

Call for submission on indicators of adaptation and resilience at the national and/or local level or for specific sectors¹

We thank you in advance for filling out this template with concise, evidence-based information and for referencing all relevant sources. As you will see on the last page of the document, more detailed information on case studies, tools/methods and other knowledge resources for dissemination through the [Adaptation Knowledge Portal](#) is welcome, but optional.

Name of the organization or entity:

Community Forests Pemba

Type of organization/entity:

Please choose as appropriate:

- | | |
|-------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> Local government/ municipal authority | <input type="checkbox"/> Regional center/network/initiative |
| <input type="checkbox"/> Intergovernmental organization (IGO) | <input type="checkbox"/> Research institution |
| <input type="checkbox"/> National/public entity | <input type="checkbox"/> UN and affiliated organization |
| <input checked="" type="checkbox"/> Non-governmental organization (NGO) | <input type="checkbox"/> University/education/training organization |
| <input type="checkbox"/> Private sector | |

Scale of operation:

- | | |
|-------------------------------------------|-----------------------------------|
| <input checked="" type="checkbox"/> Local | <input type="checkbox"/> National |
|-------------------------------------------|-----------------------------------|

Specific sectors addressed:

- | | |
|----------------------------------------------------------------|---------------------------------------------------------------|
| <input type="checkbox"/> Adaptation finance | <input checked="" type="checkbox"/> Gender |
| <input checked="" type="checkbox"/> Agriculture | <input type="checkbox"/> Health |
| <input type="checkbox"/> Biodiversity | <input type="checkbox"/> Heavy industry |
| <input checked="" type="checkbox"/> Community-based adaptation | <input type="checkbox"/> Human settlements |
| <input type="checkbox"/> Disaster risk reduction | <input type="checkbox"/> Indigenous and traditional knowledge |
| <input type="checkbox"/> Ecosystem-based adaptation | <input type="checkbox"/> Infrastructure |
| <input type="checkbox"/> Ecosystems | <input type="checkbox"/> Services |
| <input checked="" type="checkbox"/> Energy | <input type="checkbox"/> Tourism |
| <input checked="" type="checkbox"/> Food security | <input type="checkbox"/> Urban resilience |
| <input checked="" type="checkbox"/> Water resources | <input type="checkbox"/> Other (Please specify below) |

¹ FCCC/SBSTA/2016/2, paragraph 18.

City(ies)/Country(ies)/Region(s) of operation (if appropriate):

Pemba Island, Tanzania.

Description of relevant activities/processes or research:

Please describe the activities/processes that your entity has implemented in relation to indicators of adaptation and resilience. In case your organization carried out research, please describe it.

Community Forests Pemba (CFP) is based in the Zanzibar region of Tanzania, on Pemba Island. Since 2015 CFP has been working to implement their latest project, funded through the European Commission's Global Climate Change Alliance, titled *Scalable Resilience: Outspreading Islands of Adaptation* (SROIA).

Over the course of the 5-year SROIA project, CFP staff will work with more than 19 communities on the island of Pemba, Zanzibar, to help community members adopt and develop new strategies for climate change adaptation. Such strategies, known in-project as adaptive livelihood activities, include but are not limited to reforestation, agroforestry, renewable energy generation and poly-culture spice farming. Benefits to target communities from these adaptive livelihood activities usually fall into three categories: climate change adaptation; climate change mitigation; and income generation.

Climate change adaptation is augmented primarily by restoring the local environment surrounding target communities and by reducing target community's reliance on expensive and vulnerable imported resources. Good examples of this climate change adaptation in the SROIA project is reforestation of abandoned agricultural zones. These reforested sites begin to rebuild soil, increasing the amount of organic matter within soils and reducing heat extremes at the soil surface. This allows soils to increase in depth and nutrient content, allowing community members to begin planting food crops underneath species initially planted. In this way, those communities are better able to weather the effects of climate change as a result of the reforestation effort.

Climate change mitigation is promoted through activities that both remove and reduce greenhouse gasses from and in the atmosphere. Reforestation is another great example of a project activity that removes greenhouse gasses from the atmosphere as planted trees grow. Perhaps the best example of an adaptive livelihood activity that mitigates climate change by way of reduced emissions is through the manufacture and distribution of efficient cook stoves. Approximately 90% of energy consumed in Tanzania comes from woody biomass – wood and charcoal - used for cooking. This not only represents a significant driver of deforestation both on Pemba and mainland Tanzania, but also a significant amount of direct greenhouse gas emissions into the atmosphere. By working with target communities and training interested community members in the manufacture and distribution of improved efficiency cook stoves, early results from project beneficiaries indicates that fuel consumption – and associated emissions - is reduced by half.

