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Developing Baseline Information and Indicators: Adapting Water Resource Management in the Comoros to Increase Capacity to Cope with Climate Change

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Final Synthesis Report

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Acronyms

ADB	African Development Bank
AFD	French Development Agency
GDT Project	Sustainable Land Management Project
ECDD	Communitarian Involvement for Sustainable Development project
LDCF	Least Developed Country Fund
Ma-Mwe	National Water and Energy Enterprise
MDG	Millennium Development Goals
M&E	Monitoring and Evaluation
Prodoc	Project Document
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
TORS	Terms of Reference
UCEA	Water Committees Union of Anjouan
UCEM	Water Committees Union of Mohéli
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme
UNDP CO	United Nations Development Program Country Office
UNV	United Nations Volunteer
VRA	Vulnerability Reduction Assessment
WHO	World Health Organization

Introduction and scope of the mandate

The purpose of this mandate was to develop a baseline for the project Adapting Water Resource Management in the Comoros to Increase Capacity to Cope with Climate Change whose objective is to reduce the risk of climate change on lives and livelihoods from impacts on water resources in Comoros. This project includes three outcomes:

1. Institutions at a national (i.e. Ma-Mwe and ANACM) and community (i.e. UCEA and UCEM) level strengthened to integrate climate change information into water resource management;
2. Water supply and water quality for selected pilot communities to combat impacts of climate change improved; and
3. Awareness and knowledge of adaptation good practice for continued process of policy review and development increased.

During the project design phase, a Project Results Frameworks was developed and nine indicators identified. The tasks of this mandate included the following:

1. Validate the relevance of and if necessary develop further these indicators, based on the adaptation outcome targets the project is aiming to achieve. Indicators should be SMART¹, results-based, gender-sensitive, and the means of verification should be as easy as possible;
2. Consider whether the Outcome targets are achievable and relevant, and if necessary, propose how they could be revised;
3. Collect baseline data against which project indicators could be measured. Baseline values should be established for the relevant project indicators on the basis of the data collected; and
4. Identify data gaps and agree in consultation with UNDP and UNEP on a methodology to fill in the data gaps.

These have been realized following a detailed methodology which included two field missions in Comoros that allowed the team to assess the suitability and develop the indicators further, analyze project design, outcomes targets and corresponding outputs, collect baseline data and identify data gaps.

Methodology

The methodological approach followed to undertake the four tasks identified in the Terms of Reference (ToRs)² for this consultancy is presented below.

Task 1 - To validate the relevance of and if necessary develop further the indicators included in the Project Results Framework of the LDCF Comoros project.

The suitability of the 9 indicators included in the Project Results Framework has been assessed based on information and data collected during the two field missions and on the following criteria:

1. Are the proposed indicators SMART?
2. Are they neutral?
3. Do they allow a monitoring of all proposed outputs for achieving the identified outcomes? Do they need modifications for reflecting the proposed outputs?

¹ The GEF Secretariat has issued guidance on the use of “SMART” indicators (Specific, Measureable, Achievable and Attributable, Relevant and Realistic, and Time-bound, Timely, Trackable and Targeted). GEF climate change indicators were developed in 2000. For a description, see www.gefweb.org/MonitoringandEvaluation/MEPoliciesProcedures/MEPIndicators/mepindicators.html

² The TORs are presented in Annex 1

4. Can they describe how the achievement of the results will be measured?
5. Are they easily measurable and monitored at reasonable cost and effort? Will the data be gathered?
6. Are they measurable in all pilot sites?
7. Are they clear and easily understood?
8. Are they gender sensitive? Can the gender approach be easily reflected within the proposed indicators?
9. Can they be disaggregated according to age, social condition, where necessary?
10. Are the data available in the field and what are the interactions with the Comorian context?

Indicators have been tested and assessed during two field missions. The first mission was conducted from October 18th to November 6th 2010 and focused on institutional aspects and water resource infrastructure for domestic and drinking uses. A preliminary relevance assessment of 7 indicators among 9 and the collection of baseline data were performed. This mission also allowed the team to test the data collection tools in the field (gender sensitive focus groups, Vulnerability Reduction Assessments – VRA, institutional interviews) and to refine them based on feedback from local stakeholders prior to the second mission, which took place from November 8th to November 24th. The latter focused on water resource for agricultural uses, capturing of rainfall and improving water quality from reduced soil erosion. The second mission also aimed at completing the relevance assessment of the 9 indicators and missing data that could not be collected during the first mission.

A detailed list of persons met during these missions is provided in Annex 2.

Task 2 – To consider whether the Outcome targets are achievable and relevant, and if necessary, propose how they could be revised

The Outcome targets have been assessed based on: (i) an in-depth documentation review; (ii) interviews with stakeholders during the two missions at the national and local institutional levels, and other donors active in the water sector; and (iii) discussions with communities in the five pilot sites through focus groups and interviews with local decision makers. The proposed outputs have also been assessed so as to establish whether they are correctly defined to deliver the outcomes.

Task 3 - To collect baseline data against which project indicators could be measured.

Data collection tools used during the two field missions included the following:

- In-depth documentation review³;
- Institutional interviews at the national and local levels;
- Focus groups: to assess the baseline level of vulnerability to climate change; the consultants conducted VRAs in each of the pilot sites. A baseline vulnerability index for the project sites has been derived against which project impacts can be evaluated.

The focus groups/VRAs were conducted following the approach and methodology described in the UNDP Guide to the Vulnerability Reduction Assessment⁴. They were conducted based on a composite of 4 indicator questions, tailored to capture locally-relevant issues that are at the heart of understanding vulnerability to climate change, e.g.: (i) Vulnerability of livelihood/welfare to existing climate change and/or climate variability; (ii) Vulnerability of livelihood/welfare to developing climate change risks; (iii) Magnitude of barriers to adaptation (institutional, policy, technological, financial, etc); and (iv) Ability and willingness of the community to sustain the project intervention.

³ A complete list of documents reviewed is presented in Annex 4

⁴ Andrew Crane Droesch, Nickey //Gaseb, Pradeep Kurukulasuriya, Andre Mershon, Katiella Mai, Moussa, Dale Rankine, Alejandro Santos. UNDP Guide. A Guide to the Vulnerability Reduction Assessment. December 2008. 13 pp.

Vulnerability in this case was analysed vis-à-vis climate change impacts on water availability and quality.

VRA meetings were preceded by awareness raising activities for the project's local stakeholder community on emerging climate trends and future projections. Local stakeholders/project beneficiaries answered all questions and provided qualitative data based on the discussions, leading to a vulnerability score on a scale of 1 to 5 (1. Not vulnerable; 2. Not very vulnerable; 3. Moderately vulnerable; 4. Quite vulnerable; 5. Highly vulnerable).

- Pilot sites visits, including current drinking water supply and storage infrastructures, potential drinking water sources, current capture of rainfall infrastructures and eroded/deforested water catchment areas;
- And finally running line transects for collecting data of the percentage of land surface covered by forest tree canopy, even though it has proven very difficult to provide a precise assessment of the forest canopy coverage given the very large areas concerned and the variety of situations within those areas.

Relevance of the indicators

The following presents an assessment of each of the 9 pre-identified indicators in the Project Results Framework. This assessment is based on the 10 criteria listed in the methodological section.

Original indicator 1 (Objective indicator). The percentage change in vulnerability of men and women living in the pilot sites to climate change risks on availability of clean water.

1. This indicator is SMART.
2. Rather than defining a percentage change, it would be better to define a degree of vulnerability which is easier to measure, based on the results of the VRA, and other data collected during interviews and focus groups. The percentage change can then be calculated from those values.
3. Not applicable, as this indicator reflects the overall objective of the project which is to reduce the risk of climate change on lives and livelihoods from impacts on water resources in the Comoros.
4. It describes how the outputs and outcomes will be achieved, by impacting on the vulnerability of men and women to climate change risks specifically regarding the availability and quality of water.
5. It is easily measurable at low cost (especially for the suggested modified indicator) by organising focus groups and VRAs in pilot sites, and conducting a few interviews with resources persons.
6. It is measurable in all pilot sites.
7. It is clear and easily understood (especially for the suggested modified indicator).
8. It is gender sensitive.
9. It cannot be disaggregated according to age or social condition.
10. Data are available in the field.

Proposed modifications: The degree⁵ of vulnerability of men and women living in pilot sites to climate change risks on availability and quality of water (domestic and irrigation water).⁶

Original indicator 2 (Outcome 1 indicator). Number of policy documents revised to include regulations and provisions that promote gender-equitable adaptation in the water sector

1. The proposed indicator is SMART. It is specific but could better reflect the political context of the Union of Comoros. The three decision-making levels should be identified, i.e. the Union level, the Islands level and the local/community level.

⁵ This degree should be a ranking from 1 to 5, based on the ranking of the VRAs: 1. Not vulnerable; 2. Not very vulnerable; 3. Moderately vulnerable; 4. Quite vulnerable; 5. Highly vulnerable.

⁶ The modifications vis-à-vis the initial indicator are shown in red.

2. This indicator is neutral.
3. This indicator reflects: Output 1.3. (Preparation and provision of improved climate information for water resource management policies and spending plans); and Output 1.4. (Integration of improved climate information with water resource management policies and spending plans, and other relevant policies). These outputs should contribute to achieve the proposed outcome by improving the integration of climate change information into water resource management.
4. It describes well how the achievement of the results of these outputs will then be measured.
5. This indicator is easily measurable at a low cost, by interviewing policy makers and institutional partners at the different levels. Data can easily be gathered.
6. It is measurable in all pilot sites.
7. This indicator is clear and well understood as there is only one specific water policy document in Comoros at the Union level, and water acts in each village in Moheli and Anjouan Islands.
8. It is gender sensitive as these policy documents should promote gender-equitable adaptation in the water sector. The gender approach can be easily measured by analysing the degree to which gender is integrated into these policy documents.
9. Not applicable for this indicator.
10. Data are available in the field but this indicator should better reflect the political context of the Union of Comoros, and the three decisional levels.

Proposed modifications: Number of policy documents at the Union decisional level, the island decisional level and the community/local level, revised or elaborated to include regulations and provisions that promote gender-equitable adaptation in the water sector.

Original indicator 3 (Outcome 1 indicator). The number of policy-makers and planners using adjusted processes and methods to develop gender-equitable water management policies that integrate climate change projections.

1. The proposed indicator is SMART. It is specific but could better reflect the political context of the Union of Comoros. Two of the three decisional levels should be identified, i.e. the Union level and the Islands level.
2. This indicator is neutral.
3. This indicator reflects: Output 1.1. (Information on climate change risks to water availability in Comoros improved); Output 1.2. (Capacity to assess and monitor changes in water supply and quality (given climate change projections) developed); Output 1.5. (Capacity development plan for policy review and design among decision-makers developed based on best known scientific and technical evidence-base); and Output 1.6. (Capacity development plan for policy review and design among decision-makers implemented). These outputs should contribute to the outcome by building the capacities of policy-makers and planners in the following areas: collecting water data, modelling climate trends, monitoring water quality and supply, and reviewing and designing gender equitable water policies which integrate climate change projections.
4. It describes well how the achievement of the results of these outputs will then be measured, by measuring the number of policy makers and planners whose capacities have been strengthened.
5. This indicator is easily measurable at a low cost, by interviewing policy makers and institutional partners at the different levels. Data can be easily gathered.
6. It is measurable in all pilot sites.
7. This indicator is clear and well understood. However, it should be more specific about the adjusted processes and methods which will be developed and used by decision makers and planners (i.e. collecting water and climate data, modelling climate trends, monitoring water quality and supply).
8. It is gender sensitive as it should be able to measure gender-equitable policies that integrate climate change projections. The gender approach will be reflected by assessing the degree to which gender is integrated into these water policies.
9. Not applicable for this indicator.
10. Data are available in the field, by interviewing the different Directorates at the Union and Islands level.

