geographical Information System

Figure 5: Strategic Planning Process in MWI (Source: Ministry of Water & Irrigation, National Water master Plan Directorate, internal communication)

Steps

- Collecting, compiling all relevant data (hydro-geology, infrastructure, water production and demand for households, small and large industries, touristic, agricultural, socio-economic, etc.)
- Developing a WEAP model for water allocation and resource management for the entire country.
- Development of a data management platform for all relevant data (based on Wiki-technique, integrated in the data management of the Ministry).
- Identifying a core team with different qualification (engineers, geologist, economists), training on the job, incorporating the new tasks into the daily workflow of the institution (sustainability).
- Discussing modeling results within small experts groups, presenting results to the decision makers of the relevant entities.
- Establishing a internal and external user network to ensure the sustainability of the work.

Results and lessons learned

Water balance and reallocation models for the entire country based on administrative units (Governorate, district) and on hydrological units (surface or groundwater basin). Information platform on intranet base holding all relevant information of the sector.

Results prepared by the NWMP – directorate for regular reporting, strategic water resource planning, supports the development of a water strategy and the investment planning.

With the development of these models new tasks and responsibilities are established in the partner organization. Parallel to the technical tasks, organizational changes occurred within the Ministry. This ‘reorganization‘ is accompanied by strengthening the presentation and communication skills of the employees.

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About this collection of factsheets

This factsheet with additional descriptions of applied Vulnerability Assessments (VAs) provides an overview of different methodological approaches and existing experiences with VAs gained in GIZ projects. Most displayed VAs have been conducted within projects funded by the German Federal Ministry for Economic Co-operation and Development (BMZ). Two VAs (MACAF and PVPA) have been conducted within projects funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

The idea to produce this overview resulted from a survey conducted in autumn 2012 regarding the needs of GIZ adaptation projects to learn from the experiences in other projects.

It is a living document and as methods and experiences advance, we would like to update the current application examples and add new experiences.

Please contact nele.buenner@giz.de or julia.olivier@giz.de if you have comments, suggestions or new examples of VAs which could enrich this overview.

This collection of factsheets has been authored and edited by Nele Bünner. Contributions and suggestions from Julia Olivier are gratefully acknowledged. We also thank the following colleagues for contributing their practical examples: Joab Osumba and Petra Jacobi (MACAF and PVPA, Kenya), Till Below (GVC, Cambodia), Maike-Christine Potthast and Ghazi Gader (MFSM, Tunisia), Isabel Renner (MARSICO, Peru), Daniel Roduner (RISE, Bolivia), Dirk Rolker (PCVA, India) and Johannes Stork (WEAP, Jordan).

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