Finally, linking climate change adaptation and mitigation activities to livelihood generation is an important way to secure community buy-in to proposed adaptive livelihood activities. CFP's kitchen garden training and support is an excellent example of this. CFP staff began work with interested beneficiaries – disproportionately women – to help them establish and manage kitchen gardens: small vegetable gardens used primarily for production of food for within-house use. As trainees began to have success and expand their kitchen gardens, surplus produce began to be sold in markets. This created a new source of income to both households and women. This not only resulted in improved food security and empowered primarily female trainees, but also now generates a significant new source of income. In this way kitchen gardens are becoming a popular activity throughout target

communities.

Taken as a whole, these adaptive livelihood activities were designed to help target communities better adapt to the effects of climate change from both an ecological and socioeconomic perspective.

To determine how well adaptive livelihood activities were being taken up and adaptation and resilience of project beneficiaries improving, CFP had to design a system by which changes in indicators of adaptation and resilience could be tracked following project activities. As such, specific indicators of adaptation – reduction in fuel used, access to locally-generated renewable electricity, access to clean drinking water – were selected to be monitored before, during and at the end of project activities. These indicators of adaptation and resilience were activity specific and were relatively easy to determine. However, tracking, monitoring and evaluating changes in these indicators was a challenge that CFP management and staff have been working for 2 years to overcome.

Description of relevant tools/methods:

Please describe the tools and/or methods that have been developed and/or used.

Community Forests Pemba has developed and implemented a rigorous system to monitor and evaluate a variety of input, output, outcome, and impact level targets and indicators of adaptation related to project activities. The system, known as FieldVIEW (Field Visit Information for Evaluating Work), relies on mobile tablets for continuous data collection in the field coupled to server-side data analysis using Python.

Continuous Input and Output Data Collection

Mobile tablets enable CFP project staff to register individual beneficiaries of project activities. Once an individual is registered, any input provided to the individual is registered under that individual. These inputs include:

- Trainings attended
- Equipment received
- Field Visits to her/him

Additionally, for an individual the project outputs that they produce and are associated with are tracked, including:

- Agroforestry Plots (GPS-mapped location and size, perennial and annual crops grown)
- Tree Nurseries (Annual construction material, GPS-mapped location, size, annual seedlings grown)
- Afforestation and Reforestation Sites (GPS-mapped location and size, perennial species counts and types)
- Rainwater Harvesting Systems (GPS-mapped location, collection area, storage tank capacities and types, filtration types, monthly water levels)
- Fuel Efficient Cook Stoves (Monthly total produced and sold)
- Multi-Strata Kitchen Gardens (GPS-mapped location, perennial and annual crops grown)
- Sustainable Beekeeping Groups (GPS-mapped location, hive types and counts, colony counts, honey and wax production)
- Renewable Energy Generation (GPS-mapped location, equipment types and capacities, monthly energy generation totals)
- Spice Forest Polyculture (GPS-mapped location and size, perennial and annual crops grown)

The tablets provide accessible and cohesive data visualizations via activity specific dashboards. Such dashboards facilitate data analysis in real time and in the field, improving staff understanding of project results.

Annual Outcome and Impact Data Collection

Beginning at the start of project activities, CFP staff annually use tablets to collect outcome- and impact-level results by way of a tablet-based questionnaire survey. When each new survey is developed, a test group is selected on which to trial the survey questions, allowing staff to address any issues discovered during this trial run.

A random selection of individuals is surveyed in each community using the finalized survey questions. The individuals are interviewed in person, and answers are recorded directly into the tablets. The individuals that are initially surveyed will continue to be surveyed annually to better track the outcomes and impact of the project.

The tablets are a key part of the survey collection process and serve multiple functions. For example, they eliminate error by removing the transcribing step that is necessary for paper-based surveys to transfer their results onto the computer. Additionally, they enable questions to be shown or hidden depending on previous answers, thereby streamlining the data collection process for staff. The use of tablet devices is essential for quality collection of project data.

Data Syncing

CFP project staff often work in locations without internet access. As such the FieldVIEW system must be available locally on tablets. This raises the opportunity for conflicting copies of data coming from different staff tablets that have been in the field at the same time. This presented a unique challenge with syncing the data with a master data collection system.