Proposed modifications: *The number of policy-makers and planners at the Union and Islands levels using adjusted processes and methods in terms of collecting water and climate data, modelling climate trends and monitoring water quality and supply, to develop gender-equitable water management policies that integrate climate change projections.*

Original indicator 4 (Outcome 2 indicator). *Percentage increase in the population at each pilot site with improved delivery of drinking water.*

1. This indicator is not specific and measurable. Currently, it is impossible to measure the percentage of population in each pilot site with access to drinking water. The quantity of water supplied per person and per day is more specific but very difficult to measure. In addition, the number of litres of water theoretically accessible to a household may be great in the case of water collection from a river, but it is limited by the quantity of work induced to collect and carry water back home. After conducting interviews and focus groups, it appears that people in pilot sites cannot provide an assessment of their level of access in terms of quantity of water used per person and per day. A better proxy could have been the daily quantity of water used per household. However, the difficulty of gathering relevant data at the household level remains. This is mainly due to the fact that water is used at the household level and because several members of a household could be responsible in collecting water from the river or boreholes. Furthermore, several different types of containers are used to collect water and it is currently not possible to monitor the types and number of containers used to collect water per household and per day. To conclude, it seems preferable to identify a qualitative indicator which would include user perception of their level satisfaction as regards available drinking water sources desegregated by their perception on the quantity of water available, the accessibility to water sources and the quality of this water. This perception could be measured easily through the different focus groups and VRAs to be conducted, and also interviews in Moroni. A rating on a scale of 1 to 4, could be provided per category (defined as quantity, access and quality).

As per the Millennium Development Goals (MDG), the MDG 7c goal is ‘Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation’. As per the World Health Organization (WHO), improved drinking water sources are defined in terms of the types of technology and levels of services that are more likely to provide safe water than unimproved technologies. Improved water sources include household connections, public standpipes, boreholes, protected dug wells, protected springs, and rainwater collections. WHO defines reasonable access as the availability of at least 20 liters per person per day from a source within one kilometer of the user’s dwelling.

2. This indicator indicates a direction and is not neutral. It should be modified to be neutral.
3. This indicator reflects: Output 2.1. Technologies to improve water access and quality that mitigate climate change risks piloted, e.g. soil conservation measures, water harvesting, remedial work on existing boreholes; and Output 2.2. Community members trained to manage adaptive water interventions sustainably. These outputs should contribute to the outcome by improving water supply and strengthening local water management capacities.
4. It describes how the achievement of the results of these outputs will then be measured, but should be more specific.
5. This indicator is not easily measurable, due to its lack of specificity.
6. Despite the above-mentioned limits, this indicator is measurable in all pilot sites, based on surveys and focus groups.
7. It is not clear how the improved delivery of drinking water will be measured. What does ‘improved’ mean?
8. It is not gender sensitive. However, data about access to drinking water desegregated by gender is not available. If women and old persons are the main people in charge of water collection, access to collected water inside households is difficult to assess or would require face-to-face interviews with a number of women.
9. This indicator cannot be disaggregated according to age, social condition.
10. Data are not available in the field.

Proposed modifications: Overall perception of the population per pilot site on: (i) the daily quantity of water accessible for domestic uses; (ii) the facility of access to this water; and (iii) the quality of the water used (best quality being improved drinking water as per the definition of WHO and the UN MDG) (ratings to be provided for each category on a scale of 1 to 4, with levels defined as follows: (1) very satisfied; (2) satisfied; (3) unsatisfied; and (4) very unsatisfied)

Original indicator 5 (Outcome 2 indicator). Percentage increase in agricultural production at all pilot sites.

1. This indicator is not specific enough: what agricultural production are we referring to? Over what period (since there are up to 3 harvests per year, with different yields for each one, shall we consider average annual production?)? In what precise area (Bandasamlini and Lingoni – Pomoni are large areas with no clear ‘border’ in this mountainous region)?
2. It is not neutral and indicates a direction.
3. This indicator reflects: Output 2.1. Technologies to improve water access and quality that mitigate climate change risks piloted, e.g. soil conservation measures, water harvesting, remedial work on existing boreholes; and Output 2.2. Community members trained to manage adaptive water interventions sustainably.
4. It describes how the achievement of the results of these outputs will then be measured.
5. It is not easily measurable because it is not specific enough. Are we talking about tons of agricultural production? Of what products? Over what area? No data and statistics on the global production in the project pilot sites exist. It is therefore preferable to concentrate the indicator on the two main types of agricultural products at each pilot site, and assess the yield level, for which farmers can provide approximate numbers and that is a good indicator of water availability for the plants.
6. This indicator is measurable in all pilot sites including a sustainable land management component (i.e. Bandasamlini and Lingoni-Pomoni).
7. It is clear and well understood.
8. It is not gender sensitive as agricultural activities are conducted by both men and women over the same plots.
9. This indicator could theoretically be disaggregated by age and social condition but it would be rather costly and doesn’t seem necessary.
10. Data are available in the field.

Proposed modifications: Average yield for the 2 main vegetable products in the project areas (tomato and Potato in Bandasamlini and tomato and onions in Lingoni-Pomoni)

Original indicator 6 (Outcome 2 indicator). Number of cases of hepatitis and typhoid fever reduced in all five pilot sites.

1. This indicator is SMART.
2. It is not neutral and indicates a direction. The annual number of cases should be preferred.
3. This indicator reflects: Output 2.1. Technologies to improve water access and quality that mitigate climate change risks piloted, e.g. soil conservation measures, water harvesting, remedial work on existing boreholes; and Output 2.2. Community members trained to manage adaptive water interventions sustainably. These outputs should contribute to the outcome by improving the quality of water.
4. The indicator describes how the achievement of the results of these outputs will then be measured.
5. It is measurable. However hepatitis is not the most common water-borne disease. The number of cases of acute diarrhoea would be more indicative. Data are available at the regional health directorates.
6. The indicator is measurable in all pilot sites (the annual number of cases of typhoid was not available at the regional health directorate of Moheli but some data were available at the hospital of Fomboni. This being said, the data refers to the main hospital of the Moheli island and the data do not only reflect the situation in the pilot site of the Djandro Plateau). Data are available by sanitary district which in most of cases, refer to the pilot sites.

7. It is clear and well understood.
8. It is not gender sensitive. A gender approach could be added to this indicator, as the data available are disaggregated by gender.
9. The indicator can be disaggregated by age.
10. Data are available in the field.

Proposed modifications: *Annual number of cases of typhoid and acute diarrhoea within pilot sites.*

Original indicator 7 (Outcome 2 indicator). Percentage of land surface covered by forest tree canopy

1. The indicator is not specific (what is the precise area concerned? Since there is no land registry, there is no clear border of where e.g. Bandasamlini starts and ends); it is measurable with aerial or satellite photographs, but this is not realistic in terms of budget, and not timely (unless such photos can be taken at precise dates every year). Line transects cannot be used given the topography of the areas concerned, in particular in Anjouan, and the dissemination of reforested plots.
2. The indicator is neutral
3. This indicator reflects: Output 2.1. Technologies to improve water access and quality that mitigate climate change risks piloted, e.g. soil conservation measures, water harvesting, remedial work on existing boreholes; and Output 2.2. Community members trained to manage adaptive water interventions sustainably. These outputs should contribute to the outcome by improving the quality of water.
4. It describes how the achievement of the results of these outputs will be measured.
5. As mentioned in point 1, the indicator is not easily measurable at a reasonable cost and effort. The new proposed indicator is more restrictive in terms of overall results of the project on total land surface actually covered by trees, however it is far easier to measure and gives a good indication of the success of the project's reforestation activities.
6. It is not measurable in all pilot sites. Approximate tree coverage value could be assessed in Bandasamlini once the area is delineated (mountain tops), but it is impossible in Lingoni-Pomoni because deforestation occurs in small plots in the middle of the forest, within a very mountainous area, and there is no possibility to obtain an overview of the entire area (with the exception of aerial photos).
7. It is clear and well understood.
8. Not applicable.
9. Not applicable.
10. Data are not easily available in the field.

Proposed modifications: *Number of surviving planted trees in the reforested areas.*

Original indicator 8 (Outcome 3 indicator). Number of men and women (public and decision-makers) aware of climate change vulnerability and adaptation responses (survey-based results).

1. This indicator is not SMART as it is measurable with difficulty (how do you precisely measure awareness of climate change?).
2. It is neutral.
3. This indicator reflects: Output 3.1. Knowledge products developed on lessons learned for policy makers, communities and donors throughout the project; and Output 3.2. Learning disseminated through platform for national learning and sustainability. These outputs will contribute to the outcome by raising awareness during workshops and seminars and diffusing knowledge.
4. It describes how the achievement of the results of these outputs will then be measured.
5. It may be measurable at low cost but with difficulty as counting the number of men and women among public and decision-makers aware of climate change vulnerability and adaptation responses requires a high level of time and effort. The definition of a percentage of men and women aware of climate change vulnerability and adaptation responses could be more effectively assessed and at a lower cost, through interviews and focus-groups.
6. Currently, this indicator is not measurable in pilot sites.

7. It is clear and well understood.
8. It is gender sensitive.
9. Not applicable.
10. Data are not available in the field.

Proposed modifications: Overall estimation (in percentage) of men and women (public and decision-makers) aware of climate change vulnerability and adaptation responses.

Original indicator 9 (Outcome 3 indicator). Number of knowledge products generated and disseminated.

1. This indicator is not very specific. Knowledge products should be defined.
2. It is neutral.
3. This indicator reflects: Output 3.1. Knowledge products developed on lessons learned for policy makers, communities and donors throughout the project; Output 3.2. Learning disseminated through platform for national learning and sustainability; and Output 3.3 Disseminate Comorian experience in knowledge networks related to water and climate change, including ALM, GAN and IW Learn. These outputs will contribute to the outcome by raising awareness during workshops and seminars and diffusing knowledge.
4. It describes how the achievement of the results of these outputs will then be measured.
5. It is measurable and data is available. However, the different knowledge products should be defined.
6. It is measurable in all pilot sites.
7. It is well understood but could be clearer, by specifying the different knowledge products.
8. Not applicable.
9. Not applicable.
10. Data is available in the field.

Proposed modifications: Number of newspaper articles, booklets and pamphlets highlighting the lessons learned during the project and number of technical documents on lessons learned submitted to knowledge networks.

Detailed Baseline Data

Baseline data collected are presented below for each proposed modified indicator.

Modified indicator 1 (Objective indicator): The degree of vulnerability of men and women living in pilot sites to climate change risks on availability and quality of water (domestic and irrigation water).

- **Moroni:** 42,000 inhabitants. Drinking water is currently supplied by only two boreholes (ONU4 and TP5) supplying an inadequate network. Both of them have shown signs of over-exploitation and are not protected against any potential contamination. The percentage of leakages within the network is estimated at 60%. Currently, 10,000 m³ of water are pumped each day, and only 4,000 m³ are supplied to the population of Moroni. The network is therefore not operating efficiently as a result of low maintenance. Currently, water from boreholes is forced back to two water tanks (one with a storage capacity of 2,000 m³ and another one of 500 m³). Another one with a storage capacity of 500 m³ will be operating soon. However, this configuration is inadequate for providing drinking water to the entire population of Moroni. It is anticipated that the expected reductions in water supply due to climate change and increasing population pressures will result in an increased demand on the two boreholes, increasing exploitation even further. **Vulnerability in this pilot site is estimated at 4: quite vulnerable**
- **Plateau Djandro in Moheli:** 4,830 inhabitants. Drinking water in the four villages where the project will be implemented is supplied by boreholes, uncovered in most cases, and cisterns from the capital Fumboni. Supply systems are inadequate and the quality of water is very low, or undrinkable. Currently,

the mean estimated access to poor quality water is 30-40 l/person/day. Vulnerability to climate variability is estimated at '4: quite vulnerable', as water supply depends mostly on the quantity of rain. Vulnerability to climate change is also estimated at 4: quite vulnerable. Barriers include low water management capacities, low technical capacities, high deforestation rates and low financial capacities. To conclude, the ability and willingness of the communities to sustain the project intervention are evaluated as low. **The degree of vulnerability of men and women living in these four villages is evaluated as quite vulnerable (mean rating for Siry of 3.75; mean rating for Wanani of 4; mean rating for Mlabanda of 3.6; mean rating of Nkangani of 4.1).**

- **In Lingoni-Pomoni in Anjouan:** 4,824 inhabitants. Drinking water is provided by collecting water from a river. The collecting system needs rehabilitation and upsizing. The water distribution system is old and also needs rehabilitation, upsizing (since the population has grown tremendously) and extension to new village areas. Leakage along the distribution network is high. Access to drinking water is **highly unsatisfactory and highly dependent on the river flow. The degree of vulnerability of men and women living in the two villages is therefore estimated at 4: quite vulnerable.**
- **In High Nioumakele in Anjouan:** 35,000 inhabitants. Drinking water is provided by one network, the Hamkoko network which supplies eight villages. A collecting system on a river supplies this network. It is old and inappropriate. The level of access to drinking water is estimated at 20 to 30 l/person/day. Vulnerability to climate variability is estimated as high, as the river flow has highly decreased during the past years. Vulnerability to climate change is also estimated as high, as reductions in water flow are expected, due to a decrease in rainfall. Barriers include the high length and age of the network, the high population density of these villages and the low technical and maintenance capacities. The ability and willingness of the communities to sustain the project intervention are evaluated as moderate. **The degree of vulnerability of men and women living in these villages is evaluated as quite vulnerable.**
- **In Bandamsamlini in Grande Comores the project only considers water needs for irrigation purposes.** Whereas rain fed agriculture is the traditional practice, the increasing drought during the dry season makes it less and less productive, and irrigation (together with conservation practices) is needed to reestablish decent yields. The project plans to build/rehabilitate reservoirs and cisterns, providing better access to irrigation water for a number of farmers. Associated with adapted agricultural techniques aiming to reduce water needs, **the degree of vulnerability of men and women living in the area is evaluated as 3, moderately vulnerable** (only agriculture is concerned, and not domestic water).

Modified indicator 2 (Outcome 1 indicator). Number of policy documents at the Union decisional level, the island decisional level and the community / local level, revised or elaborated to include regulations and provisions that promote gender-equitable adaptation in the water sector.

- The Water Act in the Union of Comoros was elaborated in 1994, but does not include any regulations for application. Furthermore, climate change aspects were not taken into account while elaborating this Water Act. One Environmental Law and Environmental Strategy exist but they lack regulations for their implementation.
- At the Union level, there is a water inter-ministerial Committee that includes the participation of different ministries/Directorates and institutional partners/donors. The meeting frequency of this Committee is low and should be strengthened in order to contribute to the revision of policy documents.
- At the Islands decisional level, there is no specific policy document relative to the water sector which includes regulations and provisions that promote gender-equitable adaptation in the water sector.
- At the local level, on the islands of Moheli and Anjouan, in each village where the project will be implemented, there exists a water act and a specific water management committee. These water acts do not include regulations and provisions that promote gender-equitable adaptation.

- The Comoros agricultural strategy document dates back to 1994 and has not been implemented. According to the consultations conducted, water management in this document seems to be considered only regarding its importance for agricultural intensification, but not as an increasing difficulty for the sector due to climate change.

Modified indicator 3 (Outcome 1 indicator). The number of policy-makers and planners at the Union and Islands levels using adjusted processes and methods in terms of collecting water and climate data, modelling climate trends and monitoring water quality and supply, to develop gender-equitable water management policies that integrate climate change projections

- Policy makers and planners at the Union and Islands levels **do not** currently integrate knowledge of climate change into policies related to water and agriculture. Furthermore, they lack capacities in collecting water data, modelling climate trends, monitoring water quality and supply. **Overall, the total number of policy-makers and planners is 49.**
- At the Union level: the Energy and Water Directorate includes one Director and one hydraulic engineer (there are 7 people working for the African Development Bank project), the Environment Directorate includes one Director and 5 planners, and the Agricultural Directorate employs 8 persons in total. **Total of policy makers and planners at the Union level: 20.**
- In MaMwe, the institution in charge of supplying water in Moroni, there is 1 engineer in the water supply service (and 10 technical agents), 1 manager and 8 technicians in the water production service, 1 manager and 2 assistants in the marketing and cost recovery service, and 2 engineers and 1 technician in the planning service. **Total of employees in MaMwe for which capacities should be built: 5.**
- In ANACM and the national meteorology directorate, there are 30 employees and one third of them are planners. **Total of planners for which capacities should be built, especially regarding monitoring climate trends: 10.**
- At the island level: in Moheli, **1 Director and 2 planners** are currently working for the Directorate of Environment and water; and in Anjouan, **there is 1 director and 5 planners.**
- UCEM in Moheli includes only **2 permanent employees.**
- UCEA in Anjouan includes **7 permanent employees.**

Modified indicator 4 (Outcome 2 indicator). Overall perception of the population per pilot site on: (i) the daily quantity of water accessible for domestic uses; (ii) the facility of access to this water; and (iii) the quality of the water used (best quality being improved drinking water as per the definition of WHO and the UN MDG)

- **Moroni (42,000 inhabitants):**
Less than 50 % of the population in Moroni have regular access to a reasonable quantity of drinking water from a source within one kilometre of the user's dwelling. Furthermore, there is a high heterogeneity within the city, high percentage of leakages (about 60% along the network) and high frequency of supply cuts. Quality does not currently reach WHO standards.

Baseline Ratings:

- 1. Quantity: 3**
- 2. Access: 3**
- 3. Quality: 3**

- **Djandro (4,830 inhabitants).**

In the 4 targeted villages in Djandro, Siry, Wanani, Mlabanda and Nkangani, access to drinking water is very low. Water is supplied by boreholes, uncovered in most cases, and cisterns from the capital Fumboni. Supply systems are inadequate and the quality of water is very low, or undrinkable.

Baseline Ratings:

- 1. Quantity: 4**
- 2. Access: 4**

3. Quality: 4

- **High Nioumakele in Anjouan (35,000 inhabitants):**

Drinking water is provided by one network, the Hamkoko network which supplies eight villages. A collecting system on a river supplies this network. It is old and inappropriate. The level of access to drinking water varies between villages. Overall, there is low water pressure on the secondary water supply network and as a consequence it is frequent that no water reaches private connections.

Baseline Ratings:

1. Quantity: 3

2. Access: 2

3. Quality: 3

- **In Lingoni-Pomoni in Anjouan (4,824 inhabitants):**

Access to water for the two villages is either from the main network (highly insufficient in pressure/quantity and with many leakages) or directly from the rivers. The majority of villagers therefore have to walk a lot, up to 10 times a day, to carry water home. In addition, water is often contaminated resulting in many diseases.

Baseline Ratings:

1. Quantity: 2

2. Access: 4

3. Quality: 3

Modified indicator 5 (Outcome 2 indicator). Average yield variation for the 2 main vegetable products in the project areas (tomato and potato in Bendasamlini and tomato and onions in Lingoni-Pomoni)

- 2010. **Bandasamlini:** tomato average yield is 440kg per 1000 plants, and potato average yield is 326kg per 100kg of seeds.
- In **Lingoni**, tomato average yield is 558kg per 1000 plants and onion average yield is 282kg of onions per 100g of seeds.
- In **Pomoni**, there are still good yields of tomato; the average measured is 1851kg per 1000 plants. Onions give 385kg per 100g of seeds.
- Since Lingoni and Pomoni are considered a single location, those figures can be aggregated but the high difference between the two villages is quite interesting. The average consolidated yields are 1205kg of tomatoes per 1000 plants and 333kg of onions per 100g of seeds .

Modified indicator 6 (Outcome 2 indicator). Annual number of cases of typhoid and acute diarrhoea within pilot sites

- **Djandro pilot sites** (Wanani sanitary district – 4830 inhabitants):
 - Number of cases of typhoid in 2009: total of 40
 - Number of cases of acute diarrhoea in 2009: total of 28 (15 men and 13 women)
- **Pomoni sanitary district in Anjouan** (pilot site of Lingoni-Pomoni – 4,824 inhabitants):
 - Number of cases of typhoid in 2009: total of 29 (19 men and 10 women)
 - Number of cases of acute diarrhoea in 2009: total of 731 (368 men and 363 women)
- **Mremani sanitary district in Anjouan** (pilot site of Nioumakele – 35,000 inhabitants):
 - Number of cases of typhoid in 2009: total of 9 (5 men and 4 women)
 - Number of cases of acute diarrhoea in 2009: total of 252 (125 men and 127 women)
- **Moroni sanitary district in Grande Comores** (42,000 inhabitants):
 - Number of cases of typhoid in 2009: total of 75
 - Number of cases of acute diarrhoea in 2009: total of 141
- **Bandasamlini** is not concerned by this indicator.

Modified indicator 7 (Outcome 2 indicator). Number of surviving planted trees in the reforested areas.

The GDT project has planted 10,000 fruit and forest trees up to the present in Lingoni-Pomoni (in a specific agricultural zone). None have been planted in Bandasamlini for the moment (planned from 2010).

No limits to deforestation currently exist (no protection measures). Awareness exists but there is no means of control.

Modified indicator 8 (Outcome 3 indicator). Overall proportion (in percentage) of men and women (public and decision-makers) aware of climate change vulnerability and adaptation responses.

- Currently knowledge on climate change vulnerability and adaptation responses is low among public and decision makers. However, a global environment, climate change and disaster risks management strategy which includes different components, performance indicators and references has been elaborated and is under approbation.
- Awareness of climate change is good among decision makers and public, as everybody has once heard about climate change in newspapers or on the local radio. However, awareness of climate change vulnerability and more specifically adaptation responses is low. People have heard about climate change but do not implement adaptation measures or responses.
- It could be estimated that currently 10 % of decision makers and less than 5% of population in pilot sites are aware of climate change vulnerability and adaptation responses.

Modified indicator 9 (Outcome 3 indicator). Number of newspaper articles, booklets and pamphlets highlighting the lessons learned during the project and number of technical documents on lessons learned submitted to knowledge networks.