Any data that is inserted, updated or deleted on a tablet is tracked within that tablet. To sync with the master data collection system once back in the CFP office, the tablets export updates to an XML file, which is imported by the master system, incorporating the field updates. This updated master copy of the database is then redeployed onto the tablets for future data collection. The syncing process is performed bi-weekly and is the responsibility of a single individual staff specially trained to avoid conflicts in data collection and dissemination.

Data Analysis and Dissemination

The merged data on the master collection system are then analyzed using several Python-based packages and scripts. The analyzed data outputs are used in both internal and external reports. The frequent internal reports are used to inform future activities, enabling CFP to pivot quickly when issues and challenges are identified. The data used in external reports are tailored to specific project stakeholders, depending on their level of engagement. For example, district authorities receive reports specific to their district, and regional authorities receive reports specific to the districts within their region. Having all data collected and analysed in a single master collection system allows CFP to more easily communicate with stakeholders at various levels.

Key outcomes of the activities/processes undertaken:

Please provide information regarding the outcomes of the activities/processes described above, and do not hesitate to add qualitative assessment and/or quantitative data to substantiate the information.

Using FieldVIEW, CFP has already been able to register and track a few thousand beneficiaries from the project. The data collected is helping CFP to identify activities that provide the greatest adaptation-return on investment, while also providing a platform for identifying issues and deploying resources to meet those challenges early.

Through continuous feedback from project staff CFP has been able to continuously refine procedures related to routine data collection and streamline their monitoring and evaluation process. This 'learning how to learn' process is an important strategy ingrained within CFP procedures.

This results tracking system has also helped to present a clearer picture of which sectors - Agriculture, Water, Energy, Forestry - project beneficiaries are most engaged within. For example, very few beneficiaries are involved within only a single sector. Through a randomized survey of registered beneficiaries, CFP is better able to gather clearer insights into the interconnectedness of all of project activities:

Figure 1: Project beneficiaries by sector (A=Agriculture; W=Water; E=Energy; F=Forestry).

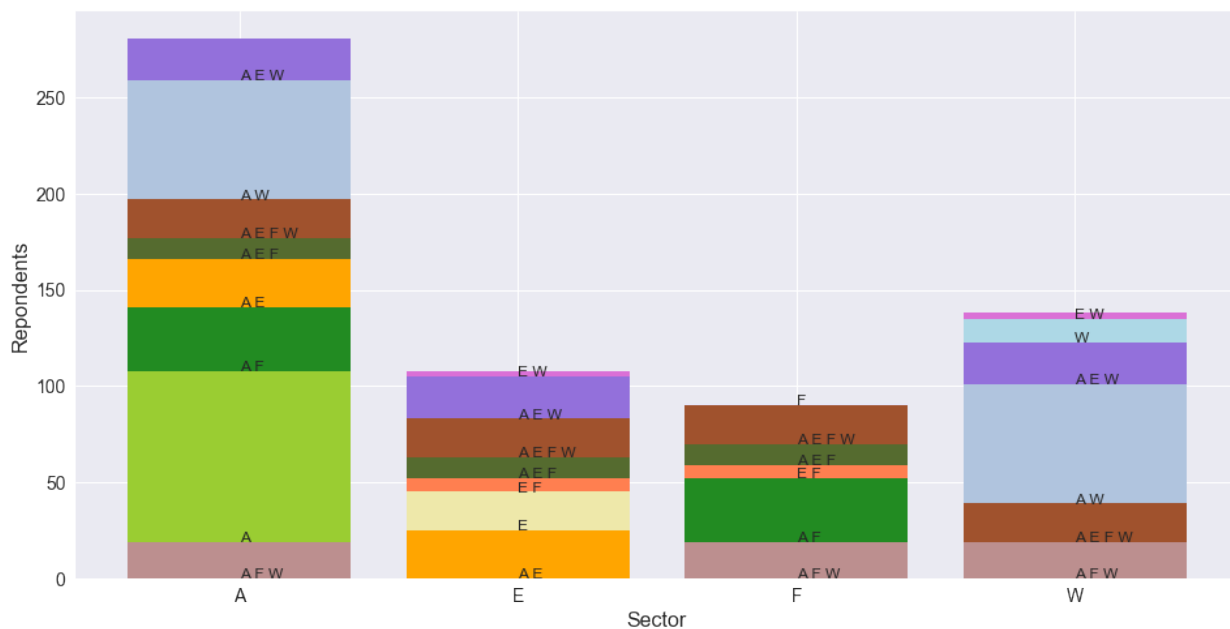
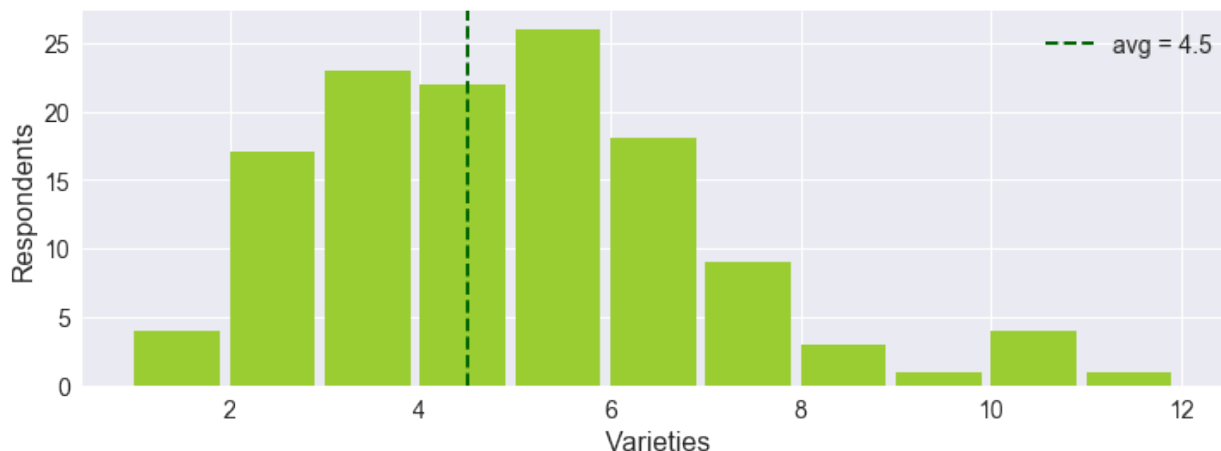