- Except the National Communication and the National Adaptation Program of Action, currently there are no available documents and reports about good practices on adaptation to climate change risks on availability and quality of water in Comoros disseminated within knowledge networks.

Means of verification of the methods to be used for measuring the indicators

Annex 3 presents an updated version of the Project Results Framework which presents the synthesised baseline data, targets and means of verification.

Essentially, the methods to be used for measuring the indicators are the same as the ones presented in the methodology section of this report. They include the following:

- **Focus Groups/VRA:** One focus group/VRA should be conducted in (i) each of the four villages included in the pilot site of the *Plateau Djandro* in Moheli (namely Siry, Wanani, Mlabanda and Nkangani); (ii) in two villages included in the pilot site of Bandasamlini in Grande Comores (namely Ivhembeni and Diboini), and (iii) in Lingoni and in Pomoni in Anjouan.

The VRAs will be organised with groups of beneficiaries of a size of no more than 50-60 people. These groups should be representative of the different socio-economic groups of the community and their composition gender sensitive, as much as possible. The mission reports elaborated prior to this synthesis report describe the composition of the first VRA implemented in each village and pilot site and also details their results. Annex 4 describes the tool used for the VRA, including how it was applied in Comoros.

The approach for conducting VRAs should follow the approach and methodology described in the UNDP Guide to the Vulnerability Reduction Assessment. The VRA is based on a composite of 4

indicator questions, tailored to capture locally-relevant issues that are at the heart of understanding vulnerability to climate change. The four VRA indicators as presented in the UNDP guide are:

- (i) Vulnerability of livelihood/welfare to existing climate change and/or climate variability (e.g. an increase in average annual temperature in the order of 1 °C since 1960, a shortening of the rainy season from six months to between two and three months in favour of the dry season, and an increase in the irregularity of rainfall since 1960⁷);
- (ii) Vulnerability of livelihood/welfare to developing climate change risks (e.g. decline in rainfall of between 2 and 14% during the dry season by 2090 (June to August), increase in mean annual temperature of between 0.8 and 2.1 °C by 2060, and increase in the frequency of climatic hazards (e.g. tropical cyclones, droughts, episodes of heavy rainfall and flooding));
- (iii) Magnitude of barriers to adaptation (institutional, policy, technological, financial, etc); and
- (iv) Ability and willingness of the community to sustain the project intervention.

Local stakeholders/project beneficiaries should answer all questions and provide qualitative data based on the discussions, leading to a vulnerability score on a scale of 1 to 5 (1. Not vulnerable; 2. Not very vulnerable; 3. Moderately vulnerable; 4. Quite vulnerable; 5. Highly vulnerable).

- **Interviews:** Semi-directed interviews should be conducted with key institutional stakeholders.
- **Documentation review:** This means of verification will be used essentially for monitoring the results of outcome 1 and outcome 3.
- **Statistical sanitary services in the regional health directorates of Fomboni, Mutsamudu and Moroni:** These services will provide the statistical data of the annual number of cases of typhoid and acute diarrhoea.
- **Interviews with 10 farmers in Lingoni, in Pomoni and in Badamsamlini respectfully:** These interviews will ensure the monitoring of the annual agricultural yields, as a direct indicator of water availability for cultivation.
- **Line transects to all (or a relevant sample of) reforested plots:** this will be used to count the number of trees actually planted and surviving during project implementation. This shall be completed by surveys among local populations to monitor awareness raising as regards reforestation activities.

Outcomes targets, outputs and projected activities

During the two missions, the consultants conducted an assessment of the outcome targets, the corresponding outputs and the projected activities. Special attention has been given to the budget allocation to each outcome within the UNDP LDCF Prodoc and UNEP LDCF Prodoc. The following presents an overall assessment of the relevance of each of the three outcomes, their outputs and projected activities, based on the field visits and the reconstituted budget. The objective here is not to assess the budget allocations for each output precisely (which would require further analysis and access to the detailed calculations made for the budget set-up). Instead, the objective is to provide a few comments and recommendations based on mission findings.

Outcome 1

The budget committed for outcome 1 is the following:

⁷ UNDP Project Document. Adapting water resource management in the Comoros to expected climate change. 2010. p.10

Table 1: Budget committed to Outcome 1: Institutions at national (i.e. Ma-Mwe and ANACM) and community (i.e. UCEA and UCEM) levels strengthened to integrate climate change information into water resource management.

Outputs	Activities	Budget (in US\$)	
		UNEP	UNDP
Output 1.1. Information on climate change risks to water availability in Comoros improved. [Supported by UNEP]	1.1.1. Assess ANACM's meteorological equipment needs and based on this assessment, provide the required equipment to collect data required to validate the hydrological models computed in Activity 1.2.1. 1.1.2. Install small-scale weather stations. 1.1.3. Convert climatic data on microfiles into a usable format. 1.1.4. Analyse available meteorological data (including data converted in Activity 1.1.3, river flow data and rainfall data) to validate the hydrological models computed in Activity 1.2.1. 1.1.5. Develop systems for the collection, storage and analysis of meteorological data on all three islands. 1.1.6. Install a tide gauge on Grande Comore.	550 000	
Output 1.2. Capacity to assess and monitor changes in water supply and quality (given climate change projections) developed. [Supported by UNEP]	1.2.1. Undertake an institutional mapping exercise and identify capacity gaps in terms of water resource management in the face of climate change. 1.2.2. Train ANACM staff on how to collect and monitor meteorological data and how to run the hydrological models. 1.2.3. Train Ma-Mwe staff on how to incorporate meteorological data and climate change risk into water resource management. 1.2.4. Train UCEA staff (in Anjouan) and UCEM staff (in Mohéli) in O&M of water supply infrastructure.	150 000	
Output 1.3. Preparation and provision of improved climate information for water resource management policies and spending plans. [Supported by UNEP]	1.3.1. Undertake hydrological modelling of water resources (given climate change projections) on each of the three islands to: i) take stock of available water supplies; ii) determine the rate of replenishment and diminishment of resources; and iii) determine the impacts of climate change on available water resources in order to enable future planning and management of water resources. This will be undertaken in conjunction with the AFD project and the SIDS IWRM project.		
Output 1.4. Integration of improved climate information with water resource management policies and spending plans, and other relevant policies. [Supported by UNDP]	1.4.1. Carry out analysis to define sectoral policies that promote or impede the resilience of communities with the five pilot sites to climate change. 1.4.2. Develop policy notes for each sectoral policy outlining and demonstrating the impacts, costs and benefits of a particular sectoral policy on the resilience of livelihoods on all three islands. 1.4.3. Revise the Water Act (including development of regulations for enforcement). 1.4.4. Develop proposals for altering national budgets and/or water tariffs. 1.4.5. Review and revise legislation and policy relating to the Agricultural Development Policy,		192 000
Output 1.5. Capacity development plan for policy review and design among decision-makers developed based on best known scientific and technical evidence-base. [Supported by UNEP]	1.5.1. Develop a capacity development plan for policy review and design among stakeholders. [Supported by UNEP] 1.5.1.1. Establish a capacity development plan based on gaps identified in Activity 1.2.2. 1.5.1.2. Train decision-makers on the proposed development/revisions of policies and legislation in the water sector (at both national and community level).	30 000	
Output 1.6. Capacity development plan for policy review and design among decision-makers implemented. [Supported by UNDP]	1.6.1. Establish cross-ministerial body for government coordination on adaptation policy. 1.6.1.1. Conduct workshops. 1.6.1.2. Establish a national project board with the following institutions represented: NDEF, ANACM, NDEWR and other agencies (both national and island level).		96 000
Sub-total Outcome 1		730 000	288 000

Comments: Outcome 1 is relevant to the project overall objectives in the context of climate change in Comoros. The proposed outputs are relevant to the outcome and are clearly stated.

Output 1.3: the share between AFD funding and UNEP funding is not clear. The activity will require a substantial quantity of work and the scope of work should be well defined according to the available budgets between the two institutions. A specific coordination effort is needed between the UNDP CO, the local AFD

agency, and also other partners such as the African Development Bank (ADB), regarding the support to water supply in the Union of Comoros in the context of climate change.

Output 1.4: In Comoros, the quantity of useable policy documents and legislations is low (e.g. the agricultural policy document cannot be found; it dates back to 1992 and is not implemented anyway). As a consequence, the integration of improved climate change information should target relevant and implemented policy documents. The budget allocation of 192,000 USD for this task seems fairly high for a small country.

Output 1.6: The budget allocation for capacity development workshops seems fairly high. The number and type of workshops really necessary for the project outcomes should be very well defined, in order to avoid excessive spending in this type of activity.

Outcome 2

The budget committed for outcome 2 is the following:

Table 2: Budget committed to Outcome 2: Water supply and water quality for selected pilot communities to combat impacts of climate change improved.

Outputs	Activities	Budget (in US\$)	
		UNEP	UNDP
Output 2.1. Technologies to improve water access and quality that mitigate climate change risks piloted, e.g. soil conservation measures, water harvesting, remedial work on existing boreholes. [Supported by UNDP]	Moroni TPI Rehabilitation		388 202
	Construction of two reservoirs (500 m3) at Bandamsamlini		180 060
	Rehabilitation of one impluvium at Bandamsamlini		33 238
	Rehabilitation of three cisterns at Bandamsamlini		24 929
	Reforestation activities at Bandamsamlini		40 761
	Construction of one reservoir (500 m3) at Nioumakele		90 030
	Installation of one water transmission main at Nioumakele (13,304 m)		361 658
	Construction of one reservoir (500 m3) at Lingoni-Pomoni		90 030
	Installation of one water transmission main at Lingoni-Pomoni (2000 m)		57 059
	Reforestation activities at Lingoni-Pomoni		40 761
	Construction of one reservoir (500 m3) at Djandro		90 030
	Installation of a basic water network in Djandro		283 336
	International consultants, local consultants & CTA	16800	177 000
	Contractual services		110 272
Travel		11 100	
Undertake research into reforestation in the Comoros using the data generated by small-scale weather stations		35 100	
activities (and conversely, the costs associated with deforestation)		14 100	
Output 2.2. Community members trained to manage adaptive water interventions sustainably. [Supported by UNDP]	2.2.1. Establish and train a management committee at both pilot sites on Grande Comore to ensure sustainability (including maintenance) of pilot interventions. Management committees will consist of community members (at least 20 members, 10 of which must be women) under the supervision of at least two Ma-Mwe technicians (who are involved in the rehabilitation/establishment of the works from the outset).		114 400
	2.2.2. Undertake training of Ma-Mwe staff in financial analysis in order to ensure follow-up customer and debt service (e.g. affordability and cost-recovery analyses, inventory of customers and follow-up, metering, billing, invoice preparation, collection).		
	2.2.3. Undertake technical training of selected Ma-Mwe staff (engineers and technicians) in-charge of O&M (training will involve such matters as how to do chlorine dosing, how to operate, dismantle and repair a chlorination pump, how to dismantle, service and reinstall a motor-pump and how to detect leakages on both pump types).		
	2.2.4. Train community members in the pilot sites to operate and maintain new/rehabilitated water storage infrastructure where applicable.		
	2.2.5. Establish and train communities at the two reforestation sites on how to undertake reforestation on a large scale (e.g. horticultural skills involving sapling propagation in		
Sub-total Outcome 2		66 000	2 092 866

Comments: Outcome 2 is very relevant to the project objective, since it should result in a concrete improvement of access to water in the face of climate change. Based on info provided by UNDP CO, overall budget committed to pilot interventions is 2,000,000,USD.

However, the foreseen level of investment (output 2.1) in pilot activities (totaling 1,598,512 USD) seems to be underestimated when taking the significant needs and the technical constraints in the pilot sites into account. It is not clear to the consultant how the investment decisions have been made, as they do not always fit local contexts (needs, technical constraints such as local topography, distance from water source, etc.) nor are they clear for the local people involved in the ProDoc definition. For example, the installation of one transmission main at Lingoni-Pomoni (2km) means that a choice will have to be made between Lingoni or Pomoni, and that only one of the two villages will benefit from it (this will certainly pose some difficulties locally).

Furthermore, the total amount of 373,366 USD committed for the construction of one reservoir at Djandro and the installation of one basic water network to supply water to the 4 villages seems underestimated considering the feasibility study conducted the previous year by AFD for the installation of the same water network. The latter estimated the associated cost for the four villages at approximately 1,200,000 € (1,550,000 USD – provision for technical assistance and contractual services included). Prior to conducting the infrastructure work, financial and technical feasibility studies should be implemented, including an assessment of possible water catchments, water distribution network analysis and design, cost study of water exploitation and supply and cost recovery studies, as well as socio-environmental studies. Furthermore, as the local AFD agency projects some investments in the water sector in this area, the UNDP CO should coordinate with AFD to identify complementary efforts and avoid duplication.

Regarding investments projected in Moroni for rehabilitating TP1 borehole, since the project has been designed, MaMWe has signed an exploitation agreement of TP1 with a private Malagasy firm. This agreement specifies that the Malagasy firm could rehabilitate the borehole and exploit it to bottle 10 m³ of drinking water per day (potential pumping flow of 120 m³ per hour). This agreement also specifies that MaMWe could connect its supply network to this borehole. However, this agreement was not made available to the mission. During the beginning of this LDCF project, a specific technical study should be implemented by MaMWe, in coordination with the Malagasy firm, to determine what could be done to connect the Moroni network to TP1.

Regarding reforestation activities, 95ha are budgeted for Bandasamlini and 95ha for Lingoni-Pomoni. There seems to have been a misunderstanding in Moheli where 60ha had been initially foreseen. Counting 1000 trees per hectare, this means that the project shall plant 190,000 trees within the project duration. Considering that the GDT project, which is entering its final phase, was only able to plant 10,000 trees so far, the production and plantation of 190,000 trees seems to be a very optimistic objective.

The question is therefore to assess the real need of each investment to achieve the project outcome 2.

In Bandasamlini, reforestation activities are necessary on mountain tops, since the complete deforestation will hardly permit natural regeneration. The real need for the construction of the two reservoirs is questionable: it is true that agriculture yields are badly affected by drought, but the rehabilitation of the 3 cisterns and the impluvium already in place will constitute a good first step for the area. Accompanied with strong awareness raising on agricultural practices, tree fencing of agricultural plots, and the reforestation activities, some improvements on rainwater regime and decreased water needs shall be achievable. According to the UNDP CO, the exact area of intervention is Bandasamlini/Sangani (this area is delimited in some small areas where the impluvium and the cisterns to be rehabilitated and built are located : Madjoma and Hanpandze. So after discussions, interventions design could be as follows :

- Impluvium rehabilitation (Bandasamlini/Sangani)
- 1 New reservoir (Bandasamlini/Sangani : Madjoma)
- Rehabilitation of 3 cisterns (Bandasamlini/Sangani: Hanpandze)

In Lingoni-Pomoni, there is a real need for the rehabilitation and upsizing of the transmission main down to the two villages associated with the construction of one reservoir for each village and a dedicated agricultural area. As regards reforestation activities, the need for tree plantations is highly questionable. Deforestation in Lingoni-Pomoni occurs on small plots (slash and burn) for agricultural production purposes, in the middle of a large, mountainous forest area. If some steep areas surely call for plantation investments in order to protect

the river banks, it seems clear that natural regeneration will quickly occur as long as an area is protected against further cuts and exploitation. Natural regeneration in such a humid and hot climate is indeed a fast process as long as the land is not very eroded and there is still some forest around (which is the case here). When it occurs, growth rates are usually very fast, biodiversity is higher than with tree plantations and trees are usually healthier and better adapted to their environment. Instead of planting trees, the project could advantageously be modified towards a concerted delineation of an area protected from any deforestation, with strong awareness raising of populations and forest management committees put in place. As already discussed in different initiatives locally, such a protected area shall surround the mount Ntringui forest and in this way protect this ‘water tower’ of Anjouan.

Going even further, all reforestation activities shall be accompanied by agricultural technical training and follow-up, as there is a lot of space for improvement of agricultural practices (choice of crops, varieties, mulching and composting practices, etc.) and production of fire-wood around agricultural plots. It is indeed necessary to target the roots of the deforestation problem, which mainly reside in a lack of knowledge and technical experience to renew fertility on agricultural plots, in addition to fire wood needs (for cooking as well as distilleries).

Outcome 3, project management and M&E

The budget committed for outcome 3, project management and M&E is the following:

Table 3: Budget committed to Outcome 3: Awareness and knowledge of adaptation good practice for continued process of policy review and development increased, project management and M&E

Outputs	Activities	Budget (in US\$)	
		UNEP	UNDP
Output 3.1. Knowledge products developed on lessons learned for policy makers, communities and donors throughout the project. [Supported by UNEP]	3.1.1. Compile the results and lessons learned of activities piloted under Outcome 1 and 2 and identify barriers to their upscaling. 3.1.2. Develop awareness and training materials based on activity 3.1.1. (such as briefing notes, fact sheets and cross-sectoral guides) for decision-makers and sectoral planners. (These materials will provide information on the need to incorporate climate change considerations into water resource planning, including the economic benefits thereof).	70 834	
Output 3.2. Learning disseminated through platform for national learning and sustainability. [Supported by UNDP]	3.2.1. Establish parliamentary working groups and brief them through seminars on: i) the risks to the water sector posed by climate change; and ii) the project’s lessons to improve their understanding of both climate change impacts and effective adaptation in the water sector. 3.2.2. Conduct one national and three island-level workshops for dissemination of projects lessons to stakeholders. 3.2.3. Conduct community workshops to disseminate project lessons. 3.2.4. Publish workshop proceedings and distribute as hardcopies and electronic copies. 3.2.5. Develop newsletters, newspaper articles, booklets and pamphlets highlighting the lessons learned during the project and sensitizing the general public on climate change adaptation in the water sector. The newsletter will be produced at least once a month to maintain project visibility and momentum. 3.2.6. Disseminate project lessons via a short, informative radio segment on local radio.		74 000

Output 3.3 Disseminate Comorian experience in knowledge networks related to water and climate change, including ALM, GAN and IW Learn. [Supported by UNEP]	3.3.1. Collate and submit all technical documents on lessons learned to knowledge networks related to water and climate change (including ALM, GAN and IW Learn). 3.3.2. Establish a project website through which relevant project information will be disseminated. 3.3.3. Develop a briefing paper on lessons learned from the project for publication in a peer-reviewed journal and for presentation at an international conference on adaptation to climate change in: i) a SIDS and/or ii) water resource management.	33 166	
Sub-total Outcome 3		104 000	74 000
Project Management		90 000	210 000
M&E		30 000	70 000

Comments: Outcome 3 is relevant although the policy context in Comoros is not very efficient.

Budget for output 3.1 seems really high as compared to the work necessary for its implementation. The same applies to output 3.2: the proposed budget will allow a large number of workshops that, if necessary, should not multiply excessively.

Conclusions and Recommendations

The four tasks were conducted following a rigorous methodology, including two field missions in Comoros, project site visits, several interviews, focus groups/VRAs and an in-depth documentation review.

The assessment of the nine pre-identified indicators followed a systematic process guided by 10 criteria. Based on this assessment, some modifications are needed in order to propose indicators that are only SMART, neutral, reflecting the proposed outputs, measurable at reasonable cost and effort and for which data are available in the field. Local context and field realities call for some modifications as well, so that indicators can be easily measured. The following are the proposed modified indicators based on the results of this assessment. The modification vis-à-vis the original indicators appear in red:

- Indicator 1 - **The degree⁸ of vulnerability** of men and women living in pilot sites to climate change risks on availability **and quality** of water (domestic and irrigation water).⁹
- Indicator 2 - Number of policy documents **at the Union decisional level, the island decisional level and the community/local level**, revised or elaborated to include regulations and provisions that promote gender-equitable adaptation in the water sector.
- Indicator 3 - The number of policy-makers and planners **at the Union and Islands levels** using adjusted processes and methods **in terms of collecting water and climate data, modelling climate trends and monitoring water quality and supply**, to develop gender-equitable water management policies that integrate climate change projections.
- Indicator 4 - **Overall perception of the population per pilot site on: (i) the daily quantity of water accessible for domestic uses; (ii) the facility of access to this water; and (iii) the quality of the water used (best quality being improved drinking water as per the definition of WHO and the UN MDG) (ratings to be provided for each category on a scale of 1 to 4, with levels defined as follows: (1) very satisfied; (2) satisfied; (3) unsatisfied; and (4) very unsatisfied)**

⁸ This degree should be ranking from 1 to 5, based on the ranking of the VRAs: 1. Not vulnerable; 2. Not much vulnerable; 3. Moderately vulnerable; 4. Quite vulnerable; 5. Highly vulnerable.

⁹ The modifications vis-à-vis the initial indicator are shown in red.

- Indicator 5 - Average yield for the 2 main vegetable products in the project areas (tomato and Potato in Bandasamlini and tomato and onions in Lingoni-Pomoni)
- Indicator 6 - Annual number of cases of typhoid and acute diarrhoea within pilot sites
- Indicator 7 - Number of surviving planted trees in the reforested areas
- Indicator 8 – Overall perception (percentage) of men and women (public and decision-makers) aware of climate change vulnerability and adaptation responses
- Indicator 9 - Number of newspaper articles, booklets and pamphlets highlighting the lessons learned during the project and number of technical documents on lessons learned submitted to knowledge networks

Baseline data were collected for each of the 9 indicators and are presented in the revised Project Results Framework, with reviewed targets by the end of the project and means of verification. The latter includes the following: (i) Focus groups/VRAs; (ii) Institutional interviews; (iii) Documentation Review; (iv) Statistical sanitary services in the regional health directorates of Fomboni, Mutsamudu and Moroni; (v) Interviews with farmers; and (vi) Line transects to all (or a relevant sample of) reforested plots.

To conclude, project activities are not perfectly clear to the main stakeholders and beneficiaries, and not perfectly in line with budget allocations. The inception phase of the project will therefore be very important, with the aim to detail the project work plan and clarify its activities to all concerned stakeholders. Technical and financial feasibility studies are needed for all water catchment and supply infrastructure projected in pilot sites. Financial provisions for those studies should be completed. These studies should cover water catchment possibilities assessment, water distribution network analysis and design, cost of water exploitation and supply and cost recovery studies, as well as socio-environmental studies, among others.

As AFD and the ADB are active in the water sector and given that the national coordination is weak, the project team will have to ensure good coordination with these donors. Support to the national water committee could help strengthen coordination.