Figure 1 above shows the total number of activities that beneficiaries were implementing by sector. The letters indicate which sectors the beneficiaries were active in. For example, AEF indicates the

beneficiaries that were active in Agriculture, Energy and Forestry sectors through the project. Thus, AEF is listed in each of the bars of Agriculture, Energy, and Forestry.

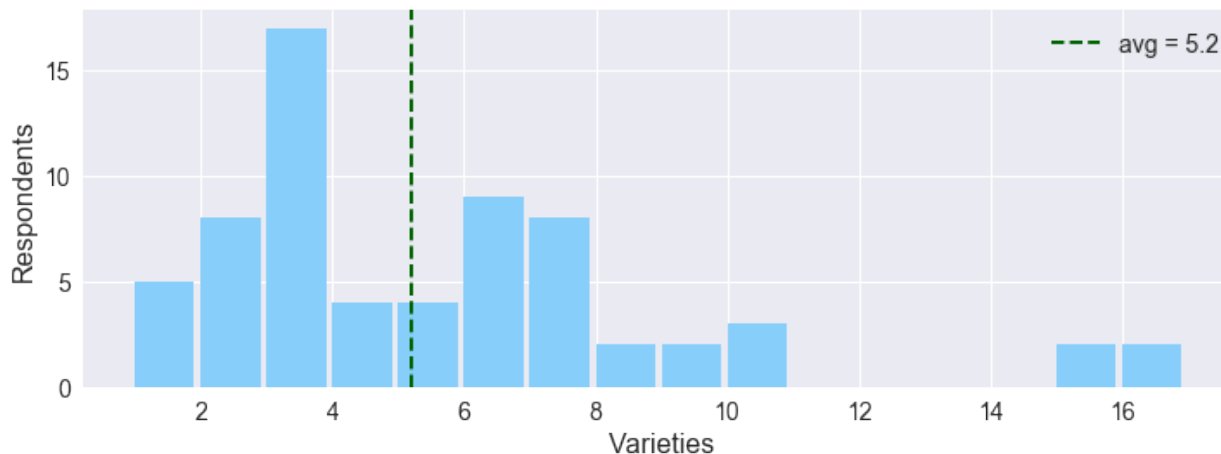
Data collection has also helped staff to identify the resiliency of agricultural activities by tracking varying indicators of resiliency. For example, diversity of annual and perennial crops within beneficiary plots can be used as an indicator of resiliency as greater diversity suggests greater resilience.