Furthermore, technical support should be provided to MaMwe, ANACM, UCEM and UCEA to implement the project. Technical assistance is needed to implement capacity building and awareness raising activities on climate change adaptation in the water sector and also water supply infrastructure to be built or rehabilitated. It will most likely be necessary to hire one United Nations Volunteer (UNV) to support MaMwe, one in ANACM and one in UCEM and UCEA (as there is already one French volunteer funded by an AFD project which is supporting UCEM and UCEA). This technical support is needed to implement projected activities, but also to coordinate activities with other programs, in support of the Chief technical advisor and the project team yet to be established.

Annex 1 – Terms of Reference

DEVELOPING BASELINE INFORMATION AND INDICATORS: ADAPTING WATER RESOURCE MANAGEMENT IN THE COMOROS TO INCREASE CAPACITY TO COPE WITH CLIMATE CHANGE.

1. BACKGROUND

The context

Climate change projections and impacts predicted for the Comoros correspond with the global trend predicted for Small Islands in the Indian Ocean in the Fourth Intergovernmental Panel on Climate Change (IPCC) Assessment Report. The following projections have been predicted for the Comoros by various sources:

- A decline in rainfall of between 2 and 14% during the dry season by 2090 (June to August);
- An increase in mean annual temperature of between 0.8 and 2.1 °C by 2060;
- Sea level rise (SLR) of 20 cm by 2050;
- An increase in the frequency of climatic hazards (e.g. tropical cyclones, droughts, episodes of heavy rainfall and flooding).

Exacerbating these impacts are the Comoros' inherent vulnerabilities as a Small Island Developing State (SIDS) (small land area, susceptibility to natural disasters, geographical isolation, limited natural resources and sensitive ecosystems). Further compounding the situation are existing unsustainable anthropogenic practices (such as deforestation). The inherent vulnerability of the islands is exacerbated by the low capacity of the Comorian people to adapt themselves to climate change impacts and also by the very low level of involvement of the governmental institutions to assist the population with coping with the impacts.

Water supply and quality in the Comoros is presently poor. Overall, water availability in the Comoros is dependent on a number of factors, including geography, rainfall input (geographical disparity, seasonal fluctuations), upstream and downstream land use (agriculture, land cover, urbanization), current and future climate changes and ecosystem integrity. Changes in climate patterns (such as the prolonged dry season), including climatic variability, are affecting and will continue to affect the supply, quality and distribution of water resources available to end users in the Comoros. Future climate change is likely to exacerbate this situation.

The project

The **goal** of this project is *to adapt water resource management to climate change in the Comoros*. The project **objective** is *to reduce the risk of climate change on lives and livelihoods from impacts on water resources in Comoros*. These will be addressed through the realization of three outcomes:

4. Institutions at a national (i.e. Ma-Mwe and ANACM) and community (i.e. UCEA and UCEM) level strengthened to integrate climate change information into water resource management.
5. Water supply and water quality for selected pilot communities to combat impacts of climate change improved.
6. Awareness and knowledge of adaptation good practice for continued process of policy review and development increased.

Outputs under Outcome 1:

1.1. Information on climate change risks to water availability in Comoros improved.

- 1.2. Capacity to assess and monitor changes in water availability/quality (given climate change projections) developed.
- 1.3 Climate change risks integrated into water resource management policies and spending plans.

Outputs under Outcome 2:

- 2.1. Technologies to improve water access and quality that mitigate climate change risks piloted (e.g. soil conservation measures, water harvesting, remedial work on existing boreholes, and interference radius between boreholes should be carried out).
- 2.2 Community members trained to manage adaptive water interventions sustainably

Interventions to be implemented in the five pilot sites include:

- Rehabilitation of existing water supply infrastructure;
- Construction of drinking water storage facilities (cisterns, reservoirs);
- Rehabilitation of simple irrigation systems to ensure adequate water provision to crops;
- Reforestation.

Further information on the baseline and adaptation alternative for these interventions can be found in Annex 1.

Outputs under Outcome 3:

- 3.1. Knowledge products developed on lessons learned for policy makers, communities and donors throughout the project.
- 3.2. Learning disseminated through platform for national learning and sustainability.
- 3.3 Comorian experience disseminated in knowledge networks related to water and climate change, including ALM and IW Learn.

The project indicators

The objective level indicator is as follows:

- i) The percentage change in vulnerability of men and women living in the pilot sites to climate change risks on availability of clean water.

Outcome level indicators are as follows:

Outcome 1: Institutions at a national (i.e. Ma-Mwe and ANACM) and community (i.e. UCEA and UCEM) level strengthened to integrate climate change information into water resource management.

- i) Number of policy documents revised to include regulations and provisions that promote gender-equitable adaptation in the water sector.
- ii) The number of policy-makers and planners using adjusted processes and methods to develop gender-equitable water management policies that integrate climate change projections.

Outcome 2: Water supply and water quality for selection pilot communities to combat impacts of climate change improved.

- i) Percentage increase in the population at each pilot site with improved delivery of drinking water¹⁰.
- ii) Percentage increase in agricultural production at all pilot sites.
- iii) Number of cases of hepatitis and typhoid fever reduced in all five pilot sites¹¹.
- iv) Percentage of land surface covered by forest tree canopy¹².

Outcome 3: Awareness and knowledge of adaptation good practice for continued process of policy review and development increased.

- i) Number of men and women (public and decision-makers) aware of climate change vulnerability and adaptation responses (survey-based results).
- ii) Number of knowledge products generated and disseminated.

The project is funded by the Least Developed Countries Fund, an adaptation fund of the UN Framework Convention on Climate Change, managed by the Global Environment Facility.

The contracting Agency is the UN Development Programme (UNDP). Supervision of the contract will be undertaken by UNDP and UN Environment Programme (UNEP).

2. TASKS

1. To validate the relevance of and if necessary develop further the indicators included in the Project Results Framework (See UNDP and UNEP prodocs and CEO endorsement request) of the LDCF Comoros project, based on the adaptation outcome targets the project is aiming to achieve. Indicators should be SMART, results-based, gender-sensitive, and the means of verification should be as easy as possible.
2. Consider whether the Outcome targets are achievable and relevant, and if necessary, propose how they could be revised.
3. To collect baseline data against which project indicators could be measured. Baseline values should be established for the relevant project indicators on the basis of the data collected.
4. Identify data gaps and agree in consultation with UNEP and UNEP on a the methodology to fill in the data gaps.

3. DURATION OF THE CONTRACT

58 days over the period: 30 July 2010 – 31 January 2010

This includes 8 days to cover two international trips and two internal trips in Comoros.

¹⁰ This will be measured based on surveys (and water meters where applicable) regarding the number of litres of water supplied to households within pilot sites on a daily basis.

¹¹ This will be measured by the percentage reduction in cases in nearby hospitals compared with average levels at the beginning of the project. The percentage reduction will be calculated based on surveys in communities who are unable to get to hospitals and based on hospital records where applicable.

¹² This will be measured every 12 months after rehabilitation by running line transects through the restored area.

4. EXPECTED DELIVERABLES

Deliverables should be written in English. The following deliverables are expected:

1. A workplan and description of methodology together with draft survey(s)
2. First mission summary report (no more than 4 pages plus annexes) which should contain information on the following:
 - Description of the methodology used to develop the baseline information.
 - Recommendations for indicators and outcome targets for the two project sites;
 - Baseline values which would be used to measure progress on the baseline during project implementation;
 - Description of the means of verification of the methods to be used for measuring the indicators;
 - Recommendations on conducting the second mission, including a description of lessons learned.
3. Second mission summary report (no more than 4 pages plus annexes) which should contain information on the following:
 - Description of the methodology used to develop the baseline information.
 - Recommendations for indicators and outcome targets for the remaining three project sites;
 - Baseline values which would be used to measure progress on the baseline during project implementation;
 - Description of the means of verification of the methods to be used for measuring the indicators.
4. A draft synthesis report and a final synthesis report (no more than 10 pages each plus annexes) which will contain but not limited to the following:
 - Description of the methodology used to develop the baseline information.
 - Description of the recommended baseline and indicators;
 - Recommendations for changes to Outcome targets, if necessary;
 - Description of the means of verification of the methods to be used for measuring the indicators;
 - An updated version of the project results framework with validated indicators, baseline values for all indicators and Outcome targets;
 - Annexes (documentation of interviews, surveys made, of the survey, list of people involved / consulted, references etc).

5. CONDUCT OF WORK

The consultant is expected to:

- Coordinate activities and workplan implementation as the team leader of a two international experts composed team.
- liaise with the relevant Government authorities to determine verifiable data that could be used to formulate the indicators.
- work closely with the UNDP Country Office in implementing the tasks, under the guidance of the UNDP and UNEP Regional Advisers.
- to keep in close contact with UNDP and UNEP, informing the Agencies should any problems arise that would compromise the delivery of the final outputs.

- take a gender-sensitive approach to carrying out survey work.

6. TIMING OF WORK

The consultant is expected to spend:

- 5 days preparing for the field mission, and elaborating data gathering tools (eg surveys). This would include developing a participatory rural appraisal on community perception to vulnerability and capacity to adapt. It is recommended that part of this preparation time is spent in-country;
- 10 days each at first two five project sites during the mission (total 20 days), on project tasks set out in Section 2;
- 5 days each at the remaining three project sites during the second mission (total 15 days), on project tasks set out in Section 2;
- 10 days for drafting and review process.

Two missions should be fielded: the first expected to be in October/November 2010, and the second in December 2010. Baseline and indicator information should be completed for two project sites in November, which would test the methodologies to be used in the remaining three project sites. Further refinement of the methodology based on this initial experience would be carried out by the consultant.

A draft final of the report should be completed by 17 January, and a final report should be submitted 31 January 2010.

7. BUDGETING ARRANGEMENTS

Payment will be tranced according to the following schedule, and upon receipt of deliverables to a satisfactory standard by UNDP and UNEP:

Payment 1: 20%

Submission of workplan and methodology

Payment 2: 40%

Submission of the first mission report

Payment 3: 40%

Final synthesis report

International travel expenses and accommodation expense should be billed separately, and the expense form should be sent to the UNDP Country Office for reimbursement. Travel within Comoros will be arranged and paid for by the UNDP Country Office.

8. COMPETENCIES

Technical

Demonstrated experience in:

- developing logframes and SMART-based indicators, and appraising projects on the basis of logframe indicators;
- participatory rural appraisal methods: developing surveys and conducting the surveys;
- water resources management, including agricultural water interventions;

- developing water infrastructure;
- developing climate change adaptation analysis;
- developing problem analysis and critically examining potential solutions, and ways to measure progress on those solutions;
- institutional assessment and development.

Experience required

- A minimum of 5 years relevant work experience in water sector projects, including implementation at country level.
- Demonstrated experience on climate change adaptation
- Experience in working and collaborating with governments.
- Strong interpersonal and communication skills.
- Fluency in French (spoken, written and reading) and high standard of English writing and spoken skills.

Annex 2 – List of persons interviewed during the two missions

Date	Name	Organisation and position
18/10	Youssef MBEICHEZI	UNDP CO - ARR/P
18/10	Karim ALI AHMED	UNDP CO - Environment Program Associate
19/10	Said Mohamed NASSUR	National Directorate of Water and Energy - Director of Water and Energy
19/10	Kassim AHMED IBRAHIM	African Development Bank Water Supply Program – Coordinator
19/10		National Directorate of Environment - Director of Environment
19/10	Mohamoud Alibay POUNDJA	National Directorate of Meteorology/ANACM - Director of Meteorology National
19/10	Halifa CHANFI	National Directorate of Meteorology/ANACM - Engineer
20/10	Henry Alphonse MLANAO	MaMwe – General Director
20/10	NaMwe - The two Engineers of	planning service
21/10	Joseph PIHI	UNDP CO - Deputy Resident Representative
25/10	Faissoili ben Mohadji	Directorate of Environment and Agriculture of Moheli - Director of Agriculture and Environment
26/10	Ibrahim CHAMSIDINE	UCEM - President
26/10	Coordinator, engineer and employees	UCEM
26-28/10	Tsira MINDHIRI	Marine Park of Moheli – Coordinator
26-28/10	Said BEN OMAR	Civil Security – Director
26/10	Djandro Pilot Site	Community of Siry Ziroudani – 40 inhabitants
27/10	Djandro Pilot Site	Community of Wanani – 40 inhabitants
27/10	Djandro Pilot Site	Community of Mlabanda – 37 inhabitants
28/10	Djandro Pilot Site	Community of Nkangani – 30 inhabitants
28/10		Regional Health Directorate of Moheli – Deputy Director
30/10	Alibay AHMED SENAL	Directorate of Environment of Anjouan –Director of Environment
30/10	Anzilani ABDOU	GDT Project - Coordinator
30/10		Sanitary Statistical Service/Regional Health Directorate of Anjouan – Coordinator
01/11	Omar HOUMADI	UCEA - President
01/11	Chaif ABDALLAH	AFD RESEAU Project – Coordinator in Anjouan
01/11	Said AHMED SABA	UCEA - Water Management Support Service – Coordinator
02/11	Hugh Doulton	ECDD Project – Coordinator
04/11	Jean François VAVASSEUR	AFD Moroni – Director
04/11	Tiphaine GUILLET	AFD Moroni – Project Manager
04/11	Flavien JOZY	French Association HSF
10/11	Karim ALI AHMED	UNDP CO - Environment Program Associate
10/11	Saïd Hamada Mdziani	Projet GDT (Gestion durable des terres) – RUTI (coordonateur) Grande Comores
10/11	Yousseoufa Mohamed Ali	Projet GDT – Coordonateur National
10/11	Mohamed Halifa	INRAPE – Directeur Général
10/11	Ms Chadhouliati Abdou	INRAPE – Directrice adjointe / Responsable

	Chakour	laboratoire phytopathologie
10/11	Dr Azali	Univ. de Moroni – Responsable du laboratoire d’analyse de l’eau
10/11	Ahamada Djoubeire	INRAPE - Département de Génie Rural - hydraulicien
13/11	Bandasamlini project site	Community of Ivhembeni – 30 inhabitants
13/11	Bandasamlini project site	Group of rural women – 10 women
13/11	Bandasamlini project site	Community of Diboini – 23 inhabitants
14/11	Bandasamlini project site	10 farmers
15/11 and 22/11	Saïd Ahmed Othman	Projet Eau-CC PNUD - Consultant national
15/11	Hamadi Idaroussi	Direction nationale de la stratégie agricole – Responsable élevage, ancien directeur général
15/11		Syndicat National des Agriculteurs Comoriens - President
16/11	Anzilani ABDOU	GDT Project - Coordinator in Anjouan
17/11		Ministre de l’agriculture et de l’environnement – Union des Comores (participation VRA Lingoni)
19/11	M. Abdoul Houssene Souleimane	PNUD – Projet ‘Organisation Communautaire de Base’ (OCB) - VNU National
20/11	M. Halidi Ahmed Ben Ali	Directorate of Environment of Anjouan - Director of Environment

Annex 3 – Updated Results Framework

Project Objective	Suggested Indicators	Baseline – Data Collected	Targets by the end of the project	Means and source of verification
To reduce the risk of climate change on lives and livelihoods from impacts on water resources in the Comoros	i) The degree ¹³ of vulnerability of men and women living in pilot sites to climate change risks on availability and quality of water (domestic and irrigation water).	<ul style="list-style-type: none"> • Moroni: Vulnerability to climate change risk on availability and quality of water in this pilot site is estimated as 4: quite vulnerable • Plateau Djandro in Moheli: The degree of vulnerability of men and women living in these four villages is evaluated as quite vulnerable (mean rating for Siry of 3.75; mean rating for Wanani of 4; mean rating for Mlabanda of 3.6; mean rating of Nkangani of 4.1). • Lingoni-Pomoni in Anjouan: The degree of vulnerability of men and women living in the two villages is therefore estimated at 4: quite vulnerable. • High Nioumakele in Anjouan: The degree of vulnerability of men and women living in these villages is evaluated as quite vulnerable. • Bandamsamlini: The degree of vulnerability of men and women living in the area is evaluated as 3 moderately vulnerable. 	<ul style="list-style-type: none"> • Moroni: Vulnerability to climate change risk on availability and quality of water is decreased from 4 to 2 at least. • Plateau Djandro in Moheli: The overall vulnerability to climate change risk on availability and quality of water is decreased from 4 to 2. • Lingoni-Pomoni in Anjouan: The overall vulnerability to climate change risk on availability and quality of water is decreased from 4 to 4. • High Nioumakele in Anjouan: The overall vulnerability to climate change risk on availability and quality of water is decreased from 4 to 2. • Bandamsamlini: The overall vulnerability to climate change risk on availability and quality of water is decreased from 3 to 2. 	<ul style="list-style-type: none"> • Interviews with MaMwe; Water distribution meters; Surveys. • VRAs in Siry, Wanani, Mlabanda and Nkangani; interviews with UCEM. • VRA in Lingoni and VRA in Pomoni; interviews with UCEA. On-site verification. • Interviews with UCEA; focus groups • VRA in Badamsamlini; On-site verification.
Outcomes	Suggested Modifications	Baseline - Data Collected	Target by the end of the project	Mean and source of verification used
Outcome 1: Institutions at a national (i.e. Ma-Mwe and	ii) Number of policy documents at the Union decisional level, the island decisional level and the community / local level,	<ul style="list-style-type: none"> • The Water Act in the Union of Comoros, but without any regulations for application. • One Environmental Law and Environmental Strategy, but lack 	<ul style="list-style-type: none"> • The Water act is revised and includes regulations and provisions that promote gender equitable adaptation. • One water program with priority actions by 2030 is elaborated by the 	<ul style="list-style-type: none"> • Interviews with the water and energy Directorate and the Environment Directorate at the

¹³ This degree should be ranking from 1 to 5, based on the ranking of the VRAs: 1. Not vulnerable; 2. Not much vulnerable; 3. Moderately vulnerable; 4. Quite vulnerable; 5. Highly vulnerable.

<p>ANACM) and community (i.e. UCEA and UCEM) level strengthened to integrate climate change information into water resource management.</p>	<p>revised or elaborated to include regulations and provisions that promote gender-equitable adaptation in the water sector.</p>	<p>regulations for application.</p> <ul style="list-style-type: none"> • Water inter-ministerial Committee at the union level. • At the local level, in the island of Mohéli and Anjouan, each village has its own water act and its specific water management committee, but do not include regulations and provisions that promote gender-equitable adaptation. • The Comoros agricultural strategy document dates back 1994 and has not been implemented. It seems that water management is only considered under the intensification side of things and not as an upcoming difficulty for the sector 	<p>end of the project</p> <ul style="list-style-type: none"> • Water Acts at the local level in the pilot sites in Moheli and Anjouan are revised to include regulations and provisions that promote gender-equitable adaptation 	<p>national level, Water and Environment Directorates in Moheli, Anjouan and Grandes Comores, UCEM and UCEA</p> <ul style="list-style-type: none"> • Revised policy documents • VRA in the four pilot villages in Moheli, i.e. Siry, Wanani, Mlabanda and Kangani • VRA in Lingoni and Pomoni in Anjouan • VRA in Bandamsamlini in Grande Comores
	<p>iii) The number of policy-makers and planners at the Union and Islands levels using adjusted processes and methods in terms of collecting water and climate data, modelling climate trends and monitoring water quality and supply, to develop gender-equitable water management policies that integrate climate change projections</p>	<ul style="list-style-type: none"> • Policy makers and planners at the Union and Islands levels do not currently integrate knowledge of climate change into policies related to water and agriculture and they lack capacities in collecting water data, modelling climate trends, monitoring water quality and supply. • At the Union level: Total of policy makers and planners at the Union level of 20 • In MaMwe, Total of employees in MaMwe for which capacities should be built of 5 • In ANACM and the national meteorology directorate, total of planners for which capacities should be built, especially regarding monitoring climate trends, of 10. • At the island level: in Moheli, 1 Director and 2 planners are currently working for the Directorate of Environment and water; and in Anjouan, there is 1 director and 5 planners. 	<ul style="list-style-type: none"> • By the end of the project, at least the following numbers of planners are using adjusted processes and methods, in terms of collecting water and climate data, modelling climate trends and monitoring water quality and supply, to develop water management policies that integrate climate change projections : <ul style="list-style-type: none"> - 7 policy makers and planners at the Union level, - 5 in MaMwe, - 10 in ANACM, - 3 in the Directorate of Environment in Moheli, - 5 in the Directorate of Environment in Anjouan, - 2 in UCEM, and - 7 in UCEA 	<ul style="list-style-type: none"> • Interviews with the Energy and the Water Directorate and the Environment Directorate at the Union Level, MaMwe, ANACM, the Environment Directorate of Moheli and the Environment Directorate of Anjouan, UCEM and UCEA.