Figure 2: Number of different annual crops found within agroforestry plots



Most beneficiaries are growing between three and seven annual varieties within a single plot, a successful increase from the two to three crops that most beneficiaries were growing before the project began (as indicated during collection of baseline surveys taken before project activities began).

Figure 3: Number of different perennial crops found within agroforestry plots.



Description of lessons learned and good practices identified:

Please consider the following points when describing lessons learned and good practices: (a) effectiveness/impacts of the activities/processes (including measurability of the impacts), (b) efficiency in the use of resources, (c) replicability (e.g. in different locations, at different scales), (d) sustainability (i.e. meeting the current economic, social and environmental needs without compromising the ability to address future needs).

Following are some of the lessons learned by both CFP management and staff in the first 2 years of the SORIA project activities.

Streamline the Process

During the initial piloting of FieldVIEW, there were many bugs that needed to be fixed, and many changes made to the user interface that helped to improve the system. As FieldView needs to serve as a tool to enhance the effectiveness of the project team both in the field and in the office it is important to keep the system as simple to use as possible. Collect only the information that will inform project progress and success. Too much data can confuse and obscure outcomes.

Continuous Training

For the project team to become familiar and comfortable with the system, CFP management set a schedule for training and provided continuous training for the first few months. When new staff were brought onboard they were required to work with other staff users in the field for the first few weeks to gain familiarity.

Systematize Feedback

When rolling out with a new system there needs to be clear processes for staff users to provide feedback so that recommendations for improvement can be captured and implemented.

Establish Development Procedures

Have clear procedures in place for continuing to develop the data collection system. Updates can break parts of the software, and it is important to keep developmental builds separate from the production system. It is important to only incorporate new features after thorough testing.

Continuous Refinement

As projects progress, new insights will lead to necessary changes within the data collection system, and when new projects are on-boarded there will inevitably be a need to update tracking indicators. The data will inform project activities, and project activities must continue to inform data collection.

Automate Where Possible

Writing reports takes time. A digital data collection system can automate the charts and graphs used in reports. It can even structure the report by providing a template to complete.

Description of key challenges identified:

Please describe the key challenges associated with those activities/processes or the use of those tools/methods, that policy-makers, practitioners and other relevant stakeholders should know about.

Collecting reliable routine data is resource intensive, and as such it is important to simplify the data collection process as much as possible. As *FieldVIEW* continues to develop, the feedback from project staff helps to refine this system and, ultimately, improve the way CFP works. Staff feedback has helped to identify unnecessary data that is being collected, necessary data that was not being collected, and data that is being collected that could be collected in a more efficient manner.

As mentioned earlier, it was difficult to develop a system that could sync between multiple offline copies found on different mobile tablets. Changes to the data in any of the tablets need to be tracked and synced with the master collection system. This process was time consuming, but it ultimately has helped to streamline the routine monitoring process.

It is important to be open with the project team. There are challenges with team members reporting issues within their activities because of fear that it reflects poorly on their performance. However, the team collecting the data are the eyes and ears of the project and need trust that they can raise issues with management openly and without fear of backlash. This is a difficult challenge to overcome, but is extremely important. CFP is working to celebrate successes with the project team in order to maintain trust.

Planned next steps (as appropriate):

Based on this experience or research, have next steps been planned to address/study some of the identified challenges, scale up or scale out such activities/processes?

CFP is increasing the automation of data analysis and presentation through automatic reports and the development of an online interactive 'dashboard' to share project progress in real time in an easily accessible way. To feed into the dashboard, CFP is currently developing a process to sync the data stored in *FieldVIEW* on CFP's local server with a duplicate database located on their website. The dashboard is currently being developed on the local server using a variety of open source tools, and it will be posted online soon.

Relevant hyperlinks:

Please provide hyperlinks to sources of information.

CFP data portal: <http://data.forestspemba.org/>

Further information:

Please do not hesitate to submit more detailed information on case study(ies), tool(s)/method(s) and/or other relevant knowledge resource(s) that are relevant to economic diversification. The latter will be shared through the [Adaptation Knowledge Portal](#):

- [Case study\(ies\)](#)
- [Tool\(s\)/method\(s\)](#)
- [Other knowledge resource\(s\)](#) (online portals, policy briefs, training material, multimedia material, technical reports and scientific publications)