		<ul style="list-style-type: none"> • UCEM in Moheli includes only 2 permanent employees. • UCEA in Anjouan includes 7 permanent employees. 		
<p>Outcome 2: Water supply and water quality for selected pilot communities to combat impacts of climate change improved.</p>	<p>iv) Overall perception of the population per pilot site on: (i) the daily quantity of water accessible for domestic uses; (ii) the facility of access to this water; and (iii) the quality of the water used (best quality being improved drinking water as per the definition of WHO and the UN MDG) (ratings to be provided for each category on a scale of 1 to 4, with levels defined as follows: (1) very satisfied; (2) satisfied; (3) unsatisfied; and (4) very unsatisfied)</p>	<ul style="list-style-type: none"> • Moroni (42,000 inhabitants): Baseline Ratings: 1. Quantity: 3 2. Access: 3 3. Quality: 3 • Djandro (4,830 inhabitants): Baseline Ratings: 1. Quantity: 4 2. Access: 4 3. Quality: 4 • High Nioumakele in Anjouan (35,000 inhabitants): Baseline Ratings: 1. Quantity: 3 2. Access: 2 3. Quality: 3 • In Lingoni-Pomoni in Anjouan (4,824 inhabitants): Baseline Ratings: 1. Quantity: 2 2. Access: 4 3. Quality: 3 	<ul style="list-style-type: none"> • Moroni (42,000 inhabitants): Ratings Targets: 1. Quantity: 2 2. Access: 2 3. Quality: 2 • Djandro (4,830 inhabitants): Ratings Targets: 1. Quantity: 2 2. Access: 2 3. Quality: 2 • High Nioumakele in Anjouan (35,000 inhabitants): Ratings Targets: 1. Quantity: 2 2. Access: 2 3. Quality: 2 • In Lingoni-Pomoni in Anjouan (4,824 inhabitants): Ratings Targets: 1. Quantity: 2 2. Access: 2 3. Quality: 2 	<ul style="list-style-type: none"> • Interview with Ma Mwe, surveys and results of quality monitoring • Focus group/VRA, results of quality monitoring, interview with UCEM and survey • Focus group/VRA, results of quality monitoring, interview with UCEA and survey • Focus group/VRA, results of quality monitoring, interview with UCEA and survey
	<p>v) Average yield for the 2 main vegetable products in the project areas (tomato and Potato in Bandasamlini and tomato and onions in Lingoni-</p>	<ul style="list-style-type: none"> • 2010. Bandasamlini: tomato average yield is 440kg per 1000 plants, and potato average yield is 326kg per 100kg of seeds. • In Lingoni, tomato average yield is 558kg per 1000 plants and onion average 	<p>Increase by 50% actual average yields on two main vegetable productions.</p>	<p>Interview with 10 farmers in each location.</p>

	Pomoni)	<p>yield is 282kg of onions per 100g of seeds.</p> <ul style="list-style-type: none"> • In Pomoni, there are still good yields in tomato, average measured is 1851kg per 1000 plants. Onions give 385kg per 100g of seeds. 		
	vi) Annual number of cases of typhoid and acute diarrhoea within pilot sites.	<ul style="list-style-type: none"> • Djandro pilot sites (Wanani sanitary district – 4830 inhabitants): <ul style="list-style-type: none"> - Number of cases of typhoid in 2009: total of 40 - Number of cases of acute diarrhoea in 2009: total of 28 (15 men and 13 women) • Pomoni sanitary district in Anjouan (pilot site of Lingoni-Pomoni – 4,824 inhabitants): <ul style="list-style-type: none"> - Number of cases of typhoid in 2009: total of 29 (19 men and 10 women) - Number of cases of acute diarrhoea in 2009: total of 731 (368 men and 363 women) • Mremani sanitary district in Anjouan (pilot site of Nioumakele – 35,000 inhabitants): <ul style="list-style-type: none"> - Number of cases of typhoid in 2009: total of 9 (5 men and 4 women) - Number of cases of acute diarrhoea in 2009: total of 252 (125 men and 127 women) • Moroni sanitary district in Grande Comores (42,000 inhabitants): <ul style="list-style-type: none"> - Number of cases of typhoid in 2009: total of 75 - Number of cases of acute diarrhoea in 2009: total of 141 • Bandasamlini is not concerned by this indicator 	<ul style="list-style-type: none"> • By the end of the project, the annual number of cases of Typhoid and acute Diarrhoea is reduced by 25% in all pilot sites. 	<ul style="list-style-type: none"> • Statistical sanitary services in the regional health directorates of Fomboni, Mutsamudu and Moroni.
	vii) Number of surviving trees in reforested areas	The GDT project has planted 10,000 fruit and forest trees so far in Lingoni-Pomoni. None in Bandasamlini for the moment	Project document mentions 2 sites at 95ha each (Bandasamlini and Lingoni-Pomoni).	Project invoices, survey among local populations (20 persons in each

		(planned from 2010). No limits to deforestation currently (no protection measures). Awareness exists but no means of control.	2x95 @1000 tree/ha = 180,000 trees planted. Objective is a surviving rate of 80% which gives 144,000 living trees at the end of the project. Protection zone delineated and respected by inhabitants.	location)
Outcome 3: Awareness and knowledge of adaptation good practice for continued process of policy review and development increased.	viii) Percentage of men and women (public and decision-makers) aware of climate change vulnerability and adaptation responses.	Currently knowledge on climate change vulnerability and adaptation responses is low among public and decision makers. Awareness of climate change is good among decision makers and public, as everybody has once heard about climate change in newspapers or in local radio. However, awareness of climate change vulnerability and more specifically adaptation responses is low. People have heard about climate change but do not implement adaptation measures or responses. It could be estimated that currently 10 % of decision makers and less than 5% of population in pilot sites are aware of climate change vulnerability and adaptation responses.	By the end of the project, at least 30% of the population within pilot site communities and 50% of decision makers have increased awareness and knowledge on climate change impacts and adaptation options, by having assisted to seminars, island levels' workshops, community workshops and public workshops	<ul style="list-style-type: none"> • Workshops and seminars' reports. • Focus Groups and VRA
	ix) Number of newspaper articles, booklets and pamphlets highlighting the lessons learned during the project and number of technical documents on lessons learned submitted to knowledge networks.	Except the National Communication and the National Adaptation Program of Actions, currently there are no available documents and reports about good practices on adaptation to climate change risks on availability and quality of water in Comoros disseminated within knowledge networks.	By the end of the project, project lessons are distributed in hard copy (e.g. pamphlets, briefing notes, newsletters, booklets etc), electronically (e.g. via the project website), via radio broadcast and via one national and three island-level workshops.	Adaptation Mechanism, WeAdapt and International platform

Annex 4 – Description of the tool used for the VRA

VRA/Focus groups conducted

The Team conducted focus groups/VRA in each of the four villages involved in Mohéli, namely Siry Ziroudani, Wanani, Mlabanda and Nkangani; in two villages in the pilot site of Bandasamlini, namely Ivhembeni and Diboini; and both in the villages of Lingoni and Pomoni.

Approach followed and tools used

The focus groups/VRA were conducted following the approach and methodology described in the UNDP Guide to the Vulnerability Reduction Assessment. They were conducted based on a composite of 4 indicator questions (as shown in picture 1), tailored to capture locally-relevant issues that are at the heart of understanding vulnerability to climate change, e.g.:

- (i) Vulnerability of livelihood/welfare to existing climate change and/or climate variability (e.g. an increase in average annual temperature in the order of 1 °C since 1960, a shortening of the rainy season from six months to between two and three months in favour of the dry season, and an increase in the irregularity of rainfall since 1960);
- (ii) Vulnerability of livelihood/welfare to developing climate change risks (e.g. decline in rainfall of between 2 and 14% during the dry season by 2090 (June to August), increase in mean annual temperature of between 0.8 and 2.1 °C by 2060, and increase in the frequency of climatic hazards (e.g. tropical cyclones, droughts, episodes of heavy rainfall and flooding));
- (iii) Magnitude of barriers to adaptation (institutional, policy, technological, financial, etc); and
- (iv) Ability and willingness of the community to sustain the project intervention.

Vulnerability in the case of Djandro pilot site was analysed vis-à-vis climate change impacts on water availability and quality, and in the case of Bandasamlini and Lingoni-Pomoni vis-à-vis climate change impacts on water availability and quality for agricultural production.

VRA meetings were preceded by awareness raising activities for the project’s local stakeholder community on emerging climate trends and future projections. Local stakeholders/project beneficiaries answered all questions and provided qualitative data based on the discussions, leading to a vulnerability score on a scale of 1 to 5 (1. Not vulnerable; 2. Not very vulnerable; 3. Moderately vulnerable; 4. Quite vulnerable; 5. Highly vulnerable).

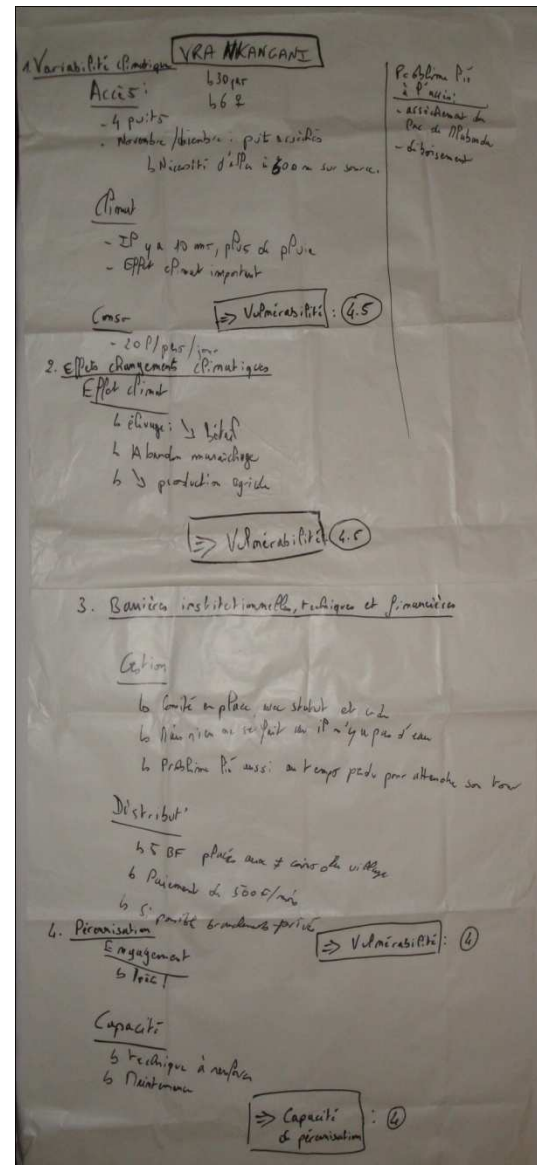


Figure 1: Completed flipchart for the VRA conducted in Nkangani

For each VRA conducted, awareness raising activities and questions were simultaneously translated into local dialects by a local translator. The team used a flipchart to collect responses and derive a vulnerability score (as shown in figure 2).

Representativeness

In the four villages of Plateau de Djandro: The groups were representative of the different socio-economic groups of the community and their composition was gender sensitive. In Siry Ziroudani, the group was composed of 40 persons, including 15 old persons and 6 women; in Wanani the group was composed of 40 persons; in Mlabanda the group was composed of 37 persons including 15 women and 8 old persons; and in Nkangani the group was composed of 30 persons including 6 women and 4 old persons.



Figure 2: VRA Meeting in Wanani

In the two villages of Bandasamlini: The groups were representative of the different socio-economic groups of the community and their composition was gender sensitive. In Ivhembeni, the group was composed of 25 men and 10 women, including 15 pretty old persons. This was completed by a focus group with women only, separately, in order to discuss their particular concerns they could not express properly in front of men. In Diboini, the VRA was conducted nearby the agricultural fields and gathered 25 men, mostly young people (only 4 'old' men).

In Lingoni and Pomoni: The VRAs conducted in both Lingoni and Pomoni villages, gathered each time almost 50 people, including women (only 2 in Pomoni and 4 in Lingoni), young and older people (3 each time).

Lessons learned

- Focus group/VRA could be perceived by population as an additional focus group leading to nothing concrete.
- Questions and debates should be translated simultaneously in local dialects;
- Questions need to be clear, precise and easily understandable;
- Prior to conduct the VRA, there is a need to communicate with local agents/translators, in order to avoid misunderstanding;
- Leaders should be identified as soon as possible during the VRA process, in order to give the parole to everybody and not only let leaders speak.

Challenges

- People have difficulties to assess their own vulnerability, barriers to adaptation and adaptation abilities. Therefore, it could be difficult to derive scoring from the VRA/focus groups.
- People also do not understand clearly the difference between climate variability and climate change;
- Meeting gender issues while organising VRA/focus groups could be sometimes challenging;
- It could be sometimes difficult to regroup people while nothing concrete is conducted. The first VRA/focus group could be perceived as an additional basic focus group which people do not want to assist.

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